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b maXX® BM3400

Parameters Manual

E 5.08005.01



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Introduction

This manual provides information concerning the parameters of **b maXX[®] BM3400** devices in connection with

- controller firmware from version 02.00
- parameters table version 48

With the parameters you will affect the behaviour of the controller. The controller affects the behaviour of the power unit and of the motor which is connected to it.

A survey of the control structures is to be found in chapter «Control system structures» from page [13](#).

After an adaptation of the parameter values has been done to their application, you must store these. References to this are to be found in chapter «Data set management» from page [19](#).

A procedure for the commissioning is to be found in chapter «Commissioning» from page [35](#).

Operating principle of the single software modules and their parameters are described in chapter «Description of the software modules» from page [43](#).

A comprehensive description of the parameters sorted by parameter numbers you will find in chapter «Parameters» from page [161](#).

A brief survey of all the parameters is shown in «Appendix A - List of parameters» from page [491](#).

1.1 Copyright and trade marks

- **b maXX®** is a registered trade mark of Baumüller Nürnberg GmbH
- **Hiperface®** is a registered trade mark of SICK / STEGMANN

2

Fundamental safety instructions

In this chapter the dangers are described, that can arise when parameterizing the **b maXX[®] BM3400** device and the meaning of the info sign is explained.

2.1 Safety notes and instructions



WARNING

The following **can occur**, if the safety note is not complied with:

- serious personal injury
- death

*The danger is: **mechanical and electrical cause**. Changing parameters affects the behaviour of the **b maXX[®] BM3400** device and consequently the behaviour of the construction and its components. If you change the adjustments of parameters, you may cause a dangerous behaviour of the construction and / or of its components.*

Please make a commissioning with consideration to all safety instructions and safety regulations after every change of parameter settings.

2.2 Information sign



NOTE

This note is a very important information.

3

Control system structures

In this chapter the control system structure of a **b maXX[®] BM3400** device is described. The model of the control system is described using graphics.

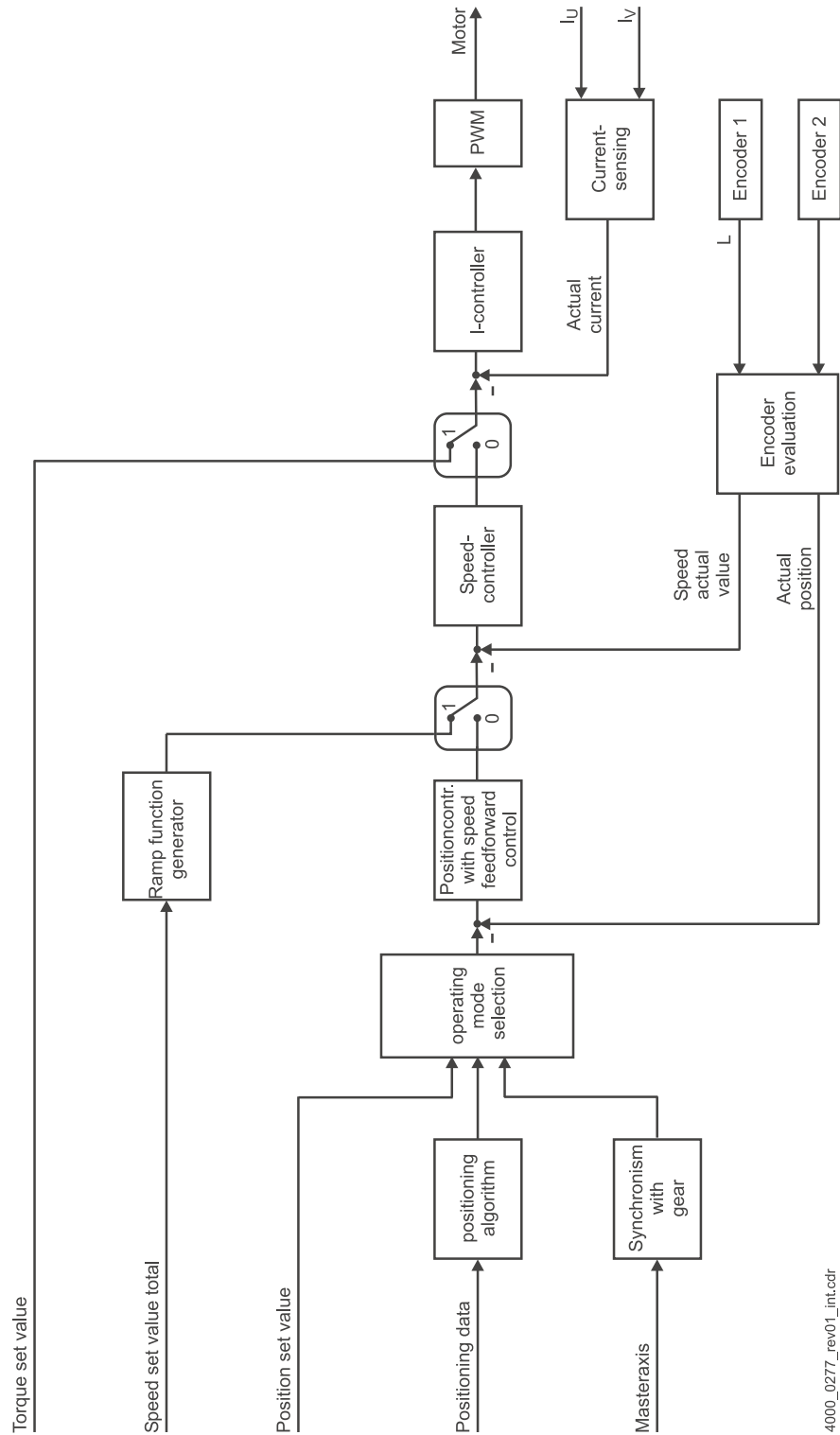
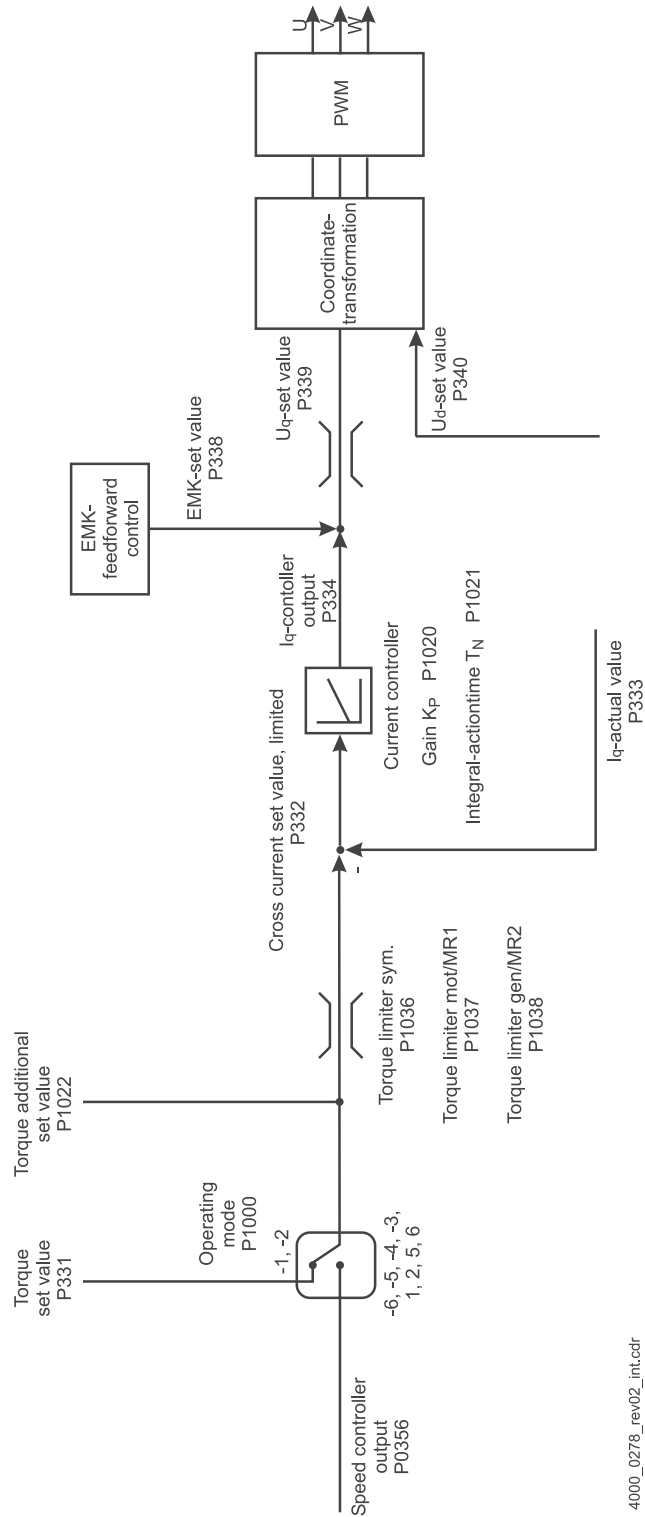


Figure 3.1: survey



4000_0278_rev02_int.cdr

Figure 3.2: current conroller

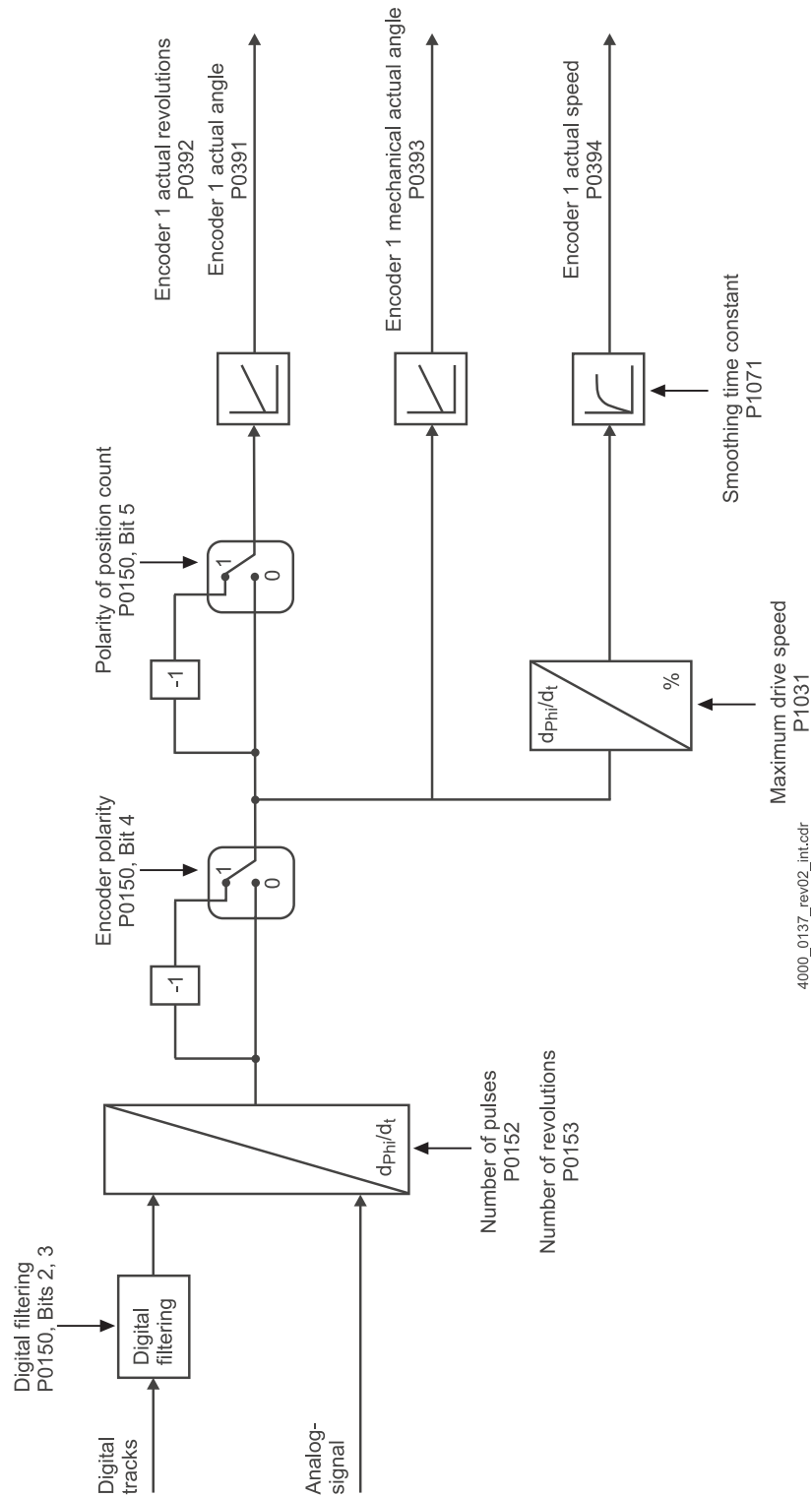
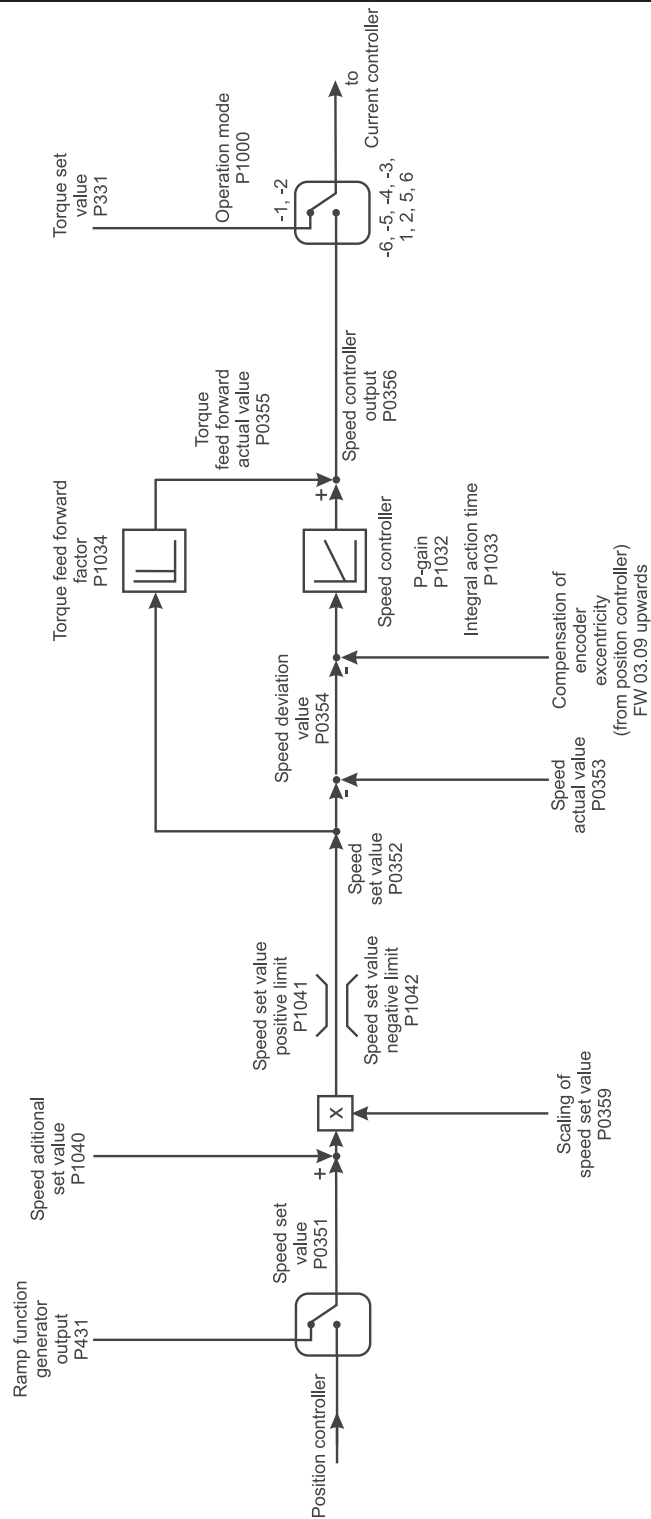


Figure 3.3: encoder evaluation



4000_0279_rev04_int.cdr

Figure 3.4: speed controller

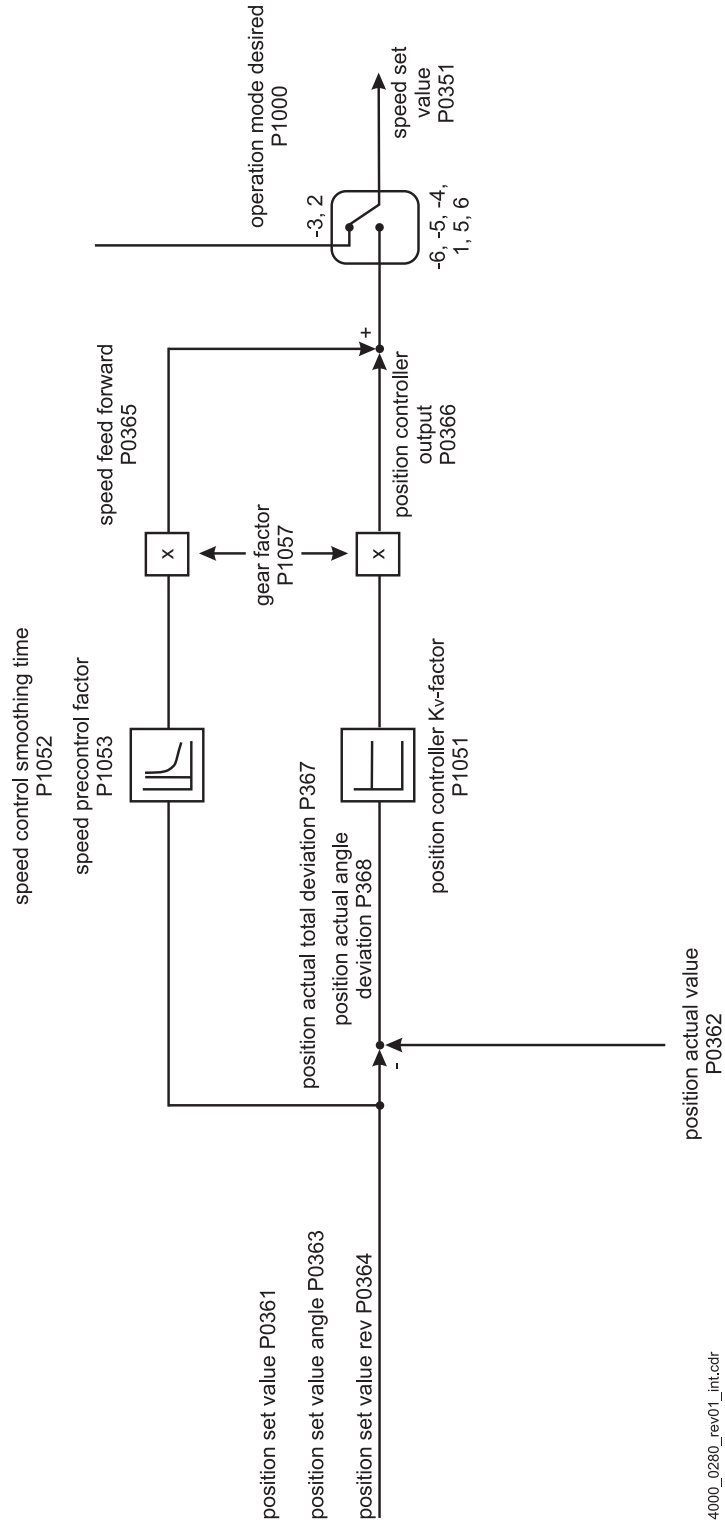


Figure 3.5: position controller



Data set management

In this chapter the data set management and functional principles of the **Parameter Storage Interface (PSI)** are described.

4.1 General information

Parameters, which can be stored in the **Electric Erasable Programmable Read Only Memory (EEPROM)** of the controller, are stored either in **Central Data (CD)** or in max. 8 switchable data sets.

CD are parameters, which are valid for the total system independant from the selected data set (e.g. encoder settings, motor settings, system settings).

Data set parameters can be changed in the online mode (operation enabled) (e.g. recipe changes and similiar). Limitations are described in chapter «Switching to data set 1 to 8» from page 34.

Located on the front side of the controller there is a connector (X2) for an external data storage device - the **PSI**.

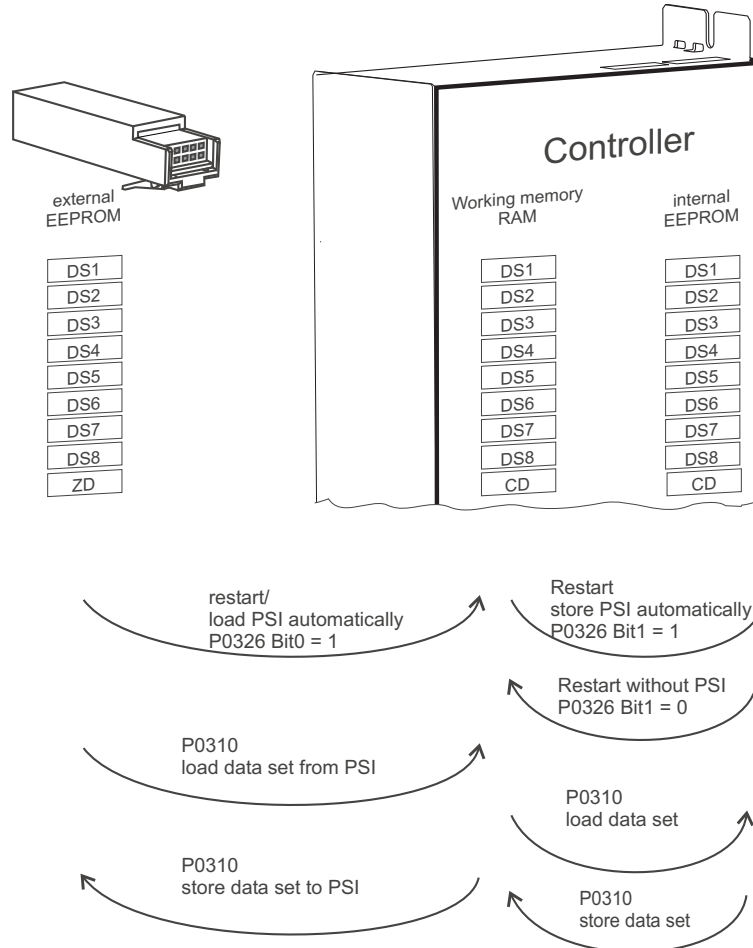


Figure 4.1: Data set management - PSI

The PSI can have one of the following states:

- Erased
- Data set stored

While saving data to the PSI (look at **P0310**) **P0326** = 0 was set.

- Data set stored, mode load PSI automatically is set

While saving data to the PSI (look at **P0310**) **P0326** = 1 was set. During power up sequence data sets are loaded with the PSI as source instead of loading them from the internal EEPROM of the controller.

- Data set stored, mode store PSI automatically is set

While saving data to the PSI (look at **P0310**) **P0326** = 3 was set. During power up sequence data sets are loaded with the PSI as source instead of loading them from the internal EEPROM of the controller.

Additionally the data sets are stored automatically to the internal EEPROM.

Using this automatism, you can parameterize several machines with the help of the PSI and no need for additional software tools.

NOTE

The PSI must only be plugged or unplugged if the controller is in an off-circuit status!

4.2 Command interface

Accessing data set management is possible using a software tool or via the field bus.

The following actions are supported:

- Creation and erase of data sets
- Initialization of data sets
- Switching between (valid existing) data sets
- Selection of the boot data set
- Copying of data sets
- Saving data sets to controller internal EEPROM or PSI
- Loading data sets from controller internal EEPROM or PSI

A command is activated either by the software tool or by writing a command code into parameter **Data set command P0310**. Additional auxiliary parameters complete the command interface.

Parameter **Data set status P0311** shows the immediate operational state of the command interface and also under certain circumstances an error message of the last command.

The write cycle counter **EEPROM Write count P0317** shows the number of EEPROM write cycles. Each command, which comprises an EEPROM memory write access, forces the controller to increment this counter.

The write cycle counter **PSI Write count P0318** shows the number of write cycles on the PSI. Each command, which comprises an PSI memory write access, forces the controller to increment this counter.

4.3 Parameter organization within the data sets

Within the controller there are eight separate memory partitions (DS1 to DS8) for parameters marked by the data set attribute .

The numbers of these parameters start from P1000. The parameter with the number P1000 exists as in data set 1, as in all other data sets (2 to 8).

One of these eight data sets are always switched active (P0312).

By writing to the parameter **Active data set number P0312** data set 1, 2, 3, 4, 5, 6, 7 or 8 can be selected to be the active one.

Accessing data sets 5 to 8 is an option. To make these data sets accessible, the software option (see «Software options» from page 45). All data sets has to be enabled.

Example:

Data set 3 is activated.

The *window* of the active data set addresses data set 3.

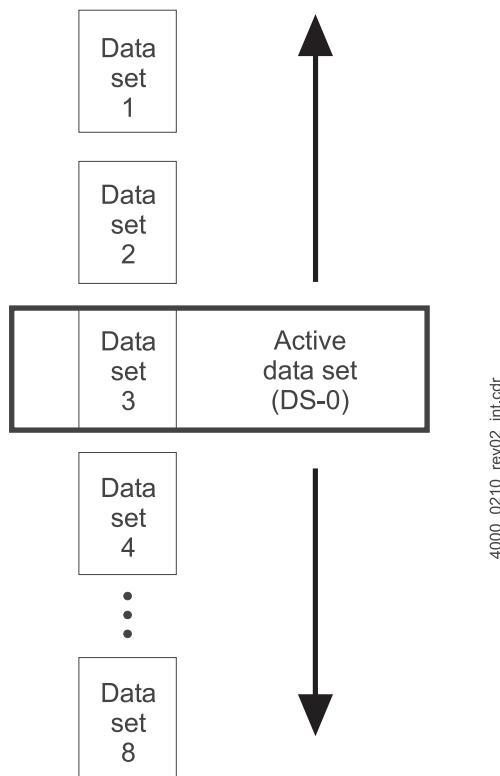


Figure 4.2: Active data set

Basically, by using external option modules or field buses you can only access data of the **active data set** (DS0).

4.4 State at delivery

In the delivery state the EEPROM is erased. After the boot procedure error messages 179 and 187 (see «Complete list of errors» from page 481) will appear.

If saving data to the EEPROM the first time, links from data set 1 to the boot data set and to the active data set become valid. All parameters have their standard values. Switching to another data set is not possible.

After parameterization of the controller and homing or search of the notch position the parameters should be stored in the internal EEPROM of the controller. If during the store operation to the EEPROM an error occurs (e.g. by switching off the controller during the programming procedure), the controller writes the standard values to the parameters after switching on again (factory setting).

4.5 PowerOn behaviour

- Without PSI

After startup of **b maXX® BM3400** all parameters of the central data as well as all parameters of the created data sets are loaded from the controller-internal EEPROM into the operating memory. The controller activates the data set, number of which is stored in parameter **Boot dataset P0327** in the EEPROM. Invalid data sets are ignored.

- PSI is plugged in and programmed

If within the PSI (**P0326** Bit0 = 1) (*Load PSI automatically*) is set, the data sets are loaded from the PSI instead from the controller-internal EEPROM into the RAM after switching on.

If further (**P0326** Bit1 = 1) (*Store PSI automatically*) is set, the data which was loaded from the PSI are automatically stored into the controller-internal EEPROM and the previous parameterization is removed.

Because parameter **P0326** is to be read immediately after PowerOn, startup behaviour is determined by mode bits of parameter **P0326** within the PSI.

NOTE



Settings concerning the startup behaviour after PowerOn *Load PSI automatically* and *Store PSI automatically* (mode bits of parameter **P0326**) are stored in the PSI. If any of these settings are changed, the PSI is to be programmed again to store these settings.

4.6 How to change, load, copy and store parameters

Modifications of parameter values (e.g. using software tools or via a field bus) only take effects in the working memory of the controller. If modification shall be kept beyond the next start-up of the controller, the parameters must be saved explicitly into the EEPROM or into the PSI.

It is not possible to save a single parameter, but only a total data set.

If a single data set or all data sets are stored, the central data is stored automatically.

By use of data set commands also parameter values of valid data sets can be loaded as single data sets or complete data sets from the EEPROM or PSI into the working memory.

If you load the complete set, an automatic data set switch-over can be performed, if the parameter value of **Active data set number P0312** in the EEPROM or PSI differs from the current value in the RAM.

The copy function of data sets allows you to copy parameter values of a valid record set source into another record set target. If the record set target is not already created, the controller creates it automatically. If the record set target is valid, the previous parameter values are overwritten. By using the software tool function Up-/Download you can also store parameters on a PC data storage device and reload them back to the controller.

For this purpose text files with extension .bpd are used. They have a structure like this (extract from a bpd file):

```
;01. April 2008 , 12:36
;a comment (multiple lines are possible) can be located here
;
;
#Dvs 0002
#Typ: bmaXX-LC
#ParaDefVer: 46
#Ver: 46
#SoftType: 1000
#ControllerType: 3000
#FirmVer: 2.01
```

```
P-Nr; DS; Value; Name; P-Key
1;-1;3000;BM_u_ControllerType;327
2;-1;1000;BM_u_SoftwareType;261
3;-1;1363;BM_u_SoftwareID;328
```

...

```
1506;1;0;BM_u_Ds1_A02_OutMin;10049
1507;1;0;BM_u_Ds1_A02_Smoothing;10050
1508;1;0;BM_u_Ds1_A02_OutputChannel;10051
```

...

Following the header lines there are the parameter lines.

A parameter line consists of:

parameter number;data set;parameter value;internal parameter name;key

Data set = -1 means, that the parameter is no member of a data set (display parameter or central data).

A parameter as member of data set takes a parameter line for each data set.

Usually all parameters are part of the bpd files. That's why these files can be used to provide documentation of display parameters actual values that would not be stored.

While reloading parameters back to the controller, the bpd file may contain less parameters and data sets.

4.7 How to mark data sets

b maXX® BM3400 has two parameters for marking data sets:

Parameters	Data type	Meaning
P1010 Data set identification number	UINT	Here you can assign a unique number of 0 to 65535 to each data set (DS0 to DS8)
P1011 Data set name	STRING	Arbitrary textual designation

4.8 Functions of data set manager

Commands of data set management

Using **Data set command P0310** the following functions are selectable:

- Reset data set management
- Write all data off all data sets to EEPROM
- Read EEPROM completely
- Clear EEPROM completely
- Assign default values (from ROM) to the actual data set
- Assign default values (from ROM) to all valid data sets
- Create data set <n>
- Clear data set <n>
- Copy data set <x> to data set <y> (from RAM to RAM)
- Load data set <x> from EEPROM to data set <x> in RAM
- Store data set <x> from RAM to data set <x> in EEPROM.
- Reset write cycle counter for EEPROM
- Write all parameters of the valid data sets into the PSI
- Read PSI completely
- Clear PSI completely

Boot data set

Boot data set is defined using **Boot dataset P0327**.

State of data set management

In order to display the result, **Data set status P0311** is used:

- Write error
- Read error
- Command processing active
- Error code



NOTE

At **Communication source P1001** the BACI command interface has to be enabled all the time to allow parameterization of service data using option modules like EtherCAT interface.

Several commands of data set management require additional parameters:

- **Data set source P0314**

Depending on **Data set command P0310** source data set refers to the EEPROM or PSI (e.g. at Write data set) or it refers to RAM (e.g. at Write data set to EEPROM / PSI).

- **Data set destination P0315**

Depending on **Data set command P0310** target data set refers to a data set in EEPROM / PSI or in RAM.

- **Active data set number P0312**

The number of the active data set is displayed here. Modifying these parameter in online mode (operation enabled) immediately causes a data set switching.

- **Error Data set parameter no. P0316**

The number of the parameter is displayed, which has caused an error during memory access (read/write). If an error occurs during command processing, the command will not interrupt transferring, but will continue transferring with the next parameter. When multiple errors occur, only the last error will be displayed.

- **EEPROM Write count P0317**

The number of write cycles to the EEPROM is displayed. Each command, which comprises a write access to the EEPROM, forces the controller to increment this counter.

- **PSI Write count P0318**

The number of write cycles to the PSI is displayed. Each command, which comprises a write access to the PSI, forces the controller to increment this counter.

- **Data set ID P1010**

Unique ID number of data set stored in EEPROM.

- **Data set name P1011**

This name of the active data set (string) can be freely chosen by the user.

The table below provides a summary of the commands of data set management:

Command	Value	Source data set	Target data set	Write cycle counter EEPROM	Write cycle counter PSI	Central data
Reset data set management	0					
Write all data off all data sets to EEPROM	1					yes
Read EEPROM completely	2					
Clear EEPROM completely	3			+1		yes
Assign default values to the actual data set	4					
Assign default values to all valid data sets	5					yes
Create data set <n>	6		data set to create	+1		
Clear data set <n>	7		data set to clear	+1		
Copy data set <x> to data set <y>	8	source data set	target data set	+1		yes
Load data set <x> from EEPROM	9	data set in EEPROM				
Store data set <x> in EEPROM	10	data set in RAM = EEPROM		+1		yes
Write all parameters of the valid data sets into the PSI	12				+1	yes
Read PSI completely	13				+1	
Clear PSI completely	14				+1	yes

4.8.1 Data set commands and possible error messages

Reset data set management

This command leads to a complete reset of all error bits or to the error status word of the data set manager.

Possible error messages:

- none

Create data set <n>

In the state at delivery each controller comes with only one active data set (data set 1) and switching to another data set is impossible. Only after the user has created another data set (2 to 8) using this command, switching between data sets is enabled. This behaviour should ensure, that the user cannot switch by mistake to a still invalid data set.

This data set command creates a data set, which is selected by **Data set destination P0315**. The parameter values of this data set are set to default values and are stored in the EEPROM.

This command causes incrementation of **EEPROM Write count P0317**.

Possible error messages:

- „Data set already exists“
- „Wrong data set number (other than 1 to 8)“

Clear data set <n>

This data set command deactivates a data set. The data set stated in **Data set destination P0315** must not be the current active data set. When a data set becomes deactivated, the controller can no longer switch to that data set. Absolutely no values - neither in the EEPROM, nor in the RAM of the controller are modified. Only the flag, which data sets are created, will be actualized in the EEPROM.

This command causes incrementation of **EEPROM Write count P0317**.

Possible error messages:

- „Data set not yet activated“
- „Wrong data set number (other than 1 to 4 resp. 8 (depending on enabled software options))“

Copy data set <x> to data set <y> (from RAM to RAM)

This data set command copies parameters in RAM from **Data set source P0314** to parameters of **Data set destination P0315**. The copy procedure takes a few milliseconds - therefore this command is enabled in offline mode (operation disabled) only.

Only assign source data sets which already have been created. If you assign a target data set, which doesn't yet exist, it will be created automatically. That command will cause the copied data to be additionally copied into the EEPROM.

This command causes incrementation of **EEPROM Write count P0317**.

Central data are also stored to EEPROM.

Possible error messages:

- „Data set not yet activated“
- „Wrong source data set number“
- „Wrong target data set number“
- „Drive not stopped“

Load data set <x> from EEPROM

This data set command loads all parameters of **Data set source P0314** from the EEPROM into the working memory of the controller. The target data set corresponds to the source data set. The data set must be valid. In online mode (operation enabled) the data set must not be the actual active data set. During copying procedures switching of data sets is disabled.

Possible error messages:

- „Data set not yet activated“
- „Wrong source data set number“
- „Drive not stopped“
- „Value less than minimum value“
- „Value greater than maximum value“
- „Parameter is read only“
- „Parameter can't be modified because of the operating state“
- „Invalid parameter value“
- „Checksum error during test“

Store data set <x> to EEPROM

This data set command stores all parameters of **Data set source P0314** from RAM into EEPROM. The data set must be valid. In online mode (operation enabled) the data set can also be the actual active data set. During copying procedures into EEPROM data set switching is enabled.

This command causes incrementation of **EEPROM Write count P0317**.

Central data are also stored to EEPROM.

Possible error messages:

- „Data set not yet activated“
- „Wrong source data set number“
- „No or invalid EEPROM header“
- „Invalid section in EEPROM“
- „Invalid data in EEPROM“
- „EEPROM write error“
- „EEPROM too small“
- „undefined error“

Read EEPROM completely

This data set command reads all parameters from EEPROM into controller RAM. Only valid controller data sets are read. The numerical assignment of the data sets in EEPROM and RAM is kept. During copying procedures switching of data sets is disabled.

Possible error messages:

- „Drive not stopped“
- „Value less than minimum value“
- „Value greather than maximum value“
- „Parameter is read only“
- „Parameter can't be modified because of the operating state“
- „Invalid parameter value“
- „Checksum error during test“

Write all data off all data sets to EEPROM

This data set command stores all parameters of the valid data sets from RAM into EEPROM. In online mode (operation enabled) one of the data sets can also be the actual active data set. During copying procedure into EEPROM data set switching is enabled.

This command causes incrementation of **EEPROM Write count P0317**.

Possible error messages:

- „No or invalid EEPROM header“
- „Invalid section in EEPROM“
- „Invalid data in EEPROM“
- „EEPROM write error“
- „EEPROM too small“
- „undefined error“

Clear EEPROM completely

This data set command resets the header entry in EEPROM only. Thus all data within EEPROM expire their validity.

This command causes incrementation of **EEPROM Write count P0317**.

Possible error messages:

- „EEPROM write error“
- „undefined error“

Clear PSI completely

This data set command clears the PSI. Thus all data within EEPROM expire their validity.

This command causes incrementation of **PSI Write count P0318**.

Possible error messages:

- „PSI not plugged“
- „PSI write error“

Assign default values (from ROM) to the actual / all data set(s)

This data set command writes the default values (factory set) from the ROM into the parameters of the active data set / of all generated data sets and is only possible in offline mode (operation disabled).

Possible error messages:

- „Drive not stopped“

Write all parameters of the valid data sets into the PSI

This data set command stores all parameters of the valid data sets from RAM into PSI. In online mode (operation enabled) one of the data sets can also be the actual active data set. During copying procedure into PSI data set switching is enabled.

This command causes incrementation of **PSI Write count P0318**.

Possible error messages:

- „PSI not plugged“
- „Undefined error“

Read PSI completely

This data set command reads all parameters from PSI into the controller RAM. The numerical assignment of the data sets in PSI and RAM remain.

During copying procedures switching of data sets is disabled.

After reading the PSI the controller transfers the data set configuration from the PSI into the working memory (RAM). Therefore the controller deletes all data sets located in the controller but not stored in the PSI. The controller creates new data sets in the RAM, with parameter values assigned from PSI data sets, as beforehand were not yet created in the controller. The data set command Write all data off all data sets to EEPROM must be run to store the new configuration before a switch-off.

Possible error messages:

- „PSI not plugged“
- „PSI cleared“
- „Drive not stopped“
- „Value less than minimum value“
- „Value greather than maximum value“
- „Parameter is read only“
- „Parameter can't be modified because of the operating state“
- „Invalid parameter value“
- „Checksum error during test“

4.8.2 Switching to data set 1 to 8

Data sets can be switched in online mode (operation enabled) by setting the desired value in **Active data set number P0312**. Reading this parameter the user can get the number of the actual selected data set.

During input the following conditions are checked before data switching takes place in online mode (operation enabled):

1. Is the value ≤ 8 and ≥ 1 ?
2. Does the specified data set already exist?

Possible error messages:

- „Data set not yet activated“
- „Wrong data set number“
- „Currently a data transfer between EEPROM / PSI and RAM is active. Data set switching is disabled.“

Data set switching is only possible in online mode (operation enabled), if the following values are equal within the active selected data set and the target data set:

- **Power Unit PWM frequency P1240**
- *Encoder1 or encoder2 for motor control P1030*
- *Encoder1 or encoder2 for position control P1050*

Only if the above mentioned conditions have been fulfilled, the data set switching in the online mode (operation enabled) can be performed.

Possible error messages:

- „Drive not stopped“

If switching between data sets using digital inputs or two-level controller you should pay attention to their data set property. Configuration of the affected digital inputs or two-level controller have to be consistent. Of special interest are the configuration of the digital inputs and the two-level controller of the target data set, which should be activated after switching. Ignoring this hint can cause continuous switching back and forth between data sets or you can reach a state, where the controller can't be handled using the software tool. The Oscilloscope function (see section «Oscilloscope function» from page 156) can only give limited help to solve such problems.



NOTE

When switching data sets you cannot regard inconsistent setpoint- and monitoring values. At time of switching it is not to be excluded, that e.g. a monitoring value of the new data set is less than the associated present actual value of data set, which was active before. In this case a monitoring function may respond, which, for example initiates a pulse inhibit.

5

Commissioning

In this chapter an exemplary commissioning of a **b maXX® BM3400** device is described. Carry out the commissioning, to make sure that the delivered devices are in an proper condition. This commissioning is **not** for the complete installation of the device for your application.

5.1 Safety instructions

Please refer to the relevant safety instructions in chapter «Fundamental safety instructions» from page 11.

DANGER



The following **will occur**, if you do not observe this safety information:

- serious personal injury
- death

*The danger is: **electricity**. The switching cabinet is equipped with power cables which carry dangerous voltages.*

Put all relevant cables off-circuit and protect them against accidental reactivation. Refer to the relevant safety rules when commissioning power electronics.

5.2 Requirements to the executing personnel

The personnel, who is assigned for commissioning, must have enough knowledge about:

- Safety technology
- Connection and operating methods of the **b maXX® BM3400** device.

5.3 Preparations

The commissioning is an exemplary checking of the functionality of the device. During commissioning the readiness for operation of the device will be checked.

Commissioning with Baumüller motors The furthermore described, exemplary commissioning is specified to Baumüller motors. In order to reduce your effort, you are provided with a motor database, which provides the most values automatically, so you can concentrate on checking the values. These can be accepted by mouse click.

Commissioning with motors of other manufacturers Motors of other manufacturers are not included into the motor data base. In this case you must enter yourself all the values. However, it is possible to include these motors into the motor data base.

WARNING



The following **may occur**, if you do not observe this warning information:

- serious personal injury
- death

*The danger is: **mechanical effects**. With a non-free-rotating motor the motor and parts which are connected with the motor can be damaged / destroyed.*

Assure, that the motor can rotate freely during commissioning.

1. Assure, that mounting is correctly executed and especially all safety instruction were referred to (see «Mounting» in the **Instruction manual b maXX® BM3400**).

NOTE



Figures referring to the next working steps are to be found in **Instruction manual** of the **b maXX® BM3400**.

2. Assure, that the installation is correctly executed, and that especially all safety instructions were referred to.
3. The software tool desired for the actual firmware version of the controller has to be installed on your PC / laptop.
4. If the motor is not included in the motor data base (see «motor data base» from page 50), assure that all the data necessary for commissioning (motor data, encoder data) are on hand.

Motor data (tool identification plate)

This data are to be found e.g. on the tool identification plate of the motor which is used during commissioning. In the present example the motor data base is used, the values in the table are presented for checking purposes only.

Name	Value, e.g.	Parameter
Motor type, designation	DS 56-M	Motor type code P0050
Nominal voltage U_N	330V	Motor nominal voltage P0053
Nominal current I_N	4.0A	Motor nominal current P0054
Nominal speed n_N	3000U/min	Motor nominal speed P0057

Motor data (Data sheet)

This data is to be found on the data sheet of the motor, which you use during commissioning.

Name	Value, e.g.	Parameter
Peak current I_{Spitze}	14.3A	Motor peak current P0069
Number of pole pairs	3	Motor number of pole pairs P0065
Max. speed n_{max}	6000U/min	Motor max. speed mechanical P0072

Encoder data (Data sheet)

This data is to be found on the data sheet of the encoder, which you use during commissioning.

Name	Value, e.g.	Parameter
Encoder type	SineCosine encoder Stegmann SRS 50/60	Using Sine-Cosine encoders with HIPERFACE® interface, encoder type is read in automatically, it must be appropriate to P3037
Number of pulses	1024	Encoder 1 number of pulses P0152 resp. Encoder 2 number of pulses P0162 Using Sine-Cosine encoders with HIPERFACE® interface, this value is read in automatically

Name	Value, e.g.	Parameter
Encoder type	Resolver	Type must be appropriate to P3037
Number of pulses	1	Encoder 1 number of pulses P0152

5. Assure, that the motor fulfills the following conditions:

- equipped with a suitable encoder (except Openloop-, Fi- and FU-mode), in our example: Resolver resp. SineCosine encoder SRS50
- connected to **b maXX® BM3400**
- ready for use

6. Make sure, that switching elements for „pulse enable“ and „quickstop clearance“ are connected to **b maXX® BM3400** and that they operate.

Assure that the switch is in off-position (inactive).

7. Assure, that all line- and motor sided safety devices are connected and ready for use.

8. Assure that the encoder for motor control is connected to the desired encoder input.



CAUTION

The following **may occur**, if you do not observe this caution information:

- property damage

*The danger is **Error in encoder assignment**. The encoder connected to the **b maXX® BM3400**, can be damaged or can work erroneous, if an improper type is connected.*

Make sure before connecting the encoder, that encoder type matches the type of the appropriate encoder input. Encoder types that have to be used you can find at the label of the device or at **P3037**.

9. Make sure that, if necessary, the safety relay is connected and wired.

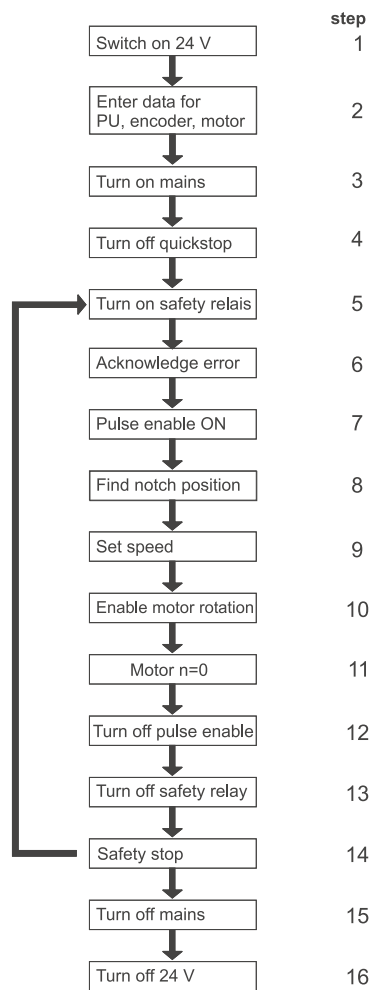
10. Assure that your PC / laptop is connected to X23 of the controller using a serial line (RS232 / 9-pole).

5.4 Survey

NOTE



If your device is not equipped with a safety relay, you can skip steps 5, 6, 13 and 14 in figure 5.1.



4000_0151_rev03_int.cdr

Figure 5.1: Starting sequence

5.5 Executing commissioning

Start with the commissioning, after you have completed the preparations.

1. Plug in the (RS232-) connecting cable between PC / Laptop and **b maXX® BM3400**. Through this cable communication from the computer to the **b maXX® BM3400** takes place.
2. Establish power supply to the **b maXX® BM3400** (mains voltage and 24V control voltage).

The device starts up with a „b“ followed by a „0“ in LED display. The *ready to use* state is indicated by a blinking right green LED and a „1“ in LED display. Eventually occurring error messages are indicated by „F xxx“ (xxx represents error number(s)) in the LED display.

3. Start the software tool.

Further hints and information you will find by using the online help of the software tool.

4. Assure, that none or the default data set resides on your controller (if necessary clear the EEPROM (P0310 = 3, see «Data set management» from page 19))
5. Activate the voltage supply for the safety relay (in case a safety relay exists).
6. Parameterization of the power unit

- Enter the current into **Power Unit max. drive current P1241**, which is at maximum necessary for your application, but take care that the current limit of the motor (see data sheet) must not be exceeded.
- Enter the present mains voltage into **Line Voltage P0035**.

7. Parameterization of encoder input(s)

Using Sine-Cosine encoder with HIPERFACE® interface data are transferred automatically - you should not change these data. If you use other encoder types, you have to enter the properties of the encoder yourself.

- The following assignments have to be done only for the used encoder input
- Number of pulses (P0152 resp. P0162) e.g. Resolver: number of pulses = 1, Sine-Cosine without HIPERFACE® number of pulses = 1024
- Make the encode active by setting Bit0 in P0150 resp. P0152

8. Parameterization of the motor

There are two possibilities:

- a) Adoption of data from the motor data base (see chapter «Motor data base» from page 50)

Motor rotating field P0087 and **Motor notch position P0082** are dependent from wiring and hardware version of the **b maXX® BM3400**. Values adopted from the motor data base have to be checked and, if necessary, modified. This will take place in step Find notch position.

- b) Manual configuration

Motor parameters are P0050 to P0103. Enter at least the following parameters. (Parameters that are not listed, should allow a first commissioning with their default values. Details to the parameters are to be found at «Parameters description» from page 166).

- Motor nominal speed P0057
- Motor max. speed mechanical P0072
- Motor maximum drive speed P1031
- Motor number of pole pairs P0065
- Motor I^2t time constant P0073
- Motor nominal current P0054

Additionally at asynchronous machines:

- Motor magnetizing current P0066
- Motor slip frequency 1 P0059

9. Save the entered data (P0310 = 1, see chapter «Data set management» from page 19).

During the save operation the right green LED will blink faster. Wait until the data set is saved to EEPROM and the right green LED remains blinking in the slower (2 seconds) interval.

10. Turn of the control voltage supply for a short time and then turn it on again.

After the reboot caused by the interrupt in supply, the device should arrive in state 1 (in LED display).

If errors are present, their reasons have to be fixed (see «Complete list of errors» from page 481) and the error messages have to be canceled (P0300).

11. At synchronous machines the notch position has to be found.

- Enter **Operation mode desired P1000** = -1 (Find notch position)
- Enter **Motor mode notch position P0094** = 0.

WARNING



The following **may occur**, if you do not observe this warning information:

- serious personal injury
- death

*The danger is: **mechanical effects**. With a non-free-rotating motor the motor and parts which are connected with the motor can be damaged/destroyed.*

Assure, that the motor can rotate freely during commissioning.

- Activate *impulse enable* and *quickstop clearance*.
- Start the device by entering the values 0, 6, 7, 15 consecutively into parameter **Controlword P0300**.
- Wait until
 - either in **Motor status notch position P0501** Bit4 is set (*notch position was found*).
 Stop the device (**Controlword P0300** = 0).
 - or an error was raised.

In this case, you have to fix the reason (see «Complete list of errors» from page 481) and cancel the error message (P0300).

A common error during the first commissioning is a wrong rotary field or a wrong counting direction of the encoder. In this cases error message 102 with P0237 = 4 will appear. You can fix this by changing the rotary field in P0087.

The step Find notch position is to be repeated.

- Deactivate *Impulse enable* and *quickstop clearance*.

12. First rotation of the motor

- Enter **Operation mode desired P1000** = -3 (speed control).
- Set **Ramp Function Generator input P1171** to 10%.
- Activate *Impulse enable* and *quickstop clearance*.
- Start the device (see above).

Now the motor should rotate with 10% of **Motor maximum drive speed P1031**.

- If errors or unusual noise occur, wrong controller settings may be the reason.

Check **P1020, P1021, P1032, P1033, P1071** resp. **P1081**.

13. Stop the device (see above).

14. Deactivate *Impulse enable* and *quickstop clearance*.

15. Save the data set (see above).

16. Turn off the voltage supply for the safety relay (if existing).

17. Separate over the accordant switching elements the device from the mains- and control voltage.

At this point the commissioning is completed successfully.

After reboot the device can be started with *Impulse enable* and *quickstop clearance*. The motor will rotate with 10% of **Motor maximum drive speed P1031**.



Description of the software moduls

In this chapter the working principles of each software module and its parameters are described. A comprehensive description of the parameters sorted by parameter numbers is to be found in chapter «Parameters» from page 161.

6.1 Allocation of the software moduls in time slices

Entries labeled with * represent function calls in dispatched mode. That means, for these functions it is not necessary to be calculated until their end within the given interval.

Time slice interval	Software module
every 62,5 μ s	P uls W eiten M odulation (PWM) Current controller (at PWM frequencies of 2kHz and 4kHz less often respectively) Oscilloscope function
every 125 μ s	Autotuning handler Encoder signal sensing, position controller, speed controller I ncremental E ncoder E mulation (IEE) Software based current limiter B Aumüller C omponent I nterface (BACI)-cyclic communication (if established)

Time slice interval	Software module
every 250 μ s	Control of position controller Synchronous operation set value generator Analog inputs CAM disk Digital inputs*
every 500 μ s	Ramp function generator Control of speed controller Analog outputs Openloop manager Cyclic CAN communication (if established)*
every 1ms	Transition manager Mains monitor 2-level controller* PT1-filter*
every 2ms	Control of finding notch position Encoder manager Positioning Phasing Control-led homing Data set management*
every 4ms	Control of speed controller Digital outputs Status word 2 Drive manager* Interpretation of power unit signals*
every 8ms	Statistics Overload management
every 16ms	Set value generator Motor temperature sensing Brake manager*

6.2 Configuration

6.2.1 Software options

The **b maXX[®] BM3400** offers the following optional software moduls:

- Find notch position using method 2

If this option is not enabled for the controller, starting the function Find notch position method 2 will result in error message 102 (*MOTOR_ERR_NOTCH_POS*), the value of Param_RastRefError will be set to 16.

- CAM disk
- All data sets

Other than the default 4 data sets, with this option enabled you will be able to use 8 data sets.

- Two-level controller

To enable a particular software option, you should contact the manufacturer to get a permission code. You will need the serial number of your device (see [P4118](#)).

6.2.2 Overload monitoring of the power unit

This monitoring protects the power unit against thermal overload. Using an I*t model the thermal behavior of the power unit is simulated and monitored.

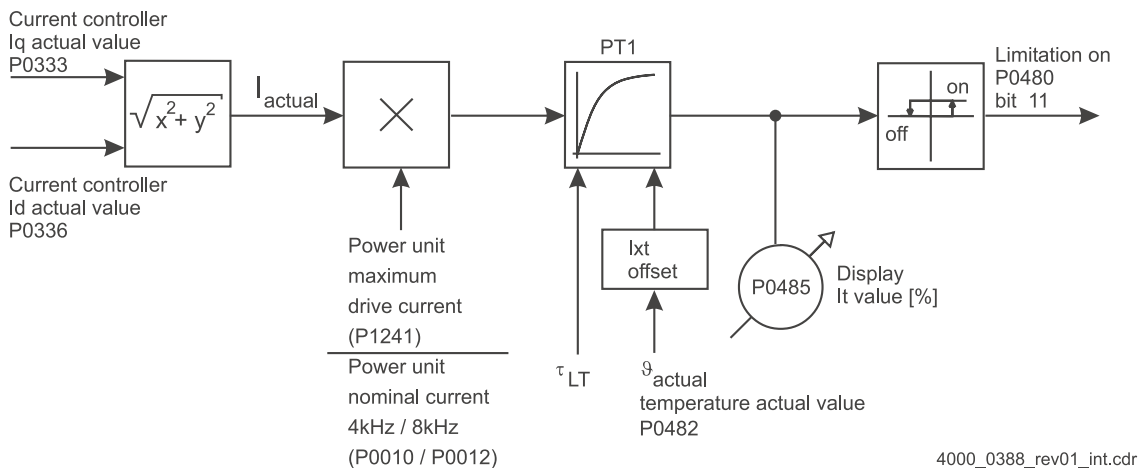


Figure 6.1: Simplified priciple of the power units overload monitoring

Current actual value	(<i>I_{act}</i>) [A]	abs(I _w), abs(I _u), abs(I _v)
Power unit nominal current 4kHz/ 8kHz/ 16kHz	(<i>I_{nom}</i>) [A]	P0010/ P0012/ P0032
Powert unit maximum current 4kHz/ 8kHz/ 16kHz	(<i>I_{max}</i>) [A]	P0011/ P0013/ P0033
Power unit maximum current of the drive	(<i>I_{lim}</i>) [A]	P1241

Power unit thermal time constant	(t_u) [s]	P0014 / P0015 / P0034
Power unit heat sink temperature actual value	(ϑ_{ist}) [°C]	P0482
Power unit I*t value	(I^*t) [%]	P0485
Power unit present overload factor	(u)	$\frac{I_{act}}{I_{nom}}$
Power unit release timet	(t_{rel}) [s] Time up to limit on I_{nom}	$-t_u \ln(1 - I_{nom}/I_{act})$

t_{rel} is assumed for a cold power unit $< 45^\circ\text{C}$

example (cold power unit):

$$I_{nom} = 10\text{A} \quad I_{act} = 12\text{A} \quad t_u = 0,9\text{s}$$

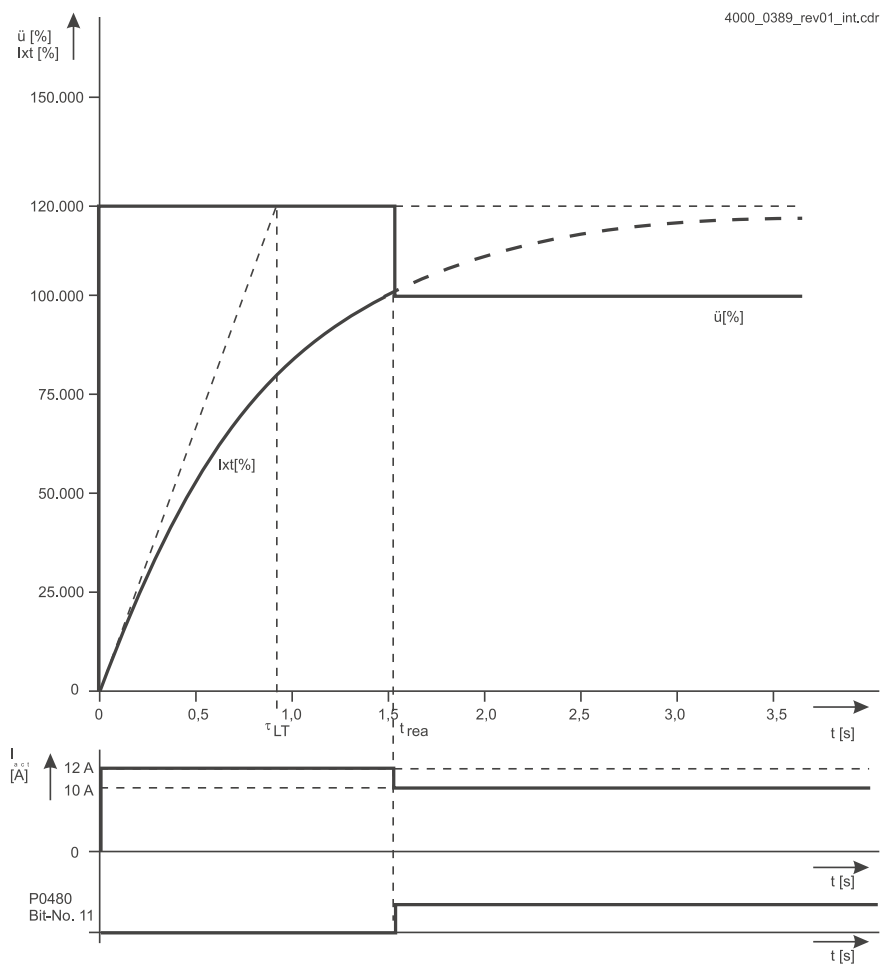


Figure 6.2: Current limitation at 100% i^*t

Starting point of this characteristic is a cold power unit (I^*t Offset = 0; $\vartheta_{act} < 45^\circ\text{C}$)

The particular nominal current will be reduced at slow movement connected with an unbalanced load of the 3 phases.

The I*t value of the particular phases is calculated separately, the display however will show the value of the phase with maximum load.

If the I*t value reaches 100%, current will be limited to 100% of the nominal current. Under ideal conditions (balanced load on all 3 phases, current actual values less or equal current set value) this limitation is correct. In practice the 100% value will be exceeded slightly. Especially during slow movements increased I*t values will be reached in the particular phases.

At I*t values above 100% the parameter **Torque reducing factor P3000** will be reduced proportionally to the increase of the I*t value but at least by 1 increment. At hold-up (maximum load to one phase) there will be a limitation to 2/3 of the current nominal value. If the I*t values reduces below 95%, the limitation will be canceled.

6.2.3 Encoder

This software module controls the assignment of encoder 1 and encoder 2 to motor control, speed control and synchronous operation.

Detailed information on configuration of the encoder inputs is to be found at [Encoder 1 mode P0150](#).

6.2.3.1 Encoder signal conditioning

Gain and amplitude error correction at resolver type encoder

The mechanical angle of a motor with resolver attached exclusively will be calculated using the SINE and COSINE tracks of the resolver.

Differences in amplitudes of both tracks can be compensated with [encoder adjustment P3438](#).

Because of different impedances and translation ratios resolver of several manufacturers can provide fairly different signal levels at a given reference signal. To balance this differences there was implemented a resolver reference signal controller ([Resolver excitation P3443](#)).

6.2.3.2 Encoder monitoring

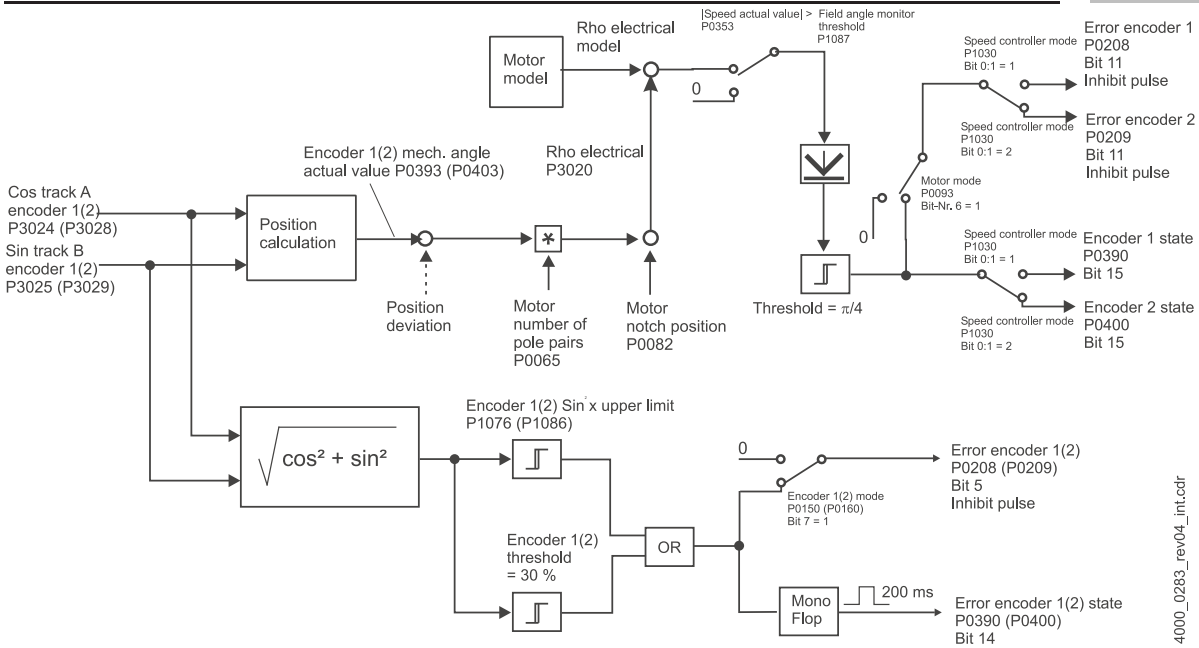
Encoder line brake monitoring

In order to detect encoder line brakes, amplitudes of the encoders sine and cosine tracks are evaluated. At encoders with sine and cosine tracks at least one of both tracks has to provide a signal level above the adjustable minimum limit. At square wave incremental encoders signal levels of both tracks have to exceed the minimum value. Exceptions from this rule will raise a line brake error (see [limit encoder wire break P3418](#) and [offset wire break limit P3433](#)).

Field angle monitoring

Field angle monitoring happens at the encoder which is configured for motor control. For this purpose the polar wheel angle calculated with the help of the motor model is compared to the polar wheel angle calculated from the encoder signals. If angles differ more than an appropriate electric angle of 45°, the corresponding Bit15 in [Encoder 1 status P0390](#) ([Encoder 2 status P0400](#)) will be set. If monitoring is activated by setting of Bit6 in [Motor mode P0093](#), the corresponding [Error Encoder 1 P0208](#) ([Error Encoder 2 P0209](#)) will be raised and *impulse enable* will be canceled.

Additionally the field angle monitoring can be activated and deactivated appropriate to [Speed actual value P0353](#) by settings in [Field angle monitor threshold P1087](#). If actual speed value is less than [Field angle monitor threshold P1087](#), this monitoring remains inactive.



4000_0283_rev04_int.cdr

Figure 6.3: Field angle monitoring and amplitude monitoring at a synchronous machine

Amplitude monitoring of encoder voltages (\sin^2 monitoring)

At encoders with sine and cosine tracks amplitude monitoring is based on the relation $\sin^2 + \cos^2 = 1$.

If monitoring is activated (Bit7 in **Encoder 1 mode P0150** resp. **Encoder 2 mode P0160**), encoder track signal levels outside the conversion range of the ADC (lower limit = 30%, upper limit in **Encoder 1 \sin^2 x upper limit P1076** resp. **Encoder 2 \sin^2 x upper limit P1086**) will raise **Error Encoder 1 P0208** resp. **Error Encoder 2 P0209** and *impulse enable* will be canceled (E117, E133).

If amplitude errors are detected, independent from an activated or deactivated monitoring Bit14 in **Encoder 1 status P0390** resp. **Encoder 2 status P0400** will be set for approx. 400ms.

6.2.4 Motor

6.2.4.1 Motor database

The motor data base of the software tool contains the following parameters: (SM valid only for synchronous machines, ASM valid only for asynchronous machines)

Parameter	Unit	Comments
Nominal mode of operation		P0055
Nominal power	kW	P0056
Rated speed	U/min	P0057
Nominal DC link voltage	V	P0053
Number of pole pairs		P0065
Ke factor	V/(1000U/min)	P0067
Peak current	A	P0069
Maximum torque	Nm	P0070
Nominal current	A	P0054
Nominal torque	Nm	
Frictional moment	Nm	P0064
Attenuation constant	Nm/(1000U/min)	
Mechanical maximum speed	U/min	P0072
Temperature threshold	°C	
$I^2 t$ time constant	s	P0073
Moment of inertia	kg cm ²	P0083
Type of temperature sensor		P0084
Magnetizing current	A	ASM P0066
Stator resistance	Ω	P0075
Slip frequency 1	Hz	ASM P0059
Slip frequency 2	Hz	ASM P0060
Temperature 1	°C	ASM P0062
Temperature 2	°C	ASM P0063
Nominal voltage	V	P0053
Nominal frequency	Hz	ASM P0061
Field weakening speed	U/min	

Parameter	Unit	Comments
Power factor		ASM P0058
Stator leakage inductance	mH	ASM P0076
Rotor resistance	Ω	ASM P0077
Rotor leakage inductance	mH	ASM P0078
Main inductance	mH	ASM P0079
Direction of rotary field		P0087
Kt factor	Nm/A	
Current at holdup	A	
Moment at holdup	Nm	
Lq inductance	mH	SM P0080
Ld inductance	mH	SM P0081
Notch position	$^{\circ}$	SM P0082 With a wrong wiring the real notch position can differ from the notch position in the motor data base. A motor that is operated with a wrong notch position may rotate unintended with maximum power!

6.2.4.2 Open Loop control at asynchronous machines

The drive controller **b maXX[®] BM3400** makes it possible to operate an asynchronous machine sensor less in speed control mode (Open Loop control). However any position controlled mode (position control, Synchronous operation, Positioning) isn't possible, because actual speed of an asynchronous machine in Open Loop mode on principle can't be determined exactly.

The Open Loop control method is based on determining the actual speed of an asynchronous machine from their voltage model, whereby the voltage set values calculated by the motor control are used. Concerning this the properties of the motor (e.g. inductance and resistance) must be well known or must be determined with the help of the autotuning function. To compensate the nonlinearity of the power unit you have to activate dead time compensation, values of which depend on the used power unit and on the switching frequency of the power transistors.

With the help of autotuning (see chapter «Autotuning» from page 60) the required values can be measured and saved.

- These values are stored in the EEPROM of the controller, but will not be transmitted during a data set upload to the PC, because they are only valid for a certain power unit. Therefore it is not possible to transmit these values per download from one controller to another.
- After changing the switching frequency (P1240) the calculation of the dead time compensation must be executed again.

Limitations of the Open Loop control at very low speed

A longer-lasting generative operation at very low speed is not allowed.

Switch on / enabling at rotating machine

On principle at enabling of the drive in the Open Loop operation there is initially no speed information available. Therefore enabling the drive at rotating motor is problematic. For the given initial setting it can occur that the motor doesn't start correctly.

In order to allow enabling the drive also at rotating motor, a special procedure (flying restart) for calculation of motor speed is implemented. This procedure can be activated in parameter **Motor mode P0093**. Furthermore the rotational direction can be specified, for which the speed is to be determined. For a drive, which e.g. may rotate only in one direction, the speed search shall only be activated in this direction. Therewith is avoided, that the motor rotates in another direction at speed measurement.

The maximum time for the measuring of the speed can be set via parameter search time (**P0381**) of the speed for Open Loop. For the search time consider the following:

- The required time, which is necessary for the determination of the speed acts in accordance with rotor time constant. The default setting for the search time is 2 seconds, at motors with great rotor time constant perhaps a longer search time is necessary. The recommended value is ten-times of the rotor time constant (**P0522** rotor time-actual value).
- The selected search time, is the maximum search time in each rotational direction. If the measuring of speed in both rotational directions is activated and the first measuring was not successful, the attempt is made to measure speed in the other direction. Therefore the total search time can be at maximum the double of the time, which was set in the parameter.

Increasing the starting torque in Open Loop operation

Depending on the accuracy of the stator resistance used in the model, the starting torque at zero speed is 10% to 20% less than the torque at higher speed, although the torque current stays constant.

To improve the starting performance, a function to increase the starting torque is implemented. Thereby the maximum torque limit at zero speed actual value is increased by the value, which was set in parameter **Starting torque boost for open loop P0382**. If the actual speed value is higher than **Speed range for torque boost P0383**, the increase is canceled. Between zero speed and **Speed range for torque boost P0383** the increase is linear interpolated.

Commissioning for Open Loop

1. Selection of the motor from the motor database or setting the data from the tool identification plate. The following values are necessary:
 - Nominal voltage (**P0053**)
 - Nominal current (**P0054**)
 - Nominal power (**P0056**)
 - Nominal speed (**P0057**)
 - Power factor (**P0058**)
 - Nominal frequency (**P0061**)
 - Number of pole pairs (**P0065**)
-

2. Execute calculation of stator resistance and total leakage inductance of the motor as well as the dead time of the power unit with the help of autotuning.
3. Initiate calculation of current controller parameters with the help of the calculated stator resistance and total leakage inductance.
4. Accepting the calculated motor parameters for the motor control and activating of dead time compensation.
5. Set the smoothing time for **Motor nominal frequency P0061**, proposed value range between 5ms and 20ms. The greater the drive inertia, the greater the smoothing time can be selected.
6. Set the speed controller.
7. Save the data set.

6.2.4.3 Field weakening at asynchronous machines

Basically at an asynchronous machine is distinguished between basic speed range (magnetic flux is constant) and field weakening range (lowering of magnetic flux to reach higher speed).

Typical characteristics of torque and power of a motor in basic speed range and field weakening range are displayed in figure 6.4.

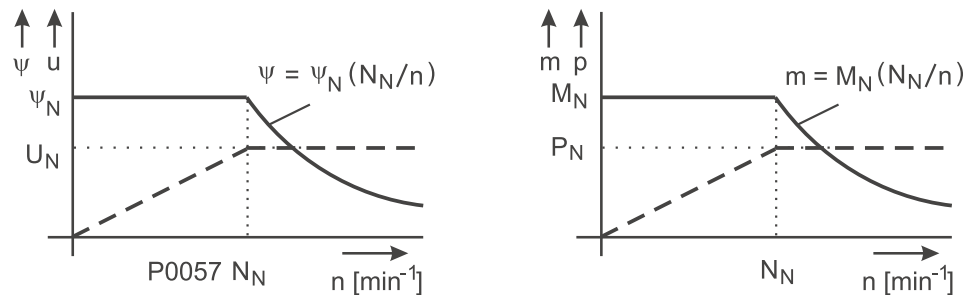


Figure 6.4: Magnetic flux and voltage

Torque and power

Field weakening starts, if DC link voltage becomes inadequate to drive the desired torque current. Depending on the available DC link voltage and desired torque this happens at different speed values.

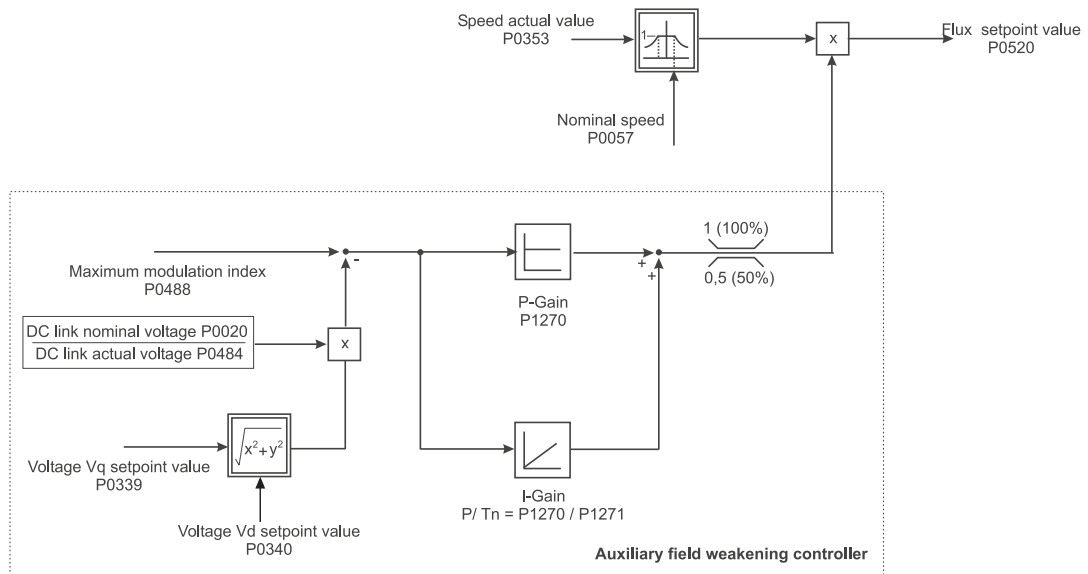


Figure 6.5: Block diagram of field weakening at an asynchronous machine

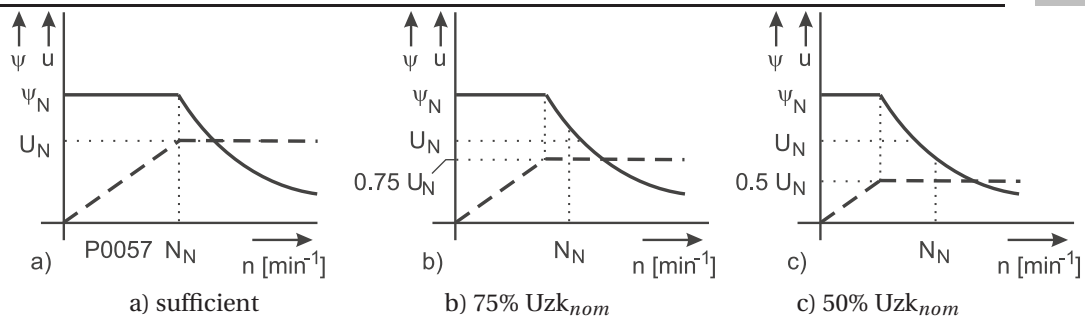


Figure 6.6: DC link voltage during field weakening of an asynchronous machine

6.2.4.4 Field weakening at synchronous machines

Some synchronous machines require a field weakening current to achieve the operating point. For standard synchronous machines it is possible to get an increase in speed of about 10% to 20% considering nominal speed at nearly the same torque.

It is distinguished between field weakening with constant field current and field weakening along the voltage limit.

If Bit7 of parameter **Motor mode P0093** is set, a constant field weakening current is pushed to the motor. Thereby induced voltage of the motor decreases and at a given DC link voltage a higher speed is achieved.

If Bit7 of parameter **Motor mode P0093** is cleared, the voltage set value is compared to the actual DC link voltage. If the DC link voltage becomes insufficient, the flux controller pushes the required field current.

The achievable maximum current is determined by **P0095** (**P0066** is not used at field weakening of synchronous machines).

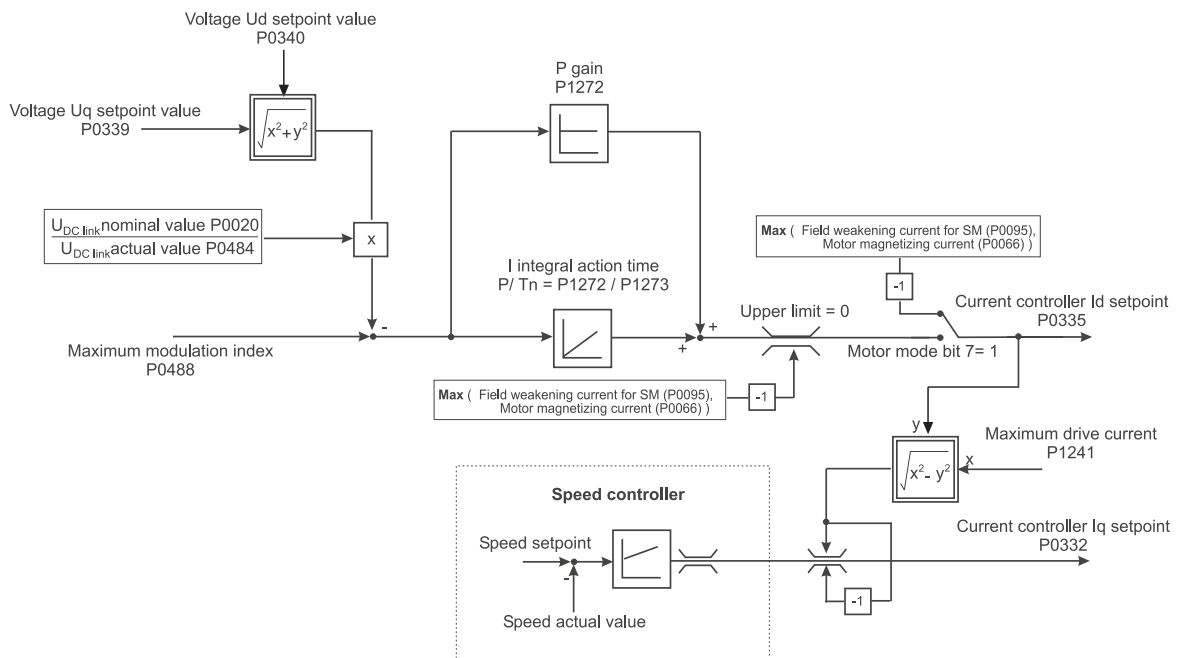


Figure 6.7: Block diagram of field weakening at a synchronous machine

6.2.4.5 Motor overload monitoring

Overload monitoring protects the motor against thermal overload. By use of an I^2t model the thermal behaviour of the motor is simulated and monitored.

At slow movement load to the 3 phases is unbalanced. That's why the I^2t values for each of the 3 phases are calculated separately. **P0502** contains the value of the phase with maximum load.

At Motor I^2t time constant **P0073** = 0 and drive manager state NOT READY TO START the motor temperature is measured (if there is a motor temperature sensor).

P0502 will then be initialized to a value corresponding to this motor temperature.

Thereby a temperature range between 40°C and 155°C is linearly mapped to 0% to 100% of **Motor I^2t actual value P0502**.

Hence the result is, that error message 99 „ I^2t overload“ may occur at power up time despite low current.

Example to overload monitoring of the motor

Power unit: **b maXX[®] BM3400** $I_{lim} = 8A_{eff}$
 Motor: DS 56 L - 3000; $I_{motor} = 5,1A_{eff}$;
 $T_t = 10min = 600s$

Power unit maximum current I_{lim}	P1241	8A
Motor nominal current I_{motor}	P0054	5,1 A
Motor I^2t warning threshold	P0092	80% (warning threshold)
Motor I^2t time constant	P0073	600s
Apparent current actual value I_{act}	P0343	Rise from 0% to 100% I_{lim} of the power unit

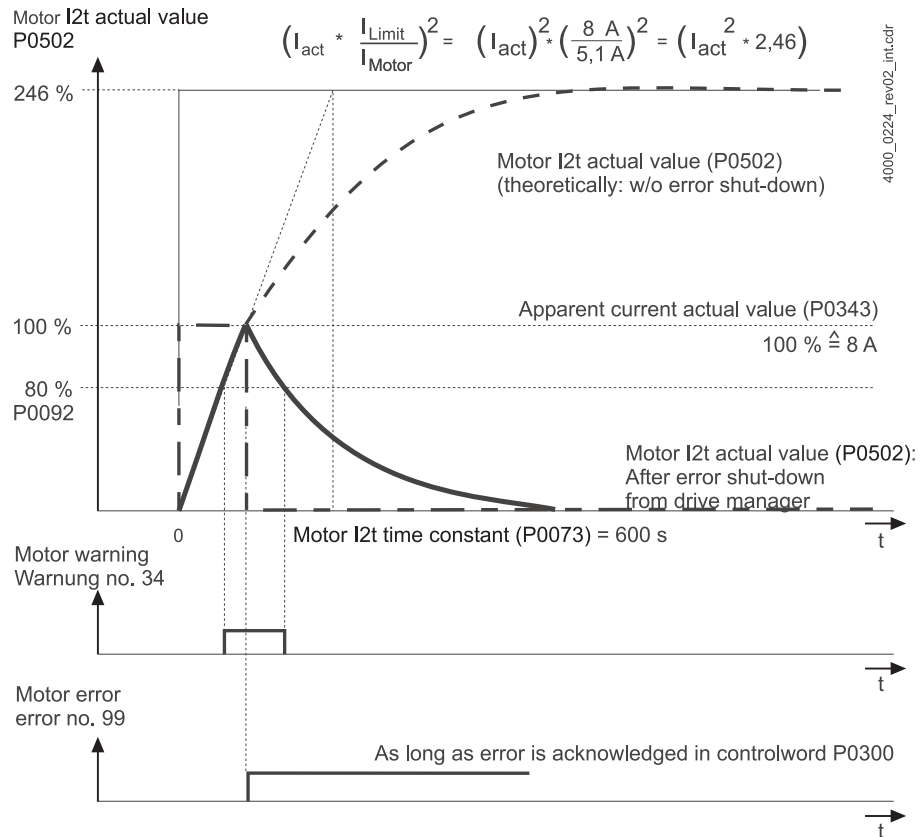


Figure 6.8: Motor overload monitoring

NOTE

If you have to consider UL 508 C:

If motor temperature is not monitored by a motor temperature sensor, motor overload monitoring is to be activated. Among other things nominal current **P0054** and time constant **P0073** of the motor have to be specified correctly.

If in FU mode the current values exceed twice the value of **P1241**, it can happen, that the calculated I²t value is a size too small.

6.2.4.6 Torque limits

Maximum torque is proportional to the obtainable torque generating current within the base speed range. This current is calculated from **Power Unit max. drive current P1241** I_{max} and the magnetizing current I_d (**P0506** for asynchronous machines in Open loop; **P0066** for asynchronous machines with encoder; **P0095** for synchronous machines, if field weakening is activated permanently (**P0093** Bit7 = 1); 0 for synchronous machines with field weakening along the voltage limit (**P0093** Bit7 = 0)).

For $I_{max} > I_d$ applies: $I_{qmax} = \sqrt{I_{max}^2 - I_d^2}$

Avoid settings with $I_{max} \leq I_d$.

Furthermore torque can be limited by limiting the set value for the torque generating current component I_q of one of the torque limits **P0357**, **P1036**, **P1037** or **P1038** (effective is always the smallest limit with respect to **P1030** Bit2).

Because in field weakening range compared to the base speed range there is a higher torque generating current necessary to achieve the same torque, the mentioned above torque limits will be reduced with increasing motor speed (see figure 6.9). This doesn't apply to **P0357**, at this parameter field weakening has been taken into account.

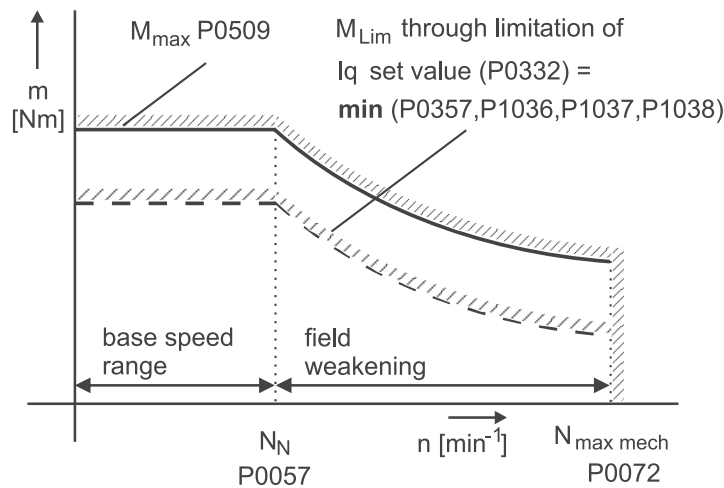


Figure 6.9: Torque limits at asynchronous machines

If multiple limits (**P0357**, **P1036**, **P1037**, **P1038**) are active at the same time, finally the smallest of all torque limits will dominate.

6.2.5 Autotuning

Starting point for autotuning are the following measurements:

- Measurement of stator resistance,
- Measurement of leakage inductance (stator inductance at synchronous machines)

Measurements of resistance and inductance can only be started combined.

A successfully finished measurement of these properties is precondition for adoption of the measured values into motor control (P1320) and activation of dead time compensation. Otherwise the values from the motor data sheet have to be used for motor control.

- Measurement of the power units dead time

Only for Open Loop a measurement of the dead time is to be accomplished and afterthat the dead time compensation is to be activated (P1320).

Activation of dead time compensation is only possible after successful measurement of the dead time.

However, this can only be done, if at the same time resistance and inductance measurements are activated or have been doen yet succesfully.

For encoder equipped drives a dead time compensation isn't necessary.

- Measurement of the drives inertial torque

Before starting the measurement of inertial torque make sure, that the parameters of the current controller are adjusted correctly yet.

Drive will be accelerated with **Maximum current for inertia measurement P0857** to a speed value given by **Maximum speed for inertia measurement P0856** and afterthat decelerated to zero speed. From the measured times to ramp up and ramp down the inertial torque will be calculated.

After the measurement the calculation of control parameters can take place (P0310).

- Parameters of the current controller

Current controller P-gain P1020

Current controller integral-action time P1021

are calculated either from the values (P0853) determined during measurement of stator resistance and measurement of leakage inductance or from the values out of the motor data sheet (P0075).

- Parameters of the speed controller

Speed controller P-gain P1032

Speed controller integral-action time P1033

Torque feed forward factor P1034

are calculated either from the values (P0858) determined during measurement of inertial torque or from the values out of the motor data sheet (P0083).

Optimization of controller parameters have only affect on the actual selected data set (see description of P0850).

6.2.6 Incremental encoder emulation

To use the incremental encoder emulation you need the optional extender board *Incremental encoder emulation* (P0552=1).

Technical details are described in the [Instruction manual](#) of the **b maXX[®] BM3400**.

Source and polarity of provided signals are selected in P0562 and the number of pulses is to be entered in P0563.

6.2.7 Digital inputs

Digital inputs can be used for external control of single or even of several bits in parameters. That way, for example, single bits in **Controlword P0300** can be influenced enabling you to control the drive manager. Four digital inputs are available and enable you to access and modify all writable 16-bit-parameters.

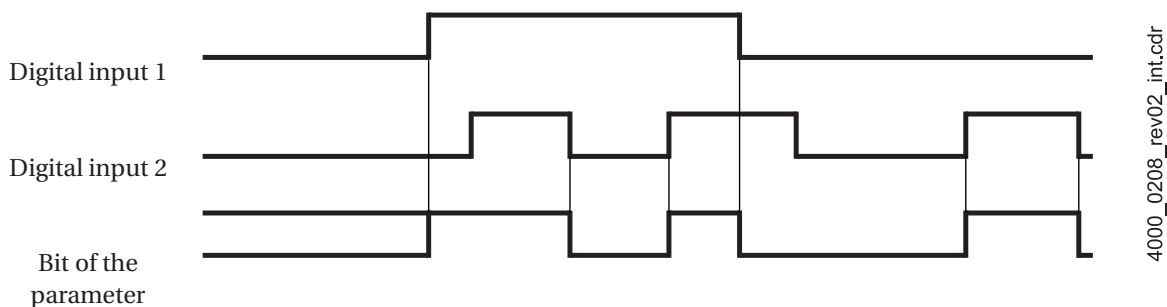
Corresponding to the 4 inputs each parameter group consists of 4 parameters:

- Target number digital input x (P1091, P1096, P1101, P1106):
Input of target parameter number
- Bit selection digital input x (P1092, P1097, P1102, P1107):
Selection of target parameter bits, which have be changed
- Bit pattern at LOW digital input x (P1093, P1098, P1103, P1108):
Bit pattern, written to target parameter when digital input is LOW.
- Bit pattern at HIGH digital input x (P1094, P1099, P1104, P1109):
Bit pattern, written to target parameter when digital input is HIGH.

At the inputs only edges are evaluated.

Thus it is possible to influence a single parameter by use of several inputs.

Example: Two inputs influence the same parameter bit



Any of the four inputs are sampled every 2ms. Contrary to this DI3 and DI4 are sampled every 250 μ s, if the **b maXX[®] BM3400** is equipped with (optional) *fast digital inputs*.

If 2 signals change their condition simultaneously, the sequence of operation is specifying the dominance. The (optional) fast digital inputs 3 and 4 are operated before inputs 1 and 2. If for instance inputs 2 and 3 work on the same bits of a parameter, input 2 will dominate because it is operated later.

P0410 shows the state of the inputs.



NOTE

A digital input x is activated by setting the parameter *Target number digital input x* . To avoid unwanted modification in parameters, the following sequence must be followed:

1. *Target number digital input $x = 0$.*
2. Set the bit selection of the desired input.
3. Set *bit pattern Low* and *bit pattern High*.
4. Set *Target number digital input x* to the desired parameter number.

Now input x is activated.

The digital input is deactivated by setting parameter *Target number digital input x* to zero.

Only the bits, which have been set in the parameter *Bit selection*, also can be modified in the target parameter according to pattern in the parameters *bit pattern at High* or *bit pattern at Low*. Accordingly such bits are kept the same in the target parameter, which equal 0 in bit selection.

A rising edge at a digital input will modify the *target parameter* as follows:

$$\text{target parameter} = (\text{target parameter AND NOT } (bit\ selection)) \text{ OR } (bit\ pattern\ High\ AND\ bit\ selection)$$

A falling edge at a digital input will modify the *target parameter* as follows:

$$\text{target parameter} = (\text{target parameter AND NOT } (bit\ selection)) \text{ OR } (bit\ pattern\ Low\ AND\ bit\ selection)$$

- example 1:

Using digital input 1, **Set Value Generator mode P0440** should set to 0, if input is Low and set to 1, if input is High.

Therefore the following settings are necessary:

Bit selection digital input 1	P1092	FFFF _{hex}
Bit pattern at LOW digital input 1	P1093	0000 _{hex}
Bit pattern at HIGH digital input 1	P1094	0001 _{hex}
Target number digital input 1	P1091	440

- example 2:

Using an additional digital input, setting of values 2 and 3 in **Set Value Generator mode P0440** should be possible. Parameter block 1 and 2 should be used.

The following settings are necessary in addition to the previous example:

Bit selection digital input 2	P1097	FFFE _{hex}
Bit pattern at LOW digital input 2	P1098	0000 _{hex}
Bit pattern at HIGH digital input 2	P1099	0002 _{hex}
Target number digital input 2	P1096	440

Digital input 1 affects Bit0 resp. Bit2 to Bit15, digital input 2 affects Bit1 to Bit15.

Bit No.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Start value P0440	1	1	1	1	0	0	0	0	1	1	1	1	0	1	0	1
Input 1 → HIGH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Input 2 → HIGH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Input 1 → LOW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Input 2 → LOW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

- example 3:

By using parameter group 3, a digital input should affect Bit4 and Bit11 of **Controlword P0300**.

The following settings are necessary to get the desired behaviour:

Bit selection digital input 3	P1102	0810 _{hex}
Bit pattern LOW digital input 3	P1103	0800 _{hex}
Bit pattern HIGH digital input 3	P1104	0010 _{hex}
Target number digital input 3	P1101	300

Bit No.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Start value P0300	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
Input 2 → HIGH	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
Input 2 → LOW	0	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1

6.2.8 Digital outputs

4 digital outputs can be used to forward certain states to the higher-level control or for display purposes. That way, e.g. certain bits or also bit combinations of **Statusword P0301** can be reported towards the outside.

A maximum of 4 outputs can work at the same time. Unused outputs are set to Low level. Digital output 4 is implemented as changeover contact of a relay.

According to the 4 outputs each parameter group consists of 4 parameters:

- Source number digital output x:

Number of parameter, which is to be displayed (only 2 byte parameter permitted). (**P1111**, **P1115**, **P1119**, **P1123**)

- Bit selection digital output x:

Selection of the bits of the source parameters, which are considered. (**P1112**, **P1116**, **P1120**, **P1124**)

- Bit pattern digital output x:

If this pattern matches the selected bit pattern of the source parameter, the selected output will be switched to HIGH. (**P1113**, **P1117**, **P1121**, **P1125**)

The 4 outputs are refreshed every 4ms.

P0415 displays the state of the digital outputs.



NOTE

A digital output x is activated by setting the parameter *Source number digital output x*. To avoid unwanted output values, the following sequence must be followed:

1. *Source number digital output x* = 0
2. Set *Bit selection digital output x*
3. Set *Bit pattern digital output x*
4. Set *Source number digital output x* to the desired parameter (output active)

The selected bits of the source parameter are compared against the *bit pattern*. If these bits are equal, the digital output is set HIGH.

The digital output is deactivated by setting parameter *Source number digital output x* to zero.

- Example:

Digital output 3 should go HIGH, if **P0200** Bit0 = 0 and Bit2 = 1.

Therefore the following settings must be taken:

Bit selection digital output 3 Bit0, Bit2	P1120	0005 _{hex}
Bit pattern digital output 3 Bit0 = 0 and Bit2 = 1	P1121	0004 _{hex}
Source number digital output 3	P1119	200

6.2.9 Analog inputs

The analog input can be used to acquire an external voltage. That way, e.g. via the parameter **Ramp Function Generator input P1171** the speed set value can be specified using an external input voltage.

The analog input makes it possible to modify all writeable 16 bit and 32 bit parameters. On 32 bit parameters only the high word is affected, the low word remains unchanged. Consequently for 32 bit parameters only the high word of the maximum value is significant.

The parameter group consist of the following parameters::

- **P1130** Activation analog input
- **P1131** Smoothing time analog input
- **P1132** Scaling factor analog input
- **P1133** Target number analog input
- **P1134** Offset analog input
- **P1135** Threshold analog input
- **P0420** Actual value analog input

The analog input is sampled every $250\mu\text{s}$.

The acquired value is smoothed with the smoothing time and multiplied by the scaling factor. After that operation the offset is added. If the result is less than the threshold, the value becomes zero.

The result is also limited to \pm maximum value of the target parameter.



NOTE

The voltage on the analog input takes effect, immediately after setting **P1130** and **P1133**.

To deactivate the analog input, **P1130** and **P1133** have to be set to zero. The last input value still remains in the target parameter.

Along the signal path of the analog input there are two operational amplifiers with gain is set to 0,118. This results in a signal range from $1,5\text{V} \pm 1,18\text{V}$ at the input of the ADC corresponding to $\pm 10\text{V}$ at the analog input. There is no explicit scaling to a smooth value like 2048, because an unnecessary multiply operation would take additional processing time additionaly to the scaling operation. To reach a smooth value with $\pm 10\text{V}$ at the input, a default scaling factor of 1,27 can be used ($1,5 / 1,18 = 1,27$).

Recommended steps during programming:

1. Set the desired *smoothing time analog input*.
 2. Set the *Scaling factor analog input*.
 3. Set the *offset analog input* to adjust zero position
-

4. If necessary set *Threshold analog input* to the desired value
5. Set *Target number analog input*.
6. Activation of the analog input takes place

If the target number should be modified, at first the target number should be set to zero and after that the above mentioned procedure is to pass through, to avoid unintended side effects.

Calculation basics:

Analog input voltage: $U_{in} \{ -10V \dots +10V \}$;

Calculation formulae:

- for unipolar parameters:

$$value\ analog\ input\ [\%] = \frac{U_{in}[V] + 10V}{2 \cdot U_{inmax}[V]} * scaling * 100\% + offset$$

If $value\ analog\ input > 100\%$, then $value\ analog\ input$ is limited to 100%.

If $|value\ analog\ input| < Threshold\ [\%]$, then $value\ analog\ input$ is set to zero.

- for bipolar parameters:

$$value\ analog\ input\ [\%] = \frac{U_{in}[V]}{U_{inmax}[V]} * scaling * 100\% + offset$$

If $value\ analog\ input > 100\%$, then $value\ analog\ input$ is limited to 100%.

If $value\ analog\ input < -100\%$, then $value\ analog\ input$ is limited to -100%.

If $|value\ analog\ input| < Threshold\ [\%]$, then $value\ analog\ input$ is set to zero.

The following value is written to the target parameter:

$$target\ parameter\ value = \frac{value\ analog\ input\ [\%]}{100\%} \cdot maximum\ value$$

On 32 bit parameters the maximum value is determined from the high word of the real maximum value.

Only the high word is written to the target parameter.

The low word remains unchanged.

- Examples:

Scaling = 1; Offset = 0%; Threshold = 0%

Unipolar target parameter:

10V	↔	100% * Maximum value
5V	↔	75% * Maximum value
0V	↔	50% * Maximum value
-5V	↔	25% * Maximum value
-10V	↔	0% * Maximum value

Bipolar target parameter:

10V	↔	100% * Maximum value
5V	↔	50% * Maximum value
0V	↔	0% * Maximum value
-5V	↔	-50% * Maximum value
-10V	↔	-100% * Maximum value

Scaling = 1; Offset = 0%; Threshold = 10.1%

Unipolar target parameter:

10V	↔	100% * Maximum value
5V	↔	75% * Maximum value
0V	↔	50% * Maximum value
-5V	↔	25% * Maximum value
-9V	↔	0% * Maximum value (Threshold!)
-10V	↔	0% * Maximum value

Bipolar target parameter:

10V	↔	100% * Maximum value
5V	↔	50% * Maximum value
1V	↔	0% * Maximum value (Threshold!)
-1V	↔	0% * Maximum value (Threshold!)
-5V	↔	-50% * Maximum value
-10V	↔	-100% * Maximum value

Scaling = 2; Offset = -100%; Threshold = 0%

Unipolar target parameter:

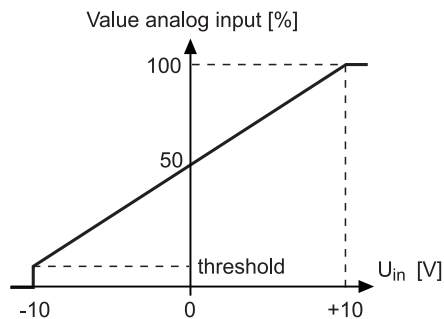
10V	↔	100% * Maximum value
5V	↔	50% * Maximum value
0V	↔	0% * Maximum value
-5V	↔	0% * Maximum value (Limitation!)
-10V	↔	0% * Maximum value (Limitation!)

Bipolar target parameter:

10V	↔	100% * Maximum value
5V	↔	0% * Maximum value
0V	↔	100% * Maximum value
-5V	↔	100% * Maximum value (Limitation!)
-10V	↔	100% * Maximum value (Limitation!)

Unipolar target parameter

Offset = 0 %; Scaling = 1


Bipolar target parameter

Offset = 0 %; Scaling = 1

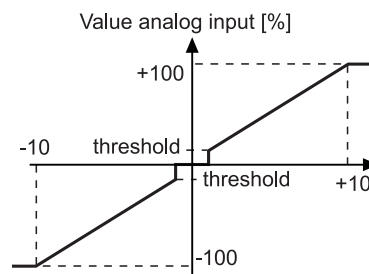


Figure 6.10: Example curves

4000_0209_rev01_jm.cdr

6.2.10 Analog outputs

With the analog outputs any drive parameter, as e.g. current actual value, speed actual value or contouring error, but also status parameters can be displayed. 16 bit as well as 32 bit parameters can be displayed.

There are 2 parameter groups for analog outputs. Therewith a maximum of 2 analog outputs can be used simultaneously. Analog outputs are refreshed every 500µs.

The following parameters belong to each parameter group:

- Channel selection analog output **P1150** and **P1154**
- Source parameter number analog output **P1151** and **P1155**

Parameter number for the source parameter, which shall be generated at the output. The calculation of the output value acts automatically in accordance with the kind of the parameter: 16 or 32 bit, signed or unsigned.

- Scaling factor analog output **P1153** and **P1157**

Scaling factor for the calculation of the output value.

- Offset analog output **P1152** and **P1156**

With the offset the output value is able to be shifted by a possible offset error of the analog output or to generate a requested shift.

6.2.10.1 Calculation basics

For the calculation of the analog outputs it is assumed that there is a standard scaling in the drive. Most of the actual value parameters, as e.g. speed, torque and current, are scaled internally to 4000_{hex} (at 16 bit parameters) or 40000000_{hex} (at 32 bit parameters). That means that a parameter value of 4000_{hex} (or 40000000_{hex}) accords to 100%. If the parameter, which is to be displayed is shown in the standard scaling, the simplified conversion formulae can be used.

Signed parameters:

$$U_{out} = \text{parameter value [\%]} * \text{scaling [WinBASS]} * 10V + \text{offset [V]}$$

Unsigned-Parameter:

$$U_{out} = \text{parameter value [\%]} * \text{scaling [WinBASS]} * 20V - 10V + \text{offset [V]}$$

For the scaling of parameters, which do not correspond to the standard scaling, the general calculation formulae are valid. Thereby the internal representation must be used in order to calculate the parameter value. This information is to be found at the according parameter description.

16 bit signed parameter

$$U_{out} = \frac{\text{parameter value [internal]}}{4000_{hex}} * \text{scaling [WinBASS]} * 10V + \text{offset [V]}$$

32 bit signed parameter

$$U_{out} = \frac{parameter\ value[internal]}{40000000_{hex}} * scaling[WinBASS] * 10V + offset[V]$$

16 bit unsigned parameter

$$U_{out} = \frac{parameter\ value[internal]}{4000_{hex}} * scaling[WinBASS] * 20V - 10V + offset[V]$$

32 bit unsigned parameter

$$U_{out} = \frac{parameter\ value[internal]}{40000000_{hex}} * scaling[WinBASS] * 20V - 10V + offset[V]$$

Limitations

Scaling factor of signed parameters can take a negative sign. At unsigned parameters this will result in wrong output values.

During calculation there are limitations at two steps.

$$temp = parameter\ value * scaling$$

The temporary value *temp* is limited to 100% standard scaling.

$$temp = temp + offset$$

The temporary value *temp* is limited to 100% standard scaling.

$$U_{out} = temp$$

6.2.10.2 Example 1 - Parameters with standard scaling

The value from parameter **Encoder 1 actual speed P0394** shall be displayed on output 1. Therefore parameter group 1 must be used.

The following settings are necessary:

Select fast analog output 1	P1150	1
Source number fast analog output 1	P1151	394
Offset fast analog output 1	P1152	0 (zero Offset)
Scaling factor fast analog output 1	P1153	1

(100% speed shall result in 10V at the output)

6.2.10.3 Example 2 - Parameters without standard scaling

The value from parameter **Position actual total deviation P0367** shall be displayed on output 2. Therefore parameter group 2 must be used.

The range of ± 2 revolutions should be mapped to $\pm 10V$ at the output (parameter is 32 bit signed and is divided into 16 bit revolution and 16 bit angle).

The necessary scaling factor is to be calculated like follows:

$$\text{scaling}[\text{WinBASS}] = \frac{U_{out} - \text{offset}[\%]}{10V} * \frac{40000000_{hex}}{\text{parameter value}[\text{internal}]}$$

Thereby $U_{out} = 10V$ should represent a parameter value of 00020000_{hex} (2 revolutions). Offset is set to 0. Consequently results:

$$\text{scaling}[\text{WinBASS}] = \frac{10V}{10V} * \frac{40000000_{hex}}{00020000_{hex}} = 2000_{hex} = 8192_{dez}$$

The following settings are necessary:

Select fast analog output 2	P1154	2
Source number fast analog output 2	P1155	367
Offset fast analog output 2	P1156	0 (zero offset)
Scaling factor fast analog output 2	P1157	8192

6.2.10.4 Example 3 - Unsigned parameter without standard scaling

The value from parameter **Power Unit DC link actual voltage P0484** shall be displayed at analog output 1.

Scaling of the 16 bit unsigned parameter is given with 4000_{hex} corresponding to 540V. At 0V DC link voltage 0V shall appear at the output, at a DC link voltage of 600V the output shall provide 10V.

From the formula for 16 bit parameters it can be seen that for the value range 0 to 4000_{hex} a voltage of -10V to +10V is provided.

In the example however there only should be a positive voltage, that is why an offset of 10V must be added. This is to be reached by using the value 10V for the offset **P1152 / P1156**. Now the scaling factor **P1153 / P1157** can be calculated:

$$\text{scaling}[\text{WinBASS}] = \frac{U_{out} + 10V - \text{offset}[\%]}{20V} * \frac{4000_{hex}}{\text{parameter value}[\text{internal}]}$$

$U_{out} = 10V$; offset = 10V;

$$\text{parameter}[\text{internal}] = \frac{600V * 4000_{hex}}{540V}$$

$$scaling[WinBASS] = \frac{10V + 10V - 10V}{20V} * \frac{540V * 4000_{hex}}{600V * 4000_{hex}} = 0,45$$

The following settings are necessary:

Select fast analog output 1	P1150	1
Source number fast analog output 1	P1151	484
Offset fast analog output 1	P1152	10V
Scaling factor fast analog output 1	P1153	0,45

6.2.11 BACI

BAumüller **C**omponent **I**nterface (**BACI**) define the hardware- and the software interface of Baumüller between controller and option cards in the **b maXX**[®] system. Via this interface both the controller and the control system are able to communicate with other option cards, like field bus slave, field bus master card, IEI option module and so on. Likewise controller and PLC can, among each other exchange data.

Depending on the hardware configuration the **b maXX**[®] **BM3400** can be equipped with different firmware versions: The firmware version with software ID 1363 provides a CAN slave module (CANopen resp. CAN-sync) according to the onboard CAN interface hardware, which is based on the controller integrated CAN interface.

Alternatively the firmware with the software ID 1460 contains functions of the universal component interface BACI, which enable the communication between the controller and optional extender boards (e.g. EtherCAT slave). Optional extender boards for **b maXX**[®] **BM3400** are permanent features of the device. There is only one extension slot. Freely accessible module slots are not existant, therefore equipping with such an extender board is only possible ex factory. Functionality of BACI is limited accordingly.

6.2.11.1 BACI services

BACI differentiates between the following communication services:

- System configuration (after PowerOn) and reconfiguration (during running operation)
- Cyclic Data - fast synchronous transfer of actual and set values (no strings)
- Service Data - not time-critical access to parameters
- Command Interface - **b maXX**[®] **BM3400** internal for automatic configuration and diagnosis.
- Synchronization, Interrupt. The controllers operating cycle can be synchronized with a sync signal provided via cotrol lines by e.g. a field bus module.

6.2.11.2 Configuration of BACI using controller parameters

The slot for optional extender modules is labeled with the character „G“, configuration parameters concerning to this module itself are labeled accordingly.

Hardware /Software configuration of the optional module

Parameters **Option module G configuration 1 P0830 ... Option module G configuration 8 P0837** provide module specific configuration parameters for the optional module on slot „G“. The optional module can read out these parameters during initialization and then make corresponding settings. The meaning of these parameters is specific to the particular module and can be found within the **Instruction guide** of the optional module.

Configuration of set value and actual value parameters

Set value parameters are those parameters, which are cyclic written from the optional module to the controller. In contrast to this, actual value parameters are cyclic written from the controller to the optional module. During the cyclic communication a once pre-defined scope of set values and actual values is exchanged to each other repeatedly at a given time within a given period. This configuration is read from the particular controller parameters and provided to the optional module at boot time. The optional module in turn can assign a deviant configuration to the controller. This happens automatically on system initialization. After completion of this initialization, the configuration parameters in the controller show the currently valid configuration. Moreover, in the running operation an optional module can declare and effectuate a change of configuration together with the controller. In this case the controller configuration parameters reflect the changed configuration. For the cyclic set- and actual value transmissions the kind and scope of the parameters are limited:

- The number of possible transmissions between controller and optional module at **b maXX® BM3400** is limited to 8 set values and 8 actual values at the moment.
- Only parameters with the attribute *cyclic writeable* (in this documentation labeled as *CW*) may be written cyclic.
- Only 16 bit or 32 bit parameters are permitted for cyclic transfer. Character strings are excluded from the cyclic transfer but can be read or written as service data.

Set values: Parameters **P0801** to **P0808** define the parameter numbers of the maximum 8 theoretically possible cyclic set values.

Actual values: Parameters **P0809** to **P0816** determine the parameter numbers of the maximum 8 theoretically possible cyclic actual values.

Cyclic transfer rate: Parameter **Option module 1 master 1 cyclic time P0800** determines how many controlling cycles (at $125\mu s$ a throw) must elapse until the next cyclic transfer will be started:

The value is considered to be a factor to $125\mu s$.

Value	Meaning
0	No cyclic data transfer
1	prohibited
2	$250\mu s$
3	$375\mu s$
...	

Definition of time of cyclic transfer: Option module 1 master 1 cycle offset set values P0818 resp. corresponding actual values P0819 specify the cycle offset for the data transfer of set and actual values. This offset defines in which controller cycle within a transfer period data transfer of set and actual values should happen.

6.2.11.3 Sequence of the cyclic communication

The following diagram outlines the chronological sequence of a cyclic BACI communication between controller and an optional module. Parameters P0800 to P0819 are used to configure the optional module.

The following settings are effective (value is considered to be a factor to 125 μ s):

Parameter	Value	Description
Optional module 1 Master 1 cycle time P0800	4	Data transfer every 500 μ s. This corresponds to the sync interval, on which the controller synchronizes itself
Optional module 1 Master 1 cycle offset set values P0818	0	Set values are transmissioned in the controller cycle, which follows the sync pulse, that therefore means in the interval zero.
Optional module 1 Master 1 cycle offset actual values P0819	3	Actual values are transferred in the 3rd controller interval, that means in the last interval before the next sync pulse.

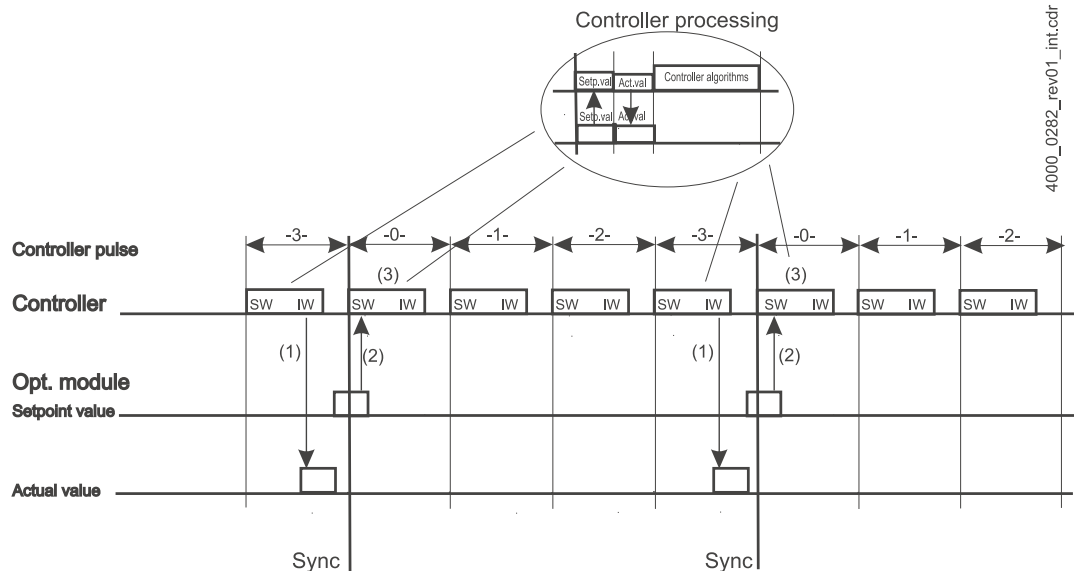


Figure 6.11: BACI timing cyclic communication

The individual processes during the communication are characterized in the diagram by parenthesized numerals, for example (3).

- (1) Transmission of the actual values from the controller to the optional module in the third controller interval. The actual values are, if necessary, rescaled within the optional module and e.g. are made available to the field bus.
- (2) Preparation of the set values by the optional module and transmission of the set values to the controller.
- (3) Within the controller processing the set values are written into the target parameters and afterwards the control algorithms are calculated. At the end of the controller task new actual values are available.

The detail drawing of the controller processing shows, how the controller first reads in the set values over the BACI interface of the option card, then writes the actual values to the option card and then calculates the control algorithms.

6.2.11.4 Error monitoring

While using BACI different error sources are possible.

- Configuration errors
- Run-time errors

All the errors are recognized from the system and are signaled via the error mechanisms of the controller and are, for example, shown in WinBASS II. Parameter **Error in function or option modules P0204** shows, that an error in connection with an optional module has occurred. The error code in parameter **Error Option module G P0245** shows the exact cause of error. In case there are two errors at one module simultaneously, the controller shows the error code, which it has recognized last of all.

Configuration errors

The most common configuration errors are:

Error	Meaning
Invalid parameter number for set value 1...8	Parameter number doesn't exist or cyclic write access isn't allowed
Invalid parameter number for actual value 1...8	Parameter number doesn't exist or cyclic read access isn't allowed (wrong data type)
Wrong value for cyclic time	Value for communication interval is set to 0 or 1
Wrong value for cyclic offset	The value for cycle offset, that means the information, in which the controller interval set- or actual values are exchanged is faulty. Cycle offset never may be greater than or equal to the value of the period, because the counting of cycle offset starts at 0.
PCI error or general error during read or write operation	Read / write error on the configuration registers of the option module - cause: module faulty.

Error	Meaning
Timeout within the configuration phase after system start	The option module doesn't initialize its BACI driver or it initializes it too late. Error reaction is adjustable. Possible causes: At the PLC: Program is not started At field bus module: System initialization is not completed

Run-time errors of the BACI can appear at all communication services during the cyclic communication and at the service channel data communication.

Run-time error cyclic communication

Error	Meaning
Invalid value at set parameter 1...8	The cyclic to be written value violates the min-/max limit of the named parameter
BACI timeout with cyclic data	The controller monitors the cyclic communication over a timeout mechanism. A timeout-counter starts at the first successful cyclic set value transmission. Every further successful cyclic set value transmission retriggers this time counter.
Access conflicts with slave at cyclic communication	At an unfavorable choice of the cycle offsets, during the cyclic communication access conflicts between controller and optional module can arise. Hence these offsets shouldn't be changed to differ from the recommendations given in the manual, without having exact knowledge of the chronological context! Corrective measures by access conflicts: Modification of the offset v
Error cyclic communication: Alive-counter conflict	The so-called alive-counter-mechanism of BACI monitors cyclical the reciprocative existence and correct operating of the communication partner. The controller signals an alive-counter conflict, if the option card doesn't react to the cyclic communication demands anymore. Remedy: Restarting of the system, checking of the user program in the PLC, in case the concerning optional module is a control.

Run-time error service data communication

If during service data communication an error occurs at run-time, the **b maXX® BM3400** controller will send an error message to the appropriate optional module. Field bus modules translate these error messages into the corresponding field bus specific messages and pass them on to the master.

The following table displays the possible error codes:

Error code hex.	Error code dec.	Meaning
0x0100	256	Wrong parameter number. A parameter with these number doesn't exist
0x0101	257	Wrong data type
0x0102	258	Value less than minimum value
0x0103	259	Value greather than maximum value
0x0104	260	Parameter is read only
0x0105	261	reserved
0x0106	262	Changing the parameter is not possible at the current state of operation (e.g. changing specific parameters isn't permitted during operation state 4).
0x0107	263	Invalid parameter value (e.g. Operation mode desired P1000 must not be set to zero value).
...	...	reserved
0x011B	283	Using parameter Communication source P1001 access to parameters via service data transfer is disabled. The checkbox <i>BACI, enable write access via service data transfer</i> on WinBASS or ProDrive window Drive manager must be set.

Diagnosis

For a diagnosis of the BACI-communication services the controller offers the following development parameters:

Parameter	Meaning
P3344	Internal BACI status
P3345	Counter for access conflicts with option module.
P3346	Counter for alive-counter-errors (see above)
P3347	Counter for reconfiguration operations during the current operation
P3348	Counter for the cyclic data exchange of set values.
P3349	Counter for den cyclic data exchange of actual values.
P3350	Counter for BACI commands
P3351	Counter for service data communication

6.2.12 CAN interface

The **b maXX® BM3400** is equipped with a CAN interface as a standard feature, which consists of the on-chip can cantroller, 2 parallel RJ-45 jacks (X44, X45) and 2 hex-switches (S40, S41). This interface can be used either for CANopen or for CANsync.

CAN mode

Selection of CAN protocol using parameter **CAN mode P0540** (corresponds to the display of parameter **CAN status P0541**)

Bit no.	Meaning
15	1 CANsync
	0 CANopen

This selection takes effect after the boot procedure according to the stored parameter. Bit15 of parameter **CAN status P0541** shows, which protocol actually is selected. Depending on this, the other bits of this parameter have different meaning (see description of parameter **P0541**).

Further functions of parameter **CAN mode P0540**:

Bit no.	Meaning
0	0 Baudrate is recognized by hardware (hex-switch)
	1 Baudrate is determined by parameter P0542
1	0 Node number is recognized by hardware (hex-switch)
	1 Node number is determined by parameter P0545

Meaning of hex-switches

Hex-switches are used to select node number and baudrate.

Switch	Bit no.	Meaning
S41	0...3	lower 4 bit of the node number
S40	4...6	higher 3 bit of the node number
	7	Baudrate (0 → 125kBit/s, 1 → 500kBit/s)

Example:

S40 = 8, S41 = 1 → Baudrate = 500kBit/s, Node number = 1

6.2.12.1 CANsync protocol

Software module CANsync-Slave is part of the **b maXX® BM3400** firmware. Activation takes place by selecting the appropriate CAN protocol using parameter **CAN mode P0540** as described in **6.2.12**.

Behaviour of the **b maXX® BM3400** as attendee at the CANsync-Bus does generally comply with the behaviour of a slave in synchronized operation. To actually get a synchronized receipt of set values (and comital of actual values), the parameters for synchronization have to be set accordingly. To transmit the synchronization state, Bit1 of *synchronization state* has to be assigned as Bit15 of *Statusword*. The following cycle periods are supported:

- 8ms (Baudrate = 125kBit/s)
- 4ms (Baudrate = 250kBit/s)
- 2ms (Baudrate = 500kBit/s)
- 1ms (Baudrate = 1000kBit/s)

Telegrams:

Set value channel 1	Up to 8 byte each	
Set value channel 2	Data from master	
Actual value channel 1	Up to 8 byte each	
Actual value channel 2	for own actual values or set values of other slaves	
Command channel	Action commands: Parameter commands:	1 - Write Controlword Read parameter Write parameter
Answer channel	Answer to parameter commands	

Mapping:

It is possible to configure 2 set values, 2 actual values and the statusword as process data. For this purpose parameters **P3240** to **P3248** are used (according to ZK-Parameters at **b maXX® BM4400** or **V-Regler**):

- P3240** (corresponds to ZK 0) Parameter number 1. set value
- P3241** (corresponds to ZK 1) Parameter number 2. set value
- P3242** (corresponds to ZK 4) Mapping 1. set value
- P3243** (corresponds to ZK 5) Mapping 2. set value
- P3244** (corresponds to ZK 16) Parameter number 1. actual value
- P3245** (corresponds to ZK 17) Parameter number 2. actual value
- P3246** (corresponds to ZK 20) Mapping 1. actual value
- P3247** (corresponds to ZK 21) Mapping 2. actual value
- P3248** (corresponds to ZK 25) Mapping Statusword

Successful mapping will be shown in parameter **CAN status P0541**.

Coding of mapping parameters

Mapping of set values(**P3242** and **P3243**)

Bit no.	Meaning
0	Significance 0 Set value is invalid 1 Set value is valid
1...2	Position within the telegram of set values and actual values 0 0 Set value starts with Word 0 (Byte 0) within the telegram of set or actual values 0 1 Set value starts with Word 1 (Byte 2) within the telegram of set or actual values 1 0 Set value starts with Word 2 (Byte 4) within the telegram of set or actual values 1 1 Set value starts with Word 3 (Byte 6) within the telegram of set or actual values* *(only word type format)
3...5	No. of set value oder actual value telegram 0 0 0 Set value is located in set value or actual value telegram 1 0 0 1 Set value is located in set value or actual value telegram 2 0 1 0 reserved ... 1 1 1 reserved
6	Format 0 set value is word type format 1 set value is doubleword type format
7	Set value telegram /Actual value telegram 0 Set value is located in set value telegram 1 Set value is located in actual value telegram
8...12	CANsync slave number if Bit7 = 1 0 0 0 0 CANsync slave number 0 0 0 0 1 CANsync slave number 1 ... 1 1 1 1 0 CANsync slave number 30 1 1 1 1 1 CANsync slave number 31
13...15	reserved

Mapping of actual values (P3244 and P3245)

Bit no.	Meaning
0	Significance 0 Actual value is invalid 1 Actual value is valid
1...2	Position within the actual value telegram 00 Actual value starts with word 0 (Byte 0) in the actual value telegram 01 Actual value starts with word 1 (Byte 2) in the actual value telegram 10 Actual value starts with word 2 (Byte 4) in the actual value telegram 11 Actual value starts with word 3 (Byte 6) in the actual value telegram* *(only word type format)
3...4	Actual value telegram No. 00 Actual value is located in actual value telegram 1 01 Actual value is located in actual value telegram 2 10 reserved 11 reserved
5	reserved
6	Format 0 Actual value is word type format 1 Actual value is doubleword type format
7...15	reserved

Mapping of Statusword (P3248)

Bit no.	Meaning
0	Significance 0 Mapping of Statusword is invalid 1 Mapping of Statusword is valid
1..2	Position within the actual value telegram 0 0 Statusword starts with word 0 (Byte 0) in the actual value telegram 0 1 Statusword starts with word 1 (Byte 2) in the actual value telegram 1 0 Statusword starts with word 2 (Byte 4) in the actual value telegram 1 1 Statusword starts with word 3 (Byte 6) in the actual value telegram
3..4	Actual value telegram no. 0 0 Statusword is located in actual value telegram 1 0 1 Statusword is located in actual value telegram 2 1 0 reserved 1 1 reserved
5	reserved
6	Format 0 Statusword is always word type format
7..15	reserved

CAN Status during active CANsync protokol (P0541)

Bit no.	Meaning
0...1	Module status 0 0 Initializing 0 1 Running
2	reserved
3	reserved
4	0 Set value 1 not mapped 1 Set value 1 mapped successfully
5	0 Set value 2 not mapped 1 Set value 2 mapped successfully
6	reserved
7	reserved
8	0 Actual value 1 not mapped 1 Actual value 1 mapped successfully
9	0 Actual value 2 not mapped 1 Actual value 2 mapped successfully
10	reserved
11	reserved
12	0 Statusword not mapped 1 Statusword mapped successfully
13	reserved
14	reserved
15	1 CANsync protokol active

Required settings

CAN Modus - P0540	Protokol CANsync (Bit15 = 1), Selection, how Baudrate and node number are to be determined
Setting of baudrate	depending on P0540 via hexswitch S40 or using parameter P0542
Setting of node number	depending on P0540 via hexswitch S40/S41 or using parameter P0545
Source of sync signal	P0531 = 1
Sync interval	P0532 = 1000, 2000, 4000 or 8000
Sync tolerance	P0533
Sync offset	P0534
Enable communication source CANsync module	P1001 Bit1...3 = 1
Parameter selection Statusbit 15	P1292 = 530
Bitmask for Statusbit 15	P1293 = 1
Mapping of set values and actual values	P3240 ...3248

6.2.12.2 CANopen protocol

Software module CANsync-Slave is part of the **b maXX® BM3400** firmware. Activation takes place by selecting the appropriate CAN protocol using parameter **CAN mode P0540** as described in **6.2.12**.

Detailed information regarding the CANopen protocol as well as a description of the supported objects is to be found within the „Programming Guide CANopen slave“ for **b maXX® BM3400**.

6.2.13 Synchronization

Controlling cycle can be synchronized to an external signal (**Source sync signal P0531**), which can be provided e.g. from an optional module. The external signal must meet appropriate requirements concerning accuracy.

Requirements to the synchronization signal

Cycle period of the synchronization signal must match one of these values: $250\mu\text{s}$, $500\mu\text{s}$, 1ms , 2ms , 4ms , 8ms .

Synchronization happens on the falling edge of the signal. Low level must remain for at least 200ns for the edge to be detected.

The accepted difference of the synchronization interval from the nominal value is 800ppm (resp. $800/1000000$). Maximum accepted difference at 2ms cycle period therefor is $1,6\mu\text{s}$. A difference above this value can't be compensated by the drive.

To allow major differences of the signal, the tolerance can be adjusted at parameter **Sync tolerance P0533**. These tolerance value at the same time represents the range, within the drive is seen to be synchronous to the external signal.

Method of synchronization

The start of the controlling cycle is synchronized to the falling edge of the synchronization signal with an accuracy of 1600ppm (resp. $1600/1000000$).

At loss of the synchronization signal or if the signal is outside the accepted tolerance range, controlling cycle goes on with a fixed clock of $62,5\mu\text{s}$. If the drive is in Offline mode, warning 48 (**P0264**) will appear, in Online mode error 165 will be reported. If warning 48 is present, the drive can't be switched over to Online mode (**P0305** remains in state 3).

As soon as a valid synchronization signal is detected, synchronization on this signal happens automatically.

Relocation of the controlling cycles start in relation to the synchronization signal is possible using parameter **Sync offset P0534**. A positive sign value of sync offset moves the start of the controlling cycle to the right of the synchronization signal, a negative sign value respectively moves it to the left.

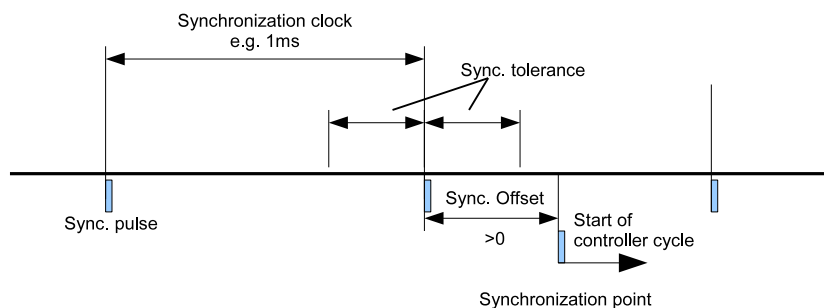


Figure 6.12: Timing diagram synchronisation with sync.-offset > 0

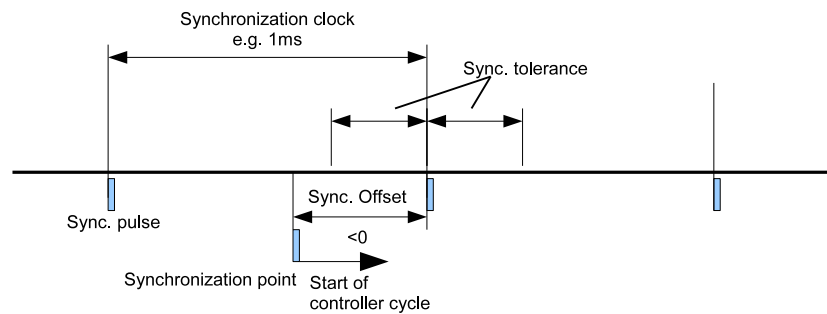


Figure 6.13: Timing diagram synchronisation with sync.-offset < 0

6.2.14 Display filter

The **b maXX® BM3400** controller provides two freely configurable PT1-filters to smooth display values. Time constants of the filters can be set via **P2045** and **P2046** and can be selected within a range of 0ms to 32,767s. Filtering applies to:

- WinBASS
- Analog outputs
- BACI cyclic data (prozess data)
- BACI service data

Smoothened values are displayed, internally the controller uses the unfiltered values for calculation. In the oscilloscope function the controller always uses unfiltered parameter values as for recording data as for trigger compare values.

6.2.15 Notch filter

In order to suppress unwanted resonance frequencies three notch filters are implemented for speed set value, speed actual value and torque set value. The figure below shows the amplitude-frequency characteristic of the notch filter at a center frequency of 1000Hz and a bandwidth of 500 Hz. At the center frequency attenuation of the notch filter reaches its maximum.

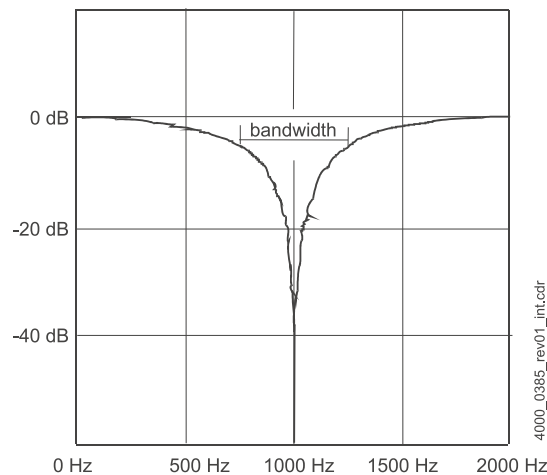


Figure 6.14: Amplitude-frequency characteristic of the notch filter

NOTE



- Ensure that the assigned bandwidth always is less than half the resonance frequency.
- If center frequency is set to 0Hz (default value), the notch filter is deactivated.

6.2.16 Application

For several application specific purposes like linking of inputs and outputs or access via field bus systems the application parameters **P3314** to **P3338** are available.

All application parameters can be stored.

6.3 Management

6.3.1 Device management

The drive manager maintains the essential system resources of the drive. Amongst others these include the complete device control in the different operation modes, the transfer between operation modes, troubleshooting and the management of all communication interfaces. Drive control is based on a state machine, which can be managed using parameter **Controlword P0300** or hardware control inputs.

Managing the device by exclusively controlling hardware inputs is possible. For this purpose, in parameter **Communication source P1001** the bits concerning motor control have to be cleared.

The state machine for drive control (see [figure \(S. 91\)](#)) and the commands in the control word thereby conform to the Drivecom / CANopen standard.

The following hardware control inputs are available:

- Quickstop **SH** input:
 - Terminal: X26 SH

Input to initiate a quickstop. A low-level signal at this input causes a quickstop reaction. For standard operation a high-level signal is necessary.

- Pulses enable **IF**:
 - Terminal: X26 IF

Enables the pulses for PWM. This input directly controls the driver of the power unit. If this input is held at low level, the power unit can't provide pulses.

6.3.1.1 States of device control

0 - NOT READY TO START

- The electronics are voltage-supplied
- Initialization is running
- Drive operation is disabled
- *Ready to operate relay* is OFF (drive is not ready to run)

1 - START DISABLED

- Software / hardware initialization is completed
 - Application can be reparameterized
 - Drive operation is disabled
 - Switch-on is disabled
 - *Ready to operate relay* is ON (drive is ready to run)
-

2 - READY-TO-START

- Application can be reparameterized
- Drive operation is disabled
- Switch-on is enabled
- *Ready to operate relay* is ON (drive is ready to run)

3 - SWITCHED ON

- Application can be reparameterized
- Drive operation is disabled
- Power unit is ready-to-run, mains supply is available
- *Ready to operate relay* is ON (drive is ready to run)
- At **ASM**: Machine is energized

4 - OPERATION ENABLED

- Application can be reparameterized
- Drive operation is enabled
- *Ready to operate relay* is ON (drive is ready to run)

5 - INHIBIT OPERATION ACTIVE

- Application can be reparameterized
- Drive operation is enabled
- Command close down is active
- *Ready to operate relay* is ON (drive is ready to run)

6 - SHUT DOWN DRIVE ACTIVE

- Application can be reparameterized
- Drive operation is enabled
- Command shut down is active
- *Ready to operate relay* is ON (drive is ready to run)

7 - QUICKSTOP ACTIVE

- Application can be reparameterized
- Quickstop function is active
- Drive operation is enabled
- *Ready to operate relay* is ON (drive is ready to run)

E - ERROR REACTION ACTIVE

- Application can be reparameterized
- An error dependend action is carried out
- Drive operation can be enabled

F - ERROR

- Application can be reparameterized
- Drive operation is disabled
- *Ready to operate relay* is OFF (drive is not ready to run)

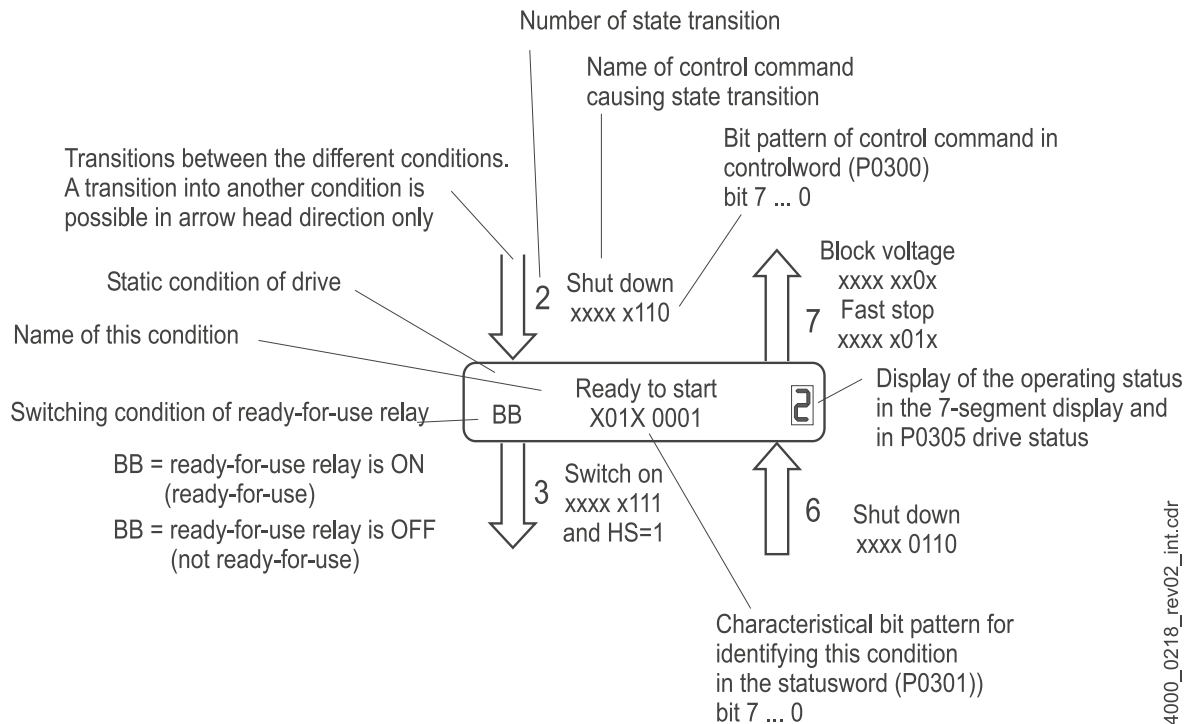
6.3.1.2 Introduction to illustration of the device control

Figure 6.15: Illustration of a state within the state machine

Within the status (see above) Bit7...Bit0 of **Statusword P0301** are displayed in binary format as XXXX XXXX.

At transition between states (arrows see above) Bit7...Bit0 of **Controlword P0300** are displayed in binary format as xxxx xxxx.

All bits labeled with X (bits of the *Statusword*) or x (bits of the *control word*) are irrelevant concerning the control of the state machine and the illustration of the actual state.

6.3.1.3 State machine of device control

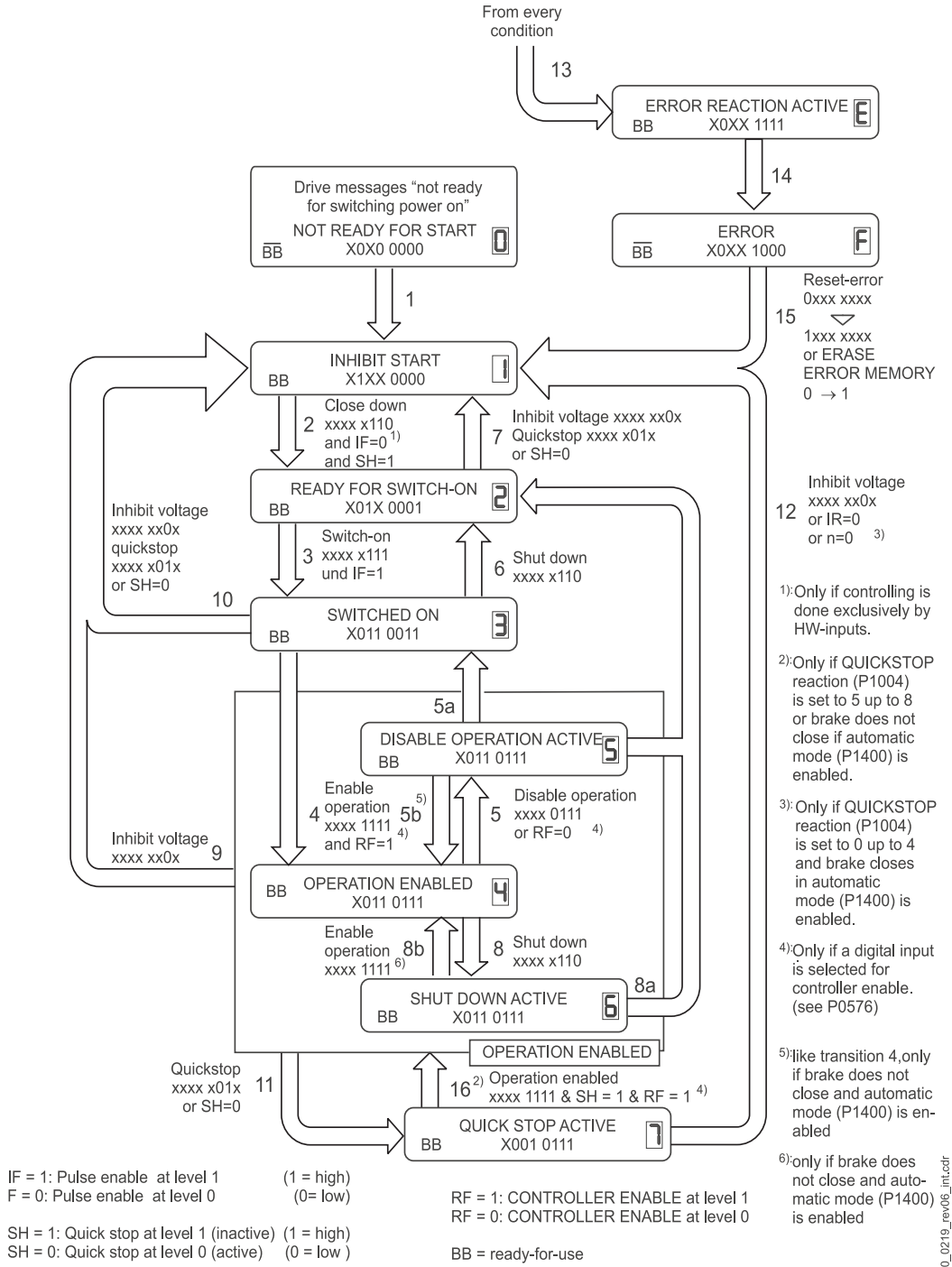


Figure 6.16: State machine of device control

0 - ENTRY POINT OF THE STATE MACHINE → NOT READY-TO-START[0]

- Event:
 - power on 24V supply
 - Software Reset
- Action:
 - *Ready to operate relay* relay is switched off
 - Initialization and selftest are started

1 - NOT READY-TO-START[0] → START DISABLED[1]

- Event:
 - Initialization and selftest completed successfully
- Action:
 - *Ready to operate relay* is switched on

2 - START DISABLED[1] → READY-TO-START[2]

- Event:
 - Command Shut down
- Condition:
 - *Quickstop* input X26 = High and
 - if controled only by hardware switch: *Pulses enabled* X26 = Low
- Action:
 - none

3 - READY-TO-START[2] → SWITCHED ON[3]

- Event:
 - Command Switch on
- Condition:
 - *Pulses enabled* X26 = High
 - Mains supply is ready-to-operate, Mains power is present
 - Saftey relay is (if present) switched on
- Action:
 - Monitoring of safety relay and *ready-to-operate* of mains supply are activated
 - If using **ASM (P0093)** the machine is energized.

4 - SWITCHED ON[3] → OPERATION ENABLED[4]

- Event:
 - Command Operation enabled
- Condition:
 - Monitoring of brake status doesn't report any error (P1400)
 - Brake pad wear indicator doesn't report any error (P1400)
- Action:
 - Drive operation is enabled
 - Holding brake is released (only if brake is in automatic mode (P1400))

5 - OPERATION ENABLED[4] → INHIBIT OPERATION ACTIVE[5]

- Event:
 - Command Inhibit operation or
 - *Pulses enabled* input X26 = Low
- Action:
 - Operation inhibit is instigated (depending on settings a slowing-down process or rolling off without control)

5a - INHIBIT OPERATION ACTIVE[5] → SWITCHED ON[3]

- Event:
- Condition:
 - Speed value 0 accomplished or
 - immediate *Pulses disabled* is assigned for Inhibit operation
- Action:
 - Drive operation is inhibited
 - by using **ASM (P0093)** the machine is energized

5b - INHIBIT OPERATION ACTIVE[5] → OPERATION ENABLED[4]

- Event:
 - Command Operation enabled
- Condition:
 - *Pulses enabled* X26 = High
 - *INHIBIT reaction* (P1006) is not set to Inhibit drive function (Pulses disabled, zero value)
 - Holding brake couldn't be applied and is in automatic mode (P1400) and monitoring of brake status (P1400) is activated

- Action:
 - Drive operation is enabled

6 - SWITCHED ON[3] → READY-TO-START[2]

- Event:
 - Command Shut down or
 - *Pulses enabled* input X26 = Low
- Action:
 - Monitoring of *ready-to-operate* of mains supply is deactivated
 - Monitoring of safety relay (if present) is deactivated

7 - READY-TO-START[2] → START DISABLED[1]

- Event:
 - Command Quickstop or
 - Command Inhibit voltage or
 - *Quickstop* input X26 = Low
- Action:
 - none

8 - OPERATION ENABLED[4] → SHUT DOWN DRIVE ACTIVE[6]

- Event:
 - Command Shut down
- Action:
 - Drive shut-down is instigated (depending on settings a slowing-down process or rolling off without control)

8a - SHUT DOWN DRIVE ACTIVE[6] → READY-TO-START[2]

- Condition:
 - Speed value 0 accomplished or
 - Immediate *Pulses disabled* is assigned for Shut-down operation
- Action:
 - Drive operation is inhibited
 - Monitoring of *ready-to-operate* of mains supply is deactivated
 - Monitoring of safety relay (if present) is deactivated

8b - SHUT DOWN DRIVE ACTIVE[6] → OPERATION ENABLED[4]

- Event:
 - Command Operation enabled
- Condition:
 - *Pulses enabled* X26 = High
 - *Shut-down reaction* (P1005) is not set to Drive operation disabled (Pulses disabled, zero value)
 - Holding brake couldn't be applied and is in automatic mode (P1400) and monitoring of brake status (P1400) is activated
- Action:
 - Drive operation is enabled

9 - OPERATION ENABLED[4] → START DISABLED[1]

- Event:
 - Command Inhibit voltage
- Action:
 - Drive operation is disabled
 - Monitoring of *ready-to-operate* of mains supply is deactivated
 - Monitoring of safety relay (if present) is deactivated

10 - SWITCHED ON[3] → START DISABLED[1]

- Event:
 - Command Inhibit voltage or
 - Command Quickstop or
 - *Quickstop* input X26 = Low
- Action:
 - none

11 - OPERATION ENABLED[4] → QUICKSTOP ACTIVE[7]

- Event:
 - Command Quickstop or
 - *Quickstop* input X26 = Low
- Action:
 - Quickstop function is initiated

12 - QUICKSTOP ACTIVE[7] → START DISABLED[1]

- Event:
 - Command Inhibit voltage or
 - Quickstop operation is finished (speed value 0 is accomplished) and holding brake is applied (if brake is in automatic mode (P1400) and monitoring (P1400) is activated) or
 - *Pulses enabled* input X26 = Low
- Action:
 - Drive operation is disabled
 - Monitoring of *ready-to-operate* of mains supply is deactivated
 - Monitoring of safety relay (if present) is deactivated

13 - all states → ERROR REACTION ACTIVE[E]

- Event:
 - Drive error recognized
- Action:
 - *Ready to operate relay* is switched off
 - error reaction dependend on particular error is initiated

14 - ERROR REACTION ACTIVE[E] → ERROR[F]

- Event:
 - Error reaction is finished
- Action:
 - Drive operation is disabled
 - Monitoring of *ready-to-operate* of mains supply is deactivated
 - Monitoring of safety relay (if present) is deactivated

15 - ERROR[F] → START DISABLED[1]

- Event:
 - Command Error reset or
 - Error reset via **IF** input = Low → High
 - Condition:
 - Cause of error is not present any longer
 - Action:
 - Error reset is executed (error specific acknowledge function)
-

- *Ready to operate relay* is switched on

16 - QUICKSTOP ACTIVE[7] → OPERATION ENABLED[4]

- Event:
 - Command Enable operation
- Condition
 - Quickstop reaction (P1004 resp. P1009) is set to *Remain in quickstop* (values 5 to 8)
 - Quickstop reaction (P1004 resp. P1009) is not set to *Remain in Quickstop* (value less than 5) and Holding brake couldn't be applied and brake is in automatic mode (P1400) and monitoring brake status (P1400) is activated
- Action:
 - Drive operation is enabled again

Transition between states only happens, if actions have been done completely.

Sequence of actions corresponds to their operation sequence during switching between states.

After complete operation of actions the next state is accomplished and new commands are accepted.

6.3.1.4 Controlling the Ready-to-operate relay

The switching status of the *Ready-to-operate relay* only changes at the following state transitions:

Transition	Switch action at the <i>Ready-to-operate relay</i>	Comment
0	Switches off	Start initializing the drive
1	Switches on	Drive initializing is completed
13	Switches off	Errors have been recognized in the drive
15	Switches on	All errors are acknowledged and der the drive is free off errors

Hence corresponding to every state of the drive manager there is a unique state of the *Ready-to-operate relay*.

State	Switching status of the <i>Ready-to-operate relay</i>
NOT READY TO START	OFF
START DISABLED	ON
READY-TO-START	ON
SWITCHED ON	ON
OPERATION ENABLED	ON

State	Switching status of the <i>Ready-to-operate relay</i>
QUICKSTOP ACTIVE	ON
ERROR REACTION ACTIVE	ON
ERROR	OFF

6.3.2 Brake management

Dependent on drive status at drives with motor holding brake the brake can be switched manually or automatically. Control can happen via the power unit (only devices with microcontroller within the power unit (P3379) or via a digital output. For monitoring the brake status and the brake pad wear digital inputs can be used.

With activated monitoring an error message is generated, if the brake couldn't be released or applied or if the brake pad is insufficient.

Adjustable acknowledge and delay times make it possible to adapt to brake specific reaction times.

Manual brake control (P1400 Bit0 = 0)

The brake can be applied and released independently of the drives operation status (P0302 Bit0).

Automatic brake control (P1400 Bit0 = 1)

In automatic mode the brake is controlled depending on the drives operation status, during states 0 (NOT READY TO START) to 3 (SWITCHED ON) the brake is applied. At transition to state 4 (OPERATION ENABLED) the brake will be released.

For commissioning purposes (P0880 Bit1 = 1) the brake can controlled manually in automatic mode too. This option is not available within the software tool, the parameter has to be written directly via the parameters list.

Releasing the brake

While starting the drive the motor is energized at the transition from state 3 (SWITCHED ON) to 4 (OPERATION ENABLED) before releasing the brake. This prevents a hanging axis to sink, provided that at least a speed controlled operation is active.

NOTE



Sinking of a hanging axis could not be avoided in the following cases:

- The drive operates in one of the modes Find notch position, Autotuning or Current control.
- An asynchronous machine is operated without encoder (Open Loop).
- An additional torque set value (P1022) is applied.

Different modes can be selected to release the brake, see also torque diagram below.

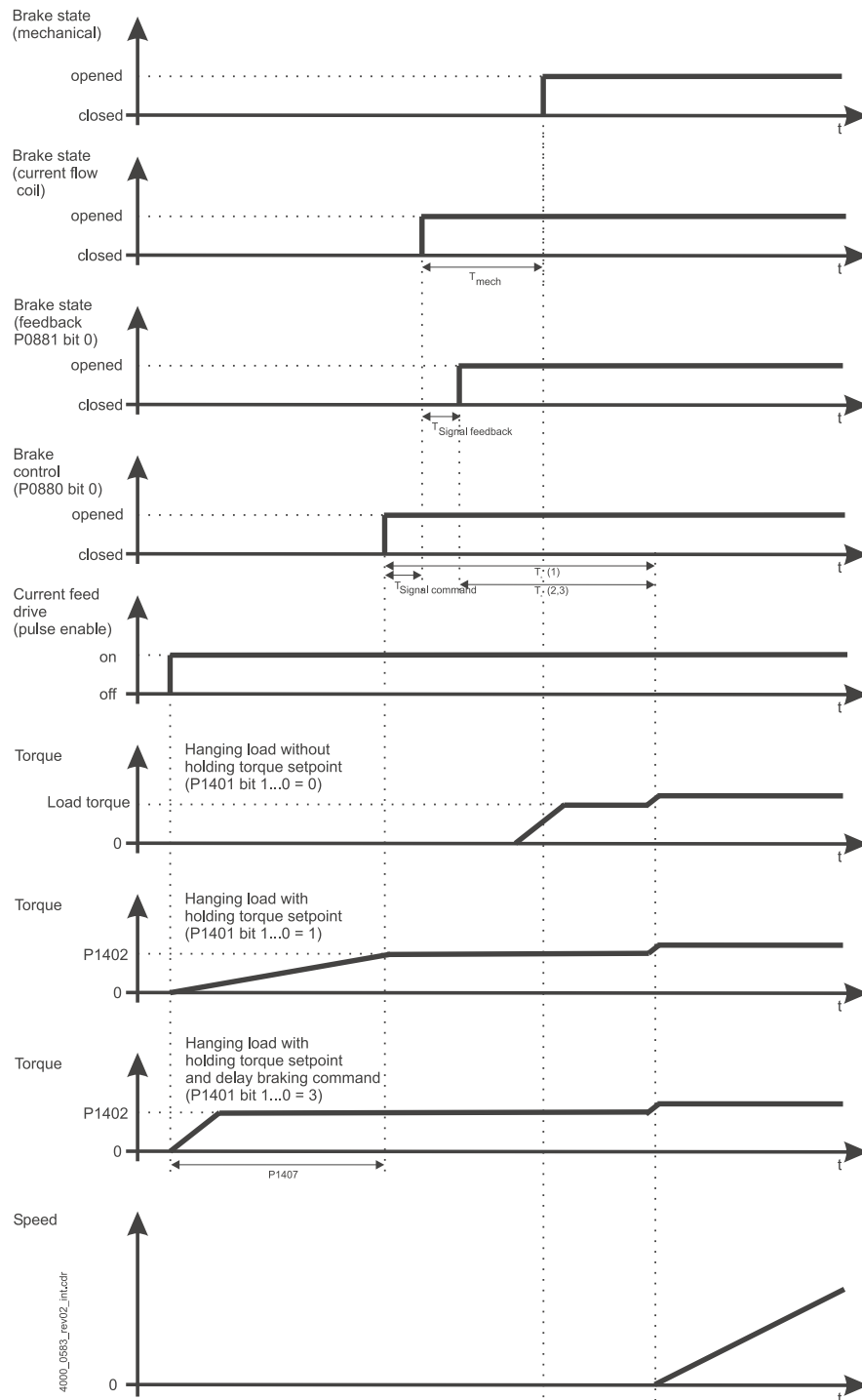


Figure 6.17: Device start with automatic brake control

- Hanging axis without prompted holding torque

The torque to clamp the load is established after releasing the brake. Due to the necessary control deviation there will be a insignificant sinking of the load.

- Hanging axis with prompted holding torque

If at a hanging axis the outer load torque is well known, a compensating holding torque can be established before releasing the brake:

The torque to hold the load is established before releasing the brake. If the torque is achieved, the command Release brake is sent. If the holding torque exactly matches the load torque, the load will not sink. An eventual difference between load torque and adjusted holding torque will result in an insignificant move and will be disposed of. If it's not possible to achieve the parameterized holding torque, the brake will not be released. The drive then goes to ERROR state.

- Hanging axis with prompted holding torque and delayed brake command

The torque to hold the load is established before releasing the brake. Whether or not the torque is achieved, the command Release brake follows after an adjustable time delay **P1407**. If the holding torque exactly matches the load torque, the load will not sink. An eventual difference between load torque and adjusted holding torque will result in an insignificant move and will be disposed of.

To adjust the **Start of motion delay P1406** refer to the following advice:

1. if status monitoring is deactivated (**P1400** Bit1 = 0):

$$T_B > T^1_{SignalKom} + T^2_{mech}$$

2. if status monitoring is activated (**P1400** Bit1 = 1) and the response signal monitors the status of the brakes current:

$$T_B > T_{mech} - T^3_{SignalRueck}$$

3. if status monitoring is activated (**P1400** Bit1 = 1), response signal via digital input (**P0883** Bit0 = 1) and the response signal reports the mechanical status of the brake:

$$T_B = 0$$

¹Command operation time in the controller: With brake activation via power unit (**P0882** Bit0 = 0) max. 70ms, with activation via digital output (**P0882** Bit0 = 1) max. 2ms.

²Typical actuation time of holding brakes (type dependend) ca. 75ms...350ms

³Time to establish the current through the brakes coil (type dependend ca. 30ms) + time to operate the response signal in the controller: With response via digital input (**P0883** Bit0 = 1) max. 40ms.

For a decent error reaction follow the rule: **P1404** Timeout response signal > $T_{SignalKom} + T_{SignalRueck}$

Applying the brake

While applying the brake it is considered, if the drive is still under torque or if the pulses are disabled.

Pulses enabled (drive under torque)

If the drive is actively slowed down (reaction to Quickstop / Shut-down / disable drive / Drive error) and the torque should be removed after the slowing-down process (Pulses disabled), the brake will be applied at an adjustable speed limit. The following Pulses disabled can be delayed additionally, if compensation of a mechanical dead time makes this necessary. After applying the brake and expiration of delay time the slowing-down ramp is canceled (see figure 6.18 speed controlled slowing-down ramp, dotdashed line).

If activated status monitoring recognizes that the brake couldn't be applied, the drive remains under torque in state Quickstop active / Shut down drive active / Inhibit operation active to avoid sinking of a hanging load.

This state will be reported by an appropriate error message. The user can move the drive into a torque free position and switch off the drives torque (Pulses disabled or Inhibit voltage).

The conditions and events, which are necessary to make the transition to the state Operation enabled, are to be found in chapter «State machine of device control» from page 88.

In state Error reaction active this verification doesn't take place. Consequently as well at activated monitoring and released brake the transition to Error state will happen. Thus the drive becomes torque free.

If the drive suddenly becomes torque free through Pulses disabled (hardware input or reaction to Quickstop / Shut-down / disable drive / Drive error), the brake can be applied immediately or at achievement of a speed limit (see above). At a hanging axis it is recommended to apply the brake immediately (P1401 Bit2 = 0), because the drive could be accelerated by the external torque and the speed limit would not be achieved.

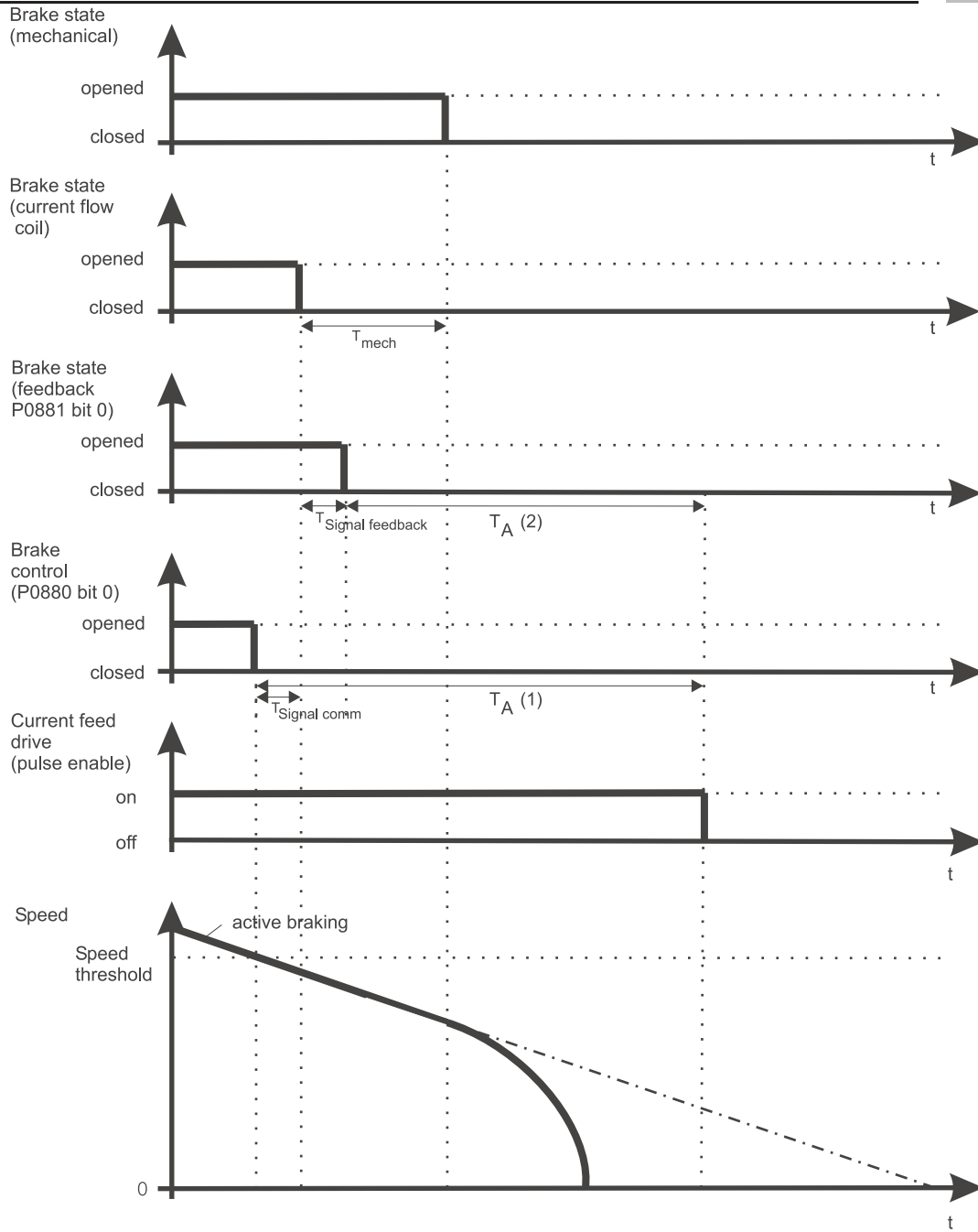


Figure 6.18: Slowing-down with automatic brake control

To adjust the time delay of Pulses disabled T_A (P1405), following this rule is recommended:

1. if statur monitoring is deactivated (P1400 Bit1 = 0):

$$T_A > T^4_{SignalKom} + T^5_{mech}$$

2. if status monitoring is activated (P1400 Bit1 = 1) and response signal reports the status of the brakes current:

$$T_A > T_{mech} + T^6_{SignalRueck}$$

3. if status monitoring is activated (P1400 Bit1 = 1), response signal via digital input (P0883 Bit0 = 1) and the response signal reports the mechanical status of the brake:

$$T_A = 0$$

6.3.3 Data set management

Description to data set management is to be found in chapter «Data set management» from page 19.

⁴Time see release brake

⁵Release time of holding brakes type dependend, ca. 125ms...400ms

⁶Time to descent of the current through the brakes coil (type dependend, ca. 30ms) + response operation time in the controller:
 With status report via power unit (P0883 Bit0 = 0) max. 100ms With response via digital input (P0883 Bit0 = 1) max. 10ms.
 For a decent error reaction follow the rule: P1404 Timeout response signal > $T_{SignalKom} + T_{SignalRueck}$

6.4 Set value generators

6.4.1 Ramp function generator

The ramp function generator serves for the generation of rising or slanting ramps in the operation modes with speed control Prompted speed 1 ($P1000 = 2$) and Speed control ($P1000 = -3$) resp. to control slowing-down processes (Quickstop, Shut-down drive, Inhibit drive).

The ramp function generator has an input with separately adjustable ramp-up and ramp-down time. Furthermore, the ramp-down time for the quick stop function is separately adjustable.

Input and output values of the ramp function generator are relative variables ($\pm 100\%$) and are scaled to parameter **Motor maximum drive speed P1031**.

The ramp-up resp. ramp-down time determine the ramp slope for the acceleration and slowing-down process. At this the time values correspond to a change in set value of 100%.

The ramp function generator offers the following control possibilities directly via the control word (see also **P0300**):

- Inhibit ramp function generator (set output permanently to 0, i.e. slow-down at the current limit)
- Stop ramp function generator (freeze the output value)
- Inhibit ramp function generator set value (set input internal to 0, that means slow-down at the deceleration ramp)

Furthermore with the ramp function generator mode **P1170** the following options are selectable:

- Inhibition of positive or negative set values
- Sign inversion of set values
- Setting of ramp shape:
 - Trapezoidal speed profile; square-wave acceleration:

You have got the possibility to smooth the speed value using a PT1 filter.

- S-curve with square speed profile; trapezoidal acceleration:

The resulting ramp-up- or ramp-down time at a change in set value of 100% are calculated as follows:

$$T_{ramp-uptotaltime} = T_{ramp-uptime} + T_{SKramp-uptime}$$

resp.

$$T_{ramp-downtotaltime} = T_{ramp-downtime} + T_{SKramp-downtime}$$

- Interpolation of output set value according the control cycle period
- Choice between 16-bit-parameter (**P1171**) or 32-bit-parameter (**P1179**) as input value to the ramp function generator

- Reference value for ramp function generators hold time **P1174**
 - Change in set value from 100% to 0%
 - Change in set value from the current set value to 0%

For a decent operation of slowing-down processes at quickstop- or ramp-down ramp the speed controller must sufficiently be parameterized.

6.4.2 Set value generator

The set value generator creates a constant set value for each of four time zones. Thereby set value and retention time are separately adjustable for every zone.

The set value generator is able to effectuate the following target parameters (selectable via **Set Value Generator mode P0440**):

- Ramp function generator input
- Additional speed set value
- Torque set value
- Current positioning data set

In the first three modes the time affects the output time for the according set value. In the mode Switchover current positioning set the time specifies the retention time in the target position.

Furthermore it can be set, if after expiration of the last time zone the set value generator starts with the first time zone again (endless operation), or if only one cycle is passed through and the last set value remains. Therewith e.g. the following speed set value process can be generated:

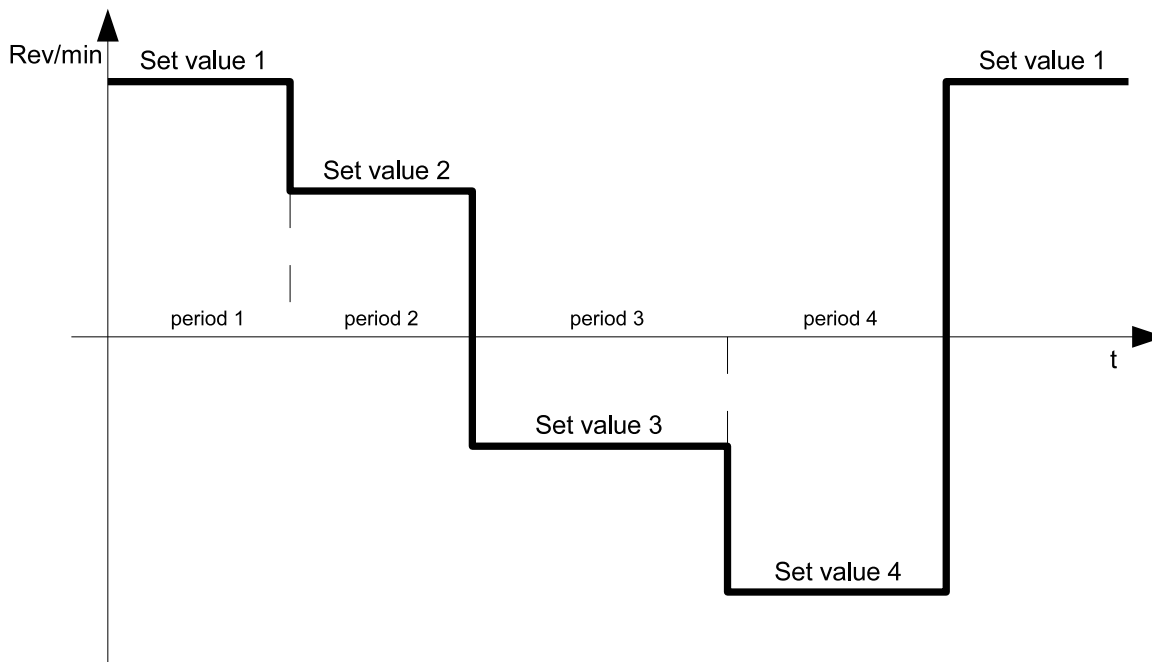


Figure 6.19: Set value generator; speed set value characteristic

The set value generator has a cycle time of 16ms and is only active if the drive is enabled. Hence the adjusted time values can only be realized with a granularity of 16ms. Up to 16ms longer times resulting of this are not accounted in the next time zone.

After enable of the drive it is always started with the first set value from the profile which was set.

6.4.3 CAM disk

In the **b maXX® BM3400** firmware is a simple CAM disk function implemented, whereby a value is read out of a configurable table and written to a target parameter. To read out the table the CAM disk function has the following modes:

1. Time scheduled operation
2. Time scheduled operation with virtual master device
3. Operation controlled by parameters

The index is calculated by the runtime function with an adjustable period (see parameter *SyncInterval*). Using this parameter it is possible to use the mode Synchronization with prompted synchronous set values, where the set values are quadratic interpolated between two succeeding controller periods (0,125ms).

6.4.3.1 Time scheduled operation

At this mode the index of the table is incremented every loop cycle.

6.4.3.2 Time scheduled operation with virtual master device

At this mode the index results from (**position virtual master of CAM Module P2089**), speed (difference of positions in time interval) of which is adjustable using **speed of virtual master P1189**. At this *CamSpeedVirtualMaster* = 128 represents an index increment of one table entry (sampling point) per set value interval. That means, between the sampling points there is an interpolation with a resolution of 1/128. If the virtual master device provides a negative sign speed value, the curve will be passed through in reverse direction. The maximum usefull speed depends on the number of sampling points and the shape of the curve itself.

Range of values from master position: 0 ... (128 · CamMaxIndex (**P2080**) - 1)

Operation time of the curve is calculated as

$$Zeit = CamMaxIndex \cdot 128 \cdot \frac{SyncInterval}{CamSpeedVirtualMaster}$$

To make combinations more clearly, see the example below:

count of valid CAM table entries P2080	512
Sync interval P0532	250µs
speed of virtual master P1189	327

Operation time of the curve shall be calculated:

$$Time = 512 \cdot 128 \cdot \frac{0,250ms}{327} = 50,10ms$$

Wanted is the value, which must be assigned to **speed of virtual master P1189**, to achieve an operation time of the CAM disk of 50ms.

$$CamSpeedVirtualMaster = CamMaxIndex \cdot 128 \cdot \frac{SyncInterval}{Zeit}$$

therefor

$$CamSpeedVirtualMaster = 512 \cdot 128 \cdot \frac{0,250ms}{50ms} = 327$$

6.4.3.3 Operation controlled by parameters

At this mode the input parameter (with adjustable modifications) is used as index to access the table.

Calculation of the index happens as

$$Index = (CamInParam(P2082) - CamIdxBaseValue(P2085)) \gg CamIdxShiftFactor(P2086)$$

The runtime function of the CAM disk is operated in the 250µs time slot.

6.4.3.4 States and operation break down of CAM disk

The module operates in 3 states (CamState (P2088)):

Whitin state KURVE_IDLE (inaktiv) table values can be loaded and configuration parameters

count of valid CAM table entries P2080,
 CAM Input Parameter number P2082,
 CAM Output Parameter number P2083,
 CAM Reference Parameter number P2084,
 Basic Value of CAM Input (Offset) P2085,
 Shift Factor for Normalising CAM-Input P2086,
 CAM Output Cycle Offset P2090

as well as configuration bits in CAM Mode P2087 can be written.

With the transition to state KURVE_INIT_START (aktiv) internal variables are set and the validity of the configuration is checked. A wrong configuration is reported with corresponding error bits in status (CamState (P2088)). If there is no error, the module is ready to start providing set values. Index resp. the position of the virtual master device are cleared to zero before the start.

Output of set values (transition to state KURVE_RUN) is started with a low-high edge of the startbit in CamMode. Within the Relative mode at start time the value of parameter CAM Reference Parameter number P2084 is read. After that all the table values are related (added) to this value. Thereby synchronization of set values can happen, after set values have been applied yet otherwise. By selection of the parameter in CamRelParam it is possible to address as set values as actual value. If Relative mode is not selected, table values are written as absolute values.

If a cyclic pass through the table is selected within time scheduled operation, at the end of the table resp. at maximum position of the virtual master device the value CamOffset (is calculated and written automatically when using the software tool) is added and the output of set values is cyclic proceeded until a reset or deactivation of the CAM disk function (immediately canceling the output of set values in each case).

With cleared startbit the output of setvalues will be stopped at the end of CAM disk. If a unique table pass through is configured, the CAM disk cycle will be passed through exactly one time to the and and then switched to the KURVE_INIT_START state.

Parameters

The CAM disk needs the following parameters:

Name	Number	Meaning
CamSpeedVirtualMaster	P1189	Speed of the virtual master device
CamMaxIndex	P2080	Number of valid table entries for CAM disk generator
CamActIndex	P2081	Actual table index for CAM disk generator
CamInParam	P2082	Input parameter (index) for CAM disk generator (mode: operation controlled by parameters)
CamOutParam	P2083	Target parameter for CAM disk generator
CamRelParam	P2084	Parameter number of source reference for CAM disk generator in relative mode
CamIdxBaseValue	P2085	Base value for index calculation of CAM disk generator (mode: operation controlled by parameters)
CamIdxShiftFactor	P2086	Shift factor for index calculation of CAM disk generator (mode: operation controlled by parameters)
CamMode	P2087	Mode for CAM disk generator
CamState	P2088	Status of CAM disk generator
CamPosVirtualMaster	P2089	Position of virtuel master device
CamOffset	P2090	cyclic offset

6.4.3.5 Interpolation

During operation controlled by parameters and with a virtual master device interpolation is possible between table entries. This can be activated with Bit10 of parameter *CamMode*. You can choose between linear and quadratic interpolation (Bit11 of *CamMode*).

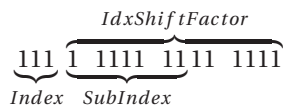
Mode operation controlled by parameters

Calculation of table index happens as:

$$Index = (CamInParam - CamIdxBaseValue) \gg CamIdxShiftFactor$$

Thereby only the upper bits of input are used as index to the table. At large *CamIdxShiftFactor* values a major part of the input information is ignored, what can lead to erratic behavior of values in the output parameter.

Purpose of interpolation is to use the information given at the input to finer adjust the output.



The example above shows, how many bits are used to calculate the *Index* and *SubIndex* if the input parameter has 16 bit and *IdxShiftFactor* is set to 13. The number of bits, which are available for calculation of the *SubIndex*, determines the maximum number of sampling points that can be used during interpolation. Within the example 7 bits are used for *SubIndex*, so there are $2^7 = 128$ intermediate values or sample points differentiable.

If we assume

Index	actual calculated index
y_i	base value of the CAM disk, which is associated with index
y_{i+1}	base value of the CAM disk, which is associated with next index
<i>bits</i>	<i>IdxShiftFactor</i> , but maximum of 7

the output value is calculated as

$$y_{SubIndex} = (y_{i+1} - y_i) \cdot \frac{SubIndex}{2^{bits}} + y_i$$

Modus time scheduled operation

At time scheduled operation with virtual master device the master cycle (*CamPosVirtualMaster*) can take 128 intermediate values by definition of speed of the virtual master device.

For this positions the output values of the CAM disk are interpolated between the sampling points. At pure operation of table values (time scheduled operation without virtual master device) interpolation is not provided.

6.4.3.6 Interface to WinBASS

CAM disk function is controlled by the software tool using parameters. The table itself is a memory area within the controller, which can be accessed via a common interface.

CAM disk table

The table has a capacity of 1026 words. 1024 words of these are used for the CAM disk table itself, whereby 1024 sampling points are possible with 16 bit parameters and 512 sampling points are possible with 32 bit parameters.

At table index 1024 (index starts with 0) the offset is allocated (corresponds to *Tabelle*[0] + *CamOffset*(P2090)). A flag at table index 1025 labels the validity of the table.

The table can be stored within the parameters memory (EEPROM resp. PSI). In the EEPROM all the 1026 words are stored, but using the communication interface you can only access the actual CAM disk values (1024 words).

The offset is copied from **CAM Output Cycle Offset P2090** during initialization of CAM disk.

The range of values of parameter **Data set command P0310** was modified to handle the table.

Value	Meaning
29	Save CAM disk data
30	Load CAM disk data

The commands above are only affect the internal parameters memory. To store onto PSI the command 12 Write all parameters of the valid data sets into the PSI must be used.

If the controller is activated (controller is in state 4), loading the CAM disk data from the parameters memory is prohibited. If you try this anyhow, parameter **Data set status P0311** is set to 7 (*DSV_ERR_NO_CHANGE*).

The controller monitors the actual operation state of the CAM disk during the write operation of the mode parameter. Several actions (e.g. changes in configuration) only can be performed in state *KURVE_IDLE* (inactive).

To download the CAM disk data a handshake is to be followed, where at first the actual CAM disk table has to be invalidated before starting the download. After the download has finished the CAM disk table has to be enabled again. The controller will provide error messages if:

- download shall be started, but CAM disk data are still valid,
- CAM disk data shall be invalidated, but the controller is active,
- CAM disk shall be commissioned but the table isn't validated yet.

The status of the CAM disk table (valid / invalid) is stored within the EEPROM too.

6.5 Controller

6.5.1 Speed controller

The Kp factor of the speed controller **Speed controller P-gain P1032** has no unit.

To get the physical unit in A*s/rad (speed in rat/s), the following conversion is necessary:

$$SpeedcontrollerPgain \cdot \frac{10A}{2\pi \cdot 50Hz} = \frac{SpeedcontrollerPgain}{10\pi} \cdot (A \cdot \frac{s}{rad})$$

6.5.2 DC link controller

During slowing-down processes energy is recovered back from the motor to DC link, which is wider charged up. This energy can only be reduced by a chopper resistor.

To prevent the DC link voltage from rising up to steeply, it is limited by control to an adjustable maximum value **DC link controller set value P1250**. For this purpose the slowing-down torque of the device is reduced if necessary.

6.5.3 Two level controller

The **b maXX[®] BM3400** controller has two independently operating and freely configurable two-level controllers.

With the two-level-controller 1 relative and absolute switching thresholds can be monitored. At two-level-controller 2 the relative switching thresholds are omitted.

The operating mode of the according two-level controller is configurable.

The two-level controller works according to the data type of the actual value within a value range

- from -32768 to +32767 with signed variables (INT, DINT) and
- from 0 to 65535 with unsigned data types (UINT, UDINT, WORD, DWORD).

According to this the parameters for the switching thresholds are interpreted signed or unsigned. At specification of 32 bit parameters the two-level controller only evaluates the high word (Bit16 ... Bit31) for the actual value.

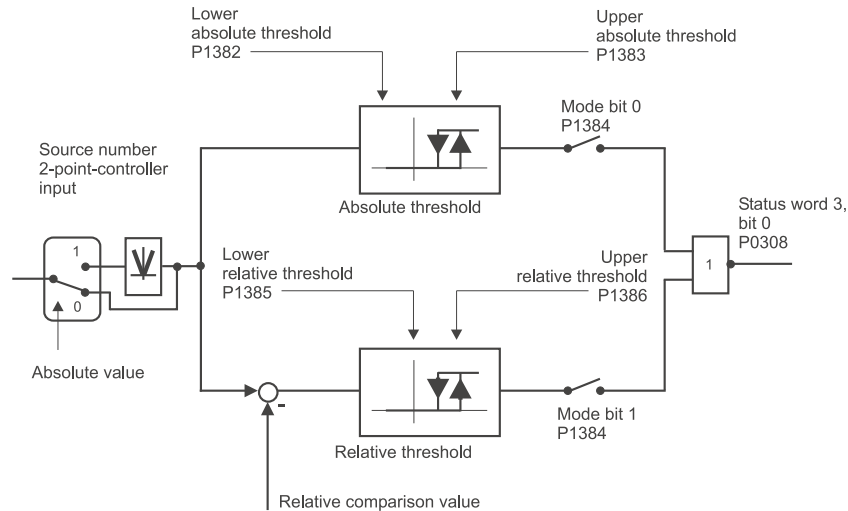


Figure 6.20: Structure diagram of two-level-controller 1

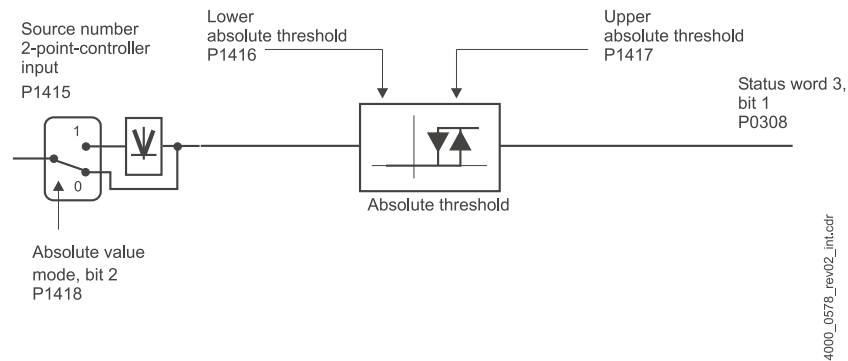


Figure 6.21: Structure diagram of two-level-controller 2

6.5.3.1 Two level controller with absolute thresholds

This operation mode is the classical application of two-level controllers.

To two-level-controller 1 applies:

Hysteresis is determined by both parameters **Lower threshold absolute two-level-controller1 P1382** and **Upper threshold absolute two-level-controller1 P1383**. The lower switching threshold always must be less than the upper switching threshold - the controller does not internally check the value ratio.

The two-level-controller with absolute thresholds is activated by Bit0 = 1 in parameter **Mode two-level-controller1 P1384**:

The two-level-controller 2 switches off, if the following is valid:

Two-level-controller input \geq Two-level-controller upper switching threshold

The two-level-controller switches on, if the following is valid:

Two-level-controller input $<$ Two-level-controller lower switching threshold

Usage e.g. for temperature monitoring, speed monitoring a.s.o.

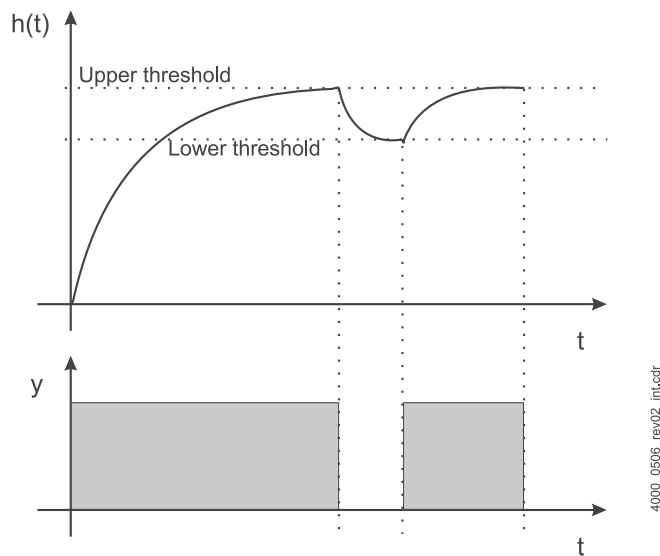


Figure 6.22: Two-level-controller with absolute thresholds

Accordingly the following is valid for the two-level controller 2:

Activation happens by setting Bit0 = 1 in parameter **Mode two-level-controller 2 P1418**. Threshold value parameters are **Upper threshold absolute two-level-controller 2 P1417** and the corresponding lower threshold **P1416**.

6.5.3.2 Two level controller with relative thresholds

Only applies to two-level-controller 1.

In this operating mode **Parameter number input value two-level-controller1 P1380** is compared with one upper and one lower switching threshold, which is calculated from the instantaneous value of (**Parameter num relative compare value two-level-controller1 P1381**). The switching point therefore is not fixed, but it observes the instantaneous value, whose parameter number is specified in parameter (**P1381**).

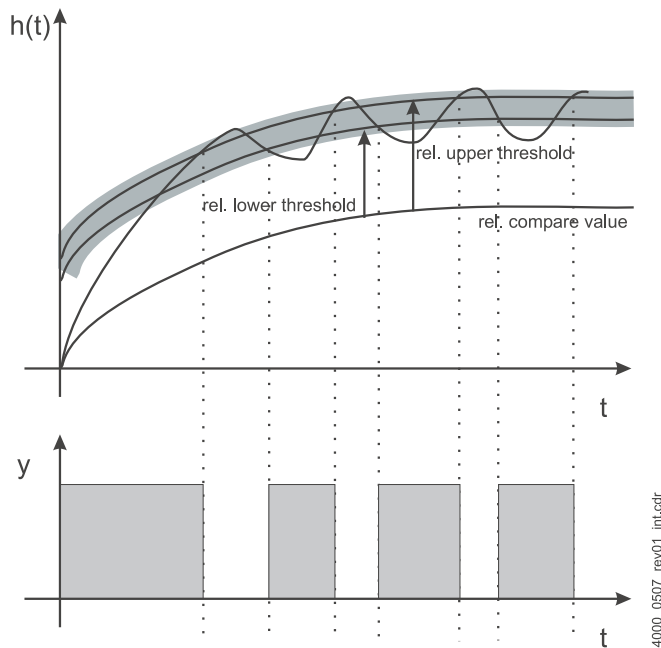


Figure 6.23: Two-level-controller with relative thresholds

The switching hysteresis arises from the difference between the upper and lower switching thresholds.

Setting Bit1 = 1 in **Mode two-level-controller1 P1384** activates the two-level-controller with relative thresholds.

The two-level-controller switches off, if the following is valid:

Two-level-controller input \geq Two-level-controller relative upper switching threshold

The two-level-controller switches on, if the following is valid:

Two-level-controller input $<$ Two-level-controller lower switching threshold

Application sample: heat sink controlling of the power unit

The output of the two-level-controller switches a solenoid valve for the cooling water supply of the power unit cooling.

In order to avoid dew, the heatsink temperature of the power unit never may be less than the environmental temperature.

Controlled variable is the heatsink temperature ((**Power Unit heatsink actual temperature P0482**). This actual value is compared with the relative comparison value of the environmental temperature at the heatsink. This, for example, can be determined via an external temperature sensor, which is connected to the analog input.

If the relative offset shall be 5K and the hysteresis shall be 5K too, the *two-level-controller relative lower switching threshold* = 5 and *two-level-controller relative upper switching threshold* = 10.

6.5.3.3 Combination of operating modes using relative and absolute thresholds

Both threshold types can be activated together, so that the curve of the relative threshold is limited by a fixed, absolute threshold in the controller and can be monitored. The output of the two-level controller 1 thus switches on, if the actual value is below the relative and absolute lower threshold and switches off, if the actual value exceeds the relative or absolute upper threshold (NOR logic).

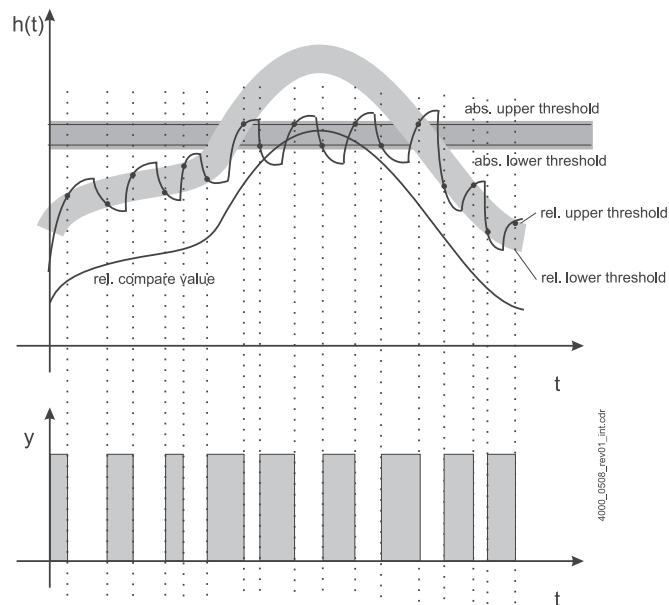


Figure 6.24: Combination of absolute and relative thresholds

6.5.3.4 Sign independent monitoring

By setting mode-bit2 (P1384 resp. P1418) the controller generates the absolute value and compares it with the thresholds, which also must be positive. Applications of this modus are e.g. speed monitoring (independent of the pos. and neg. rotational direction).

6.5.3.5 Linking of the controller output to the target parameter

The output of a two-level controller can directly be used to change a writeable **b maXX[®] BM3400** parameter.

This method is similar to that of the digital inputs. All 16 bit parameters can be used as a target parameter. At 32 bit parameters only the high word (Bit16 ... Bit31) is writeable.

When switching off a two-level controller the bit pattern at LOW (in consideration of bit selection) is automatically written to the target parameter.

The two-level-controller can also be used for switching between data sets (see chapter «Switching to data set 1 to 8» from page 34)

Meaning of the linking parameters: Parameters for two-level controller 1:

Parameter	Meaning
P1387	Target parameter number
P1388	Selection of the bits in the target parameter, which have to be changed
P1389	Bit pattern, which is written in the target parameter at controller output LOW.
P1390	Bit pattern, which is written to target parameter at controller output HIGH.

Parameters for two-level controller 2:

Parameter	Meaning
P1419	Target parameter number
P1420	Selection of the bits in the target parameter, which have to be changed
P1421	Bit pattern, which is written to target parameter at controller output LOW.
P1422	Bit pattern, which is written to target parameter at controller output HIGH.

At a positive edge of the two-level controller output the target parameter is changed as follows:

Target parameter = (Target parameter AND NOT (bit_selection))
OR (bit pattern at High AND bit_selection)

At a negative edge of the two-level controller output the target parameter is changed as follows:

Target parameter = (Target parameter AND NOT (bit_selection))
OR (bit pattern Low AND bit_selection)

If an error (e.g. value greater than maximum value or less than minimum value) occurs during the write operation, the controller will provide a corresponding error message (error code 24).

6.6 Operation modes

6.6.1 Setting target position (positioning)

Operation mode Setting target position is a form of drive-controlled positioning.

Based on the target position values the travelling profile is calculated within the drive and the target position is approached.

For selection of speed profile you can choose between a trapezoidal profile (time optimum), a S-curve (jerk smoothed) or a Sin^2 profile (jerk smoothed).

NOTE



While using the Sin^2 profile in combination with inconvenient parameter settings, oscillating and erroneous (with offset) speed set values can be appear. **Brakepoints may be passed over - even with initiated hardware limit switches!**

The drive has 16 positioning sets (1...16) and an active positioning set (0), which contains the positioning data (e.g. positioning set value, positioning speed, positioning acceleration etc.).

Position data may be changed

- statically (before the start of positioning) or
- dynamically (during an active movement)

If the travelling profile is changed dynamically, it is automatically adjusted to the new positioning data.

The target position can be assigned

- absolutely
- relatively to a target position or
- relatively to the instantaneous actual position (*on the fly positioning*)

During positioning the travelling distance of the drive can be limited with hardware limit switches and with freely adjustable software limit switches. If the drive reaches such a limit switch, it is slowed-down and a corresponding status message or error message is generated.

Sensing of the positioning actual value can be done by using one of the supported encoder systems. In order to establish an absolute reference from the drive position to the travel distance at the encoder systems, which do not supply absolute positioning information (e.g. incremental encoder and singleturn encoder), there are different possibilities of homing. These are implemented as own operating modes and are prescribed in chapter «Homing» from page 138.

6.6.1.1 Control of positioning

There are two different variants of control:

- Old behaviour (like V-Regler)

Positioning is started with Bit11 (*Start Positioning*) of **Controlword P0300**, Bit4 (*New set value*) is only used for handshake purposes.

To use Positioning with V-Controller behaviour, Bit9 in parameter **Positioning mode P1190** is to be set.

- New behaviour

The new behaviour only operates using Bit4 (*New set value*). With every rising edge at this bit the positioning data sets are copied (data set X to data set 0), applied internally and the positioning is started.

6.6.1.2 Positioning data

The controller has 16 positioning data sets (1...16) and one active positioning data set (0).

From which positioning data set the data is applied at the next starting command (rising edge in the control bit *New set value*, **Controlword P0300** Bit4) is assigned using parameter **Positioning record number actual P1191**. Thereby the data is copied from the specified positioning data set into the positioning data set 0.

Additionally a mode (**Positioning mode P1190**, Bit11) is selectable, in which positioning data can be changed and the positioning can be started already at the switching of the current positioning data set **P1191**. In this case no edge in the control bit *New set value* is necessary, but the bit must have been set.

There are the following different positioning procedures:

- Single setpoints

With this procedure a positioning data set is started, the drive is positioned on the target and stops there. Even during positioning, it is possible to activate a new task (edge at *New set value*), which is accepted immediately. The drive changes directly to the new positioning data.

This procedure is selected, if the bit *Change set immediately* (Bit5 at **Controlword P0300**) is not set.

- Set of setpoints

With this procedure several positioning data are activated one after another. The drive shall not come to standstill at the first target, but should activate the next data starting from the just reached target position.

This procedure is selected, if the bit *Change set immediately* (Bit5 at **Controlword P0300**) is set.

The state of bit *Change set immediately* in **Controlword P0300** is evaluated together with the activation of a travelling task at a rising edge of *New set value*.

6.6.1.3 Bits in the control word / status word

The following bits in **Controlword P0300** are used to control the positioning:

Bit No.	Name	Meaning
4	New set value	Signal to apply data and start the positioning procedure. Used for handshake procedure. A rising edge activates a positioning procedure.
5	Change set immediately	Flag to choose between single setpoint and set of setpoints. 0 Single setpoint: The drive shall stop at the target position. During travelling process new travelling tasks are applied immediately. 1 Set of setpoints: The drive doesn't stop at the target position and will apply the next travelling task not before reaching the target position.
6	absolute / relative	Flag to choose between specifying the target absolutely or relatively (only at selection of a special type of target specification). 0 Absolute target specification 1 Relative target specification

The drive sets the following mode dependent bits in **Statusword P0301** as response:

Bit No.	Name	Meaning
10	Target position reached	Message that the positioning target has been reached. 0 Target position not reached 1 Target position reached
12	Set value acknowledgement	Handshake signal, Feedback of the drive that the positioning data are applied: 0 Drive is ready to receive new set values. 1 Drive acknowledges applying the set values.

Annotations:

- Target position reached:

The message *Target position reached* indicates, that the positioning target has been reached. It is not indicated until the bit *New set value* in **Controlword P0300** is cleared. Because of the handshake procedure this message is not indicated if the bit *New set value* has been set.

An exception is the option *Start automaticaly after switching positioning data set* (Bit11 in **Positioning mode P1190**). In this case the message *Set value reached* is also not suppressed if the control bit *new set value* has been set.

- Set value acknowledgement:

Set value acknowledgement is the controllers answer to a new start command. The drive sets this bit after applying the positioning data and the positioning has been started. The bit is cleared as soon as the drive is ready to receive new set values. As long as this bit is set the control may not start a new positioning task. But the data in the positioning data sets are able to be changed.

6.6.1.4 Actions with rising edge in new setpoint

- The selected positioning data set (**P1191**) is copied to the active positioning data set 0.
If position data set 0 is selected, no data are copied. The data are used directly from the positioning data set 0.
 - If relative positioning is selected, the target position is calculated.
 - If the software limit switches are activated, the target position is checked against the allowed travelling range and depending on the setting (**P1190**, Bit5) an error is generated or the target position is limited.
 - The status flag *Target position reached* (Bit10 in **Statusword P0301**) is cleared.
 - The status flag *Set value acknowledgement* (Bit12 in **Statusword P0301**) is set to indicate that the positioning data have been applied.
 - In the mode Single setpoint positioning data are applied immediately (also if the drive is still positioning) and the positioning with the new data is executed.
 - In the mode Set of setpoints the data won't become effective until the previous target has been reached.
-

6.6.1.5 Operating sequence with single setpoints

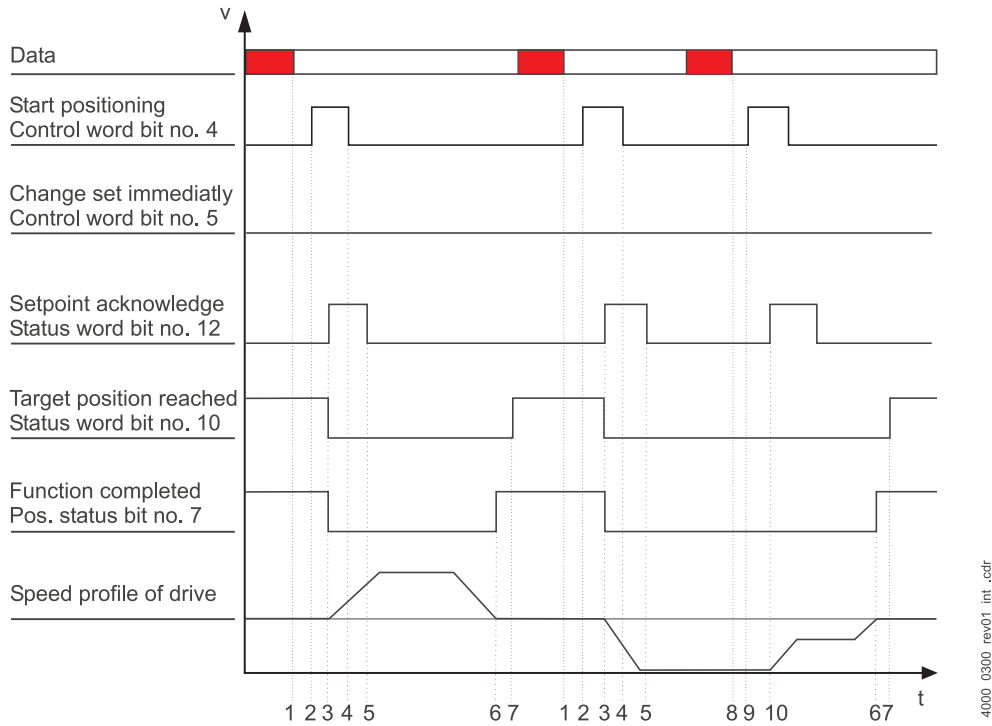


Figure 6.25: Positioning handshake with single setpoint

1. The control has transmitted the positioning data to the drive. The data will become effective not before an edge in bit *New set value* is recognized.
2. The control sets the bit *New set value* in **Controlword P0300**. The rising edge is a starting request for positioning. As the mode Single setpoint should be used, the bit *Change set immediately* (Bit5 in **Controlword P0300**) must be cleared at the appearing of the edge.
3. By setting of *Set value acknowledgement* the drive indicates that the starting request was recognized. The set values have been applied and the positioning procedure has been started. The message *Target position reached* is canceled and by clearing the bit *Function completed* in parameter **Positioning control status P0460** is indicated that the ramp generator provides new values.
4. The control clears the bit *New set value*.
5. In response to the cleared bit *New set value* the drive also clears the bit *Set value acknowledgement* in the status. From now on the message *Set value reached* is displayed again. It is suppressed as long as *New set value* is set.
6. Drive reaches the target position. The ramp generator reports *Function completed*, but from the smoothing generator values can still be provided.
7. The drive signals *Target position reached*. This happens dependent on the set positioning window **P1194** and the positioning window time **P1195**.

8. New positioning data are send while a positioning is active. These data are not taken into account until an edge is recognized in *New set value*.
9. Control sets *New set value*, although the previous positioning has not been completed yet. Nevertheless the data are applied and become effective immediately.
10. By setting of *Set value acknowledgement* the drive signals a recognized starting request. The new set values have been applied and became effective immediately, also if the previous positioning has not been completed yet.

6.6.1.6 Operating sequence with set of setpoints

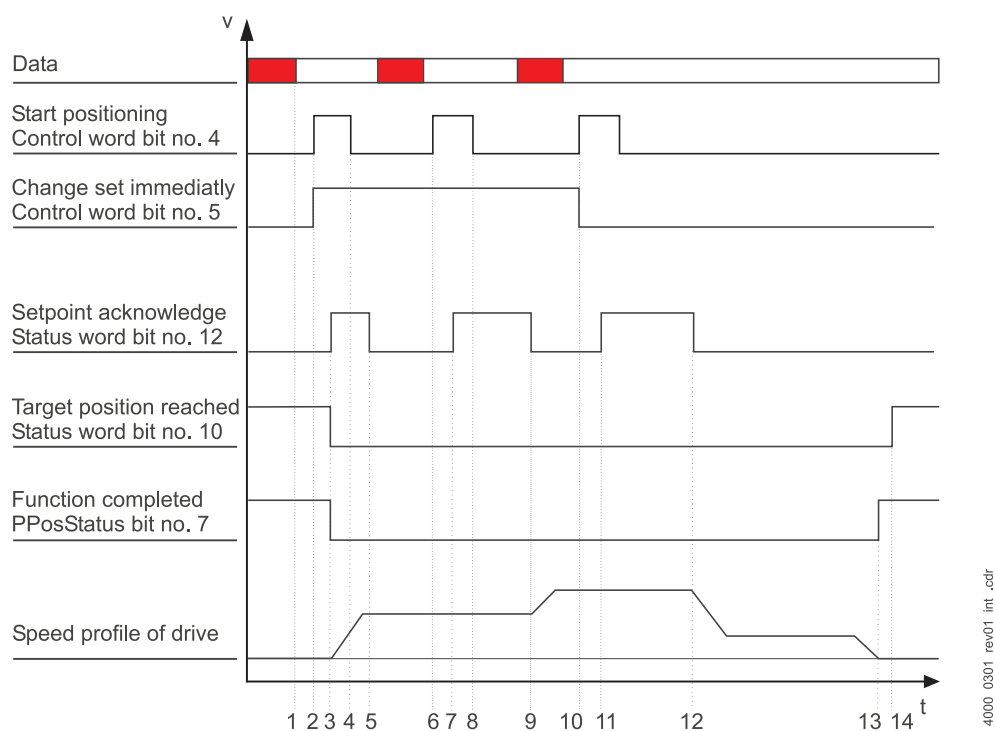


Figure 6.26: Positioning handshake with set of setpoints

1. The control has transmitted the positioning data to the drive. The data will become effective, not before an edge in bit *New set value* appears.
2. The control sets the bit *New set value* in **Controlword P0300**. The rising edge is a starting request for the positioning. As the mode set of setpoints shall be used the bit *Change set immediatly* (Bit5 in **Controlword P0300**) must be set at the edge.
3. By setting *Set value acknowledgement* the drive signals a recognized starting request. The set values have been applied and the positioning procedure has been started. The message *Target position reached* is cleared and by clearing bit *Function completed* in parameter **Positioning control status P0460** is signaled that the ramp generator provides new values.

4. The control clears bit *New set value*.
5. In response to the cleared bit *New set value* the drive also clears the bit *Set value acknowledgement* in the status.
6. The control has send new data and once more sets the bit *New set value* so that the data are applied. At this point of time the drive has not yet reached the first target position.
7. By setting of *Set value acknowledgement* the drive indicates that new data are applied. As the previous target has not been reached yet, they still won't become effective. The new positioning data are effective not before the first target position has been passed.
8. The control again cancels the bit *New set value*.
9. The drive has reached the first target position and now activates the new positioning data. From now on the drive is prepared to receive new set values, what is reported by canceling *Set value acknowledgement*.
10. The control has send new data and once more sets the bit *New set value* so that the data are applied. The positioning data should be the last data of this specification sequence, the drive should now stop at the target. That's why the bit *Change set immediately* must be cleared.
11. By setting of *Set value acknowledgement* the drive indicates that new data are applied. As the previous target has not been reached yet, they still won't become effective. The new positioning data are effective not before the first target position has been passed.
12. The drive has reached the second target position and now activates the new positioning data. From now on the drive is prepared to receive new set values, what is reported by canceling *Set value acknowledgement*.
13. The ramp generator reports *Function completed*, but values can still be provided from the smoothing generator.
14. The drive signals *Target position reached* depending on the set positioning window and the positioning window time.

6.6.1.7 Hardware limit switch

To limit the travelling range hardware limit switches can be used. These hardware limit switches are only effective in the operating modes position target specification and Jogging. Additionally they can be used for Homing, whereby they serve as reference markings and not as travelling limiter.

Monitoring of limit switches is selected by Bit1 of parameter **Positioning mode P1190**. Bit1 is used to principally activate or deactivate the monitoring. Bit6 determines, if additionally to the slowing-down procedure an error message shall be displayed.

The status of the limit switch is always reported independently of the operating mode and of the further settings in parameter **Positioning switch status P0461**.

Selection of inputs for hardware limit switches

For use with hardware limit switches each of the digital inputs can be selected. Selection of the input takes place with parameter **P1214** resp. **P1215**.

Monitoring of hardware limit switches

While operation mode position target specification is active and the drive is enabled triggering one of

the hardware limit switches leads to the following reaction:

- In parameter **Positioning switch status P0461** the corresponding bit for the hardware limit switch is set.
- The drive is slowed-down to speed value = 0 along the ramp given by parameter **Positioning stop deceleration P1213**.
- The travel direction further into the switch is inhibited.
- If the response Error message is selected, an error is reported.
Error 198: „Negative hardware limit switch triggered“
Error 199: „Positive hardware limit switch triggered“
The reported error does not lead to an *Pulses disabled*, the drive remains position- controlled. This error must be acknowledged before a new travelling request is executed.

NOTE



While using the Sin^2 profile in combination with inconvenient parameter settings, oscillating and erroneous (with offset) speed set values can be appear.
Brakepoints may be passed over

Leaving the hardware limit switch

If now a new positioning task is started the travelling direction is checked.

New travelling profile leads into the inhibited direction:

The travelling profile is not operated.

- The inhibited direction remains inhibited.
- If the response Error message is selected, an error is reported again.

New travelling profile leads into the enabled direction:

The travelling profile is operated.

- The inhibited direction remains inhibited, as long as the corresponding hardware limit switch is triggered.
- If the response Error message is selected, an error is reported again, if at the end of the travelling profile (new target position) the corresponding hardware limit switch is still triggered.

The hardware limit switches can't be used to stop (interrupt) a running positioning, because the new target position must lead in the enabled direction in any case.

Special case with both hardware limit switches triggered

If both hardware limit switches are triggered, both directions will be inhibited. Before the next travelling task can be executed one hardware limit switch have to be released.

6.6.1.8 Software limit switch

In the operating modes position target specification and Jogging software limit switches can be used to limit the travelling range. In all other operation modes the software limit switches are ineffective.

The configuration of software limit switches should follow these rules:

hardware limit switch 1 < software limit switch 1 < software limit switch 2 < hardware limit switch 2

The response of the limit switch monitoring is selectable:

Automatic limitation

If the response *Automatic limitation* is selected for the software limit switch, all target positions beyond the limit switch are limited to the corresponding limit switch. In other words - travelling goes to reach the software limit switch. Moreover the status flag for the according software limit switch is set and the message *Set value reached* will not be reported.

Error message

If the response *Error message* is selected for the software limit switch, the drive will report the error messages 196 resp. 197 „Software limit switch 1 resp. 2 triggered“, if the target position is beyond the limit switches.

The drive thereby remains position-controlled and doesn't carry out the incorrect request. The affected limit switch is shown in the parameter **Positioning switch status P0461**.

As long as the error message is present, no new positioning requests are executed. At first the error message has to be acknowledged. The status message *Target position reached* also will not be reported.

If a positioning request with invalid target position is activated, while the drive still is in motion, the running positioning procedure is still completed.

6.6.1.9 Target inputs

The range of values for the positioning consists of 16 bit revolutions and 16 bit angles, whereat the position as well as the actual position value basically is to be referred to as unsigned. There is one exception - the CANopen mode. In this case a calculated range displacement between the target position and the actual position target is to be made.

Hereby the target is to be seen as signed value, the range of values therefore extends from -2^{15} revolutions to $+2^{15}$ revolutions.

Specifying the target position is possible on different ways:

- Absolute target position
 - Relative target position in positive resp. negative direction, related to the previous target position.
 - Relative target position in positive resp. negative direction, related to the actual position value when the task is activated.
 - Relative target position with sign, related to the previous target position.
 - Selection between absolute / relative specified target position:
-

Via Bit6 in **Controlword P0300** is specified, if the target position is to be considered absolutely or relatively (related to the previous position target). If Bit6 is set at the rising edge of *New set value*, specification is to be considered as relative target position. If Bit6 is cleared, an absolutely specified target position is assumed. Relatively specified target positions are signed, but must be operated via **Positioning target position 0 P0600** anyway.

- CANopen mode:

Via Bit6 in **Controlword P0300** is specified, if the target position is to be considered absolutely or relatively (related to the previous position target). But for the absolute target input a range displacement in the target position is calculated. In this mode the range of values for positioning is to be considered as signed. The target input happens via the parameter **Relative Positioning control target position 0 P0607**.

- Absolute positioning to angle in positive resp. negative direction or along the shortest way

Only the angle of the target specification is considered and is approached in the next possible position.

- Absolute positioning to angle with selectable number of revolutions

Positioning takes place to the requested angle. The number of rotation is counted relatively.

- Modulo positioning in direction of the shortest way (optimized on distance)

This positioning can be used at axes, where an endless positioning (rotary axis operations) is wanted and the target positioning shall be specified in the modulo format. The ratio of an intermediary transmission element (e.g. gear) is considered via the definition of the modulo value range (**Positioning modulo position P1239**). Therefrom the controller calculates the shortest distance to the target position.

6.6.1.10 Switch operation mode to positioning

When switching into the operating mode Positioning a switch-over with speed adaption is possible.

The drive hereby retains the last speed for 16ms (starting from the time of switch-over). Within this time a new positioning request can be started, which can directly be applied.

After expiry of 16ms slowing-down to zero speed takes place with the delay specified in **Positioning stop deceleration P1213**.

The speed adaption is activated via Bit2 in parameter **Positioning mode P1190**.

6.6.1.11 Stop running positioning

By the setting of the *Stop* bits (Bit8 in **Controlword P0300**) a running positioning can be stopped.

For the deceleration ramp the data of actual positioning set are used.

The execution of the *Stop* commands are immediately displayed in Bit10 of **Positioning control status P0460**. If speed set value = 0 (**Positioning control status P0460** Bit15) and simultaneously the *zero speed message* (**Encoder 1 status P0390** or **Encoder 2 status P0400**, Bit10) is set, the axis is considered as stopped and *Set value reached* (Bit10 in **Statusword P0301**) is set.

With clearing the *Stop* bits automatically the remaining distance is travelled and the status bits *Set value reached* (Bit10 in **Statusword P0301**) as well as Bit10 in **Positioning control status P0460** are cleared.

Earliest if speed set value is set to zero, the stopped positioning can be continued again.

If the *Stop* bit is set yet at the time of setting the start command, positioning won't be started. Start up happens not before clearing the *Stop* bit.

During the stop status also the profile data together with the target position can be changed. For this a rising edge at the *Start* bit **Controlword P0300**, Bit4 *New set value* resp. Bit11 *Start positioning*) is necessary. However, the positioning profile cannot be switched.

At a Sin^2 positioning the new profile data are only applied, if speed set value = 0 (**Positioning control status P0460**, Bit15) and the *Stop* bit (**Controlword P0300**, Bit8) has been set.

6.6.1.12 Cancel running positioning

By setting the *Cancel* bit (**Controlword P0300**, Bit12)) the running positioning can be canceled.

For the deceleration ramp the data of actual positioning set are used. Execution of the *Cancel* command is immediately displayed in **Positioning control status P0460**, Bit10. With the bit *Set value reached* (**Statusword P0301**, Bit10) the completion of canceling the operation is displayed.

Earliest if speed set value is set to zero (**Positioning control status P0460**, Bit15), a new positioning operation can be started. The *Cancel* bit must not be set at this time.

Contrary to *Stop* running positioning via the *Stop* bit (**Controlword P0300**, Bit8), after clearing the *Cancel* bit the positioning will not continue.

6.6.1.13 Set value profiles

There are different speed value profiles implemented for positioning: Trapezoidal profile, S-curve profile and Sin^2 profile.

- At the Trapezoidal profile (time optimized) with constant acceleration values is calculated, changes in acceleration therefore happens in steps. In order to absorb the thereby conditioned jerk it is possible to smooth the generated profile by a PT1 filter.
- At the S-curve profil acceleration isn't changed in steps but trapezoidal. The maximum jerk (change in acceleration) is adjustable.
- At the Sin^2 profile acceleration is changed sinusoidal. The profile conforms to the inclined sine wave according to VDI 2143.

The time to finish positioning is at the same context (same distance, same maximum speed and acceleration) always longer while using S-curve profile than using trapezoidal profile without smoothing.

6.6.1.14 Comparison of the travel profiles of positioning

	Trapezoidal profile (time optimized)	Trapezoidal profile with smoothing	S-curve profile (jerk free)	Sin ² profile (jerk free)
Starting behaviour	rough			smooth
Behaviour while entering the target	rough	smooth		smooth
Acceleration profile	Block shaped	Block shaped smoothened	Trapezoidal	Sinusoidal
Speed value profile	Trapezoidal	Trapezoidal smoothened	S shaped	Sin ² shaped
Inclination to oscillate	high	low	low	lowest
Acceleration steps (da/dt → ∞)	3 resp. 4	none	none	none
Online change of position data possible	Yes	Yes	Yes	No
Mode <i>Single setpoint</i> possible	Yes	Yes	Yes	Yes
Mode <i>Set of setpoints</i> possible	Yes	Yes	Yes	No

The following examples show the different profiles:

Position data for example 1:

- Travel distance = 1 revolution
- Positioning speed = 230U/min
- Positioning acceleration, deceleration = 61U/s²
- Smoothing 20ms
- Jerk 1068U/s³

Position data for example 2:

- Travel distance = 134 revolutions
- Positioning speed = 7324U/min
- Positioning acceleration, deceleration = 180U/s²
- Smoothing 100ms
- Jerk 1068U/s³

Comparison of both examples shows the numerical limitations at lower dynamics.

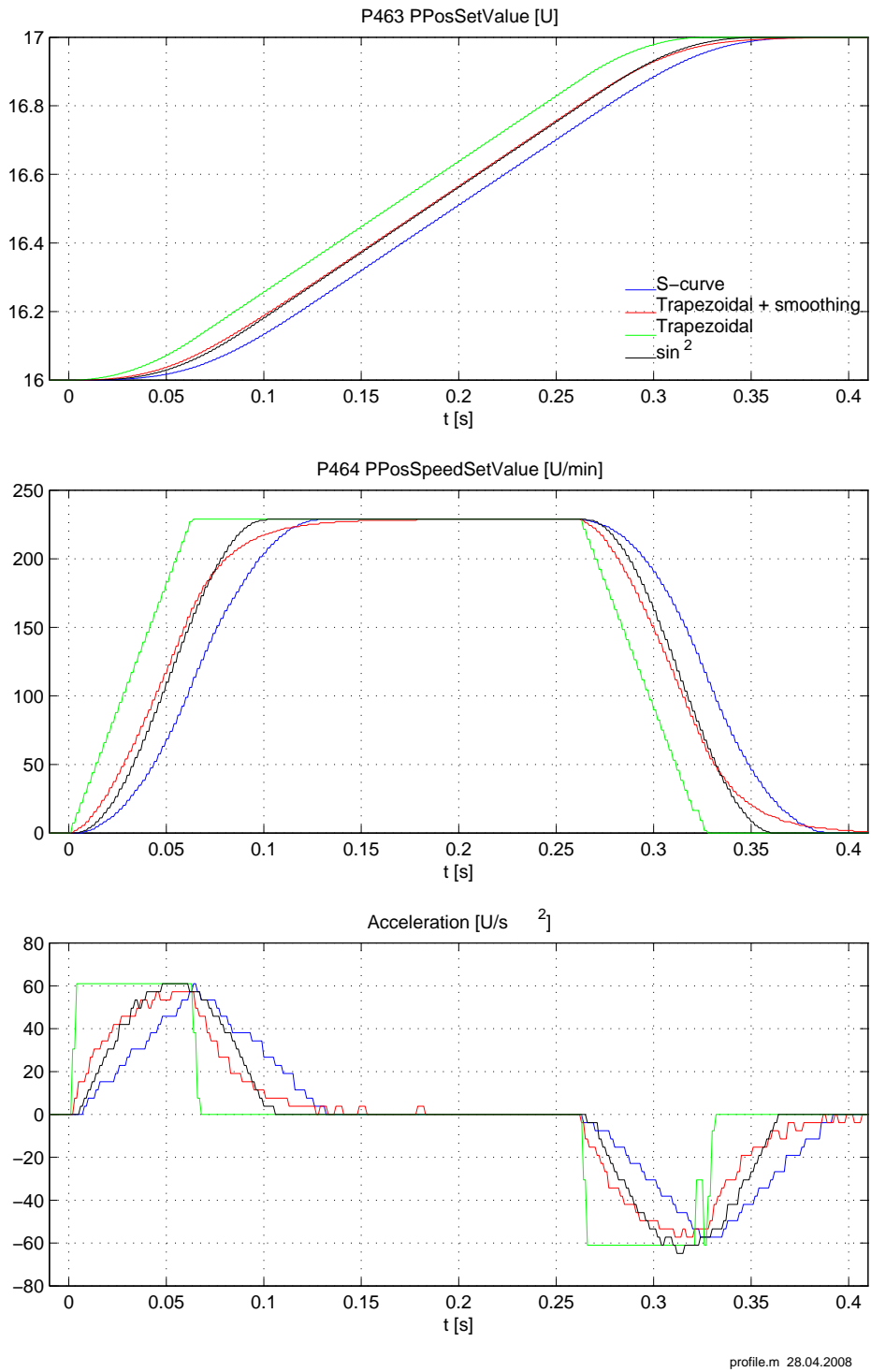


Figure 6.27: Comparison of travel profiles example 1

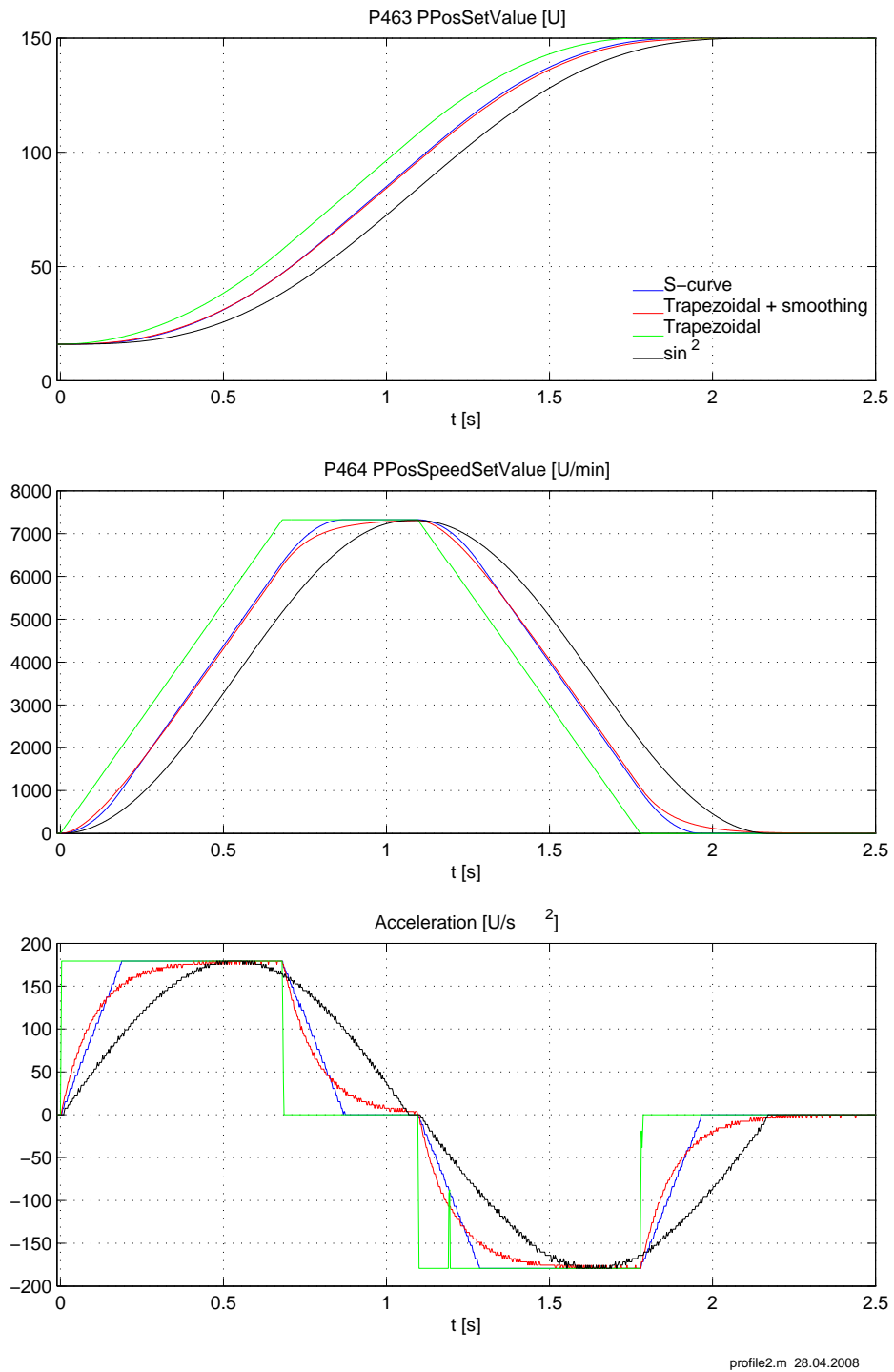


Figure 6.28: Comparison of travel profiles example 2

6.6.1.15 Positioning with V-Controller behaviour

In the following the original starting- and handshake method of positioning is prescribed. This method can be selected using parameter **Positioning mode P1190**.

The controller has 16 positioning sets (1..16) and one active positioning set (No. 0).

Using **Positioning record number actual P1191** at the beginning of positioning one out of the 16 positioning sets (1...16) is selected resp. transmitted via field bus.

With the command *Start positioning* (Bit11 in **Controlword P0300**) the positioning process is started. The *Start* bit always has to be set at the beginning of positioning. The positioning is then completed independent from the state of the *Start* bit.

Dependent from the specification of target position (parameters **Positioning target input 0 P0601**, **Positioning speed 0 P0602** a.s.o.) there are the following differences regarding to the *Start* bit:

- With the absolute limited target specification (target specification = 0, 5, 6, limited to maximum travel range) the *Start* bit may remain set. Positioning then always takes place to the current absolute target position. That means, with *Start* bit set, only new (absolute) target positions have to be written.
- With the normal relative target specification (target specification = 1, -1, 4) it depends on the positive edge of the *Start* bit. A new target position is generated in relation to the previous target position, if the positive edge of the *Start* bit appears.
- With the flying relative target specification (target specification = 2, -2, 7) it also depends on the positive edge of the *Start* bit. A new target position is generated which is relative to the current actual position, if the positive edge of the *Start* bit appears.
- With an absolute unlimited target specification (target specification = 3, not limited to maximum travelling distance) the drive will be positioned along the shorter way to the target. The maximum travelling range can be exceeded, if the software limit switch function is off.

Target positions are allowed to be changed at any time.

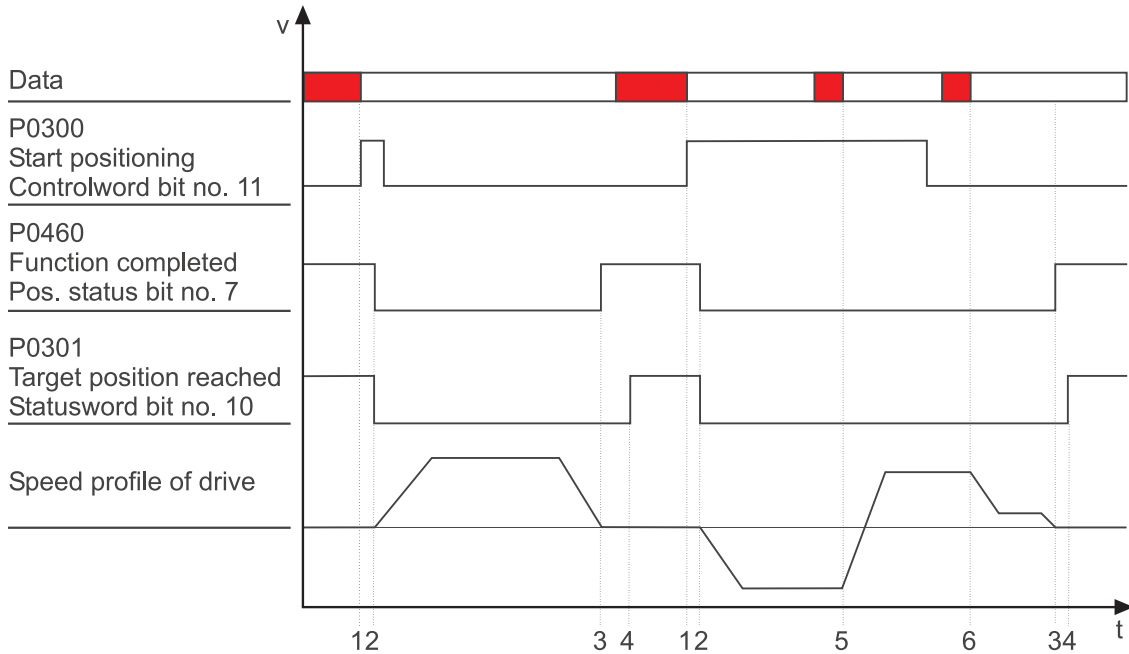
With the Trapezoidal profile changes become effective immediately, also if the drive is in motion at the moment. It immediately begins positioning to the new target position, if the target data specification dependent condition to the *Start* bit is fulfilled.

Changes due to switching between positioning data sets take effect immediately. Change of positioning speed, positioning acceleration and positioning delay is only effective if simultaneously the start bit is set. Parameters **P0601** target input 0 or **P0611** target input 1, and so on have no effect on this.

If the starting command has been accepted by the drive controller the drive starts positioning and *Target position reached* (Bit10 in **Statusword P0301**) changes to 0.

If the positioning function recognizes a *Quickstop* requirement, this results in slowing-down the drive to standstill according to the *Quickstop* code switching of the positioning process. If the operation is enabled again and a new start is requested, with absolute positioning the drive restarts positioning to the original target position.

Operating sequence of absolute positioning (target specification = 0)



4000_0212_rev02_int.cdr

Figure 6.29: Sequence of absolute positioning

Transition	Meaning	Description
1	<i>Start positioning</i> L → H	Positioning data valid; start request transmitted to Controlword P0300 .
2	<i>Operation completed</i> H → L and <i>Target position reached</i> H → L	Positioning has been started. <i>Start positioning</i> may be cleared. Between (1) and (2) a delay of 3ms to 5ms will arise!
3	<i>Operation completed</i> L → H	Providing set values by the ramp generator is finished. Attention: The smooting unit still may provide set values. See <i>Positioning status</i> Bit15.
4	<i>Target position reached</i> L → H	Will be set later than <i>Operation completed</i> depending on specified positioning window and positioning window time.
5	<i>New target position valid</i>	<i>Start</i> bit is set. Transmit new target position or positioning set was switched (therefor in the example the direction of rotation is inverted).
6	<i>New positioning speed valid</i>	A new positioning speed was transmitted or positioning set was switched.

NOTE



To change the current positioning speed or the current acceleration during the operation, Bit11 in **Controlword P0300** has got to be set.

Operating sequence of normal relative positioning (target specification = 1 or -1)

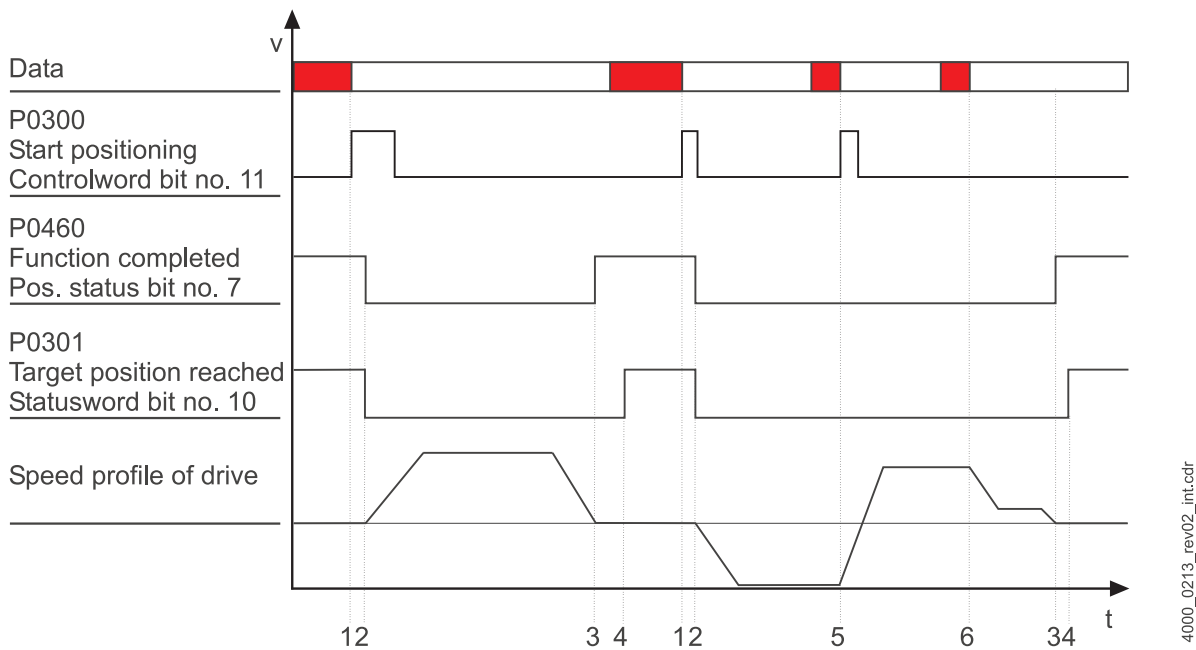


Figure 6.30: Sequence of normal relative positioning

Transition	Meaning	Description
1	<i>Start positioning</i> L → H	Positioning data valid; Start request transmitted to Controlword P0300 .
2	<i>Operation completed</i> H → L and <i>Target position reached</i> H → L	Start edge in Bit11 of Controlword P0300 recognized. Positioning will be started. <i>Start positioning</i> may be cleared. Between (1) and (2) a delay of 3ms to 5ms will arise!
3	<i>Operation completed</i> L → H	Providing set values by the ramp generator is finished. Attention: The smoothing unit still may provide set values. See <i>Positioning status</i> Bit15.
4	<i>Target position reached</i> L → H	Will be set later than <i>Operation completed</i> depending on specified positioning window and positioning window time.

Transition	Meaning	Description
5	<i>New target position valid</i>	New target position transmitted, target specification or positioning set changed. Start bit will be set again. New travelling distance will be added to the previous one (in the example rotation direction is inverted, because e.g. target specification has changed from +1 to -1).
6	<i>New positioning speed valid</i>	A new positioning speed was transmitted or positioning set has been changed.

Handshake procedure at positioning

In order to guarantee a reliable, time-independent mechanism for position control, a handshake procedure was implemented.

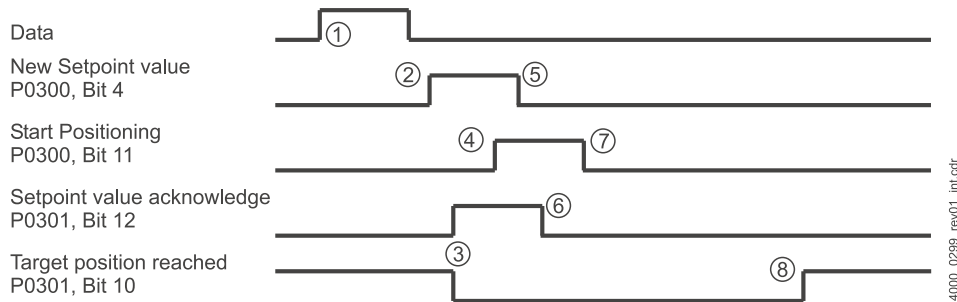


Figure 6.31: Handshake procedure at positioning

Description of steps 1 to 8:

1. The control writes new position data.
2. The control sets *New set value* in **Controlword P0300** to mark the data as valid.
3. The controller acknowledges the new set values by setting *Set value acknowledgement* in **Statusword P0301**. At the same time the message *Target position reached* in **Statusword P0301** is cleared. That way, for the succeeding procedure it is assured, that the message *Target position reached* of the previous positioning is no longer present. The message will only be set again, when the newly transmitted positioning task has been accomplished.
4. The control starts the positioning procedure by setting the Bit *Start positioning* in **Controlword P0300**. Only after this command was received the positioning will be started.
5. The control clears the bit *New set value*. This may happen before starting positioning.
6. The controller acknowledges the falling edge in control bit *New set value* by clearing the *Set value acknowledgement*.
7. The control clears the bit *Start positioning*. This may happen during the running positioning or after completion.
8. As soon as the controller completed the positioning and reached the target position, the message *Target position reached* is reported.

With the help of the handshake procedure a time-independent controlling of the positioning is possible. However it is not essential to use the handshake procedure. It is possible to transmit positioning data to the controller without the *New set value* command. These will be valid as soon as the *Start positioning* command is given.

The handshake procedure only makes sure that the *target position reached* command is guaranteed to be reset before the next *Start positioning* command is transmitted.

6.6.2 Homing

Normally an exact knowledge of the absolute position of the drive is necessary to operate positioning drives. If an incremental encoder is used for position actual value sensing or with resolver more than one motor revolution within the entire travel range is necessary, thus a homing is essential.

Also while using absolute value encoders, actual position value acquisition can be initialized by a homing procedure.

Basically it is distinguished between drive-led homing and control-led homing.

Using drive-led homing the drive itself controls the homing procedure, movement of the motor and travelling to reach the reference switch.

Using control-led homing the drive is controlled by the control sending position set values, while the reference switches are being observed by the controller. Control-led homing isn't implemented as separate operation mode but is an additional function within the operation modes Position control and Synchronous operation. Details are to be found in chapter «Control-led homing» from page 152.

In the following the drive-led homing is described, which is implemented as a separate operation mode at the **b maXX® BM3400**.

Generally homing uses a switch as reference mark.

In order to reach a higher accuracy the zero marking of the encoder is mostly called in for, but it is also possible to do homing without taking the zero marking into consideration.

The zero pulse of incremental encoders is used as zero marking, at resolvers and sinecosine encoders the mechanical zero angle is used. Mechanical zero angle thereby means 0° in parameter **Encoder 1 mechanical actual angle P0393** resp. **Encoder 2 mechanical actual angle P0403**.

By default the zero mark or zero angle of the position encoder is used, but an encoder for the zero mark can also be selected explicitly.

As a reference switch either one of the limit switches (negative or positive hardware limit switch) or a separate zero point switch can be used.

Using parameter **Positioning homing mode P1205** the type of referencing (switch, direction of approach) is set.

The different reference methods thereby conform to the drive profile of CANopen.

6.6.2.1 Operating sequence of homing with consideration to zero pulse or zero angle

Exemplary in the following the homing procedure to the negative limit switch with consideration to the zero pulse/zero angle is described. The operating sequence of other homing procedures primarily accords to this sequence, differences especially appear not only in the travelling direction but also in the switching edge.

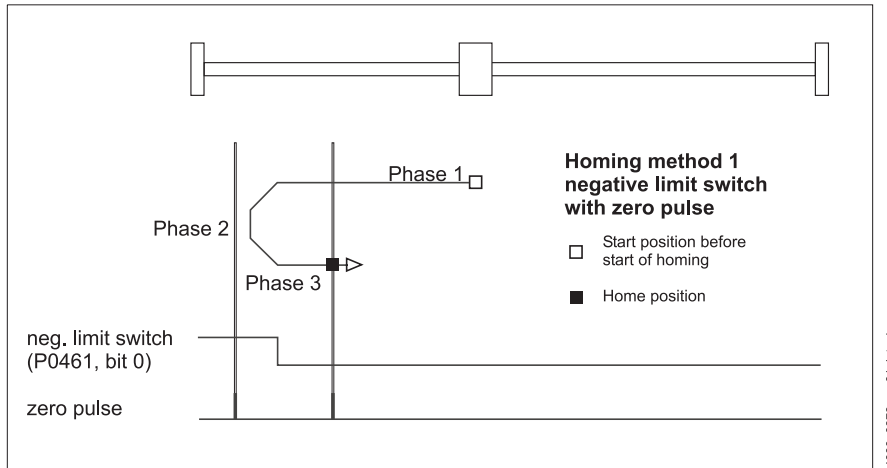


Figure 6.32: Sequence of homing towards a neg. limit switch with consideration of zero pulse

- Phase 1

During phase 1 drive is operated with **Positioning homing speed P1201**, until the homing switch has been reached. The acceleration value to reach the homing speed is set with **Positioning homing acceleration P1203**.

If the switch already has been triggered before the start, procedure will directly begin with phase 2.

- Phase 2

After reaching the reference switch the drive is slowed-down with **Positioning homing deceleration P1204** and is accelerated in opposite direction to one eighth of homing speed (but at least to end speed of homing). Now the switch is left again.

- Phase 3

With the falling edge of the reference switch the speed of backing out is decelerated to **Positioning homing final speed P1202**. As soon as this speed has been reached the zero marking is evaluated. The drive continues travelling with final homing speed till the zero pulse or the zero angle of the encoder has been recognized. At recognition of the zero pulse or zero angle the drive is stopped and the homing position is set.

6.6.2.2 Displacement of zero angle

Using homing methods with consideration of the zero angle or zero pulse, it can happen that this is located within the switching tolerances of the reference switch. With repeated homing procedures this can lead to two different homing positions with a gap of 1 revolution. In these cases zero angle or zero pulse are not always recognized in the same encoder revolution because of switching tolerances.

At incremental encoders with zero pulse in this case the encoder or the switch must be mounted in a way so that the zero pulse won't be near the switching tolerances anymore.

At absolute value encoders for the internal calculations the encoder zero angle can be relocated with parameter **Positioning encoder offset P1209** in such a way that it is outside the tolerances of the switch. The measured angle at the homing switch is displayed in parameter **Mechanical angle at reference switch P0371**.

6.6.2.3 Homing operation sequence only on switch

At homing methods only using switches no evaluation of the zero pulse or zero angle takes place. The accuracy therewith depends on the switching tolerances of the switch.

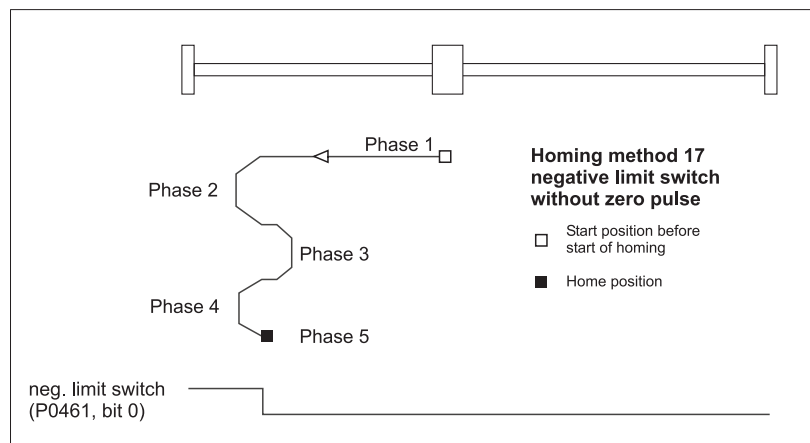


Figure 6.33: Sequence of homing towards a neg. limit switch without consideration of zero pulse

- Phase 1

During phase 1 the drive is operated at **Positioning homing speed P1201** until the reference switch is reached. The acceleration value to reach the homing speed is set with **Positioning homing acceleration P1203**.

- Phase 2

After reaching the reference switch the drive is slowed-down with **Positioning homing deceleration P1204** and is accelerated in opposite direction to one eighth of homing speed (but at least to end speed of homing). Now the switch is left again.

- Phase 3

The falling edge of the switch causes an anew reversal of the travel direction. Again the drive approaches the switch, once again with an eighth of the homing speed.

- Phase 4

After reaching the reference switch the drive is slowed-down and is accelerated in opposite travel direction on homing end speed, the drive therewith is slowly driven out of the switch.

- Phase 5

At the falling edge of the switch the drive is immediately slowed-down to 0 and homing position is set.

6.6.2.4 Homing without setting of homing position

For specific applications setting of the homing position can be deactivated (P1190, Bit12). The position set- and actual values are not changed in these cases, the drive instead remains at the homing position and the position values can be read from a control for instance.

6.6.2.5 Notes

Wiring of switches

The limit- and reference switches can be wired as NO- or NC contact. The type of wiring can be set in the drive via parameter **Positioning switch mode P1208**. Because of safety reasons (recognition of cable breakage) a wiring as NC contact is recommended.

End switch

During homing procedures the travelling distance is not limited by the hardware- or software limit switches!

The end switches should be constructed in such a way that they cannot be passed over. The switching status *active* therefore should be able to be left at the negative limit switch only in positive direction, at the positive limit switch only in negative direction.

Problems during homing

If homing can't be completed after reaching the reference switch (no response via Bit10 of **Statusword P0301**), this can be due to the settings of the positioning window **P1194**. After reaching the homing position the drive must remain for the specified positioning window time within the positioning window. Perhaps the positioning window is set too small so this condition cannot be complied with.

Reproducibility

To reach matching homing positions the following conditions must be complied with:

- The homing speeds, -acceleration, -deceleration as well as the encoder offset may not be changed after it once has been set.
- During phase 1 the homing speed must be reached.

6.6.2.6 Homing method 1 (neg. limit switch)

Homing is executed towards the negative limit switch. If at start the limit switch has not been actuated, travelling goes towards the switch.

Homing position is the first zero pulse or zero angle to the right of the switch (after the switch is inactive again).

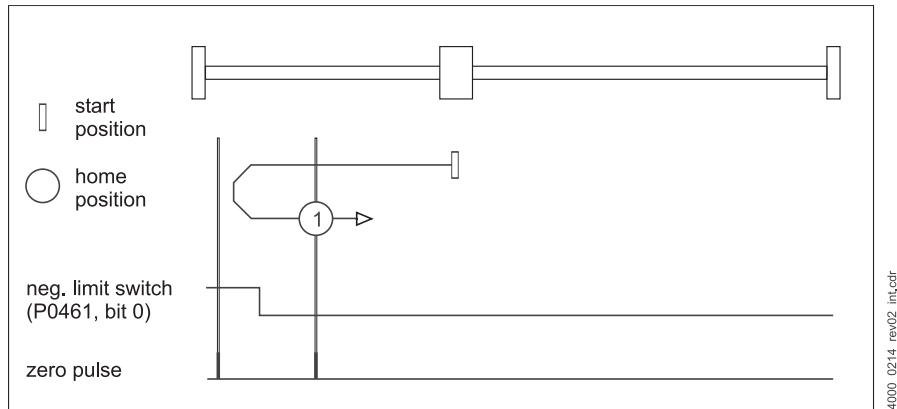


Figure 6.34: Homing method 1

6.6.2.7 Homing method 2 (pos. limit switch)

Homing is executed towards the positive limit switch. If at start the limit switch has not been actuated, travelling goes towards the switch.

Homing position is the first zero pulse or zero angle to the left of the switch (after the switch is inactive again).

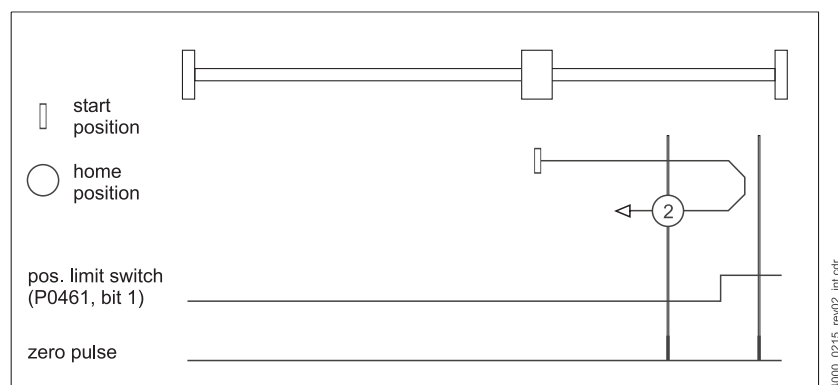


Figure 6.35: Homing method 2

6.6.2.8 Homing methods 3 and 4 (pos. zero point change-over switch)

Homing is executed towards the positive zero point change-over switch, that means, the switch can be somewhere in the travelling range and is continuously active from the switching point onwards in positive direction. The starting direction of travel is dependent on the switching status and the methods which are used.

Homing position is the first zero pulse to the left or to the right of the switch.

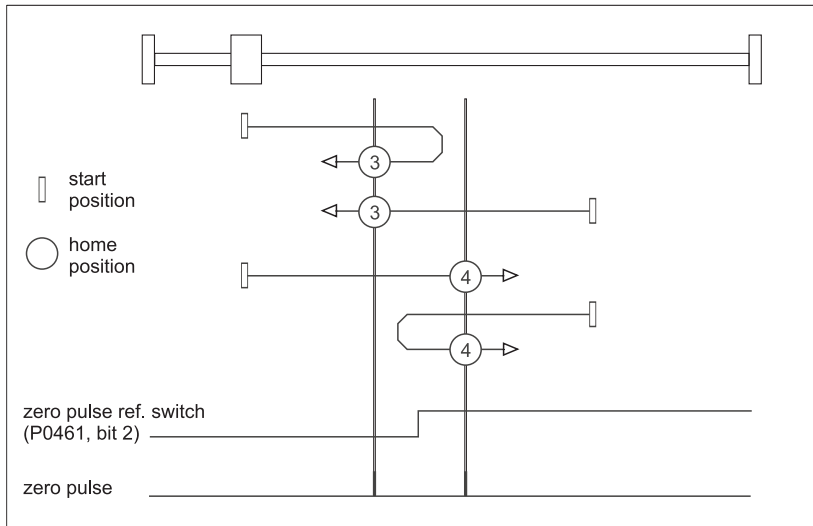


Figure 6.36: Homing methods 3 and 4

6.6.2.9 Homing methods 5 and 6 (neg. zero point change-over switch)

Homing is executed towards the negative zero point change-over switch, that means, the switch can be somewhere in the travelling range and is continuously active from the switching point onwards in negative direction. The starting direction of travel is dependent on the switching status and the methods which are used.

Homing position is the first zero pulse or zero angle to the left or to the right of the switch.

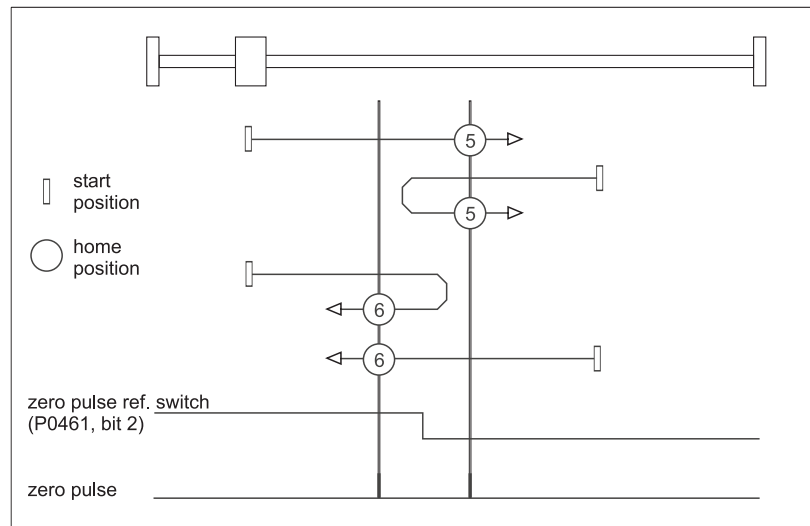


Figure 6.37: Homing methods 5 and 6

6.6.2.10 Homing methods 7 to 14 (Homing switch)

These homing methods are intended for cases in which the homing switch only is active along a part of the travelling range.

Homing methods 7 to 10

Initially the travel direction is positive except the reference switch is activated when homing is started. In this case the travel direction is dependent on the switching edge which is searched for. If the initial travel direction is directed away from the switch, the travel direction is changed at the positive limit switch. Homing position is one of the zero pulses or the zero angles at the rising or the falling edge of the switch.

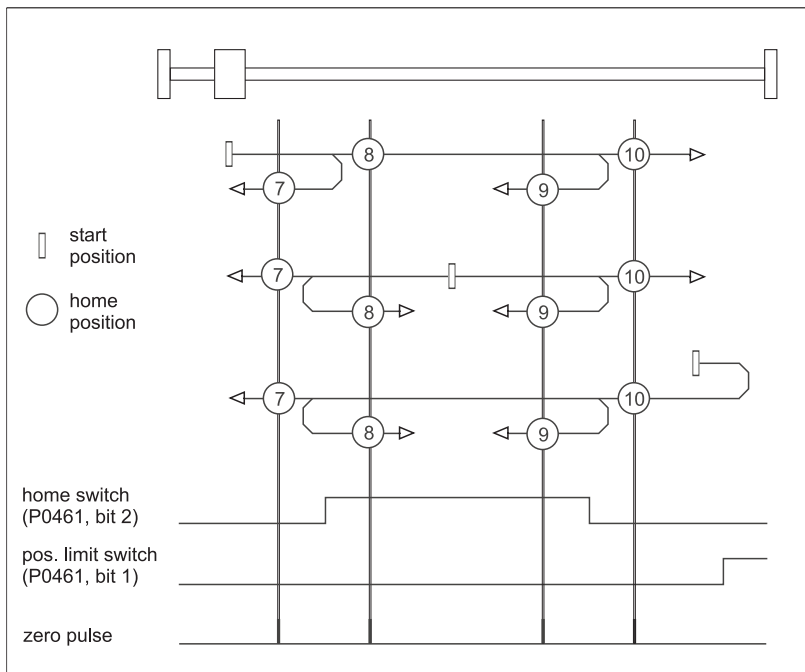


Figure 6.38: Homing methods 7 to 10

Homing methods 11 to 14

Initially the travel direction is negative except the reference switch is activated when homing is started. In this case the travel direction is dependent on the switching edge which is searched for. If the initial travel direction is directed away from the switch, the travel direction is changed at the negative limit switch. Homing position is one of the zero pulses or the zero angles at the rising or the falling edge of the switch.

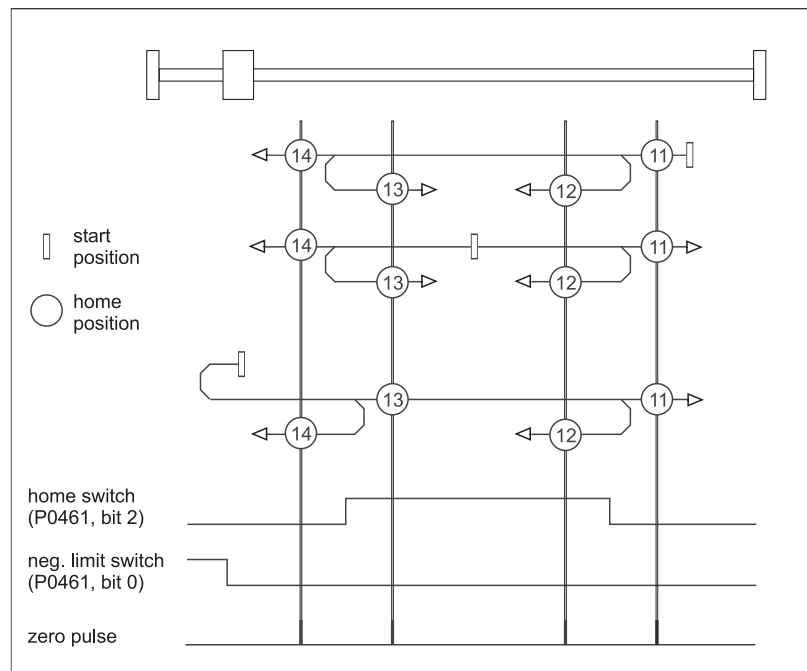


Figure 6.39: Homing methods 11 to 14

6.6.2.11 Homing methods 15 and 16 (reserved)

These methods are reserved for future options accordant to the drive profile of CANopen.

6.6.2.12 Homing methods 17 to 30 (without zero pulse or zero angle)

Homing methods 17 to 30 do not use a zero pulse or a zero angle as an additional reference mark. It is only referenced on the switch. Otherwise these methods accord to homing 1 to 14. Exemplarily only homing from 19 to 20 is shown.

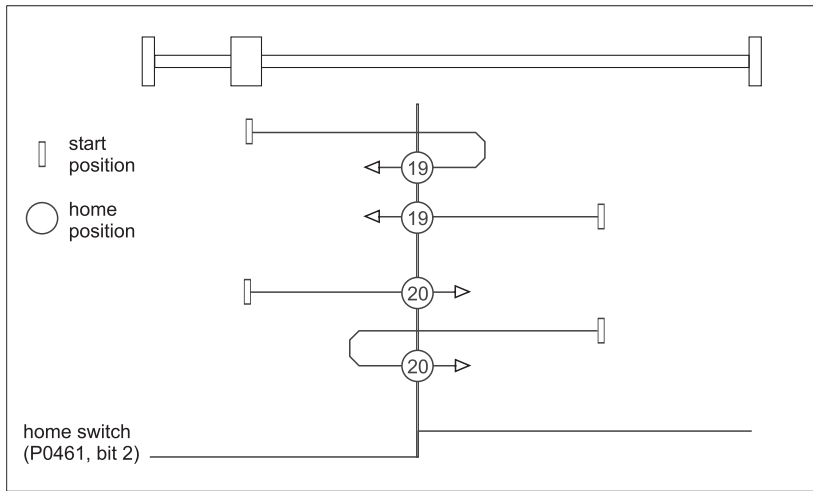


Figure 6.40: Homing methods 19 and 20

6.6.2.13 Homing methods 31 and 32 (reserved)

These methods are reserved for future options accordant to the drive profile of CANopen.

6.6.2.14 Homing methods 33 and 34 (zero pulse only)

These homing methods do not use switches but only the zero pulse or zero angle as reference mark. The homing position is the next zero pulse or zero angle in negative or positive direction.

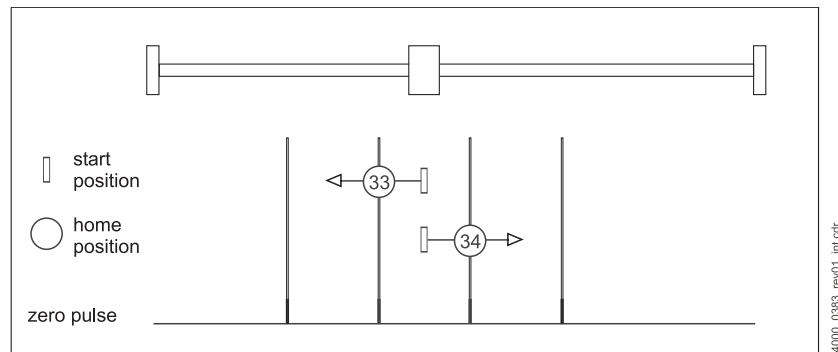


Figure 6.41: Homing methods 33 and 34

6.6.2.15 Homing method 35 (only setting of home position)

At this homing method the homing position is set at the current position. The drive thereby remains at the current position.

6.6.2.16 Manufacturer-specific homing methods

There are still more manufacturer-specific homing methods. The methods –1 to –5 are identical with some of the profile-compliant homing methods. They are only existent due to compatibility reasons. The assignment is shown in the following table:

Manufacturer-specific method	corresponds to method	Description
-1	34	Next zero pulse or zero angle, clockwise rotation
-2	33	Next zero pulse or zero angle, counter-clockwise rotation
-3	35	Set homing position
-4	17	Negative limit switch without zero pulse
-5	18	Positive limit switch without zero pulse

Homing method –6 :

This method is not contained in the profile-compliant homing procedures. The next zero angle (shortest direction) is reached and there the homing position is set.

Homing methods –7 and –8:

With these methods homing takes place to a mechanic endstop. Using method –7 the drive moves with clockwise rotation and at -8 with counter-clockwise rotation towards the mechanic endstop.

- Phase 1

Start travelling towards the mechanic endstop with *homing speed*. At start of homing the torque is limited to **Positioning homing torque limit P1218**. To recognize the mechanic endstop it is checked, if the drive operates at the current limit (**Speed controller status P0350** Bit13 = 1), and if at the same time the *Zero speed message* is present (Encoder 1 status **P0390** or encoder 2 status **P0400**, Bit10).

If both conditions are complied with during **Positioning homing blocking time P1217** the mechanic endstop is identified.

- Phase 2

If the mechanic endstop has been identified, at this position the homing position is set and concludingly the torque limit **Positioning homing torque limit P1218** is cancelled again.

Homing methods -9 and -10:

With these methods a mechanic endstop is to be reached and concludingly it is referenced to an encoder zero angle or zero pulse.

At -9 the drive moves with clockwise rotation and at -10 with counter-clockwise rotation towards the mechanic endstop.

- Phase 1

Identical to homing methods –7 and –8

- Phase 2

If the mechanic endstop has been identified, **Positioning homing torque limit P1218** is cancelled again and with **Positioning homing final speed P1202** the drive is referenced in reversal direction to the encoder zero angle or zero pulse.

NOTE

With homing methods –7, –8, –9 and –10 the controller cannot differentiate, whether the blocking is caused by the mechanic endstop or something else. In the second case the drive is referenced wrong.

6.6.3 Synchronous operation

The software module *synchronous operation* moves a following axis (slave axis) anglesynchronous to a leading axis (master axis). The set value for the slave axis can result from one of the encoder inputs (real master axis), or from a virtual master. The position set values then are directly specified via a parameter, e.g. via a field bus.

The set values coming from the encoder system can be superimposed with an additional set value, e.g. provided via field bus.

Furthermore you have the possibility to calculate a virtual master axis in the drive itself. In this case speed set values are specified.

It is distinguished between the following synchronous operation modes:

- Speed synchronous operation / relative angle synchronous operation

In this mode the set value for the slave axis is directly provided from the encoder input.

Enabling the drive in operation mode Synchronous operation or at switch-over in this operation mode during running operation the angle between master- and slave axes will be fixed.

From this moment on master and slave axes have a permanent but not defined angular reference to each other. When the controller is inhibited or when switching to another operation mode the existing reference of the angle between the master and the slave axes will be lost.

Using the Phasing function an absolute angular synchronous operation (defined angle between master and slave axes) can be reached.

Additionally to the set value from the encoder input an overlaid movement can be implemented via a synchronous set value assignment. The set value given via P0471 resp. P0472 is interpolated by the setting interval (Sync interval P0532) to the control cycle and additively takes effect to the set values given by the encoder input.

- Synchronous set value specification via position parameters

In this synchronous operation mode the absolute position set values are directly specified (e.g. via a field bus). The set value are specified using parameter P0471 resp. P0472 and must be applied in a fixed interval. The set value is interpolated via the interpolator from the specification interval (Sync interval P0532) to the control cycle.

- Synchronous set value specification via position delta input

The set values are specified via parameter P0473. A position delta is specified (set value change). The specified position delta is not interpolated, it must be predetermined referring to the control cycle (125µs).

- Virtual master axis with ramp function generator

A speed set value is provided via the ramp function generator input P1171. Within the drive out of this a position set value (virtual master axis) is calculated. The drive follows these virtual master axis using the synchronous operation function. This method is useful, if still further drives are connected e.g. via incremental encoder emulation. These drives then will get the set value of the virtual master axis as input. That's why all axis will follow the same position set value – this axis which calculates the virtual master axis itself too.

- Virtual master axis without ramp function generator

Contrary to the function principle of virtual master axis with ramp function generator here the ramp function generator is bypassed. Set values are specified via parameter **Synchronous operation speed set value P0474**.

Using the Phasing module with synchronous operation mode Synchronous operation on sensor input an absolute angle synchronization (well defined angle difference between master and slave axis) can be achieved. Furthermore an angle offset can be specified, that e.g. can be used as a register function. This angle offset affects all modes of synchronous operation.

Elektronic gear

The Elektronic gear extends the functionality of the software module Synchronous operation by an adjustable transmission ratio between master and slave axes. The transmission ratio i will be specified as quotient of two natural nonnegative integers from 32767:1 to 1:32767 and is changeable during the running operation too.

Control of synchronous operation can be accomplished

- using the digital inputs of the controller or
- via field bus.

Phasing

The module makes it possible to automatically compensate the angle difference between master and slave axes in the operation mode Relative angular synchronization. Precondition for this is a transmission ratio between master and slave axes of 1:1 and a well defined reference of the actual encoder values to the mechanics.

Additionally it's possible to travel with an offset angle, which e.g. can be used as a register function. This register offset angle can be specified and processed anytime. This function can be used with all modes of synchronous operation including the mode Synchronous specification of set values.

The angular set values which were calculated by the phasing module are incorporated into the set value of the master axis before the consideration of the gearing factor. All travel angles are calculated modulo 360 degrees.

The displacement angle between master and slave axes is always determined once when switching into the operation mode Relative angular synchronous operation, independent on the switching status of the phasing module. Thus the displacement angle can be travelled, even at later activation of the phasing module.

All position offset angles of the module are processed as an angular sum in trapezoidal form. The maximum acceleration is adjustable. For the travelling direction and the maximum travelling speed the following modes are available:

Travelling speed:

- Constant maximum travelling speed from the time of activation of the travelling procedure onwards.
- Guarantee of a minimum resulting axis speed at superimposed travelling procedure. The maximum travelling speed is adjustable.
- Dynamically changeable travelling speed in dependence of the speed set value. The speed factor is adjustable.

Travelling direction:

- Travelling is always done relative in positive direction.
- Travelling is always done relative in negative direction.
- Travelling is always done along the shortest distance.

6.6.4 Control-led homing

Control-led homing is implemented in **b maXX® BM3400** as an additional function in the modes position control and synchronous operation with synchronous setpoint specification.

During control-led homing the control must provide position set values to the controller. Thereby the control must assure, that the drive is travelled slowly, in order to recognize the home position with the required accuracy.

Similar to the drive-led homing settings for the kind of the reference signal here are also possible. These are selected via parameter **Positioning homing encoder input P1206**.

The procedure of control-led homing is selected via **Controlword P0300**, response of the drive accordingly happens with **Statusword P0301**.

Procedure of control-led homing

The controller is in Position control (operation mode –4) or in Synchronous operation (operation mode –5).

- Phase 1 – Start of homing

By setting Bit4 (*Homing Start*) in **Controlword P0300**, the control signals the beginning of homing.

- Phase 2 – Find reference switch

From now on the drive evaluates the reference switch and reports its status via parameter **Positioning control status P0460**. As soon as the switch is activated (the NO contact or NC contact is to be parameterized accordingly), the actual position value is saved.

It is distinguished between Homing to zero pulse or Homing to encoder zero angle:

- During Homing to zero pulse the position actual value is stored not until the next zero pulse.
- During Homing to encoder zero angle the position actual value corresponding to the position value at encoder zero angle is used as reference position. Thereby at the homing position the mechanic angle of the encoder is considered. Hereby the constraint is set, that the encoder zero angle corresponds to a mechanic angle of 180°.

As soon as the home position has been found, this is reported by setting Bit13 in **Statusword P0301**. However the position set values and actual values are internally not set new, because the drive is furthermore receiving position setpoints from the controller.

- Phase 3 – Set homing position (drive)

The control have to slow-down the drive to zero speed. Subsequently Bit5 *Set homing position* in **Controlword P0300** is set. As long as this bit is set, no further position set values are applied by the drive and the old set value remains active. The drive is held position controlled on this position.

After recognition of this flag the drive sets the homing position and position set values as well as position actual values are adjusted. Herewith the difference between the current position actual value and the saved position actual value at the homing position is considered.

The difference is considered no matter what distance the drive has still made since recognition of the homing position.

As soon as the drive has set its homing position, this will be reported by Bit12 in **Statusword P0301**.

- Phase 4 – Control adjusts its position values

As soon as the drive has set its homing position and has reported this by Bit12 in **Statusword P0301**, the control can read out the new actual value from the drive and can adjust its own setpoints and actual values accordingly.

- Phase 5 – Control again activates the position values

The control clears Bit5 *Set homing position*. From this moment on, the position set values in the drive are evaluated again.

- Phase 6 – Completion of homing, switch-over to normal operation

The control completes homing by clearing Bit4 in **Controlword P0300**. In response the drive clears Bit12 *Homing completed* and Bit13 *Homing position found* in **Statusword P0301** that were set during homing procedure.

6.6.5 Position control

This operation mode is selected by setting **P1000** = -4.

Linear interpolation of the position set value

While using the interpolating input of the position controller, the position set value (**P0369**, **P0370**) to be transmitted during every bus cycle is interpolated in the controllers cycle.

Figure 6.42 shows an ideal example with a transmission rate of set values (**P0800**) of 4 controller cycles (each $125\mu\text{s}$).

Linear position interpolation (No smoothing of precontrol, Precontrol factors = 100%)

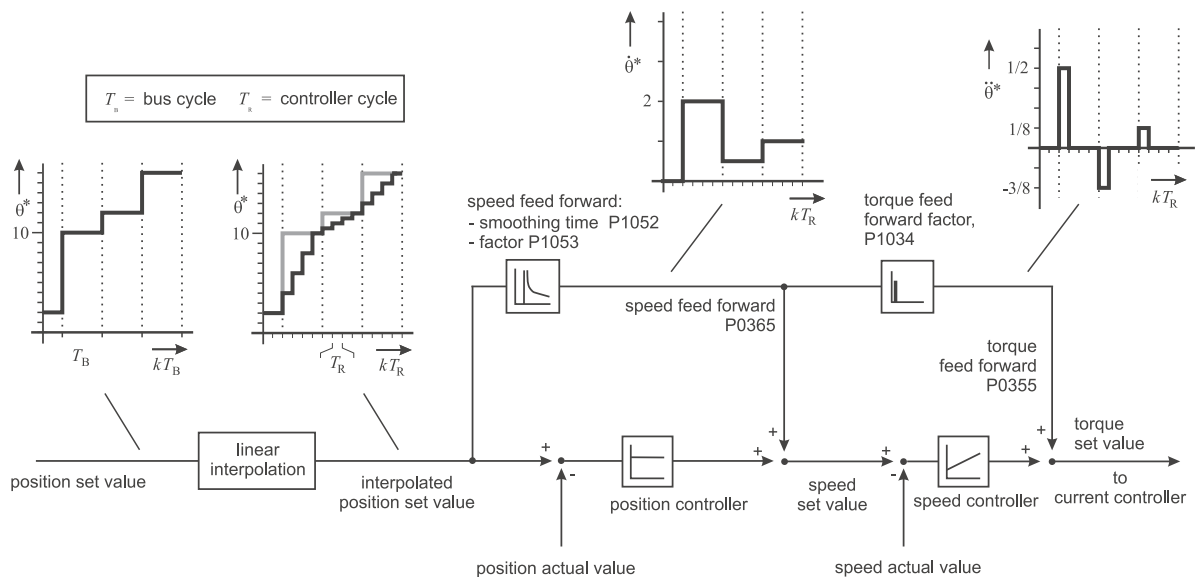


Figure 6.42: Example for linear interpolation of position set values

As a result of interpolation the speed precontrol becomes staircase-shaped and the torque precontrol (resp. the acceleration precontrol) becomes acicular. The torque precontrol necessary within one bus cycle takes place within the first controller cycle of the bus cycle.

In practice the spikes of torque precontrol can't be translated because of current limitation in the power unit and therefore cause noise within the drive. To remedy a smoothed and / or downscaled speed precontrol (see **P1052** und **P1053**) can be used.

Another possibility is downscaling the torque precontrol **P1034**, which on the other side can cause an increased contouring error.

With setting Bit4 (*Linear interpolation mode*) of **Position controller mode P1050** the torque precontrol can evenly spread to the whole bus cycle, whereby the torque precontrol can be held constantly with an unchanged mean value over the bus cycle. Speed precontrol isn't constant anymore within a bus cycle. It is changed proportionally with a slope corresponding to the distributed torque precontrol value. Modification of linear position interpolation is only useable in operation mode Position control and is deactivated per default.

Figure 6.43 shows modified linear interpolation according to the example in figure 6.42 (no smoothing of

precontrol, precontrol factor = 100%).

Because precontrol values doesn't comply to the interpolated position anymore (e.g. the integral of precontrol halves), the contouring error theoretically will increase. In practice contouring error can be reduced, because controlling parameters may be set higher and its possible to make more out of precontrol.

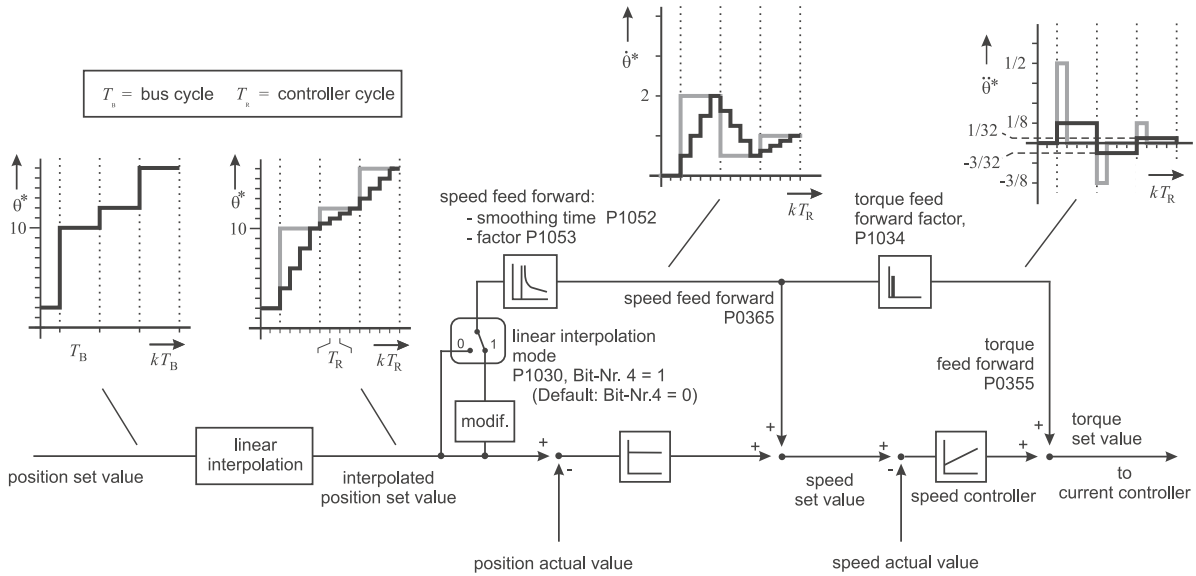


Figure 6.43: Modified linear interpolation of position set values

6.6.6 Find notch position

The operation mode Find notch position is used to detect the mounting position of the encoder at synchronous machines. A detailed description is to be found at [Motor mode notch position P0094](#).

6.7 Diagnosis

6.7.1 Oscilloscope function

For a quick and user-friendly commissioning resp. diagnosis the **b maXX® BM3400** offers an integrated oscilloscope function

The corresponding parameters are **P2000** to **P2025**.

The following table gives a review of the possibilities the oscilloscope function offers:

Number of channels:	maximum 8
Sample time:	$n * 62.5\mu s$ (n = 1...65535)
Recording time:	Memory*Sample time/(Numer of 16 bit Channels + 2* Number of 32 bit Channels)
Recording:	triggered or untriggered
Triggering	via change in parameters (that means indirectly via digital and analog inputs too), relevant bits adjustable
Number of triggers	2
Trigger combination:	Logic combination of both trigger events: AND, OR, XOR, Edge (consecutively)
Trigger delay:	adjustable 0% ... 100% (that means, recording with or without history related to the trigger event)
Behaviour at switching between data sets	Recording of data set parameters: Only values of the data set, which is valid at start time, are recordet.

6.7.2 Mains monitoring

6.7.2.1 Mains monitor (only for devices with power unit microcontroller (P3379))

The mains monitor permits a 3-phase mains monitoring and consists of the following components:

- Display of actual mains frequency and of the actual RMS of the supply voltage.
- Sensing of extremum-values of mains frequency and of supply voltage RMS.
- Monitoring of warning limits and issuing of warning messages
- Monitoring of error limits and issuing of error messages

The mains monitor is activated by setting the Bit0 in **Mainsmonitor status P2057** and operates at a cycle time of 1ms.

The following mains conditions can be monitored:

- Mains input failure and phase failure
- Overvoltage and Undervoltage
- Exceeding and falling below the frequency

Display of actual supply voltage and mains frequency

The actual supply voltage is sensed in the controller cycle every $125\mu\text{s}$ and is smoothed via a PT1-element (**Mainsmonitor mains voltage actual value P2064**).

For the mains frequency an actual measured value in **Mainsmonitor mains frequency actual value P2065** is presented every 5s.

The displays of **P2064** and **P2065** additionally can be smoothed via the free-programmable PT1-filters of the controller. Only the unsmoothed values effectuate the monitoring and the extremum sensing of the mains monitors!

Sensing of extremes of supply voltage and mains frequency

The maximum- and minimum values are displayed in the following parameters:

- **P2066** Maximum supply voltage-actual value (RMS); Reset-value = 0V
- **P2067** Minimum supply voltage-actual value (RMS); Reset-value = 736,6V
- **P2068** Maximum mains frequency-actual value; Reset-value = 0,1Hz
- **P2069** Minimum mains frequency-actual value; Reset-Value = 312,5Hz

A one-time reset of these parameters can be made by setting Bit1 in **Mainsmonitor status P2057**. A completed reset is acknowledged in **Mainsmonitor status P2057** with Bit16 = 1. After reset of Bit1 in **Mainsmonitor status P2057** the status bit Bit16 is cleared too.

The values of the extremum parameters remain after deactivating the mains monitor. However, they can not be stored and are lost after the 24V-controller supply is switched off.

Warnings of the module mains monitor

When falling below- or exceeding a warning limit immediately the according bit is set in **Mainsmonitor status P2057** and a warning message is issued. If the value returns to the permissible range, then the warning message and the mains monitor status bit immediately is withdrawn.

A warning in the module Mains monitor is signaled via Bit4 of **Warning System 1 P0260**. Via the bit bar of **Warning Mainsmonitor P0265** you can find out which kind of mains monitor warning is existent. There can be several mains monitor warnings simultaneously.

The several warnings can be activated or deactivated via **Mainsmonitor warnings mask P2062**.

The warning limits for overvoltage, undervoltage, exceeding frequency and falling below frequency can be parameterized. The setting is made via parameters **P2058** to **P2061**.

Special cases Mains failure and Phase failure

Here the error limits or -conditions correspond to those of the warning. However there is an immediate warning message, whilst for the error message the time adjusted in **Mainsmonitor mains failure reaction delay P2063** must elapse.



NOTE

The mains monitor warnings are not identic with the warnings of the module mains supply (**P0261**). There stored valid warning limits can differ from the programmable values in the mains monitor.

Error messages of the module Mains monitor

When falling below or exceeding an error limit the accordant error bit is immediately set in **Mainsmonitor status P2057**. However, error 79 „Mains monitor group error“ (**P0205** error mains supply Bit15 = 1) is generated, if the error has been there at least the time, which was set in **Mainsmonitor mains failure reaction delay P2063**. If the value returns to the permissible range, then only the mains monitor status bit is withdrawn. A reported error message is kept. Via the sub-error bit bar of **Error Mainsmonitor P0236** it can be determined which mains monitor error is present, whereby multiple bits can be set.

The several error messages can be activated or deactivated via the **Mainsmonitor mode P2056**.

The error limits for overvoltage, undervoltage, frequency exceeding and falling below frequency are programmable. The setting is made via the parameters **P2080** to **P2083**.

The error reaction of the mains monitor error 79 is adjustable. As a default value *No reaction* was preset.

Compensation for short-term interferences

They should be filtered by the internal smoothing or by mean value generation or by **Mainsmonitor mains failure reaction delay P2063**. In order to keep up the history at repeatedly occurring interferences, the internal error counter is re-counted, when returning into the *green range* and is not immediately deleted.

Special cases Mains failure and Phase failure

Here the error limits or error conditions correspond to those of the warning. The accordant error bit in **Mainsmonitor status P2057** is immediately set and a warning message is issued. There is an accordant error message, if the failure was at least **Mainsmonitor mains failure reaction delay P2063**. If there is an error bit set in **Mainsmonitor status P2057** and the error cause disappears before run out of the mains error reaction delay, then the error bit is cleared again.

Notes on parameterization

- Setting of nominal mains frequency

For the correct monitoring of mains frequency the setting of nominal frequency in Bit9 of **Mainsmonitor status P2057** is necessary:

Bit9 = 0: $f_{mains} = 50\text{Hz}$ (Default) Bit9 = 1: $f_{mains} = 60\text{Hz}$

- Activation of the mains monitor

For the drive there is no information about the mains status, e.g. via checkback main contactor. This information can be provided via a digital input with a link to Bit0 of **Mainsmonitor status P2057**.

Alternatively the working mode, described under options, can be selected.

- There is no check, if the set warning limit is *sharper* than the error limit. Both limits are monitored independent, so that it can happen that at unfavourable programming the error message can occur before the warning!

Further options of the module mains monitor

- Setting the operating mode of the mains monitor

Operating mode means, in which drive status the mains monitor shall operate. It includes the total functionality (warnings, errors, extreme acquisition) of the mains monitor.

The operating mode is set via Bit8 of **Mainsmonitor status P2057**.

Bit8 = 0: Active only in status 3 (SWITCHED ON), 4 (OPERATION RELEASED), 5 (INHIBIT OPERATION ACTIVE), 6 (DRIVE SHUT DOWN), 7 (QUICK STOP ACTIVE) and E (ERROR REACTION ACTIVE) of drive control.

Bit8 = 1: Active in each state of drive control.

6.7.2.2 Phase monitoring

- Single-phase devices

At single-phase devices the phase monitoring is switched off.

- Triple-phase devices

At loss of a phase there will be a 100Hz resp. 120Hz oscillation in the DC link at load. On the one hand this results in stimulation of the device that shall be controlled resp. lacking DC link voltage. On the other side the mains rectifiers and the DC link capacitor are burdened harder.

The 111Hz component of the DC link voltage is monitored permanently. This frequency is applicable with 50Hz and 60Hz nets.

At an unchangeable limit (amplitude of the frequency) the phase error E65 will be reported.

If the loss of a phase remains longer than adjusted in **Mainsmonitor mains failure reaction delay P2063**, the error message „PSU_ERR_MAINS_MONITOR (E 79)“ is reported with *Pulses disabled* as fixed error reaction.

At triple-phase operation with extremely switching between powered and generatoric loads in the 111Hz range this error can occure too. In this case the DC link voltage **P0484** strongly oscillates, then this error points to *DC link overload*.

6.7.3 Error memory

The **b maXX® BM3400** controller is equipped with an error memory, which can be activated and de-activated with the software tool. Besides error number and warning number **system time P2032** and **Time since last boot P2034** are stored.



Parameters

In this chapter the parameters for the **b maXX[®] BM3400** controller are described.

7.1 Structure of controller parameter range

Every parameter has

- a name,
- an association to a function group,
- an unique number,
- a data type,
- and fixed attributes or characteristics.

7.1.1 Range of numbers

The following table shows the parameters range of numbers, whereby not all available parameter numbers are assigned yet:

Range	Parameter numbers	
	from	to
Reserved for invalid number	0	0
Controller identification	1	5
Power unit identification	6	49
Motor data for 1st motor	50	100
Encoder data for 1st encoder	150	159
Encoder data for 2nd encoder	160	169
Actual values and operational data	170	599
Positioning data sets	600	799
Autotuning	850	859
Active data set	1000	1999
Development parameters	3000	3499
Specific to b maXX[®] BM3400	4096	4120

7.1.2 Field bus addressability

Accessing parameters via field bus exclusively happens via parameter numbers. Some field bus systems do not support 16-bit-numbers or limit the valid range of numbers. Thereby the arrangement of the parameters in number ranges for **b maXX[®] BM3400** was selected in such a way, that all parameters relevant for the operation of the controller are addressable by standardized field busses.

Overview of field busses and accessibility of appliance parameters:

Fieldbus	Directly accessible range of parameters in LC/MC	Manufacturers parameter number within the protocol	Extension possible through two-stage access
OPC	All	Parameter name	not necessary
CANopen	0 - 4095	Para No. + 4000 _{hex}	Yes
CANsync	0 - 4095	Para No.	Yes

NOTE

Access to data set parameters via parameter numbers is only possible to the corresponding parameter of the active data set.

7.1.3 Data type

Every parameter has a data type .

The data type reflects the number of bytes occupied by the parameter and the interpretation of each single bit. The **b maXX® BM3400** supports the following data types:

Data type	Number of bits	Range of values
INT	16	-32768 to 32767
UINT	16	0 to 65.535
DINT	32	-2.147.483.648 to 2.147.483.647
UDINT	32	0 to 4.294.967.295
WORD	16	0 to FFFF _{hex}
DWORD	32	0 to FFFFFFFF _{hex}
STRING	80 * 8	80 ASCII character

Some parameters become standardized from the ranges of integer values stated in the table above into smaller or greater ranges of values. WinBASS II carries out this scaling automatically, which must eventually be taken into account when accessing by use of external field busses.

Example:

Parameters **P0053 MotorNomVolt**

Data type = UINT (normal range of values, 0 to 65535)

Scaled range of values: 0 to 6553,0 V.

One increment equals 0,1 Volts

7.1.4 Attributes

Every parameter can have one or more attributes. Detailed information can be found within the parameter description.

Attribute	Meaning
A	Parameter only serves as display (identification, operational status, actual value, etc.)
EE	The parameter is part of the Central data (see chapter «Data set management» from page 19).
DS	Data set parameter (see chapter «Data set management» from page 19).
-	The parameter will not be saved (effective for e.g. actual values)
CW	The parameter may be written cyclicly (e.g. via a field bus). Normally these are synchronous written setpoints or the control word of the controller. Parameters whitout this attribute can be written only by using the service data communication (or the software tool) - thereby consider parameter Communication source P1001 .

7.2 Structure of the parameters description

All parameter descriptions are based on the following scheme:

P1172	Ramp function generator ramp-up time	0,00s bis 650,00s	
DS	Ramp Function Generator ramp-up time	0,00s	
	BM_u_Ds0_RFG1RampUpTime	100:1	CW

The different branches of the scheme are described below:

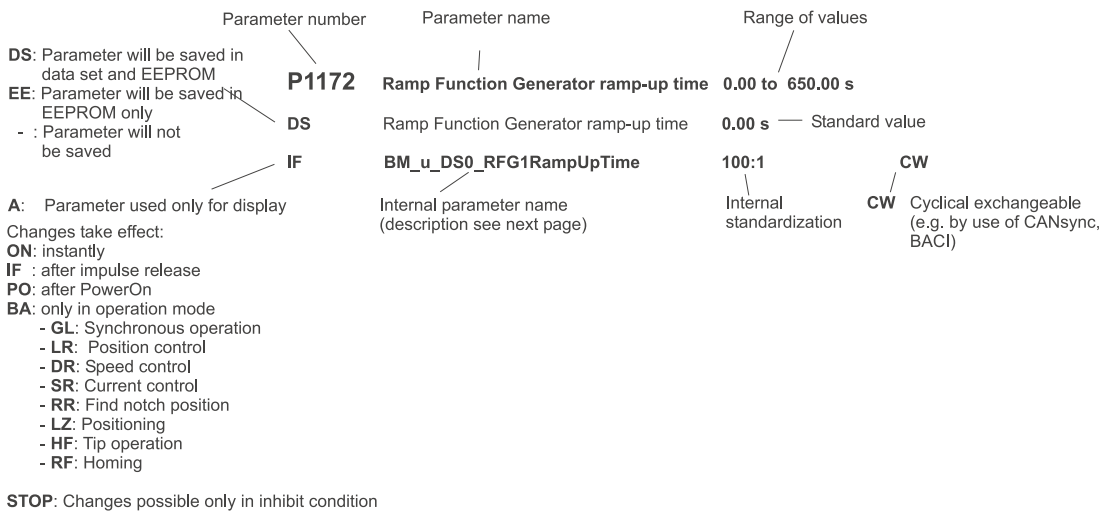


Figure 7.1: Principle of parameter description

The structure of the internal parameter name is shown below:

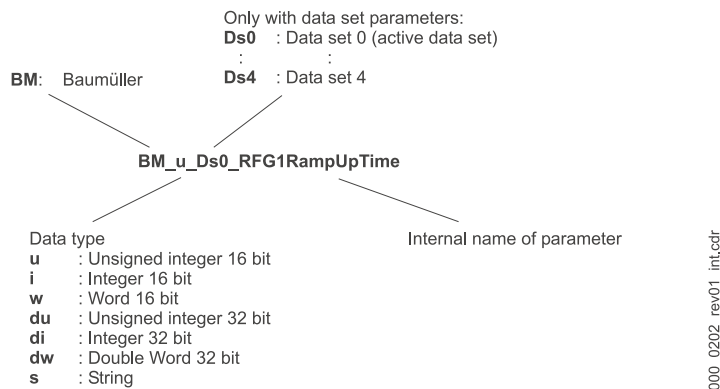


Figure 7.2: Structure of the internal parameter name

7.3 Parameters description

P0001 **Controller type** 0 bis 0xFFFF

- Regler Typ

A BM_u_ControllerType

1:1

-

Identification of controller type.

Value	Meaning
1	LCController (LC1)
2	LCController with 28xxProcessor (LC2)
3	LCController with 28xxProcessor (LC3)
3000	b maXX 3400

P0002 **Controller firmware type** 0 bis 65535

- Regler Firmware-Typ

0

A BM_u_SoftwareType

1:1

-

Differentiation between standard firmware and customized firmware.

Value	Meaning
0	Standard firmware
0 to 999	Customer-specific firmware
from 1000	Development versions

P0003 **Controller firmware ID** 0 bis 65535

- Regler Firmware-Nummer

A BM_u_SoftwareID

1:1

-

Baumüller-internal firmware number

Value	Meaning
1363	Standard firmware with CANopen
1460	Firmware with BACI

P0004	Controller firmware version	00.00 bis 99.99	
-	Regler Firmware-Version	00.00	
A	BM_u_SoftwareVersion	100:1	-

Version of used firmware.

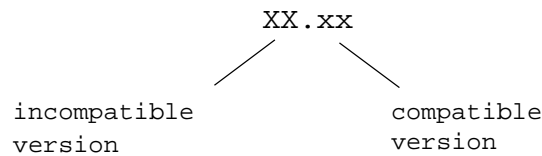


Figure 7.3: Controller firmware version

P0005	Parameter table version	0 bis 65535	
-	Parametertabellen-Version	1	
A	BM_u_ParamTableVersion	1:1	-

Version of parameter table used.

Value	Meaning
< 100	Devices with standard firmware with CANopen
> 100	Devices including firmware with BACI

P0006	Power Unit type code	20 ASCII-Zeichen	
-	Leistungsteil Typenschlüssel		
A	BM_s_AmpType	1:1	-

Display of power unit type code.
0 means *Unknown power unit*.

P0007	Power Unit serial number	0 bis 4294967295	
-	Leistungsteil Seriennummer	0	
	BM_ud_AmpSerialNo	1:1	-

This parameter is not used. See also [P4116](#).

P0008	Power Unit data configuration	0 bis 65535	
-	Leistungsteil Datenkonfiguration	0	
A	BM_u_AmpDataConfig	1:1	-

Version of the used power unit software.
Only used at devices with power unit processor ([P3379](#)).

		Contains the SVN version number of the power unit software.	
P0009	Power Unit firmware version	0 bis 65535	
-	Leistungsteil Firmware-Version	0	
A	BM_u_AmpSW_Version	1:1	-
	Version of the used power unit software.		
	Only used at devices with power unit processor (P3379).		
	Build-number x.y of the power unit software.		
	x = parameter / 256 (upper 8 bits)		
	y = mod(parameter0.256)(lower 8 bits)		
	Example: 257 = 0101 _{hex} accords to firmware version 1.1.		
P0010	Power Unit nominal current 4KHz	0,0 bis 6553,5 A	
-	Leistungsteil Nennstrom 4kHz	2,5 A	
A	BM_u_AmpNomCurrent4kHz	10:1 A	-
	Power unit nominal current (RMS value) at 4kHz switching frequency.		
P0011	Power Unit peak current 4KHz	0,0 bis 6553,5 A	
-	Leistungsteil Maximalstrom 4kHz	2,5 A	
A	BM_u_AmpPeakCurrent4kHz	10:1 A	-
	Power unit peak current (RMS value) at 4kHz or 2kHz switching frequency.		
	The peak current is greater than or equal to the power unit nominal current at 4kHz.		
P0012	Power Unit nominal current 8KHz	0,0 bis 6553,5 A	
-	Leistungsteil Nennstrom 8kHz	2,5 A	
A	BM_u_AmpNomCurrent8kHz	10:1 A	-
	Power unit nominal current (RMS value) at 8kHz switching frequency.		
P0013	Power Unit peak current 8KHz	0,0 bis 6553,5 A	
-	Leistungsteil Maximalstrom 8kHz	2,5 A	
A	BM_u_AmpPeakCurrent8kHz	10:1 A	-
	Power unit nominal current (RMS value) at 8kHz switching frequency.		
	The peak current is greater than or equal to the power unit nominal current at 8kHz.		

P0014	Power Unit thermal time constant 1	0,00 bis 655,35 s	
-	Leistungsteil therm. Zeitkonstante 1	1,00 s	
A	BM_u_AmpTimeConst1	100:1 s	-
	Power unit thermal time constant at 4kHz or 2kHz PWM frequency.		
	During the overload time (P0343 > nominal current) and (P0485 < 100%) the power unit can be operated with a peak current P0011 . After that, the current will be limited to the nominal current (see «Overload monitoring of the power unit» from page 45).		
	Nominal current: P0010 at P1240 = 4kHz, (P0032 * 8 + 3 * P0010) / 4 at P1240 = 2kHz.		
P0015	Power Unit thermal time constant 2	0,00 bis 655,35 s	
-	Leistungsteil therm. Zeitkonstante 2	1,00 s	
A	BM_u_AmpTimeConst2	100:1 s	-
	Power unit thermal time constant at 8kHz PWM frequency.		
	During the overload time (P0343 > P0012) and (P0485 < 100%) the power unit with the peak current P0013 can be operated. Then the current is limited to nominal current P0012 .		
P0016	Controler board warning temperature	0 bis 125 °C	
EE	Reglerplatinen-Warntemperatur	80 °C	
	BM_u_AmpAmbientWarnTemp	1:1 °C	-
	Warning threshold for the controller board temperature.		
	If the controller board temperature exceeds this adjustable threshold, warning 16 is activated. See also P0024 .		
P0017	Controler board shutdown temperature	0 bis 125 °C	
-	Reglerplatinen-Abschalttemperatur	0 °C	
A	BM_u_AmpAmbientMaxTemp	1:1 °C	-
	Display of shutdown threshold for the controller board temperature.		
	If the controller board temperature exceeds this threshold, then the power unit is switched off and the error 85 is activated.		
P0018	Power Unit heatsink warning temperature	0 bis 125 °C	
EE	Leistungsteil Kühlkörper-Warntemperatur	75 °C	
	BM_u_AmpHeatsinkWarnTemp	1:1 °C	-
	Warning threshold for heatsink temperature within power unit.		
	If the heatsink temperature exceeds this adjustable threshold, the warning 17 is activated. See also P0024 .		

P0019	Power Unit heatsink shutdown temperature	0 bis 125 °C	
-	Leistungsteil Kühlkörper-Abschalttemperatur	0 °C	
A	BM_u_AmpHeatsinkMaxTemp	1:1 °C	-
	Display of shutdown threshold for heatsink temperature.		
	If the heatsink temperature exceeds this threshold, the power unit is switched off and error 81 is activated.		
	The independent hardware monitoring of the chip temperature can activate error 81 before reaching the shutdown-switching threshold.		
P0020	Power Unit DC link nominal voltage	280 bis 1000 V	
-	Leistungsteil Uzk-Nennwert	540 V	
A	BM_u_AmpNomDcLinkVolt	1:1 V	-
	Displayed nominal value of DC link voltage.		
	The nominal value of the DC link voltage normally accords to $0.95\sqrt{2}$ P0035 .		
	At low mains voltages (P0035) the value is higher due to numerical reasons.		
P0021	Power Unit dead time	0,0 bis 6553,5 μ s	
-	Leistungsteil Totzeit	0,0 μ s	
A	BM_u_AmpDeadTime	10:1 μ s	-
	This parameter is not used.		
P0022	Power Unit burden factor Iac	0,1 bis 45 A	
-	Leistungsteil Bürdenfaktor Iac	0,1 A	
A	BM_i_AmpBurdenFactor_Iac	10:1 A	-
	Conversion factor for current measuring.		
	The displayed value accords to the maximum possible current measured value of the ADC (no RMS value).		
P0023	Power Unit burden factor Vdc	1 bis 900 V	
-	Leistungsteil Bürdenfaktor Vdc	1 V	
A	BM_u_AmpBurdenFactor_Vdc	1:1 V	-
	Conversion factor for the DC link voltage measurement.		
	Displayed value accords to the maximum possible measured value of the ADC.		

P0024	Power Unit mode	0 bis 1	
EE	Leistungsteil Modus	1	
	BM_w_AmpMode	1:1	-

Setting for the behavior of the power units fan.

Value	Meaning
0	This value is only selectable while using devices with power unit processor (P3379). Fans are controlled via P0482 and an internal power unit temperature value (similar but not equal to P0481). The start- and stopping thresholds of the fans can be influenced with P0016 and P0018 . The fans are active in the region of P0016 +15K to +25K or P0018 +10K to +20K.
1	At devices without power unit processor this is the default value and can't be changed. The fan is switched on together with the 24V supply. At devices with power unit processor the fans are switched on if mains supply is present or the warning „Undervoltage“ is canceled.

P0025	Power Supply Unit mode	0x0000 bis 0xFFFF	
EE	Einspeiseeinheit Modus	0x0000	
	BM_w_PSU_Mode	1:1	-

Settings for power supply unit.

Bit no.	Meaning
0	0 DC link voltage from the mains supply
	1 DC link voltage from external DC link supply
1	0 At mains failure the motoring operation is inhibited
	1 Motoring operation also possible at mains failure
15	1 No mains monitoring at ext. DC link supply

P0026	Max. Phase-Error Delaytime	0 bis 65535 ms	
-	Maximale Phasenausfall-Fehlerverzögerungszeit	0 ms	
A	BM_u_AmpPhaseErrMaxDelayTime	1:1 ms	-

This parameter is not used.

P0028	Max. Motor Current while Phase Error	0,0 bis 6553,5 A	
-	Maximal-Motorstrom bei Phasenausfall	0,0 A	
A	BM_u_AmpPhaseErrMaxCurrent	10:1 A	-
	This parameter is not used.		
P0030	Power Unit burden factor Vmain	0 bis 65535 V	
-	Leistungsteil Bürdenfaktor Netzspannung	0 V	
A	BM_u_AmpBurdenFactor_Main	1:1 V	-
	Internal value, not relevant for user. Displayed value accords to the maximum possible voltage measured value of the supply.		
P0032	Power Unit nominal current 16KHz	0,0 bis 6553,5 A	
-	Leistungsteil Nennstrom 16kHz	2,5 A	
A	BM_u_AmpNomCurrent16kHz	10:1 A	-
	Power unit nominal current (RMS value) at 16kHz switching frequency.		
P0033	Power Unit peak current 16KHz	0,0 bis 6553,5 A	
-	Leistungsteil Maximalstrom 16kHz	2,5 A	
A	BM_u_AmpPeakCurrent16kHz	10:1 A	-
	Power unit peak current (RMS value) at 16kHz switching frequency. The peak current is greater than or equal to the power unit nominal current at 16kHz.		
P0034	Power Unit thermal time constant 3	0,00 bis 655,35 s	
-	Leistungsteil therm. Zeitkonstante 3	1,00 s	
A	BM_u_AmpTimeConst3	100:1 s	-
	Power unit thermal time constant at 16kHz PWM frequency. During the overload time ($P0034 > P0032$) and ($P0485 < 100\%$) the power unit can be operated with the peak current P0033 . Then the current is limited to the nominal current P0032 .		
P0035	Line Voltage	1 bis 519 V	
EE	Eingestellte Netzspannung	400 V	
	BM_u_LineVolt	1:1 V	-
	From the set mains voltage (phase RMS value) the nominal DC link voltage is calculated according to $P0020 = 0.95 \cdot \sqrt{2} \cdot P0035$. At low mains voltages P0020 is higher due to numerical causes. It is ensured that the calculated DC link voltage is lower than the maximum DC link voltage of		

the power unit parameter **P0036**.

This parameter predefines the voltage scaling of mains monitoring and thereby in connection with **P4080** the switsching threshold of the preload relay.

**NOTE**

Assignment of the correct value to this parameter is important to assure that supply, preload relay and the DC link capacitors will not be overloaded.

P0036	Power Unit DC link maximal voltage	280 bis 1000 V	
-	Leistungsteil Uzk-Maximalwert	749 V	
A	BM_u_AmpMaxDcLinkVolt	1:1 V	-
	Display of the maximum DC link voltage of the power unit. It is determined at 96% of the chopper resistor switch-on voltage.		
P0050	Motor type code	20 ASCII-Zeichen	
EE	Motor Typenschlüssel	0	
	BM_s_MotorType	1:1	-
	Type code of motor is for information only (motor database). For the control the type must be entered in P0093 .		
P0051	Motor serial number	0 bis 4294967295	
EE	Motor Seriennummer	0	
	BM_ud_MotorSerialNo	1:1	-
	The serial number of the motor is for information only (motor database).		
P0052	Motor data configuration	0 bis 65535	
EE	Motor Datenkonfiguration	0	
	BM_u_MotorDataConfig	1:1	-
	Internal marking of version of motor data configuration is for information only (motor database).		

P0053	Motor nominal voltage	0,0 bis 6553,5 V	
EE	Motor Nennspannung	0,0 V	
	BM_u_MotorNomVolt	10:1 V	-

Nominal voltage (RMS value) of motor (contrary to the term not the DC link voltage is meant).

In the Open loop operation it is necessary for the motor model.

The value is to be taken from the type plate or the motor database.

P0054	Motor nominal current	0,1 bis 6553,5 A	
EE	Motor Nennstrom	0,1 A	
	BM_u_MotorNomCurrent	10:1 A	-

Nominal current of the motor is necessary for the I^2t monitoring, autotuning (see **P0850**) and for the control of asynchronous motors.

The value is to be taken from the type plate or the motor database.

NOTE



Scaling of current values (that means, as a reference value for current values stated in percent) is not based on the motor nominal current. Instead, the adjusted maximum output current of the controller (**Power Unit max. drive current P1241**) is used.

P0055	Motor nominal operation mode	0 bis 65535	
EE	Motor Nennbetriebsart	0	
	BM_u_MotorNomOpMode	1:1	-

This parameter shows the nominal operating mode of the motor in coded form, just as it is printed on the motor type plate (in accordance with DIN 57 530).

The high byte designates the number of the operation mode 1 to 9 according to operation mode S1 to S9. The low byte specifies the relative switching time in % applying to ten minutes.

Example: Imprint in accordance with type plate: S3-40%, High-Byte = 3, Low-Byte = 40_{dez}

The parameter is for information only (motor database).

P0056	Motor nominal power	0,00 bis 655,35 kW	
EE	Motor Nennleistung	0,0 kW	
	BM_u_MotorNomPower	100:1 kW	-

Nominal power of motor is necessary for control of asynchronous motors and in order to determine the inertia (see **P0850**).

The value is to be taken from the type plate or the motor database.

P0057	Motor nominal speed	1 bis 24000 U/min	
EE	Motor Nenndrehzahl	1 U/min	
	BM_u_MotorNomSpeed	1:1 U/min	-

Nominal speed of motor. The nominal speed is necessary for the control of asynchronous motors and in order to determine the inertia (see **P0850**).

The value is to be taken from the type plate or the motor database.

NOTE

Scaling of speed values (reference value for speed values stated in percent) is not based on the motor nominal speed. Instead, the adjusted maximum speed (parameter **Motor maximum drive speed P1031**) is used.

P0058	Motor power factor	0,00 bis 1,00	
EE	Motor Leistungsfaktor	0,00	
	BM_u_MotorPowerFactor	100:1	-

Power factor of the motor, is necessary for control of asynchronous motors.

At asynchronous motors the parameter must be set (motor database).

P0059	Motor slip frequency 1	0,00 bis 655,35 Hz	
EE	Motor Schlupffrequenz 1	0,00 Hz	
	BM_u_MotorSlipFrequency1	100:1 Hz	-

Parameters **P0059** to **P0064** are relevant only for asynchronous machines.

The slip frequency of asynchronous motors depends on temperature. This parameter is only one coordinate of the characteristic curve. Within the controller this characteristic curve is simulated. To do so, only the first 2 coordinates are used (slip frequency 1 at temperature 1 and slip frequency 2 at temperature 2).

This parameter specifies the slip frequency of the motor at nominal speed and temperature 1 (e.g. cold motor). Slip frequency 1 must be lower than slip frequency 2.

At asynchronous motors the parameter must be set (motor database).

Referring to operation mode Open Loop this parameter is for information only.

P0060	Motor slip frequency 2	0,00 bis 655,35 Hz	
EE	Motor Schlupffrequenz 2	0,00 Hz	
	BM_u_MotorSlipFrequency2	100:1 Hz	-

Description also see [P0059](#).

This parameter specifies the slip frequency of the motor at nominal torque and nominal temperature 2.

Slip frequency 2 must be higher than slip frequency 1.

At asynchronous motors the parameter must be set (motor database).

For the operating mode Open loop this parameter only serves as information.

P0061	Motor nominal frequency	0,0 bis 6553,5 Hz	
EE	Motor Nennfrequenz	0,0 Hz	
	BM_u_MotorNomFrequency	10:1 Hz	-

Display of motor nominal frequency in Hz is especially necessary for the control of asynchronous motors.

At asynchronous motors the parameter must be set (motor database).

P0062	Motor temperature 1	0 bis 65535 °C	
EE	Motor Temperatur 1	0 °C	
	BM_u_MotorTemp1	1:1 °C	-

Temperature value display, for which the motor slip frequency 1 is valid.

Description also see [P0059](#).

At asynchronous motors the parameter must be set (motor database).

For the operating mode Open loop this parameter only serves as information.

P0063	Motor temperature 2	0 bis 65535 °C	
EE	Motor Temperatur 2	0 °C	
	BM_u_MotorTemp2	1:1 °C	-

Temperature value display, for which the nominal slip frequency (slip frequency 2) is valid. Description also see [P0059](#).

At asynchronous motors the parameter must be set (motor database).

For the operating mode Open loop this parameter only serves as information.

P0064	Motor friction moment	0,00 bis 655,35 Nm	
EE	Motor Reibmoment	0,00 Nm	
	BM_u_MotorFrictionMoment	100:1 Nm	-
	Display of motor friction torques. Is considered at the determination of P0508 .		
P0065	Motor number of pole pairs	1 bis 120	
EE	Motor Polpaarzahl	3	
	BM_u_MotorPolePairs	1:1	-
	Number of motor pole pairs. The parameter must be set (motor database).		
P0066	Motor magnetizing current	0,0 bis 6553,5 A	
EE	Motor Magnetisierungsstrom	0,0 A	
	BM_u_MotorMagnetCurrent	10:1 A	-
	Magnetizing current for asynchronous motors.		

**NOTE**

The magnetizing current for the field weakening operation at synchronous machines is set in an own parameter (**Field weakening current for SM P0095**).

At unknown motor type the I_d is taken from from the type plate / motor data sheet.

If I_d is unknown it can be approximately calculated internally:

$$I_d = |I| \sqrt{1 - (k \cos \varphi_n)^2}$$

Whereas: I = Motor nominal current **P0054**

$\cos \varphi_n = \mathbf{P0058}$

k = 1,0 to 1,3 (Motor database)

At Open loop operation the parameter is not used. There **P0506** is used.

P0067	Motor Ke factor	0,0 bis 6553,5 V / 1000/min	
EE	Motor Ke-Faktor	0,0 V / 1000/min	
	BM_u_MotorKeFactor	10:1 V / 1000/min	-

Back-EMF constant (motor EMF phase RMS value at 1000 RPM) of the synchronous-/ or asynchronous machine (motor database).

If you do not have a value for the K_e factor, you can try the following strategy:

- set speed setpoint according to the nominal speed of the motor
- enable drive and run motor in no-load operation
- Try to bring the output of the Iq controller to zero by adjusting the K_e factor.

The controller also operates without K_e factor, the achievable drive therewith can be decreased.

NOTE



If the set value of the motor K_e factor **P0067** is too high, it can happen that the motor overspeeds due to an immoderate voltage precontrol.

P0068	Motor attenuation factor	0,00 bis 655,35 Nm / 1000/min	
EE	Motor Dämpfungskonstante	0,00 Nm / 1000/min	
	BM_u_MotorAttenuationFact	100:1 Nm / 1000/min	-

Display of motor attenuation factor K_d .

The displayed value is for information only (motor database).

P0069	Motor peak current	0,0 bis 6553,5 A	
EE	Motor Spitzenstrom	0,0 A	
	BM_u_MotorPeakCurrent	10:1 A	-

Peak current of motor. The displayed value is for information only (motor database).

		Parameters description	
P0070	Motor peak torque	0,00 bis 42949672,95 Nm	
EE	Motor Spitzenmoment	0,00 Nm	
	BM_ud_MotorPeakTrq	100:1 Nm	-
	Peak torque of motor. The displayed value is for information only (motor database).		
P0071	Motor field weakening speed	1 bis 36000 U/min	
EE	Motor Feldschwächdrehzahl	3000 U/min	
	BM_u_MotorMaxSpeedElectr	1:1 U/min	-
	This parameter is not used.		
P0072	Motor max. speed mechanical	1 bis 36000 U/min	
EE	Motor Maximaldrehzahl mechanisch	3000 U/min	
	BM_u_MotorMaxSpeedMech	1:1 U/min	-
	Maximum speed of motor, permissible with the mechanical construction used. The parameter limits the maximum permissible speed set value.		
P0073	Motor I²t time constant	0 bis 3600 s	
EE	Motor I ² t-Zeitkonstante	0 s	
	BM_u_MotorTimeConstant_I2t	1:1 s	-
	Further information are to be found in chapter «Motor overload monitoring» from page 57. Thermal time constant of the motor T_t [s]. T_t is taken from the motor data sheet and must be converted into seconds. If time constant = 0 is selected, the overload monitoring is deactivated. At P0073 = 0 and in the status NOT-READY-TO-START the motor temperature is measured (provided that the motor temperature is acquired with a sensor). The PT_1 -element then is initialized to this motor temperature. Thereby 40°C accord to 0% and 155°C accord to 100% of P0502 . At switching on or although there is low current the error „overload monitoring“ can occur.		
P0074	Motor Flags	0x0000 bis 0xFFFF	
EE	Motor Flags	0x0001	
	BM_w_MotorFlags	1:1	-
	This parameter is not used.		

P0075	Motor stator resistance	0,000 bis 500,000 Ohm	
EE	Motor Ständerwiderstand	0,000 Ohm	
	BM_ud_MotorStatorResist	1000:1 Ohm	-
	The stator resistance is needed for the control. (Motor database).		
	The value can be determined by autotuning.		
P0076	Motor stator leakage inductance	0,00 bis 655,35 mH	
EE	Motor Ständerstreuinduktivität	0,00 mH	
	BM_u_MotorStatorLeakInduct	100:1 mH	-
	Leakage inductance of single phase equivalent circuit diagram for asynchronous machine, is needed for the control (motor database).		
	The value can be determined by autotuning.		
P0077	Motor rotor resistance	0,000 bis 500,000 Ohm	
EE	Motor Rotorwiderstand	0,000 Ohm	
	BM_ud_MotorRotorResist	1000:1 Ohm	-
	Rotor resistance of single phase equivalent circuit diagram for asynchronous machine, is needed for the control (motor database).		
	The value can be determined by autotuning.		
P0078	Motor rotor leakage inductance	0,00 bis 655,35 mH	
EE	Motor Rotorstreuinduktivität	0,00 mH	
	BM_u_MotorRotorLeakInduct	100:1 mH	-
	Rotor leakage inductance of single-phase equivalent circuit diagram for asynchronous machine, is needed for the control (motor database).		
	The value can be determined by autotuning.		
P0079	Motor magnetizing inductance	0,00 bis 655,35 mH	
EE	Motor Hauptinduktivität	0,00 mH	
	BM_u_MotorMagnetInduct	100:1 mH	-
	Main inductance of the single phase equivalent circuit of the asynchronous machine is for information only (motor database).		

P0080	Motor Lq inductance	0,00 bis 655,35 mH	
EE	Motor Lq-Induktivität	0,00 mH	
	BM_u_MotorLqInduct	100:1 mH	-
	Lq inductance of synchronous machine, is needed for the control (motor database). The value can be determined by autotuning.		
P0081	Motor Ld inductance	0,00 bis 655,35 mH	
EE	Motor Ld-Induktivität	0,00 mH	
	BM_u_MotorLdInduct	100:1 mH	-
	Display parameters Ld inductance of synchronous machine., for the control there is only one inductance used (P0080).		
P0082	Motor notch position	0,0 bis 360,0 °	
EE	Motor Rastwinkel	240,0 °	
	BM_u_MotorNotchPos	65536: 360 °	CW
	Notch position (mounting angle encoder ↔ electrical angle 0°) of synchronous machine. For more information see P0094.		
P0083	Motor torque inertia	0,00 bis 42949672,95 kg*cm*cm	
EE	Motor Trägheitsmoment	0,00 kg*cm*cm	
	BM_ud_MotorTrqInertia	100:1 kg*cm*cm	-
	Inertia of motor, is necessary for the calculation of speed controllers parameters. The value can be determined by autotuning.		

P0084	Motor temperature sensor type	0x0000 bis 0x00FF	
EE	Motor Temperatursensor-Typ	0x0000	
	BM_u_MotorTempSensorType	1:1	-

Two different types of temperature sensors are available.

Value	Meaning	Notes
0	KTY 84	Measuring range (P0503): -30°C...260°C Error identification (P0207): <ul style="list-style-type: none"> • Temperature sensor not connected, • Temperature sensor short-circuited • overtemperature Warnings (P0263): <ul style="list-style-type: none"> • Temperature-threshold 1 or 2 exceeded
2	PTC (DIN 44081/44082)	Switching thresholds: <ul style="list-style-type: none"> • $R_{off} = 1350\Omega$ • $R_{on} = 550\Omega$ Error identification (P0207): <ul style="list-style-type: none"> • overtemperature P0503 = 260°C (otherwise 40°C) Warnings (P0263)(at the same time with error): <ul style="list-style-type: none"> • Temperature-threshold 1 or 2 exceeded
Other	Unknown sensor	Display P0503 = 40°C

P0085	Motor brake voltage	0,0 bis 1000,0 V	
EE	Motor Bremsen-Spannung	24,0 V	
	BM_u_MotorBrakeVolt	10:1 V	-

Nominal voltage of motor brake, the value is for information only (motor database).

P0086	Motor brake torque inertia	0,00 bis 42949672,95 kg*cm*cm							
EE	Motor Bremsen-Trägheitsmoment	0,00 kg*cm*cm							
	BM_ud_MotorBrakeTrqInertia	100:1 kg*cm*cm	-						
	Torque inertia of motor brake, the value is for information only (motor database).								
P0087	Motor rotating field	0 bis 1							
EE	Motor Drehfeld	1							
	BM_u_MotorRotatingField	1:1	-						
	Adjustment of the control to the phase sequence of the motor.								
	<table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Counter-clockwise rotating field</td> </tr> <tr> <td>1</td> <td>Clockwise rotating field</td> </tr> </tbody> </table>			Value	Meaning	0	Counter-clockwise rotating field	1	Clockwise rotating field
Value	Meaning								
0	Counter-clockwise rotating field								
1	Clockwise rotating field								
P0088	Motor warning temperature 1	-80 bis 250 °C							
EE	Motor Warntemperatur 1	125 °C							
	BM_i_MotorWarnTemp1	1:1 °C	-						
	Warning threshold 1 of motor temperature monitoring.								
P0089	Motor warning temperature 2	-80 bis 250 °C							
EE	Motor Warntemperatur 2	125 °C							
	BM_i_MotorWarnTemp2	1:1 °C	-						
	Warning threshold 2 of motor temperature monitoring.								
P0090	Motor shutdown temperature	-80 bis 250 °C							
EE	Motor Abschalttemperatur	150 °C							
	BM_i_MotorMaxTemp	1:1 °C	-						
	Shutdown threshold of motor temperature monitoring.								
P0091	Motor temperature hysteresis	0 bis 5 °C							
EE	Motor Temperaturhysterese	5 °C							
	BM_i_MotorMonHysteresis	1:1 °C	-						
	Hysteresis for motor temperature monitoring thresholds.								

P0092	Motor I²t warning limit	0,0 bis 100,0 %	
EE	Motor I ² t-Warngrenze	80,0 %	
	BM_u_MotorI2t_ULim	0x4000: 100 %	-
	See also «Motor overload monitoring» from page 57.		
	I ² t-warning limit at motor overload.		
	Scaling: 100% ↔ 155°C		
P0093	Motor mode	0x0000 bis 0xFFFF	
EE	Motor Modus	0x0000	
	BM_w_MotorMode	1:1	-

Bit no.	Meaning
1...0	Drive control: 0 0 Control of a synchronous machine 0 1 Control of an asynchronous machine 1 0 Sensorless control of an asynchronous machine (<i>Open loop</i>) 1 1 Reserved
2...4	Reserved
5	Motor temperature: 0 Motor temperature is not evaluated 1 Motor temperature is evaluated
6	Field angle monitoring 0 Off 1 On
7	0 Field weakening for synchronous machine at the voltage limit 1 Field weakening for synchronous machine, permanent with field weakening current (P0095)
8	For asynchronous machine only: Temperature tracing of slip frequency 0 Temperature tracing of slip frequency is switched off 1 Temperature tracing of slip frequency is active

Bit no.	Meaning
9	For asynchronous machine only: Observe waiting time for field setup 0 At simultaneous pulse and controller enable the speed set value becomes effective after 3 x TR has expired. 1 At simultaneously pulse- and controller enable, immediate torque build-up in the base speed range (to nominal speed). Above the nominal speed the torque set value operates after 3 x TR has expired.
12	Monitoring motor brake control If motor brake in the control mode is manual (P1400) 0 No monitoring 1 Monitoring active
13...14	Speed search for open loop control at pulse enable for a rotating machine 00 Speed search deactivated 01 Speed search for clockwise rotation activated 10 Speed search for counter-clockwise rotation activated 11 Speed search in both speed directions

- Bit5:

Motor temperature evaluation can be switched on or off. When motor temperature evaluation is switched on, the motor temperature will be monitored also with respect to preadjusted temperature limits. At a switched off motor temperature evaluation in **Motor actual temperature P0503** always the value 40°C is displayed.

- Bit7:

For operation of synchronous machines, a field weakening function is implemented. Therewith a speed increase of about 10% to 20% against the nominal speed can be achieved. The required field weakening current is adjusted in parameter **P0095**.

- Bit8:

The slip frequency of asynchronous motors depends on temperature. In order to optimize controlling, with this bit you can activate consideration of the temperature dependence. The temperature tracing is effective only if the motor temperature evaluation is activated (see Bit5).

- Bit9:

At asynchronous machines the behavior at drive enable can be adjusted :

Value	Meaning
0	Before enable of torque setpoint, a waiting time of three times the rotor time constant required to set up the field is regarded. During the field generating time the drive remains in the status ready-to-operate. After that the drive changes into the status operation enabled (see «Device management» from page 88).
1	When the drive is enabled, the torque setpoint is enabled immediately. That means that the drive immediately changes into the status operation enabled. Anyway, it is to be considered, that the motor cannot build up the torque immediately, because the field is not yet set up.

- Bit12:

When there is manual brake control (P1400 holding brake control mode Bit0 = 0) the motor brake can be controlled via P0302 (Bit0). The controller can recognize via a response input, if there is current flowing through the motor brake or not. If the motor brake control monitoring is activated, the controller generates an error message (no. 166), if the brake shall be controlled via the control word 2 P0302, but there is no current flow through the brake (or an interconnected relay) The error delay time can be parameterized (Holding brake timeout check-back signal P1404).

P0094	Motor mode notch position	0x0000 bis 0x0002
EE	Motor Rastwinkel-Modus	0x0000
	BM_w_MotorNotchPosMode	1:1 -

The operation mode Find notch position is used to detect the mounting position of the encoder at synchronous machines.

There are three methods to find out the notch position:

At the methods 0 and 1 the controller itself specifies a current setpoint.

Method 0 The current set value linearly increases twice from 0% to 100%. For the current feed the current feed angle Rho (P3020) is set to NotchCorrAngle1 (P3402) or NotchCorrAngle2 (P3403). The motor must be able to move into the according positions easily, at an extreme case the drive can move up to 1,25 pole pairs in one direction.

The motor finds its notch position .

The notch position is detected with the according encoder angles (P0082).

If the notch position was detected, Bit4 *Find notch position* is set in the motor notch status (P0501).

If the results are not plausible (notch position difference greater than 22,5°) the search notch position is repeated once.

If repeatedly there is inconsistency , then error no. 102, „group error at search notch position“ in P0207 is released and in the according following parameter error at search notch position

P0237 the Bit2 is set. At an incorrectly set rotating field **P0087** also error **P0237** Bit2 is released.

This can lead to saturation effects as it is supplied in field direction. In order to avoid an instable current controller caused thereby, the proportional gain is reduced to **P2126** during notch position search.

A difference of 90° would be ideal between the NotchCorrAngle1 and NotchCorrAngle2. If there is a difference of less than 45° or higher than 135° a phase sequence cannot be recognized exactly anymore. If the difference is e.g. 0° or 180° the notch position search (at drives with friction) can lead to a 180° incorrect result (**Danger: In this case, if speed control is active, the drives moves into the wrong direction with maximum torque.**).

The following table indicates the current of the single phases at an amplitude i .

Rotating field	ParamNotchKorrWinkelx [°]	i_u	i_v	i_w
Clockwise	0	0	$i/2 * \sqrt{3}$	$-i/2 * \sqrt{3}$
Counter-clockwise	0	0	$-i/2 * \sqrt{3}$	$i/2 * \sqrt{3}$
Clockwise	90	$-i$	$i/2$	$i/2$
Counter-clockwise	90	$-i$	$i/2$	$i/2$

Method 1 The motor shaft must be able to move about 4* **P2128** (default 2°) to each side. After optimization sequence in motor notch position status (**P0501**) Bit4 *Notch position found* is set. An incorrectly set phase sequence **P0087** is not recognized.

Details The notch position search has 4 states, a → indicates a subsequent state.

1. Motor current is increased (CurrentDiffPST **P3021** per 2ms), until the encoder moves more than the angle in **P2128**. → 2

If the current of **Power Unit max. drive current P1241** is present for a duration of **P2127** without exceeding of **P2128**, the notch position is calculated from the actual current angle **P3020**. →4

2. Changing of the notch position until the motor moves back (RhoDiffPST **P3022** in 2ms), current is steadily increased.

If motor moves back →1

If motor moves over more than 2* **P2128** in total, correction of notch position in great steps (the first time 90°, then 45°, 22.5°, ...), current = 0 →3

3. Stopping the drive (oscillation, return to notch position). According to **P2127** (usual values are between 50 - 100ms, at weakly damped mechanics it can be higher) → 1 with reversal current direction.
4. After displacing the current angle **P3020** by 90° the notch position search is repeated one time. → 1

After the 2nd run there is a plausibility check. If both results are more than 22.5° apart the notch position search is repeated the 3rd time. If the remaining difference again is greater than 22.5°,

an error will be reported.

The average of the last two notch position measurements is assumed.

Method 2 The motor does not move or only a little at a very well mounted drive. The motor is applied with high-frequency voltage. This causes clearly audible noise.



NOTE

If using method 2, dead time compensation has to be switched off (P1320 Bit2 = 0).

The notch position search is made in two steps. With the parameters P2120, P2121, P2122 and P2123 voltages and frequencies can be specified.

The parameters must be set, so that the current is in the range of the nominal current of the machine. The 2nd step takes advantage of saturation effects. These occur at higher currents, at some machines considerably above the nominal current.

For the first commissioning it is necessary to monitor the current actual values P0336 with the oscilloscope function. Therewith P2122 and P2123 can be set. If the current is too low it can happen that the notch position, which was found, is incorrect.

The gain of the slave controller is set with P2124. P2125 determines the minimum saturation, which is necessary for a valid result.

Error: An unsuccessful search for notch position results in error no. 102, „group error at notch position search“ in P0207. In this case the following parameter **Error by find notch position P0237** means:

Bit no.	Meaning	Causes, Troubleshooting
0	Overcurrent step 1	Method 2: Increase peak current P1241, reduce voltage amplitude P2122
1	Overcurrent step 2	Method 2: Increase peak current P1241, reduce voltage amplitude P2122

Bit no.	Meaning	Causes, Troubleshooting
2	Plausibility step 1	Methods 0 and 1: Both of the partial results do not match (notch position difference greater than 22.5°) Check rotating-field direction P0087 (only method 0) Current is too low or shaft is too immovable Method 2: Increase amplitude of voltage P2122
3	Plausibility step 2	Method 2: Increase amplitude of voltage P2123 . If P2123 already is at maximum, then lower frequency of current P2121
4	SW-option	The SW-option <i>Notch position search method 2</i> is not enabled («Software options» from page 45)
5	Timeout, interruption of notch position search after 60s	Method 1: Increase CurrentDiffPST P3021 (if current feed takes too long) or lower it (if drive is vibrating), Increase P2128 (at continuous change between steps 1 and 2) Increase P2127 (if drive did not stop after the waiting time) or lower it (if it takes too long) Lower RhoDiffPST P3022 (if the drive is vibrating) or increase it (if tracking is too slow)
6	Drive has moved more than 4* P2128	Method 1: Increase P2128 (at drive with friction, notching, initial starting torque) Lower CurrentDiffPST P3021 Lower RhoDiffPST P3022 (at a tracking, which is too quick) Check current controller setting (must not be too delayed)
7	Notch position search via more than 180°	Method 1: Drive does not allow a causally movement, torque too low, encoder problems

NOTE

Pay attention to the fact, that at the methods 1 and 2 an incorrect rotating field **P0087** is not detected.

P0095	Field weakening current for SM	0,0 bis 6553,5 A	
EE	Feldschwächstrom für SM	0,0 A	
	BM_u_SmFieldWeakeningCurrent	10:1 A	-
<p>Field weakening current for operation of synchronous machines using field weakening.</p> <p>For operation of synchronous machines, a field weakening function is implemented. Therewith a speed increase of about 10% to 20 % compared to the nominal speed can be achieved.</p> <p>If the output voltage reaches in the constant operation the value $U_{DC}/(\sqrt{2})$, field weakening starts. The maximum field weakening current is limited to 95% of power unit nominal current (P0010 / P0012).</p> <p>The maximum field weakening current usually must not be set greater than the motor nominal current (P0054).</p> <p>Magnetizing current I_d: Range from 0 up to motor nominal current (P0054)</p> <p>Reset time flux controller T_n:</p> $T_n = \frac{2}{6 \cdot f_1}$ <p>f_1: The fundamental frequency at the beginning of the field weakening</p> <p>k_p: Flux controller: 2 to 3</p>			
P0096	Motor article number	0 bis 4294967295	
EE	Motor Artikelnummer	0	
	BM_ud_MotorArticleNumber	1:1	-
<p>Item number of the motor, the value is for information only (motor database).</p>			
P0097	Motor standstill current	0,0 bis 6553,5 A	
EE	Motor Stillstandsstrom	0,0 A	
	BM_u_MotorStandstillCurr	10:1 A	-
<p>Standstill current of the motor, the value is for information only (motor database).</p>			
P0098	Motor standstill torque	0,00 bis 42949672,95 Nm	
EE	Motor Stillstandsmoment	0,00 Nm	
	BM_ud_MotorStandstillTrq	100:1 Nm	-
<p>Static torque of the motor, the value is for information only (motor database).</p>			

P0099	Motor brake torque	0,0 bis 6553,5 Nm	
EE	Motor Bremsen-Haltemoment	0,0 Nm	
	BM_u_MotorBrakeTrq	10:1 Nm	-
	Holding torque of motor brake, the value is for information only (motor database).		
P0100	Motor gear factor	0 bis 65535	
EE	Motor Getriebefaktor	257	
	BM_u_MotorGearFactor	1:1	-
	Gear factor of the motor, the value is for information only (motor database).		
P0103	magnetic pole pitch	0,01 bis 200,00 mm	
EE	Motor Polteilung	36,00 mm	
	BM_u_MotorPolePitch	100:1 mm	-
	For linear motors: Space between two magnets of different polarity. A pole pair that corresponds to an electrical revolution is 2 * P0103 .		
P0150	Encoder 1 mode	0x0000 bis 0xFFFF	
EE	Geber 1 Modus	0x0001	
	BM_w_Enc1Mode	1:1	-
	Mode parameter for encoder 1		

Bit no.	Meaning
0	0 Deactivate encoder evaluation
	1 Activate encoder evaluation
1	0 Multiplier for PPR count is 1
	1 Multiplier for PPR count is 8
4	Encoder polarity
	0 No sign inversion, clockwise rotating encoder generates positive actual speed value
	1 Sign inversion, clockwise rotating encoder generates negative actual speed value.
5	Polarity of position count
	0 Positive actual speed value effectuates positive change of target position
	1 Positive actual speed value effectuates negative change of target position

Bit no.	Meaning
6	0 Initialization of the target position actual value without reference to zero pulse of encoder
	1 Initialization of the target position actual value with reference to zero pulse of encoder
7	0 $\sqrt{\sin^2 x + \cos^2 x}$ monitoring of encoder tracks deactivated
	1 $\sqrt{\sin^2 x + \cos^2 x}$ monitoring of encoder tracks activated
8	1 Encoder-error not resettable
9	1 No error E144 „absolute position unknown“ at SM
11	0 No resolver excitation control
	1 Resolver excitation control active Different resolver gains at constant excitation can lead to encoder signals, which are either overmodulated or too small. The excitation voltage (P3443) is adjusted with the excitation control, so that the amplitude of the encoder signal ($\sqrt{P3024^2 + P3025^2}$) falls between 85% and 90% of the measuring range of the ADC. It is adequate to activate the excitation control during the commissioning for about 2 minutes, if the determined value (P3443) is saved. At an activated resolver excitation control P1076 must be greater than 90%.
12	0 No absolute value acceptance
	1 Absolute position is referred to from the other encoder Useful e.g. at drives with an exact relative encoder and an inexact absolute value encoder. By using the absolute value encoder at the initialization the saved notch position is valid. For control the better relative encoder is used.
15	Communication protocol
	0 Protocol for SinCosEncoder from Stegmann (SCM70, SCS70, SRS50, SRM50) for encoder detection and determination of absolute position
	1 No protocol

Description:

- Bit4 and Bit5: Encoder polarity and polarity of position count:

With these settings the evaluation of the encoder can be inverted.

The following combinations are possible:

Bit5	Bit4	Description
0	0	No inversion: Clockwise rotating encoder effectuates positive actual speed and enlargement of the actual position. Example: Encoder is attached to the motor side and a positive motor speed direction results in an enlargement of the actual position.
0	1	Inversion of the entire encoder evaluation: Clockwise rotating encoder effectuates a negative actual speed and a reduction of the actual position value. Example: Encoder is on the load side and a positive motor speed direction (also negative speed direction of the load!) results in an enlargement of the actual position.
1	0	Inversion only for position count, no inversion for motor control: Clockwise rotating encoder effectuates a positive actual speed value but a reduction of the actual position. Example: Encoder is attached to the motor side and a positive motor speed direction results in a reduction of the actual position.
1	1	Inversion only for motor control, no inversion for position count: Clockwise rotating encoder effectuates negative actual speed value and an enlargement of the actual position value. Example: Encoder is attached to the motor side, positive motor speed direction (also negative speed direction of the load!) results in an enlargement of the actual position.

- Bit8: Possibilities to acknowledge encoder errors:

With this bit it is possible to select, if encoder errors (cable break, communication error etc.) can be acknowledged with the control word command or if the controller must be switched off and then on again.

- Bit9: Suppress error message „Absolute position unknown“:

The error message „Absolute position unknown“ can appear on the following three conditions:

1. Error at the encoder communication (HIPERFACE®)
2. The drive control is on synchronous machine (P0093 Bit0/Bit1), the motor control is set to this encoder (P1030 Bit0/Bit1) and the encoder type (S. 277) is with communication but its communication protocol (P0150 or P0160 Bit15) is switched off.
3. The drive is on synchronous machine (P0093 Bit0/Bit1), the motor control is set on this encoder (P1030 Bit0/Bit1) and the encoder type is a rectangular- or sine incremental encoder.

NOTE

By setting Bit9, the error message can be suppressed only for the cases 2 and 3. In this case the user must assure, that after each encoder initialization a notch position search is executed.

- Bit11: Activation of automatic resolver excitation control.

This adjusts the excitation voltage (P3443), so that the encoder amplitude (determined from P3028f) is between 85% and 90% of the ADC-range.

The control is not operating, if there is an error of the encoder 1, the encoder is not activated or if the encoder 1 is not a resolver.

The control reaches its final value after about 2min.

- Bit12: Absolute angle transfer from another encoder:

If this bit is activated, at each encoder initialization the angle of the other encoder is copied to the angle of the encoder. The counter of revolutions is set to zero. The function only operates at incremental encoders. Therewith the angle position of the incremental encoder can be initialized without prior homing and the encoder therewith is made quasi-absolute.

Preconditions:

- The encoder is a rectangular- or sine incremental encoder.
- The other encoder is an absolute value encoder
- The other encoder was initialized error-free.
- The position count of the two encoders is equal.

Application example:

Motor control of a synchronous machine by an incremental encoder. The second absolute encoder serves as pole position sensor. At activated Bit12 the Search notch position is necessary only once at commissioning.

- Bit15: Communication protocol

With this bit it can be set, if at encoders with communication interface (HIPERFACE interface at absolute value encoders of Stegmann) the encoder type, the PPR count and the absolute position is read from the encoder.

If this bit is set, there is no communication executed to the encoder.

In this case the values for number of pulses and revolution of the encoder are entered manually.

If the encoder shall be used for the motor control of synchronous machines, at first the notch position must be searched.

**NOTE**

After changing the mode parameter for encoder 1, it is necessary to re-boot the controller.

Also see **P3037**.

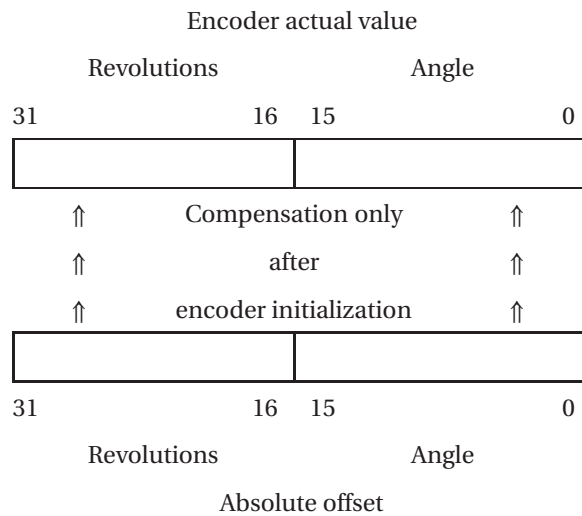
P0151	Encoder 1 type code	20 ASCII-Zeichen	
-	Geber 1 Typenschlüssel		
A	BM_s_Enc1Type	1:1	-
	Type code or type identification of encoder 1.		
	At HIPERFACE encoder the type is read from the encoder.		
	The following values are possible: <i>Resolver, Incremental encoder, none, unknown, sine/cosine 5V</i> .		
	If the encoder is deactivated the parameter value is <i>Disabled</i> .		
	From P3037 the type of existing encoder modules can be seen.		
P0152	Encoder 1 number of pulses	1 bis 32767	
EE	Geber 1 Strichzahl	1	
	BM_u_Enc1PulsesPerRev	1:1	-
	PPR count or number of cycles per revolution of encoder 1.		
	Is automatically read from the encoder at sine-cosine encoder (Stegmann).		
	At resolver: Number of pole pairs of the resolver.		
P0153	Encoder 1 number of revolutions	0 bis 65535	
EE	Geber 1 Umdrehungen	1	
	BM_u_Enc1NomRev	1:1	-
	Number of complete revolutions, which encoder 1 can display, i.e. in which the encoder can resolve an unique absolute position.		
P0154	Absolute offset encoder 1	0x80000000 bis 0x7FFFFFFF	
EE	Absolutmaßoffset Geber 1	0	
	BM_di_Enc1Offset	1:1	-
	The controller adds the value of this offset to the absolute value of encoder 1.		
	Thereby only the actual encoder values are influenced, which are used for the position control (P0391 and P0392), the mechanical angle (P0393 encoder 1 mechanical actual angle value) is		

not influenced by the absolute offset.

Behavior is independent of a possible inversion of the encoder evaluation (P0150 encoder 1 mode, Bit4 and Bit5) always the same, the offset is added after inversion.

That actual value compensation takes effect even after start-up or after an encoder initialization; writing and saving to the parameter is not sufficient for that.

The encoder actual values can be adjusted with the absolute offset by a maximum of ± 32767 revolutions. The resolution of angles is 16 bit (0 to 65535 accords to 0 to 360°). The most significant bit within the absolute offset represents the sign.



P0155	Offset encoder 1 sin	1548 bis 2548
EE	Offset Geber 1 Sin	2048
	BM_i_Sin1Offset	1:1 -

Offset of sine track of the encoder 1.

The ideal zero value of the ADC is at 2048. At SINCOS- and sine incremental encoders the values are automatically tracked. For other encoders the parameter is not important.

P0156	Offset encoder 1 cos	1548 bis 2548
EE	Offset Geber 1 Cos	2048
	BM_i_Cos1Offset	1:1 -

Offset of cosine track of the encoder 1.

The ideal zero value of the ADC is at 2048. At SINCOS- and sine incremental encoders the values are automatically tracked. For other encoders the parameter is not important.

P0160	Encoder 2 mode	0x0000 bis 0xFFFF	
EE	Geber 2 Modus	0x0000	
	BM_w_Enc2Mode	1:1	-
	Mode parameter for encoder 2, see P0150 .		
	Difference: As encoder 2 cannot be a resolver, Bit11 is not important.		
P0161	Encoder 2 type code	20 ASCII-Zeichen	
-	Geber 2 Typenschlüssel		
A	BM_s_Enc2Type	1:1	-
	See P0151 .		
P0162	Encoder 2 number of pulses	1 bis 32767	
EE	Geber 2 Strichzahl	1	
	BM_u_Enc2PulsesPerRev	1:1	-
	See P0152 .		
	Difference: Encoder 2 cannot be a resolver.		
P0163	Encoder 2 number of revolutions	0 bis 65535	
EE	Geber 2 Umdrehungen	1	
	BM_u_Enc2NomRev	1:1	-
	See P0153 .		
P0164	Absolute offset encoder 2	0x80000000 bis 0x7FFFFFFF	
EE	Absolutmaßoffset Geber 2	0	
	BM_di_Enc2Offset	1:1	-
	See P0154 .		
P0165	Offset encoder 2 cos	1548 bis 2548	
EE	Offset Geber 2 Cos	2048	
	BM_i_Cos2Offset	1:1	-
	See P0155 .		

P0166	Offset encoder 2 sin	1548 bis 2548	
EE	Offset Geber 2 Sin	2048	
	BM_i_Sin2Offset	1:1	-
	See P0156 .		
P0200	Error System 1	0x00000000 bis 0xFFFFFFFF	
-	Fehler System 1	0x00000000	
A	BM_d_SysError1	1:1	-

Bit no.	Meaning	Reaction	Specifying parameter
0	Error in module processor	IS	P0201
1	Error in module operating system	IS	P0202
2	Error in module Proprog communication	Adjustable	P0203
3	Dig. Input or CANopen error in function- or optional modules	Adjustable	P0204
4	Error in module feed unit	Adjustable	P0205
5	Error in module power unit	Adjustable	P0206
6	Error in module motor	Adjustable	P0207
7	Error in module encoder 1	Adjustable	P0208
8	Error in module encoder 2	Adjustable	P0209
9	Error in module encoder manager	Adjustable	P0210
10	Error in module drive manager	Adjustable	P0211
11	Error in module data set manager	Adjustable	P0212
12	Error in module position controller	Adjustable	P0213
13	Error in module speed controller	Adjustable	P0214
14	Error in module free programmability	Adjustable	P0215
15	Error in module CAN-synchronous	Adjustable	P0216

If there is an error in a module, the accoring bit is set. Detailed error specifications can be seen from the linked specifying parameter.

Error description, following parameter as well as possible and default reactions see «Complete list of errors» from page 481.

Actions for troubleshooting and additional information are to be found in chapter «Troubleshooting» in the **b maXX® BM3400** Instruction manual.

		Parameters description	
P0201	Error Processor	0x0000 bis 0xFFFF	
-	Fehler Prozessor	0x0000	
A	BM_w_ProcessorSysError	1:1	-
	Errors in module processor. See «Complete list of errors» from page 481.		
P0202	Error Operating-System	0x0000 bis 0xFFFF	
-	Fehler Betriebssystem	0x0000	
A	BM_w_OperatingSysError	1:1	-
	Error in module operating system. See «Complete list of errors» from page 481.		
P0203	Error Communication	0x0000 bis 0xFFFF	
-	Fehler PROPROG	0x0000	
A	BM_w_ProprogSysError	1:1	-
	Error in module Proprog communication driver. See «Complete list of errors» from page 481.		
P0204	Error in function or option modules	0x0000 bis 0xFFFF	
-	Fehler in Funktions- oder Optionsmodulen	0x0000	
A	BM_w_ExtendedModuleError	1:1	-
	Error in function- or option modules. See «Complete list of errors» from page 481.		
P0205	Error Power Supply Unit	0x0000 bis 0xFFFF	
-	Fehler Einspeiseeinheit	0x0000	
A	BM_w_PSU_SysError	1:1	-
	Error in module feed unit. See «Complete list of errors» from page 481.		
P0206	Error Power Unit	0x0000 bis 0xFFFF	
-	Fehler Leistungsteil	0x0000	
A	BM_w_AmpSysError	1:1	-
	Error in module power unit. See «Complete list of errors» from page 481.		
P0207	Error Motor	0x0000 bis 0xFFFF	
-	Fehler Motor	0x0000	
A	BM_w_MotorSysError	1:1	-
	Error in module motor. See «Complete list of errors» from page 481.		

P0208	Error Encoder 1	0x0000 bis 0xFFFF	
-	Fehler Geber 1	0x0000	
A	BM_w_Enc1SysError	1:1	-
	Error in module encoder 1. See «Complete list of errors» from page 481 .		
P0209	Error Encoder 2	0x0000 bis 0xFFFF	
-	Fehler Geber 2	0x0000	
A	BM_w_Enc2SysError	1:1	-
	Error in module encoder 2. See «Complete list of errors» from page 481 .		
P0210	Error Encoder manager	0x0000 bis 0xFFFF	
-	Fehler Geber-Manager	0x0000	
A	BM_w_EncManagSysError	1:1	-
	Error in module encoder manager. See «Complete list of errors» from page 481 .		
P0211	Error Drive manager	0x0000 bis 0xFFFF	
-	Fehler Antriebs-Manager	0x0000	
A	BM_w_DriveManagSysError	1:1	-
	Error in module drive management. See «Complete list of errors» from page 481 .		
P0212	Error Data set manager	0x0000 bis 0xFFFF	
-	Fehler Datensatzverwaltung-Manager	0x0000	
A	BM_w_DataRecSysError	1:1	-
	Error in module data set management. See «Complete list of errors» from page 481 .		
P0213	Error Position controller	0x0000 bis 0xFFFF	
-	Fehler Lageregler	0x0000	
A	BM_w_PosCtrlSysError	1:1	-
	Error in module position controller. See «Complete list of errors» from page 481 .		
P0214	Error Speed controller	0x0000 bis 0xFFFF	
-	Fehler Drehzahlregler	0x0000	
A	BM_w_SpeedCtrlSysError	1:1	-
	Error in module speed controller. See «Complete list of errors» from page 481 .		

P0215	Error Free control section	0x0000 bis 0xFFFF	
-	Fehler Freie Programmierbarkeit	0x0000	
A	BM_w_FreeCtrlSecSysError	1:1	-
Error in module free control section. See «Complete list of errors» from page 481.			
P0216	Error CANsync	0x0000 bis 0xFFFF	
-	Fehler CANsync	0x0000	
A	BM_w_CANsyncError	1:1	-
Error in module CAN-sync. See «Complete list of errors» from page 481.			
P0233	Error Power Unit serial interface	0x0000 bis 0xFFFF	
-	Fehler Leistungsteil-Serielle Schnittstelle	0x0000	
A	BM_w_AmpHiperfaceError	1:1	-
Only at devices with power unit processor (P3379).			

Value	Meaning
6	More than 5 failures at the communication
11	Unknown error code
12	Boot-Up still running
13	Command error (checksum, unknown)
14	Cyclic communication deactivated, power unit FW-update is running
15	PU provides useless values (plausibility check fails)
36	Incorrect PU data checksum
48	Update completed error-free (after an update an error always is released)
49	Update is not completed error-free

P0234	Error Encoder 1 serial interface	0x0000 bis 0xFFFF	
-	Fehler Geber 1-Serielle Schnittstelle	0x0000	
A	BM_w_Enc1SerComError	1:1	-
Error in module encoder 1 - serial interface Meaning of error numbers see P0235.			

P0235	Error Encoder 2 serial interface	0x0000 bis 0xFFFF
-	Fehler Geber 2-Serielle Schnittstelle	0x0000
A	BM_w_Enc2SerComError	1:1

Error in module encoder 2 - serial interface

Value	Meaning
1	Analog signals outside specified range
2	Error in internal angle offset
3	Data field partitioning table destroyed
4	Analog limit values not available
5	Internal I2C bus not operational
6	Internal checksum error
7	Internal watchdog error - encoder-reset
8	Overflow of the counter
9	Parity error
10	Checksum error
11	Unknown error code
12	Data number error
13	Invalid argument
14	Data field is write protected
15	Invalid access code
16	Data field is not changeable in its size
17	Word address outside of data field
18	Data field is nonexistent
28	Absolute monitoring of the analog signals
29	Transmission current critical
30	Encoder temperature critical
31	Speed too high - position determination impossible
32	Position singleturn unreliable
33	Multiturn position error
34	Multiturn position error
35	Multiturn position error
36	Invalid multiturn data checksum

Value	Meaning
37	No response from encoder
38	Encoder address unknown
39	Error reading the absolute angle position
40	Invalid checksum of received data
41	Unknown encoder type
48	Incorrect response to command

P0236	Error Mainsmonitor	0x0000 bis 0xFFFF	
-	Fehler Netzmonitor	0x0000	
A	BM_w_MainsMonitorError	1:1	-

Except for phase failure only for devices with power unit processor (P3379).

The mains monitor has determined a mains error. For this at least one error condition for the mains voltage or mains frequency must be fulfilled for the set time in P2063 mains error - reaction delay time.

Sub-error bit-bar of error 79 mains monitor group error (P0205 error power supply Bit15 = 1):

Bit no.	Meaning
0	Mains monitor has detected error „Mains failure“
1	Mains monitor has detected error „Phase failure“
2	Mains monitor has detected error „Mains undervoltage “
3	Mains monitor has detected error „Mains overvoltage“
4	Mains monitor has detected error „Mains frequency at the lower frequency limit“
5	Mains monitor has detected error „Mains frequency at the upper frequency limit“
6	Phase failure (U DC link measuring)

Multiple bits can be set.

The single errors can be activated or deactivated via P2056 mains monitor mode.

P0237	Error by find notch position	0x0000 bis 0xFFFF	
-	Fehler bei Rastlagensuche	0x0000	
A	BM_w_RastRefError	1:1	-
	For a description of this parameter see P0094 .		
P0240	Error Function module A	0x0000 bis 0xFFFF	
-	Fehler Funktionsmodul A	0	
A	BM_w_SmallModuleErrorA	1:1	-
	Error description as well as possible and default reactions see «Table of suberrors to error 48» from page 487		
P0241	Error Function module B	0x0000 bis 0xFFFF	
-	Fehler Funktionsmodul B	0	
A	BM_w_SmallModuleErrorB	1:1	-
	This parameter is not used.		
P0242	Error Function module C	0x0000 bis 0xFFFF	
-	Fehler Funktionsmodul C	0	
A	BM_w_SmallModuleErrorC	1:1	-
	This parameter is not used.		
P0243	Error Function module D	0x0000 bis 0xFFFF	
-	Fehler Funktionsmodul D	0	
A	BM_w_SmallModuleErrorD	1:1	-
	This parameter is not used.		
P0244	Error Function module E	0x0000 bis 0xFFFF	
-	Fehler Funktionsmodul E	0	
A	BM_w_SmallModuleErrorE	1:1	-
	This parameter is not used.		

P0245	Error Option module G	0 bis 65535	
-	Fehler Optionsmodul G	0	
A	BM_w_BigModuleErrorG	1:1	-
Error in option module G.			
Error description as well as possible and default reactions see «Table of suberrors to error 53» from page 487			
Actions for troubleshooting and additional information are to be found in chapter «Troubleshooting» in the b maXX® BM3400 Instruction manual.			
P0251	Error Communication parameter no.	0 bis MaxParaNr	
-	Fehler-Parameter ID Proprog-Zugriff	0	
A	BM_u_ProprogCmdErrId	1:1	-
Number of the parameters, at which at the last access via the protocol (operating program) an error occurred.			
P0260	Warning System 1	0x0000 bis 0xFFFF	
-	Warnungen System 1	0x0000	
A	BM_w_SysWarning1	1:1	-

Bit no.	Meaning	Specifying parameter
0	Warning in module feed unit	P0261
1	Warning in module power unit	P0262
2	Warning in module motor	P0263
3	System warnings	P0264
4	Warning in module mains monitor	P0265

Actions for troubleshooting and additional information are to be found in chapter «Troubleshooting» in the **b maXX® BM3400** Instruction manual.

P0261	Warning Power Supply Unit	0x0000 bis 0xFFFF	
-	Warnungen Einspeiseeinheit	0x0000	
A	BM_w_PSU_Warning	1:1	-

For the activation of the warnings see **P3378**.

Bit no.	Meaning	Warning no.
2	Mains undervoltage Enabled, if P2064 <= P4080 Cancelled, if P2064 > P4080 and P0484 does not rise (loading procedure completed, condition to bridge the precharge resistor)	2
3	Mains overvoltage P2064 >= P4081	3
4	Mains failure	4

Is only then enabled if precharging is not completed yet. If **P2064** increases due to generating operation the warning is not enabled.

Actions for troubleshooting and additional information are to be found in chapter «Troubleshooting» in the **b maXX® BM3400** Instruction manual.

P0262	Warning Power Unit	0x0000 bis 0xFFFF	
-	Warnungen Leistungsteil	0x0000	
A	BM_w_AmpWarning	1:1	-

For the activation of the warnings see **P3378**.

Bit no.	Meaning	Warning no.
0	Controller card temperature > P0016	16
1	Heatsink temperature > P0018	17
4	Undervoltage safety relay	20
7	Undervoltage DC link	23
8	Ixt-threshold 1 is exceeded	24

Actions for troubleshooting and additional information are to be found in chapter «Troubleshooting» in the **b maXX® BM3400** Instruction manual.

P0263	Warning Motor	0x0000 bis 0xFFFF	
-	Warnungen Motor	0x0000	
A	BM_w_MotorWarning	1:1	-

Bit no.	Meaning	Warning no.
0	Temperature threshold 1 exceeded	32
1	Temperature threshold 2 exceeded	33
2	I ² t-threshold exceeded	34

Actions for troubleshooting and additional information are to be found in chapter «Troubleshooting» in the **b maXX® BM3400** Instruction manual.

P0264	Global Drive Warnings	0x0000 bis 0xFFFF	
-	Allgemeine Antriebswarnungen	0x0000	
A	BM_w_DriveWarning	1:1	-

Bit no.	Meaning	Warning no.
0	Drive not synchronous	48
1	Series numbers have changed	49
2	Unauthorized SW-download	50
4	Time slice violation in-/outputs	51

Actions for troubleshooting and additional information are to be found in chapter «Troubleshooting» in the **b maXX® BM3400** Instruction manual.

P0265	Warning Mainsmonitor	0x0000 bis 0xFFFF	
-	Warnungen Netzmonitor	0x0000	
A	BM_w_MainsMonitorWarning	1:1	-

Bit no.	Meaning	Warning no.
0	Mains failure	64
1	Phase failure	65
2	Mains undervoltage	66
4	Mains overvoltage	67
5	Lower frequency	68
6	Overfrequency	69

P0290	Client alive timeout	0 bis 65535 ms	
EE	Client-Überwachungs-Timeout	0 ms	
	BM_u_ClientAliveTimeout	1:1 ms	-

This parameter sets the connection monitoring between the operating program and the controller. This allows the controller to guide the drive at interrupted communication into a safe status. If the value is zero no connection monitoring operates. The controller checks the maximum time between two telegrams. If there is a telegram failure the controller reports an error. Error reaction is adjustable.

P0291	Receive Timeout Proprog Protocol	300 bis 65535 ms	
EE	Empfangstimeout Proprog Protokoll	500 ms	
	BM_u_ProprogCharTimeout	1:1 ms	-

This parameter determines, how much time at maximum may be spend between two subsequent characters of a telegram, before the controller signals a communication error and synchronizes itself anew.

Position deviations from the standard value are technically only then efficient if according settings of the value Timeout have been made in the connection settings of operating program, in order to e.g. accept the protocol operation for the modem operation.

P0296	Reaction code bus drop-out	0 bis 3	
EE	Reaktion bei Busausfall	0	
	BM_i_ErrReaction_BusCommLost	1:1	-
	This parameter is not used.		
P0297	Error Reaction Mains Failure	-2 bis 3	
EE	Fehlerreaktion für Netzausfall	0	
	BM_i_ErrReactionMainsFailure	1:1	-
	This parameter is not used.		
P0298	Error Reaction BACI Communication	-1 bis 3	
EE	Fehlerreaktion für BACI-Kommunikation	-1	
	BM_i_ErrReactionBaci	1:1	-
	This parameter is not used.		
P0299	Error Reaction Sync Errors	-1 bis 3	
EE	Fehlerreaktion bei Sync-Fehlern	0	
	BM_i_ErrReactionSync	1:1	-
	This parameter is not used.		
P0300	Controlword	0x0000 bis 0xFFFF	
-	Steuerwort	0x0000	
	BM_w_Controlword	1:1	CW
	Own write function with bit-checking		
	Also see «Device management» from page 88.		
	This parameter is the input word used in the state machine of the device control.		

Bit no.	Meaning
0	1 Command Switch on 0 Command Shut down
1 ¹⁾	1 Command Enable voltage(operation condition) 0 Command Inhibit voltage
2 ¹⁾	1 Command Deactivate quickstop (operation condition) 0 Command Activate quickstop
3	1 Command Enable operation 0 Command Inhibit operation
4	Depending on operation mode: Ramp function generator inhibit, start homing, new setpoint
5	Depending on operation mode: RFG-stop, set homing position, immediately change set
6	Depending on operation mode: RFG zero, absolute/relative target input
7	0 → 1 quit error
8	Depending on operation mode: Stop
9...10	Reserved
11	Depending on operation mode: Jogging forwards, start positioning, inhibit setpoint, start following positioning
12	Depending on operation mode: Jogging backwards, cancel positioning
13	0 Release operation mode switching 1 Inhibit operation mode switching
14...15	Reserved

¹⁾ These bits are low active.

Description of bits

• Bit0...Bit3

Control of drive state machine. The device control commands are defined with the following bit combinations:

Command	Bit7 reset error	Bit3 operation enabled	Bit2 quick- stop ¹⁾	Bit1* inhibit voltage ¹⁾	Bit0 switch on	Transitions
Shut down	X	X	1	1	0	2, 6, 8
Switch on	X	X	1	1	1	3
Inhibit voltage	X	X	X	0	X	7, 9, 10, 12
Quickstop	X	X	0	1	X	7, 10, 11
Inhibit operation	X	0	1	1	1	X
Operation enabled	X	1	1	1	1	4
Reset error 0	0 → 1	X	X	X	X	15

The bits which are marked with X are of no significance for the accordant command.

¹⁾ These bits are low active.

• Bit4 - Inhibit ramp function generator / new setpoint / start homing

– Speed setting 1 (operation mode 2)

1: Enable ramp function generator

0: Inhibit ramp function generator (set output to zero)

– Speed control (operation mode -3)

Inverted meaning of bits compared with operation mode Speed setting 1 (operation mode 2)

1: Inhibit ramp function generator (output on)

0: Enable ramp function generator (enable output)

– Target position setpoint (operation mode 1)

1: New setpoint

– Homing operation (operation mode 6)

1: Starting of homing

– Position control (operation mode -4) and synchronous operation (operation mode -5):

-
- 1: Starting of the controlled homing
 - Bit5 - RFG-stop / setting of homing position / immediately change set
 - Target position setpoint (operating mode 1) immediately change set
 - 0: Procedure of single positioning settings (single set point).
 - 1: Set value setting (set-of-setpoints): Procedure of a speed profile.
 - Speed setting 1 (operation mode 2)
 - 1: Ramp function generator enable ramp-up
 - 0: Ramp function generator inhibit ramp-up, freeze output
 - Speed control (operation mode -3)

Inverted meaning of bits compared with operation mode Speed setting 1 (operation mode 2)

 - 1: Ramp function generator inhibit ramp-up, freeze output
 - 0: Ramp function generator enable ramp-up
 - Position control (operation mode -4) and synchronous operation (operation mode -5):
 - 1: Setting of homing position (controlled homing)
 - Bit6 - RFG zero, absolute / relative target input
 - Target position setpoint (operation mode 1)
 - 0: Absolute target input:
 - 1: Relative target
 - Speed setting 1 (operation mode 2)
 - 1: Ramp function generator enable input
 - 0: Set ramp function generator input to zero (braking with ramp)
 - Speed control (operation mode -3)

Inverted meaning of bits compared with operation mode Speed setting 1 (operation mode 2)

 - 1: Set ramp function generator input to zero (braking with ramp)
 - 0: Ramp function generator enable input
 - Bit7: Device control command quit errors.
For the command is a change from 0 to 1 in this bit necessary.
 - Bit8: Stop
 - Target position setpoint (operation mode 1)
 - 0: Continue positioning
 - 1: Stop axis with profile delay
-

- Bit11:
 - Operating mode jog operation: Jog forwards
 - Operating mode position set mode: Start positioning (only if old starting performance has been selected)
 - Operating mode spindle positioning: Start Following positioning
 - Operating mode position control: Inhibit setpoint values (positioning set values, which are written on **P0369** and **P0370** are not accepted, if a bit was set)
- Bit12:
 - Operating mode jog operation: Jogging backwards
 - Operating mode position set mode: Reset positioning with profile delay
- Bit13: For all operating modes: Inhibit operating mode switching

In order to avoid inconsistencies between the set operating mode and the operating mode-dependant bits the operating mode switching can be inhibited precisely placed. If the bit is set, the operating mode, which was set remains active. The change of the set mode is taken over, if the bit was deleted. A new operating mode can therewith be activated synchronous with the control word.

The present state for the operation mode switching is shown in **P0308**.

0 - release operating mode switch

1 - inhibit operating mode switch

Control word: Total overview of all operating modes

Bit no.	Notch position	Current control	Speed control	Speed setting 1	Position control	Jog operation	Synchronous operation	Homing operation	Target position set-point	Auto-tuning
	- 1	-2	-3 ²⁾	2 ²⁾	-4	5	-5	6	1	-7
0	Switch on (state machine device control)									
1	Inhibit voltage (state machine unit control) ¹⁾									
2	Quickstop (state machine unit control) ¹⁾									
3	Operation enabled (state machine device control)									
4	X	X	Inhibit RFG	inhibit RFG ¹⁾	Start homing	X	Start homing	Start homing	New set-point	X
5	X	X	Stop RFG	Stop RFG ¹⁾	Setting of homing position	X	Setting of homing position	X	Immediately change set	X
6	X	X	RFG zero	RFG zero ¹⁾	X	X	X	X	Absolute/relative target input	X
7	Reset error (state machine unit control)									
8	X	X	X	X	X	X	X	X	Stop	X
9	X	X	X	X	X	X	X	X	X	
10	X	X	X	X	X	X	X	X	X	X
11	X	X	X	X	Inhibit set-point values	Jog operation forwards	X	X	Start positioning ³⁾	X
12	X	X	X	X	X	Jog operation backwards	X	X	Cancel positioning	X
13	Inhibit operating mode									
14	X	X	X	X	X	X	X	X	X	X
15	X	X	X	X	X	X	X	X	X	X

The bits which are marked with X are reserved and are to be set from the control to 0.

¹⁾ These bits are low active.

²⁾ In the operating modes -3 and 2 the bits 4, 5 and 6 are prioritized as follows: Bit4 before Bit5 before Bit6

³⁾ Only if original behavior is activated.

P0301	Statusword	0x0000 bis 0xFFFF
-	Statuswort	0x0000
A	BM_w_Statusword	1:1

Also see «Device management» from page 88.

This parameter is the output word used in the state machine of the device control.

It is updated every 4ms.

Bit no.	Meaning
0 ²⁾	1 Ready-to-start 0 Not ready to start
1 ²⁾	1 Switched on 0 Not ready-to-operate
2 ²⁾	1 Operation enabled 0 Operation inhibited
3 ²⁾	1 Error 0 No error
4 ¹⁾²⁾	1 Mains voltage/DC link voltage is present 0 Mains voltage/DC link voltage is not present
5 ¹⁾²⁾	1 No requirements quickstop 0 Quickstop (or there is a quickstop request)
6 ²⁾	1 Inhibit start 0 No inhibit start
7	1 Warning 0 No warning
8	Depending on operation mode
9	Remote
10 ³⁾	1 Setpoint reached 0 Setpoint not reached
11	1 Internal limit active 0 no internal limit active
12	Depending on operation mode
13	Depending on operation mode
14...15	Parameterizable real time bits - see parameters P1290 to P1293

¹⁾ These bits are low active.

²⁾ Display operational status of drive manager.

³⁾ Meaning dependent on control word bit no. 8:

If stop = 0:	1	Setpoint reached	If stop = 1:	1	Axis stopped
	0	Setpoint not reached		0	Axis brakes

Description of bits

- Bit0...Bit6

These bits show the status of the drive state machine.

State of device control	Bit in status word					
	Bit6 switch-on inhibit	Bit5 ¹⁾ Quickstop	Bit3 Error	Bit2 Operation enabled	Bit1 switched on	Bit0 ready- to-start
NOT READY TO START	0	X	0	0	0	0
INHIBIT START	1	X	0	0	0	0
READY-TO-START	0	1	0	0	0	1
SWITCHED ON	0	1	0	0	1	1
OPERATION ENABLED	0	1	0	1	1	1
ERROR	0	X	1	0	0	0
ERROR REACTION ACTIVE	0	X	1	1	1	1
QUICKSTOP ACTIVE	0	0	0	1	1	1

The bits which are marked with X are not determined.

¹⁾ These bits are low active.

- Bit3: Error

The controller sets this bit as soon as there is an error (**P0200** error system 1), which causes an error reaction of the drive. The bit remains set during the error reaction and during the status error and is deleted at successful error acknowledge. As soon as this bit is set the 7-segment display switches to error.

- Bit4: Mains voltage / DC link voltage is present

The bit is set, if the mains voltage at the power unit is present and the DC link is loaded. It is deleted, if the mains fails.

This bit is updated, independent on the device status.

- Bit5: Quickstop or quickstop requirement active

The bit is low-active and is deleted, as soon as the quickstop reaction is enabled via the control word command Quickstop or via the hardware input *Quickstop*.

When the state ready-to-start is reached the bit is set.

If, as a quickstop reaction, the behavior *Stay in quickstop* is selected (P1004 values 5 to 8), this bit remains deleted as long as the drive is in *Quickstop*. The bit is set again, as soon as the drive is released again or, if due to a command, the status ready-to-start is reached.

- Bit = 7 warning

The bit displays, if there is a warning or an error without error reaction in the controller.

- Bit8: Status ramp function generator stop

Speed control (operating mode - 3) and speed setting (operating mode 2):

The bit displays that the ramp function generator has been stopped, that means that the output was frozen.

- Bit9: Remote

The bit is set if in parameter **Communication source P1001** the motor control via RS232 (operating program), CAN or the BACI was permitted.

- Bit10: Setpoint reached

The meaning of this bit is dependent on the status of the control word bit no. 8: Stop.

- Position control (Operating mode - 4) and Synchronous operation (- 5):

The bit is set, if the position deviation for the set position deviation time P1056 is smaller than the set limits (statistical or dynamical deviation).

- Speed control (operating mode - 3) and speed setting (operating mode 2):

The bit is set, if the speed controller deviation is less than the limit, which was set. At command *Stop* (ramp function generator control via control word) and at active brake operations (quickstop, inhibit operation) the bit is set, as soon as the drive stands still.

- Target position setting (operation mode 1):

- * If stop = 0:

The bit is set as soon as the actual position value for the set positioning window time is in the set positioning window. The bit is deleted if the drive is not in the positioning window anymore. In the operating mode Position set mode the bit is also updated at inhibited drive, thereby the last target position is taken as the set position. Consequently it can be recognized if the drive is moved manually from the last position.

- * If stop = 1:

The bit is set, as soon as the axis has stopped. Therefore the setpoint setting and the zero speed message (encoder 1 status P0390 or encoder 2 status P0400, Bit10) must apply.

The stop function is implemented only in target position set (operation mode 1).

With inhibited drive the bit is deleted in all operating modes except the target position setting - in the target position setting it is updated due to the last target position.

- Spindle positioning (operating mode -6)

The bit is set as soon as the actual position value remains for the assigned positioning window time in the positioning window. The bit is deleted if the drive is not in the positioning window anymore.

- Bit11: Internal limit active

The bit is set if an internal limit is active as for example current limit, speed limit, hardware- and software limit switch. This bit is updated, independent on the device status.

Via parameter **P1008** mask for internal limits can be determined, which internal limits shall be displayed.

- Bit12:

- Position control (operating mode - 4) and Synchronous operation (operating mode - 5):

Homing completed: Homing (controller-led referencing) was successfully completed by setting the homing position.

- Spindle positioning (operating mode -6):

1: Start-Command-Acknowledge:

The start of following positioning is acknowledged, if the spindle positioning module executes and positions the command. For this purpose the previous spindle positioning must be completed and then a rising edge must be recognized in the start-bit. This handshake only occurs at following positioning and at a start after a spindle positioning error (no. 203 or 204).

- Bit13:

- Position control (operating mode - 4) and Synchronous operation (operating mode - 5):

1: Homing position detected: The homing position was found and the actual position value at the homing position has been saved. The homing position now can be set.

- Spindle positioning (operating mode -6)

1: Homing position is set: The spindle positioning with automatic referencing was completed successfully by the setting of the homing position.

Status word: Total overview of all operating modes

Bit no.	Notch position	Current control	Speed control	Speed setting 1	Position control	Jog operation	Synchronous operation	Homing operation	Target position set-point	Spindle positioning	Auto-tuning
	-1	-2	-3/2)	22)	-4	5	-5	6	1	-6	-7
0	Ready-to-start (state machine unit control)										
1	Switched on (state machine unit control)										
2	Operation enabled (state machine device control)										
3	Error (state machine unit control)										
4	Inhibit voltage (state machine unit control) ¹⁾										
5	Quickstop (state machine unit control) ¹⁾										
6	Inhibit start (state machine unit control)										
7	Warning										
8	X	X	RFG stop	RFG stop	X	X	X	X	X	X	X
9	Remote										
10	Setpoint reached										
	Notch position determined	X	Speed set value	Speed set value	Position set value	Jogging speed reached	Position set value	Homing completed	Target position reached	In position	Auto-tuning completed
11	Internal limit active										
12	X	X	Speed=0	Speed=0	Homing completed	X	Homing completed	Homing completed	Reset set-point	Start command acknowledge	X
13	X	X	X	X	Homing position found	X	Homing position found	X	X	Homing position is set	X
14	adjustable over P1290 P1291										
15	adjustable over P1292 P1293										

The bits which are marked with X are reserved.

¹⁾ These bits are low active.

P0302	Controlword 2	0x0000 bis 0xFFFF	
-	Steuerwort 2	0x0000	
	BM_w_Controlword2	1:1	CW

Also see «Device management» from page 88.

Second control word of drive manager.

Bit no.	Meaning
0	Due to brake control in the manual control mode (P1400 Bit0 = 0) 0 Close motor brake 1 Open motor brake
1	1 Release of application error 239

P0303	Statusword 2	0x0000 bis 0xFFFF
-	Statuswort 2	0x0000
A	BM_w_Statusword2	1:1

Bit no.	Meaning	Corresponds to bit in parameter
0	Synchronization	P0530
	0 Drive not synchronous 1 Drive synchronous	Synchronization status Bit0
1	Encoder error	P0200
	0 No error 1 Error	Error system 1 Bit7
2	Status of reference switch	P0460
	0 Switch inactive 1 Switch is active	Positioning status Bit10
3	Warning safety relay	P0262
	0 Safety relay OK 1 Safety relay off or defective	Warning power unit Bit4
4	Encoder 1 initialized successfully	P0208
	0 Initialization successful 1 Encoder error (communication with encoder)	Error encoder 1 Bit0
5	Loading procedure DC link	P0262
	0 Charging completed 1 Charging active	Warning power unit Bit7
6	Zero speed	P0390
	0 Speed exceeds n=0 threshold 1 n=0 threshold fallen below	Encoder 1 status Bit10
7	Notch position, field angle search	P0501
	0 Search notch position inactive 1 Search notch position active	Motor notch position status Bit1
8	Status pulse enable	P0306
	0 IF is not set 1 IF is set	Bit0

Note:

- Bit2 (status of reference switch)

The status of the zero point switch is displayed.

- Bit3

The controller signals the error „Error safety relay“ (amp error 87), if pulse enable is released and one of the two cases occurs:

1. The safety relay is not controlled or
2. the safety relay is faulty

If there is no pulse enable and if the cases a) or b) occur, the controller only signals a warning (no. 20)

P0304	Operation mode actual	-7 bis 7	
-	Ist-Betriebsart	-3	
A	BM_i_OperationModeAct	1:1	-

This parameter displays the currently active drive operation mode.

Value	Meaning
-7	Autotuning
-6	Spindle positioning
-5	Synchronous operation with electron. gear
-4	Position control
-3	Speed control
-2	Current control
-1	Find notch position
1	Target position setpoint
2	Speed setting 1
5	Jog operation
6	Homing operation
7	Voltage-frequency control (frequency-converter mode)

P0305	Drive status	0x0000 bis 0xFFFF	
-	Antriebs-Status	0	
A	BM_w_DriveStatus	1:1	-

This parameter shows the current status of the drive.

Also see «Device management» from page 88.

Value	Meaning
0	Not ready to start
1	Inhibit start
2	Ready-to-start
3	Switched on
4	Operation enabled
5	Inhibit operation active
6	Shutdown active
7	Quickstop active
14	Error reaction active
15	Error

P0306	Status dig. inputs drive manager	0x0000 bis 0xFFFF	
-	Status dig. Eingänge Antriebsmanager	0x0000	
A	BM_w_DI_StatusDrvControl	1:1	-

Display of the status of digital inputs for drive control (quickstop and pulse enable).

Also see «Device management» from page 88.

Bit no.	Meaning
0	1 Pulse enable input is closed
	0 Pulse enable is open
1	1 Quickstop input is closed
	0 Quickstop input is open
5	Quickstop signal with drop-out delay (also see P0307)
	1 Quickstop input is closed or delay time still is running
	0 Quickstop input is open and delay time has expired

P0307	Delay for quickstop input	0 bis 65535 ms	
EE	Verzögerung Schnellhalt-Eingang	0 ms	
	BM_u_DI_QuickstopDelay	1:1 ms	CW

Adjustable delay time for the reaction to quickstop input.

The initiating of the quickstop reaction is delayed by the assigned time, the drive remains enabled during this time.

P0308	Statusword 3	0 bis 0xFFFF	
-	Statuswort 3	0	
A	BM_w_Statusword3	1:1	-

The status word 3 of the drive manager is assigned as follows:

Bit no.	Meaning
0	2-Two-level-controller 1 output
	0 Output inactive (upper limit exceeded)
	1 Output active (lower limit fallen below)
1	2-Two-level-controller 2 output
	0 Output inactive (upper limit exceeded)
	1 Output active (fallen below lower limit)
2	0 Inhibit operation mode switching enabled
	1 Inhibit operation mode switching

P0310	Data set command	0 bis 30	
-	Datensatzverwaltung Kommando	0	
	BM_i_RecordCommand	1:1	-

See chapter «Data set management» from page 19.

By use of this parameter the commands for the data set management are defined.

Value	Meaning	Source data set P0314	Target data set P0315
0	Quit data set manager		
1	Write all parameters of the valid data sets into EEPROM		
2	Completely read EEPROM		
3	Completely delete EEPROM		
4	Set standard values for active data set		
5	Set standard values for all generated data sets		
6	Create data set <n>		Data set, which is to be created
7	Delete data set <n> (bootDS not possible)		Data set to be deleted
8	Copy data set <x> to data set <y> and save data set <y>	Source data set	Target data set
9	Load data set <x> from EEPROM	DS in EEPROM	
10	Save data set <x> into EEPROM	DS in RAM = EEPROM	
11	Reset write count EEPROM		
12	Write all parameters from the applied data sets in the PSI module.		
13	Read PSI module completely		
14	Delete PSI module completely		
15	Calculate current controller parameter from motor parameter		
16	Calculate current controller parameter from optimization parameters.		
20	Reset write count PSI module		
26	Calculate speed controller parameters from the optimization parameters		

P0311	Data set status	0 bis 0xFFFF	
-	Datensatzverwaltung Status	0	
A	BM_w_RecordStatus	1:1	-

See chapter «Data set management» from page 19.

This parameter displays the status of the last data set management command.

Return code	Meaning
0	No error
1	Write/read cycle in process
2	Invalid parameter number
3	Invalid data type
4	Value less than the minimum value
5	Value greater than the maximum value
6	Read-only parameter
7	Parameter cannot be changed because of operational status
8	Invalid parameter value
9	None or an invalid EEPROM header
10	Invalid section in EEPROM
11	Invalid data in EEPROM
12	Checksum error during test
13	EEPROM write error
14	EEPROM too small
15	unidentified error
16	Parameters (numbers) are incompatible
17	Data set operation in the act. operating status not permissible (RUN)
18	Selected data set has not been created yet
19	selected data set is existing already, cannot be applied anymore
20	Wrong data set number (other than 1 to 8)
21	wrong source data set number
22	wrong data set target number
23	no enable possible during data set switch-over
24	EEPROM is reset

Return code	Meaning
25	Autotuning parameters are not valid - copying not permitted
4096 + 1...26	Data set command P310 = 1...26 was effective
4352 (1100 _{hex})	Data set switch-over was successfully

P0312 Active data set number 1 bis 8

- Aktive Datensatznummer 1

BM_u_ActiveDataSet 1:1 -

The writing to this parameter effectuates an immediate data set switching (however certain conditions must be complied to).

P0313 Valid data sets 0 bis 0xFFFF

- Angelegte Datensätze 1

A BM_w_ValidDataSets 1:1 -

See chapter «Data set management» from page 19.

Bit mask to show, which of the eight data sets are applied, that means, which of the data sets can be saved or can be read.

If bit n is set, the corresponding data set n+1 exists.

P0314 Data set source 0 bis 8

- Quell-Datensatz 0

BM_u_RecCmdSource 1:1 -

See chapter «Data set management» from page 19.

Source data set number for data set operations. According to P0310 data set command the source data set refers to the EEPROM (e.g. when reading the data set) or to the RAM (e.g. when writing data set to the EEPROM).

P0315 Data set destination 0 bis 8

- Ziel-Datensatz 0

BM_u_RecCmdDestination 1:1 -

See chapter «Data set management» from page 19.

Data set target number for data set operations. According to P0310 data set command, the data set target either refers to the data set in the EEPROM or in the RAM.

P0316	Error Data set parameter no.	1 bis MaxParaNr	
-	Fehlerhafter Parameter		
A	BM_u_RecCmdError	1:1	-
	See chapter «Data set management» from page 19.		
	Number of the parameter, which has caused an error during memory access (read/write). If an error occurs during command processing, the transfer process is not canceled but continued with the next parameter.		
	If multiple errors occur, only the last error will be displayed.		
P0317	EEPROM Write count	1 bis 65535	
-	Anzahl Schreibvorgänge EEPROM		
A	BM_u_EepromWriteCount	1:1	-
	See chapter «Data set management» from page 19.		
	Number of write access cycles to EEPROM. This counter is incremented at each write access to EEPROM.		
	Reset is possible via P0310 = 11.		
P0318	PSI Write count	0 bis 65535	
-	Anzahl Schreibvorgänge auf das PSI		
A	BM_u_PsiWriteCount	1:1	-
	Number of the write access cycles to the PSI data memory. This counter is incremented at each write access to PSI.		
	Reset is possible via P0310 = 20.		
P0319	PSI Parameter number	1 bis MaxParaNr	
-	Parameter Nummer für PSI-Zugriff	1	
	BM_u_PsiParameterId	1:1	-
	This parameter is not used.		
P0320	PSI Array index	0 bis 65535	
-	PSI Array Index	0	
	BM_u_PsiArrayIdx	1:1	-
	This parameter is not used.		

P0321	PSI Parameter data width	0 bis 65535	
-	Datenbreite PSI Parameter		
A	BM_u_PsiDataSize	1:1	-
	This parameter is not used.		
P0322	PSI Parameter value (32 Bit)	0 bis 4294967295	
-	PSI Parameterwert bis zu 32 Bit		
A	BM_ud_PsiData32	1:1	-
	This parameter is not used.		
P0323	PSI String parameter	20 ASCII-Zeichen	
-	PSI String-Parameter		
A	BM_s_PsiDataString	1:1	-
	This parameter is not used.		
P0324	PSI Data set selection	1 bis 8	
-	PSI Datensatz-Auswahl	1	
	BM_u_PsiDatasetSelect	1:1	-
	This parameter is not used.		
P0325	PSI Valid data sets	0x0000 bis 0x00FF	
-	Angelegte Datensätze im PSI		
A	BM_w_PsiValidDataset	1:1	-
	Bit mask used to display the data held within the PSI.		
	A set bit signals a created data set.		
	If bit n is set, the corresponding data set n+1 exists.		
P0326	Data set manager mode	0x0000 bis 0xFFFF	
-	Betriebsart Datensatzverwaltung	0x0000	
	BM_w_DataSetMode	1:1	-
	This parameter selects the operation mode of the PSI. It is saved in the PSI and is only applied, if the PSI is plugged at boot time.		
	If bit Bit0 was set, while saving to the PSI (P0310), AutoReadPsi is obtained, i.e. at each restart of the controller with this PSI the PSI data will be automatically read to RAM.		
	If Bit0 and Bit1 were set, while saving to the PSI, AutoStore is active, i.e. at each restart of the controller the PSI data is automatically read from PSI to RAM and is automatically saved to the		

EEPROM of the controller.

P0327	Boot dataset	1 bis 8	
EE	Boot Datensatz	1	
	BM_u_BootDataset	1:1	-

Data set, which is activated as start data set after switching on the device.

P0330	Current controller status	0x0000 bis 0xFFFF	
-	Stromregler Status	0x0000	
A	BM_w_CurrentCtrlStatus	1:1	-

Bit no.	Meaning
0...3	0 STOP
	1 RUN
	3 STAND BY
	5 INIT
4	1 FLUX OK

P0331	Torque set value	-100,00 bis 100,00 %	
EE	Drehmoment-Sollwert	0,00 %	
	BM_i_TrqSetValue	0x4000: 100 %	CW

Torque setpoint at torque control.

Scaling: 100% \longleftrightarrow torque at power unit maximum current REFP1241 (RMS value, the amplitude is $\sqrt{2}$ -times greater) at rated excitation.

At nominal excitation the parameter accords to a current set value. At field weakening the current increases by the according factor (100% **P0520**).

P0332	Current Iq set value	-200,00 bis +200,00 %	
-	Stromregler Iq-Sollwert	0,00 %	
A	BM_i_IqSetLimited	0x4000: 100 %	-

Limited cross current setpoint. See «Torque limits» from page 59.

Scaling: 100% \longleftrightarrow Peak current power unit **P1241** (RMS value, the amplitude is $\sqrt{2}$ -times greater)

P0333	Current Iq actual value	-200,00 bis +200,00 %	
-	Stromregler Iq-Istwert	0,00 %	
A	BM_i_IqAct	0x4000: 100 %	-
	Display of cross current actual value.		
	Scaling: 100% \longleftrightarrow Peak current power unit P1241 (RMS value, the amplitude is $\sqrt{2}$ -times greater)		
P0334	Current Iq controller output	-200,00 bis +200,00 %	
-	Stromregler Iq-Regler Ausgang	0,00 %	
A	BM_i_CtrlOut_Uq	0x4000: 100 %	-
	Display of cross voltage setpoint from cross current controller.		
	Scaling: 100% \longleftrightarrow $\sqrt{1/2}$ rated DC link voltage P0020 (line-to-line RMS value)		
P0335	Current Id set value	-100,00 bis 100,00 %	
-	Stromregler Id-Sollwert	0,00 %	
A	BM_i_IdSetLimited	0x4000: 100 %	-
	Limited direct-axis current setpoint.		
	Scaling: 100% \longleftrightarrow Peak current power unit P1241 (RMS value, the amplitude is $\sqrt{2}$ -times greater)		
P0336	Current Id actual value	-200,00 bis +200,00 %	
-	Stromregler Id-Istwert	0,00 %	
A	BM_i_IdAct	0x4000: 100 %	-
	Display of actual value of the magnetizing direct-axis current.		
	Scaling: 100% \longleftrightarrow Peak current power unit P1241 (RMS value, the amplitude is $\sqrt{2}$ -times greater)		
P0337	Current Id controller output	-200,00 bis +200,00 %	
-	Stromregler Id-Regler Ausgang	0,00 %	
A	BM_i_IdOut	0x4000: 100 %	-
	This parameter is not used.		

P0338	Voltage EMF set value	-200,00 bis +200,00 %	
-	Spannung EMK-Sollwert	0,00 %	
A	BM_i_VemfSet	0x4000: 100 %	-
	Display of torque generating voltage setpoint from EMF feed forward.		
	Scaling: 100% \longleftrightarrow $\sqrt{1/2}$ rated DC link voltage P0020 (line-to-line RMS value)		
P0339	Voltage Vq set value	-200,00 bis +200,00 %	
-	Spannung Uq-Sollwert	0,00 %	
A	BM_i_VqSet	0x4000: 100 %	-
	Effective cross voltage setpoint.		
	Scaling: 100% \longleftrightarrow $\sqrt{1/2}$ rated DC link voltage P0020 (line-to-line RMS value)		
P0340	Voltage Vd set value	-200,00 bis +200,00 %	
-	Spannung Ud-Sollwert	0,00 %	
A	BM_i_VdSet	0x4000: 100 %	-
	Effective direct-axis voltage set value.		
	Scaling: 100% \longleftrightarrow $\sqrt{1/2}$ rated DC link voltage P0020 (line-to-line RMS value)		
P0341	Current phase U actual value	-200,00 bis 200,00 %	
-	Strom Phase U-Istwert	0,00 %	
A	BM_i_IphaseU	0x4000: 100 %	-
	Display of the current actual value of phase U.		
	Scaling: 100% \longleftrightarrow $\sqrt{2}$ peak power unit current P1241		
P0342	Current phase V actual value	-200,00 bis 200,00 %	
-	Strom Phase V-Istwert	0,00 %	
A	BM_i_IphaseV	0x4000: 100 %	-
	Display of the current actual value of phase V.		
	Scaling: 100% \longleftrightarrow $\sqrt{2}$ peak power unit current P1241		

P0343	Apparent current actual value	0,00 bis 200,00 %	
-	Scheinstrom-Istwert	0,00 %	
A	BM_u_Iamplitude	0x4000: 100 %	-

Display of the apparent current.

Scaling: 100% ↔ Peak current power unit **P1241** (RMS value, the amplitude is $\sqrt{2}$ -times greater)

P0344	Torque actual value	-2000,00 bis 2000,00 %	
-	Drehmoment-Istwert	0,00 %	
A	BM_i_TorqueAct	0x0666: 100 %	-

Display of the referred torque.

The torque is calculated first in Nm and then scaled to the nominal torque of motor. At motor nominal torque **P0055** the referring torque is 100%, accordant to 0666_{hex} in internal display.

$$Motor Torque_{nom} = \frac{1000 Motor Power_{nom}(P0056)}{2\pi \cdot (Motor Speed_{nom}(P0057)) / 60}$$

In the operating program the torque actual value is shown in 0.1 Nm:

$$Display = \frac{Torque_{act} P0344}{100\%} \cdot Motor Torque_{nom}$$

P0345	Apparent current actual value with Iq sign	-200,00 bis 200,00 %	
-	Scheinstrom-Istwert mit Iq-Vorzeichen	0,00 %	
A	BM_i_IamplitudeIqSign	0x4000: 100 %	-

The absolute value of this parameter corresponds to parameter **Apparent current actual value P0343**, the sign accords to the sign of parameter **Current Iq actual value P0333**.

P0350	Speed controller status	0x0000 bis 0xFFFF	
-	Drehzahlregler-Status	0x0000	
A	BM_w_SpeedCtrlStatus	1:1	-

This parameter reflects the status of the speed controller.

Bit no.	Meaning
0...3	0 STOP
	1 RUN
	3 STAND BY
3	1 Error in module, error bit see error messages
4	1 Drive blocked The requirements for a blocking is drive at the current limit (P0350 Bit13 = 1) and a present zero speed message at the same time. According to setting in Bit3 of Speed controller mode P1030 is valid: P1030 Bit3 = 0: Speed = zero speed message in Bit10 of P0390 or P0400, speed threshold P1073 or P1083 P1030 Bit3 = 1: zero speed message in Bit9 of P0390 or P0400, speed threshold P1261
5	1 Speed setpoint is limited
10	0 Motoring operation
	1 Generating operation
11	0 Torque direction 1 is active
	1 Torque direction 2 is active
12	1 Actual speed value equal to speed setpoint (system deviation value P0354 < limit system deviation P1043)
13	1 Value of correcting variable limit attained (current limit)
14	1 TORQUE REDUCEING END
15	1 TORQUE REDUCEING ACTIVE

P0351	Speed set value	-200,00 bis +200,00 %	
-	Drehzahl-Stellgröße	0,00 %	
	BM_di_SpeedSetValue	0x40000000: 100 %	CW
Not limited setpoint input for speed controller.			
This parameter is also used for setpoint setting via the ramp function generator or from the position controller output.			
In position controlled operating modes this parameter acts only as a display parameter, it is internally overwritten in every controller cycle by the position controller. In speed-controlled operating modes it only may be written (e. g. via analog input), if the ramp function generator is deactivated. At active ramp function generator the ramp function generator input must be used.			
Scaling: 100% \longleftrightarrow motor maximum speed P1031			
P0352	Speed set value total	-100,00 bis +100,00 %	
-	Drehzahl-Sollwert	0,00 %	
A	BM_di_SpeedSetValueTotal	0x40000000: 100 %	-
Display of total effective speed setpoint, limited to 100%.			
Scaling: 100% \longleftrightarrow maximum motor speed P1031			
P0353	Speed actual value	-200,00 bis +200,00 %	
-	Drehzahl-Istwert	0,00 %	
A	BM_di_SpeedActValue	0x40000000: 100 %	-
Display of actual speed value.			
Scaling: 100% \longleftrightarrow maximum motor speed P1031			
P0354	Speed deviation value	-200,00 bis +200,00 %	
-	Drehzahl-Regelabweichung	0,00 %	
A	BM_i_SpeedCtrlDev	0x4000: 100 %	-
Display of actual speed value.			
Scaling: 100% \longleftrightarrow maximum motor speed P1031			

P0355	Torque feed forward	-200,00 bis +200,00 %	
-	Drehmoment-Vorsteuerung	0,00 %	
A	BM_i_TrqFeedFor	0x4000: 100 %	-
Display of torque setpoint from torque feed forward.			
Scaling: 100% ↔ torque at power unit maximum current P1241 at nominal excitation.			
At excitation TrqFeedFor accords to current setpoint. At field weakening the current increases by the according factor (100% P0520).			
P0356	Speed controller output	-100,00 bis 100,00 %	
-	Drehzahlregler-Ausgang	0,00 %	
A	BM_i_SpeedCtrlOut	0x4000: 100 %	-
Display of speed controller output (torque setpoint).			
Scaling: 100% ↔ torque at power unit maximum current P1241 at nominal excitation.			
At nominal excitaiton SpeedCtrlOut accords to current setpoint. At field weakening the current increases by the according factor (100% P0520).			
P0357	Torque Limit cyclic	0,00 bis 100,00 %	
-	Drehmomentbegrenzung zyklisch	100,00 %	
	BM_u_TrqSymDirect	0x4000: 100 %	CW
Additional symmetric torque limit for quick cyclic access (e.g. via analog input).			
At nominal excitation the torque limit accords to a current limit. At field weakening the current limit increases by the according factor (100% P0520).			
The torque setpoint from the speed controller is in additon to its limit, which is determined by the mode of the torque limit P1030 Bit2, the Torque limiter bipolar P1036 , the Torque limiter Motor/TD1 P1037 and the Torque limiter Generator/TD2 P1038 , symmetrical limited.			
Scaling: 100% ↔ torque at power unit maximum current P1241 at nominal excitation.			
The display in the operating program is made in 0.1Nm. All parameters in the following equation are in GUI format.			
The motor nominal torque used in scaling is calculated from:			

$$MotorTorque_{nom} = \frac{1000 \cdot MotorPower_{nom}(P0056)}{2\pi \cdot MotorSpeed_{nom}(P0057)/60}$$

Rescaling by the operating program

For **SM** scaling of display is in % for display in Nm:

$$Display = \frac{P0357}{100\%} \cdot \frac{PowerUnitCurrent_{max}(P1241) \cdot MotorTorque_{nom}}{MotorCurrent_{nom}(P0054)}$$

and the scaling of setting in Nm for display in %:

$$P0357 = \frac{Display \cdot MotorCurrent_{nom}(P0054) \cdot 100\%}{PowerUnitCurrent_{max}(P1241) \cdot MotorTorque_{nom}}$$

For **ASM** the scaling of display in % for display in Nm:

$$Display = \frac{P0357}{100\%} \cdot \frac{PowerUnitCurrent_{max}(P1241) \cdot MotorTorque_{nom}}{\sqrt{MotorCurrent_{nom}(P0054)^2 - MotorCurrent_{magnet}(P0066)^2}}$$

and scaling of setting in Nm for display in %:

$$P0357 = \frac{Display \cdot MotorCurrent_{nom}(P0054)^2 - MotorCurrent_{magnet}(P0066)^2 \cdot 100\%}{PowerUnitCurrent_{max}(P1241) \cdot MotorTorque_{nom}}$$

Rescaling by field bus

If the torque limit is served by field bus, this is as above described at first to be scaled into % and then with the internal format $100\% \longleftrightarrow 4000_{hex} \longleftrightarrow$ torque at maximum power unit current **P1241** at nominal excitation of the drive to be written in the parameter **P0357**.

Writing by analog inputs

At a voltage change of -10 V to +10 V at the analog input the value of the parameter torque limiting cyclic **P0357** changes from 0 to 4000_{hex} , this accords to 0% to 100% of the torque limit, if the scaling factor was accordingly set.

As the current is scaled to power unit maximum drive current **P1241**, a dependence of the torque limit results from the analog voltage at nominal excitation

for **SM**:

$$\frac{TorqueLimit}{AnalogInput + 10V} = \frac{PowerUnitCurrent_{max}(P1241) \cdot MotorTorque_{nom}}{20 \cdot MotorCurrent_{nom}(P0054)} \cdot Nm/V$$

and for **ASM**:

$$\frac{TorqueLimit}{AnalogInput + 10V} = \frac{PowerUnitCurrent_{max}(P1241) \cdot MotorTorque_{nom}}{\sqrt{MotorCurrent_{nom}(P0054)^2 - MotorCurrent_{magnet}(P0066)^2}} \cdot Nm/V$$

Examples for the specification of torque limit by analog inputs for **SM**:

Power Unit max. drive current P1241 = 10A; **Motor nominal current P0054** = 10A; Motor Torque_{nom} = 20Nm; Analog input = **Torque Limit cyclic P0357**

-10V	0%	0Nm
-5V	25%	5Nm
0V	50%	10Nm
5V	75%	10Nm
10V	100%	20Nm

Power Unit max. drive current P1241 = 20 A; **Motor nominal current P0054** = 10 A; Motor Torque_{nom} = 20Nm; Analog input = **Torque Limit cyclic P0357**

-10V	0%	0Nm
-5V	25%	10Nm
0V	50%	20Nm
5V	75%	30Nm
10V	100%	40Nm

P0358	Speed act. value after notchfilter	-200,00 bis +200,00 %	
-	Drehzahl-Istwert nach Notchfilter	0,00 %	
A	BM_di_SpeedActNotchOut	0x40000000: 100 %	-
	See «Notch filter» from page 87, P1372f.		
P0359	Scaling of speed set value	0,00 bis 100,00 %	
-	Skalierung des Drehzahlwertes	100,00 %	
	BM_i_ScalingSpeedSetValue	0x4000: 100 %	CW
	Parameter for the scaling of the speed setpoint.		
	Speed setpoint (P0352) = (Speed set value (P0351) + Speed additional setpoint (P1040)) * P0359		
	This parameter is not saved in the controller. After booting the controller P0359 = 4000 _{hex} (accordant 100%).		

P0360	Position controller status	0x0000 bis 0xFFFF
-	Lageregler-Status	0x0000
A	BM_w_PosCtrlStatus	1:1

Display of position controller status.

Bit no.	Meaning
0...3	0 STOP 1 RUN
4	1 Dynamic position deviation limit exceeded
5	1 Static position deviation limit exceeded
6	1 Timeout dynamic position deviation
7	1 Timeout static position deviation
8	1 Position setpoints are extrapolated (extrapolation is activated).
9	1 Position deviation limit 2 exceeded
10	1 Encoder for position sensing is referenced <ul style="list-style-type: none"> • The status Bit10 is set If homing has been properly completed or a spindle positioning with automatic referencing has been executed. • The status Bit10 is deleted again If the encoder for position sensing is switched over via P1050 position controller mode Bit2, or an encoder error has occurred and is acknowledged, or if homing is started.
12	1 Setpoint reached

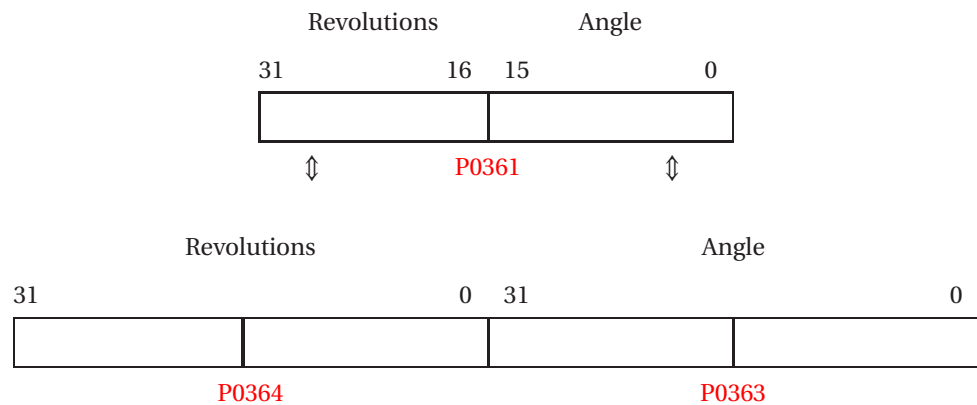
P0361	Position set value	0x00000000 bis 0xFFFFFFFF	
-	Lage-Sollwert	0x00000000	
	BM_ud_PosSetValue	1:1	CW

Setpoint input of position controller.

When the controller is enabled, the position setpoint is initialized on the immediate position actual value.

Scaling:

One turn of the motor accords to internally **65536** increments. Within a position setpoint- and a position actual value the motor angle is in the low word and the number of the revolutions in the high word.



Writing to the 32 bit position setpoint automatically updates the 32-bit position setpoint revolutions (**P0364**) and the 32-bit position setpoint angles (**P0364**) and vice versa. Internal 64 bit are used for position control.

P0362	Position actual value	0x00000000 bis 0xFFFFFFFF	
-	Lage-Istwert	0x00000000	
	BM_ud_PosActValue	1:1	CW

This parameter displays the immediate position actual value.

During initialization the position actual value is initialized on the angle of the encoder system selected for position control (not motor control). From this point of time, independent off the actual operation mode and independent off the state of unit control it is actualized continuously. In order to enable external homing, the position actual value can be written to in any state of operation.

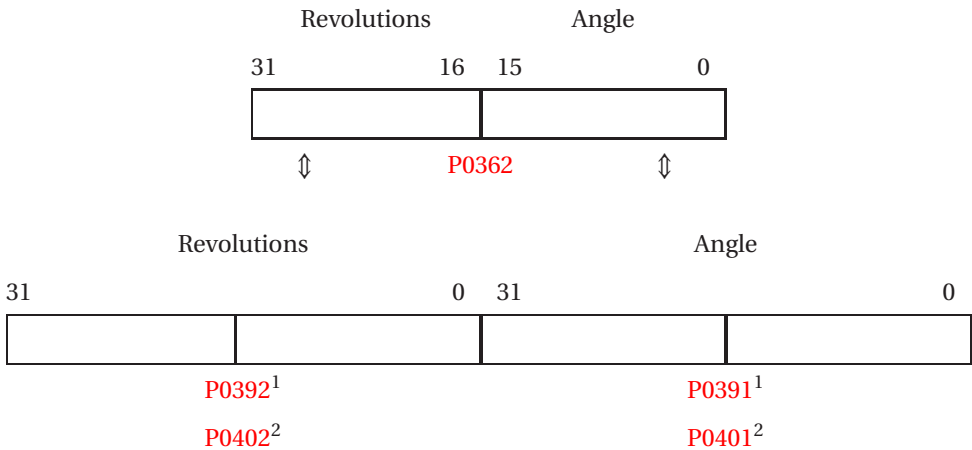


CAUTION

Changing the position actual value at active position control corresponds to a set value jerk to the position control. As a result the drive may be powered with maximum torque.

Scaling:

One turn of the motor accords to internally **65536** increments. Within a position setpoint- and an actual position value the motor angle is in the low word and the number of the whole revolutions in the high word.

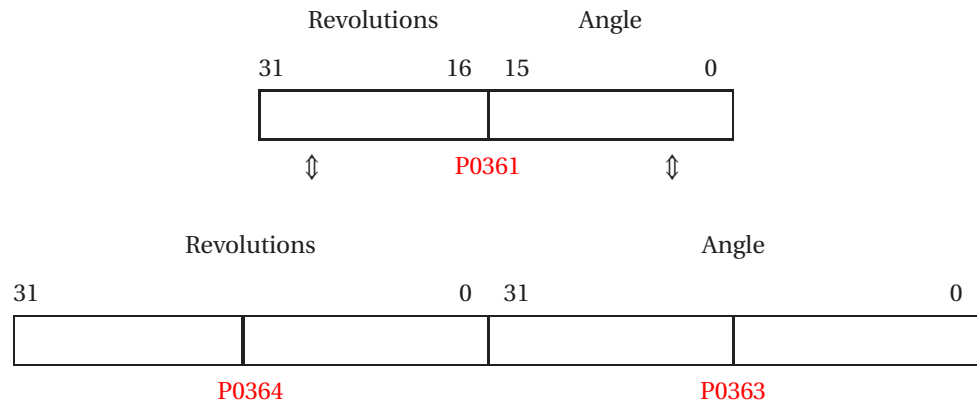


¹ encoder 1 for position control selected

¹ encoder 2 for position control selected

P0363	Position set value angle	0x00000000 bis 0xFFFFFFFF	
-	Lage-Sollwert Winkel	0x00000000	
	BM_ud_PosSetAngle	1:1	CW

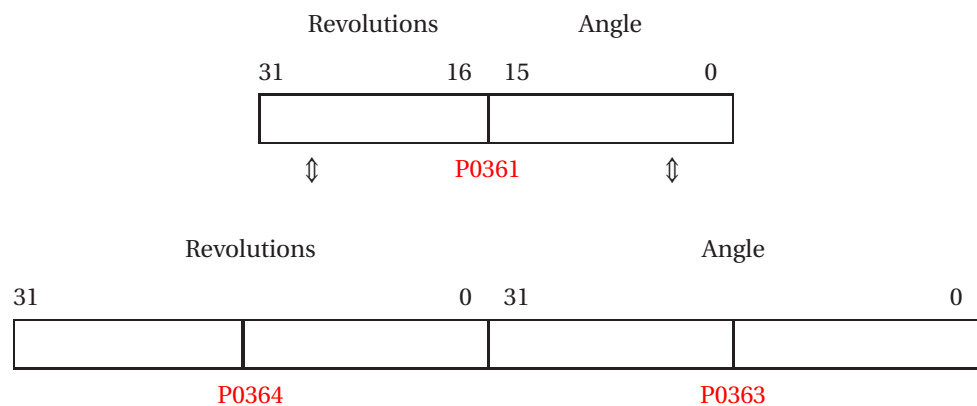
Angle of position setpoint in 32 bit resolution.



The writing of the parameter automatically updates the 32-bit position setpoint (**P0361**) Internally 64 bits are used for the position control.

P0364	Position set value rev	0x00000000 bis 0xFFFFFFFF	
-	Lage-Sollwert Umdrehungen	0x00000000	
	BM_ud_PosSetRev	1:1	CW

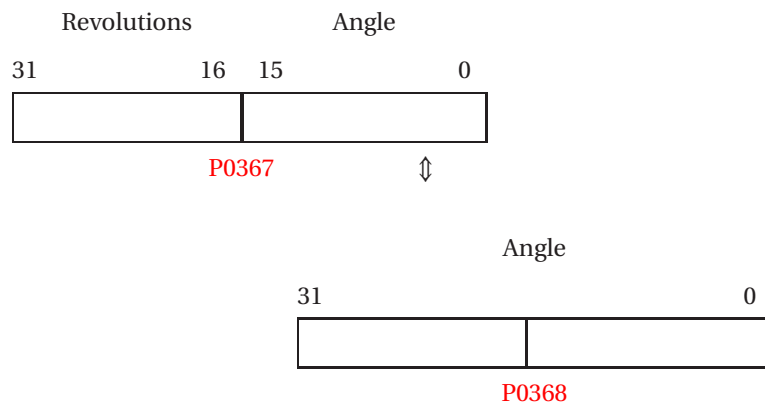
Number of revolutions in position setpoint in 32 bit-resolution.



The writing of the parameter automatically updates the 32-bit position setpoint (**P0361**) Inter-

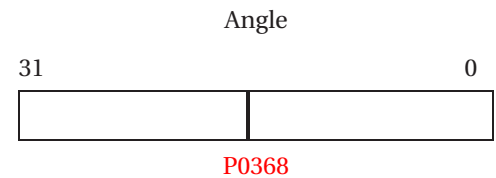
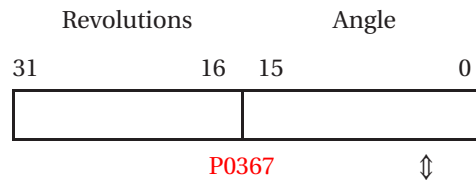
nally 64 bits are used for the position control.

P0365	Speed feed forward	-200,00 bis 200,00 %	
-	Drehzahl-Vorsteuerung	0,00 %	
A	BM_di_SpeedFeedFor	0x40000000: 100 %	-
	Basic value of speed feed-forward.		
	Scaling: 100% \longleftrightarrow maximum motor speed P1031		
P0366	Position controller output	-200,00 bis 200,00 %	
-	Lageregler-Ausgang	0,00 %	
A	BM_di_PosCtrlOut	0x40000000: 100 %	-
	Speed setpoint from the position controller without the partition of the speed feed forward control.		
P0367	Position actual total deviation	0x80000000 bis 0x7FFFFFFF	
-	Lageregler-Schleppfehler gesamt	0x00000000	
A	BM_di_PosCtrlDev	1:1	-
	Position deviation with 16-bit revolution and 16-bit angle.		
	Deviation is the difference between position setpoint and position actual value.		
	If there are very great position deviations, the following reasons for instance could be possible: a blocked motor, an unreached speed setpoint or incorrect controller coefficients at the speed controller.		
	At position deviations greater than 180 degrees the position controller goes to the limit.		
	The scaling corresponds to the position setpoint- and position actual value scaling.		



P0368	Position actual angle deviation	0x80000000 bis 0x7FFFFFFF	
-	Lageregler-Schleppfehler Winkel	0x00000000	
A	BM_di_PosCtrlDevAngle	1:1	-

Position deviation with 32 bit angle.



P0369	Position set value for interpolation	0x00000000 bis 0xFFFFFFFF	
-	Lagesollwert für Interpolation	0x00000000	
	BM_ud_PosIpSetValue	1:1	CW

Interpolating position setpoint input (16 bit revolution, 16 bit angle).
Position setpoint input for cyclic, synchronous position setpoint setting.

The cycle time is to be set in parameter Sync interval **P0532**. The predetermined position setpoint is then interpolated from the cyclic time to the internal control interval.

By parametrizing parameter position set value-smoothing interval (**P1059**) you can set, if the controller shall execute a smoothing of set values according to the method of the moving mean value generation. Thereby the value of **P1059** specifies the number of the interpolation values for the mean value generation. Value 0 means: There is no smoothing.

P0370	Position angle value for interpolation	0x00000000 bis 0xFFFFFFFF	
-	Lagesollwert-Winkel für Interpolation	0x00000000	
	BM_ud_PosIpSetAngle	1:1	CW

Position setpoint of 32 bit angle
Interpolating position setpoint angle input (32 bit angle).
Position setpoint input for cyclic synchronous position setpoint angle setting.

The cycle time is to be set in parameter Sync interval **P0532**. The predetermined position setpoint angle is then interpolated from the cyclic time to the internal control interval.

By parametrizing parameter position setpoint smoothing interval (**P1059**) it can be set, if the controller shall execute a smoothing of set values according to the method of the moving mean value generation. Thereby the value of **P1059** specifies the number of the interpolation values for the mean value generation. Value 0 means: There is no smoothing.

P0371 **Mechanical angle at reference switch** 0x0000 bis 0xFFFF

- Mechanischer Winkel am Referenzschalter 0x0000

A BM_u_MechAngleRefSwitch 1:1 -

Measured value of the mechanical angle (**P0393** or **P0403**) at the reference switch shifted by **P1201** positioning encoder offset.

This value is measured only at homing, if homing operates on encoder zero angle. With this value it is possible to determine, if the reference switch is located near the mechanical zero angle and thereby based on switching tolerances doesn't always recognize the reference point within the same revolution of the motor.

In this case the value for the zero angle shifting (**P1209** positioning encoder offset) should be set differently, so that encoder zero angle is outside the switching tolerances of the reference switch.

P0380 **open loop speed status** 0x0000 bis 0xFFFF

- Drehzahl-Status Open Loop 0x0000

A BM_w_OL_SpeedStatus 1:1 -

Only relevant if encoderless operation is set.

Bit no.	Meaning
6	0 N actual value ≤ overspeed threshold
	1 N actual value > overspeed threshold
10	1 $ N \text{ actual value} = 0$ (speed actual value has fallen below the zero speed threshold P1073)
11	1 Speed actual value has exceeded the free speed threshold P1074 .
	0 Speed actual value has fallen below the free speed threshold P1075 .

P0381	Startup time for open loop	500 bis 30000 ms	
EE	Suchzeit der Drehzahl für Open Loop	2000 ms	
	BM_u_OL_StartUpTime	1:1 ms	-

Maximum search time for determination of the motor speed at enable of the drive with rotating motor. Determination of speed is only then completed, if this is activated via parameter motor mode **Motor mode P0093**: The required time, which is necessary for the evaluation of the speed depends on rotor time constant. The default setting for the search time is 2 seconds, for motors with great rotor time constant perhaps a longer search time is necessary. As a guide value the decuple of the rotor time constant (**Rotor time constant actual value P0522** Rotor time actual value) can be specified. The assigned search time is the maximum search time in each speed direction. If the determination of speed in one rotating direction was not successful, it is attempted to determine the speed in the converse rotating direction. Therefore the total search time can be the double of the maximum time, which was set in the parameter. In the parameter Motor mode (**Motor mode P0093**) furthermore the speed direction can be specified, in which the speed is to be determined. For a drive, which e.g. may rotate only in one direction, the speed search should only be activated in this direction.

P0382	Starting torque boost for open loop	0,00 bis 40,00 %	
EE	Erhöhung des Anlaufmoments für Open Loop	0,00 %	
	BM_u_OL_TorqueBoost	0x4000:100 %	-

At actual speed value zero the maximum torque limit is increased by the set value of this parameter. If the actual speed value is higher than set value in the speed range of torque boost (**P0383**), then the torque boost is set to zero again. Between zero speed and **P0383** the increase is linear interpolated.

P0383	Speed range for torque boost	0,00 bis 20,00 %	
EE	Drehzahlbereich der Erhöhung des Anlaufmoments	0,00 %	
	BM_u_OL_TrqBoostEndSpeed	0x4000:100 %	-

For the setting of the speed range, in which the increase of the maximum torque limit must be active.

P0390	Encoder 1 status	0x0000 bis 0xFFFF
-	Geber 1 Status	0x0000
A	BM_w_Enc1Status	1:1

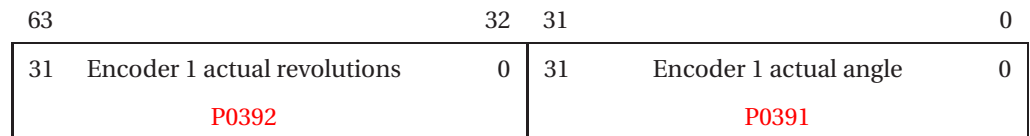
In this parameter the status of the encoder evaluation for encoder 1 is displayed.

Bit no.	Meaning
0...3	0 STOP
	1 RUN
	5 INIT
4	1 Error at initialization
5	1 Error encoder-cable break
6	Overspeed monitoring
	0 N actual value \leq overspeed threshold 1 N actual value $>$ overspeed threshold
7	1 Absolute position not known
8	Toggle bit changes after each zero pulse
9	1 $ N \text{ Actualvalue} < P1261$ (speed actual value has fallen below the zero speed threshold for block monitoring)
10	1 $ N \text{ Actualvalue} < P1073$ (speed actual value has fallen below the zero speed threshold)
11	1 Speed actual value has exceeded the free speed threshold P1074 .
	0 Speed actual value has fallen below the free speed threshold P1075 .
12...13	Reserved
14	1 Error encoder track monitoring (sine-square monitoring)
15	1 Error field angle monitoring

P0391	Encoder 1 actual angle	0x00000000 bis 0xFFFFFFFF	
-	Geber 1 Winkel-Istwert	0x00000000	
A	BM_ud_Enc1ActAngle	1:1	-

Display of position actual value angle component from encoder 1 within one revolution, left-justified with encoder-dependent resolution.

The total position actual value is 64 bit long. For its construction see below:



The total position actual value is set to zero after switching on the electronics supply.

If you have an absolute value encoder connected, it will be read out and the information will be transferred in the above stated form.

P0392	Encoder 1 actual revolutions	0x00000000 bis 0xFFFFFFFF	
-	Geber 1 Umdrehungen-Istwert	0x00000000	
A	BM_ud_Enc1ActRev	1:1	-

Display of position actual value revolution component from encoder 1.

P0393	Encoder 1 mechanical actual angle	0x00000000 bis 0xFFFFFFFF	
-	Geber 1 mechanischer Winkel-Istwert	0x00000000	
A	BM_ud_Enc1MechAngle	1:1	-

Actual value of mechanical angle within one revolution from encoder 1.

The mechanical actual angle value is (if the encoder 1 was selected for it) used for the motor guide, not for the position control.

It is neither influenced by homing nor by **P1054** absolute offset encoder 1.

P0394	Encoder 1 actual speed	-200,00 bis +200,00 %	
-	Geber 1 Drehzahl-Istwert	0,00 %	
A	BM_di_Enc1ActSpeed	0x40000000: 100 %	-

Actual speed value at encoder 1, referenced to maximum speed of system.

Scaling: 100% ↔ maximum motor speed **P1031**

P0395	Encoder 1 actual position 16	0x0000 bis 0xFFFF
-	Geber 1 Lage-Istwert 16	0x0000
A	BM_u_Enc1ActPos16	1:1

This parameter is not used.

P0400	Encoder 2 status	0x0000 bis 0xFFFF
-	Geber 2 Status	0x0000
A	BM_w_Enc2Status	1:1

In this parameter the status of the encoder evaluation for encoder 2 is displayed.

Bit no.	Meaning
0...3	0 STOP
	1 RUN
	5 INIT
4	1 Error at initialization
5	1 Error encoder power break
6	Overspeed monitoring
	0 N actual value \leq overspeed threshold 1 N actual value $>$ overspeed threshold
7	1 Absolute position not known
8	Toggle bit changes after each zero pulse
9	1 $ N Actualvalue < P1261$ (speed actual value has fallen below the zero speed threshold for block monitoring)
10	1 $ N Actualvalue < P1083$ (speed actual value has fallen below the zero speed threshold)
11	1 Actual speed value exceeded the free speed threshold P1084
	0 Actual speed value has fallen below the free speed threshold P1085
12...13	Reserved
14	1 Error encoder track monitoring (sine-square monitoring)
15	1 Error field angle monitoring

P0401	Encoder 2 actual angle	0x00000000 bis 0xFFFFFFFF	
-	Geber 2 Winkel-Istwert	0x00000000	
A	BM_ud_Enc2ActAngle	1:1	-

Display of the angle component of encoder 2: angle within one rotation, left-justified with encoder-dependent resolution.

The total position actual value is 64 bit long. For its construction see below:

63		32	31	0
31	Encoder 2 actual revolutions	0	31	Encoder 2 actual angle
	P0402			P0401

The total position actual value is set to zero after switching on the electronics supply.

If you have an absolute value encoder connected, it will be read out and the information will be transferred in the above stated form.

P0402	Encoder 2 actual revolutions	0x00000000 bis 0xFFFFFFFF	
-	Geber 2 Umdrehungen-Istwert	0x00000000	
A	BM_ud_Enc2ActRev	1:1	-

Display of revolution component of position actual value of encoder 2.

P0403	Encoder 2 mechanical actual angle	0x00000000 bis 0xFFFFFFFF	
-	Geber 2 mechanischer Winkel-Istwert	0x00000000	
A	BM_ud_Enc2MechAngle	1:1	-

Only display

Actual value of mechanical angle within one revolution of encoder 2.

The mechanical actual angle value is used for the motor control, not for the position control.

It is neither influenced by homing nor by **P0164** absolute offset encoder 2.

P0404	Encoder 2 actual speed	-200,00 bis +200,00 %	
-	Geber 2 Drehzahl-Istwert	0,00 %	
A	BM_di_Enc2ActSpeed	0x40000000: 100 %	-

Actual speed value at encoder 2, referenced to maximum speed of system.

Scaling: 100% \longleftrightarrow maximum motor speed **P1031**

P0405	Encoder 2 actual position 16	0x0000 bis 0xFFFF	
-	Geber 2 Lage-Istwert 16	0x0000	
A	BM_u_Enc2ActPos16	1:1	-

This parameter is not used.

P0410	Function module A: status digital input	0x0000 bis 0xFFFF	
-	Status der digitalen Eingänge in Modulschacht A	0x0000	
A	BM_w_DI_Status_SlotA	1:1	-

Display of the status of digital inputs.

Bit no.	Meaning
0	Status digital input 1; L-level at input \Rightarrow 0; H-level at input \Rightarrow 1
1	Status digital input 2; L-level at input \Rightarrow 0; H-level at input \Rightarrow 1
2	Status digital input 3; L-level at input \Rightarrow 0; H-level at input \Rightarrow 1
3	Status digital input 4; L-level at input \Rightarrow 0; H-level at input \Rightarrow 1
4...15	Reserved

P0415	Function module A: status digital output	0x0000 bis 0xFFFF	
-	Status der digitalen Ausgänge in Modulschacht A	0x0000	
A	BM_w_DO_Status_SlotA	1:1	-

Display of the status of the digital outputs.

Bit no.	Meaning
0	Status digital output 1; 0 \Rightarrow L-level at output; 1 \Rightarrow H-level at output
1	Status digital output 2; 0 \Rightarrow L-level at output; 1 \Rightarrow H-level at output
2	Status digital output 3; 0 \Rightarrow L-level at output; 1 \Rightarrow H-level at output
3	Status digital output 4; 0 \Rightarrow L-level at output; 1 \Rightarrow H-level at output
4...15	Reserved

P0420	Analog input 1 actual value	-100,00 bis 100,00 %	
-	Wert analoger Eingang 1	0,00 %	
A	BM_i_AI1_Value	0x7FFF: 100 %	-

This parameter displays the respective actual input value considering the scaling.

P0421	Analog input 2 actual value	-100,00 bis 100,00 %	
-	Wert analoger Eingang 2	0,00 %	
A	BM_i_AI2_Value	0x7FFF: 100 %	-

This parameter is not used.

P0430	Ramp Function Generator status	0x0000 bis 0xFFFF	
-	Hochlaufgeber-Status	0x0000	
A	BM_w_RFGStatus	1:1	-

Status of ramp function generator (RFG).

Bit no.	Meaning
0	1 RFG active
4	1 Internally the RFG output is set to 0 (RFG_INHIBIT)
5	1 RFG is stopped on the ramp (RFGSTOP)
6	1 Internally the RFG input is set to setpoint 0 (RFG_ZERO)
7	1 Quickstop ramp ist active (RFG_QS)
8	1 Ramp-up is active
9	1 Ramp down is active
10, 11	Reserved
12	1 RFG output = RFG input (setpoint reached)
13...15	Reserved

The status bit *Setpoint reached* is set according to the meaning of the bits in **Controlword P0300**:

Control word bits			Operation	Bit12 RFG output = RFG input (setpoint reached)
6	5	4		
0	0	0	Normal	Ramp function generator is active, Bit12 is set, if: Ramp function generator output - Ramp function generator input ≤ Ramp function generator setpoint-reached-band
0	0	1	RFG inhibit	Ramp function generator is active, Bit12 is set immediately. RFG output is set to 0-value.
0	1	0	RFG stop	Ramp function generator is deactivated. RFG output is frozen. Bit12 is always FALSE.
1	0	0	RFG zero	Ramp function generator is active, Bit12 is set, if RFG output has reached value 0, i. e. the drive stands still.

P0431	Ramp Function Generator output	-100,00 bis 100,00 %	
-	Hochlaufgeber Ausgang	0,00 %	
A	BM_di_RFGOutput	0x40000000: 100 %	-
	Start value of ramp function generator.		
	Scaling: 100% ↔ 40000000 _{hex}		
P0440	Set Value Generator mode	0x0000 bis 0xFFFF	
EE	Sollwertgenerator Modus	0x0000	
	BM_w_SvgMode	1:1	-

Also see «Set value generator» from page 107.

Operation mode of setpoint generator.

Bit no.	Meaning
2...0	0 0 0 Switched off
	0 0 1 Ramp function generator input 1
	0 1 0 Additional speed setpoint
	0 1 1 Torque setpoint
	1 0 0 Switchover current positioning set (P1191)
4	0 Endless operation of setpoint generator begins after sequence of the last phase with the first setpoint again.
	1 Single cycle, only one cycle of the setpoint profile, which was set is passed through. At the end the last setpoint is kept.

Notes:

Operating mode Switchover current positioning set:

In this mode the set value generator switches between the specified positioning sets (1 to 16). If a change of the positioning set shall lead directly to an execution of the positioning request, this must be set accordingly (also see parameter **P1190** positioning mode).

The times, which were set are the dwell times in the target position. Time is measured from message *Positioning target reached* on (parameter **P0301** status word, Bit10).

P0441	SVG time 1	0,008 bis 65,535 s	
EE	SWG Zeit 1	1,000 s	
	BM_u_SvgTime1	1000:1 s	-

Also see «Set value generator» from page 107.

The set value generator has a cycle time of 16 ms. Therefore, you should set only values that are multiples of 16 ms. For these times the according setpoints (**P0442**, **P0444**, **P0446**, **P0448**) are fed to the output of the set value generator **P0449**.

P0442	SVG set value 1	-100,00 bis +100,00 %	
EE	SWG Sollwert 1	+100,00 %	
	BM_i_SvgSetValue1	0x4000: 100 %	CW

Also see «Set value generator» from page 107.

The setpoints are fed to the output of the set value generator **P0449** accordant to the assigned time (**P0441**, **P0443**, **P0445**, **P0447**).

Scaling: 100% ↔ maximum motor speed **P1031**.

For the mode switchover current positioning set the specified parameter scaling is not valid. In this case the range from 0 to 16 is adequate, at a scaling of 1:1.

P0443	SVG time 2	0,008 bis 65,535 s	
EE	SWG Zeit 2	1,000 s	
	BM_u_SvgTime2	1000:1 s	-

See **P0441**

P0444	SVG set value 2	-100,00 bis +100,00 %	
EE	SWG Sollwert 2	0,00 %	
	BM_i_SvgSetValue2	0x4000: 100 %	CW

See **P0442**.

P0445	SVG time 3	0,008 bis 65,535 s	
EE	SWG Zeit 3	1,000 s	
	BM_u_SvgTime3	1000:1 s	-
	See P0441 .		
P0446	SVG set value 3	-100,00 bis +100,00 %	
EE	SWG Sollwert 3	-100,00 %	
	BM_i_SvgSetValue3	0x4000: 100 %	CW
	See P0442 .		
P0447	SVG time 4	0,008 bis 65,535 s	
EE	SWG Zeit 4	1,000 s	
	BM_u_SvgTime4	1000:1 s	-
	See: P0441 .		
P0448	SVG set value 4	-100,00 bis +100,00 %	
EE	SWG Sollwert 4	0,00 %	
	BM_i_SvgSetValue4	0x4000: 100 %	CW
	See P0442 .		
P0449	Set Value Generator output	-100,00 bis +100,00 %	
-	Sollwertgenerator Ausgang	0,00 %	
A	BM_i_SvgOutput	0x4000: 100 %	-

Also see «Set value generator» from page 107.

Scaling according to **P0440**: 100% ↔ motor maximum speed **P1031**, 100% ↔ power unit maximum current **P1241** or no. of the positioning set.

P0460	Positioning control status	0x0000 bis 0xFFFF
-	Positionierung Status	0x0000
A	BM_w_PPosStatus	1:1 -

This parameter displays the status of the positioning modules. Here, the individual bits are not supported by all operation modes.

Bit no.	Meaning	Target position setpoint	Jog operation	Homing
0	0 STOP 1 RUN			
1...5	Reserved			
6	1 Set speed > Maximum speed; limited to maximum speed	X	X	X
7	1 Function completed	X		
8	1 Homing took place	X	X	X
9	1 Slowing down active, takeover of new positioning data not possible	X		
10	1 Running positioning stopped	X		
11	1 Number range limit exceeded		X	
12	1 Setpoint reached	X	X	X
13	1 Clip-environment 1 reached	X		
14	1 Clip-environment 2 reached	X		
15	1 Set speed = 0	X	X	X

Note:

- Bit6

is set, if positioning, homing or the jog operation is started and its maximum set speed exceeds the maximum drive speed in **P1031**. Then it is automatically limited to **P1031** in order prevent position deviation.

If **P1057** gear factor is set to a value unequal than 1.00, the limit speed value reduces or increases accordingly by the factor (1/**P1057** gear factor).

- Bit7

is set, if the ramp generator has completed its function. By using the smoothing generator, still new setpoints can be set.

- Bit8

is set, as soon as homing has successfully been executed after switching on. At first the bit is reset after switching on. After successful homing the bit remains set until to the switching off of the controller. It is only then reset if homing is executed anew, so that interrupted homing cannot wrongly be displayed as valid.

- Bit9

is set, if during a running positioning set an acceptance of new data is not possible at the moment. The operation of this bit is dependent on the positioning range.

Trapezoidal curve:

Bit9 always 0; Data takeover always possible.

S-curve:

Bit9 is set, if a running positioning data set is in the braking phase. New data is not accepted until completion of braking phase (= target reached).

Sin²-curve:

Bit9 is set as soon as a positioning data set is started and is reset again not until reaching of positioning target. No online positioning is possible here.

- Bit11

is set if the range of numbers for positioning (32 bit position value) is exited in the jog operation.

- Bit12

Setpoint reached means setpoint reached in the operating mode Target position setting, in Homing operation it means *Homing position reached* and in Jogging (jog operation) it means *Jogging speed reached*. This bit is also at inhibited drive updated in the operation mode Position target input.

- Bit15

Is set, if the set speed = 0, that means, no new position values are written to the position controller input. Especially for the operation mode Position set mode this means, that the smoothing generator also has completed its function.

- Except of Bit8 and Bit12 all bits are deleted at inhibited drive. Bit12 is not deleted at inhibited drive in the operating mode Target position set.

P0461	Positioning switch status	0x0000 bis 0xFFFF
-	Positionierung Schalter Zustand	0x0000
A	BM_w_PPosSwitchStatus	1:1 -

This parameter shows the status of the hardware- and software limit switches as well as of the reference switches.

Bit no.	Meaning	Target position setting	Jog operation	Homing
0	1 Negative HW limit switch active	X	X	X
1	1 Positive HW limit switch active	X	X	X
2	1 Reference switch (zero point switch) active	X	X	X
3	Reserved			
4	1 SW-limit switch 1 active	X	X	X
5	1 SW limit switch 2 active	X	X	X
6...15	Reserved			

Notes:

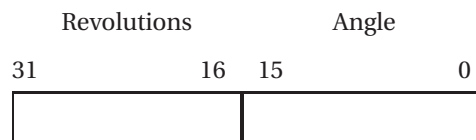
- The HW limit switches (Bit0 to Bit2) are activated independently from the operation mode and the drive status (inhibited/enabled), that means for example also in the speed control.
- The SW limit switches are only updated and displayed in the operating modes Target positioning setting and Jogging and only at an enabled controller.

P0462	Positioning control position actual value	0x00000000 bis 0xFFFFFFFF Inc
-	Positionierung Positions-Istwert	0x00000000 Inc
A	BM_ud_PPosActValue	1:1 Inc

Also see operating mode «Setting target position (positioning)» from page 119.

Scaling:

One turn of the motor accords to internally **65536** increments. Within a positioning-setpoint and an -actual value the motor angle is in the low word and the number of the whole revolution is in the high word.



P0462

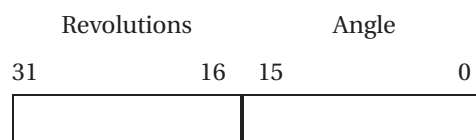
P0463	Positioning control position set value	0x00000000 bis 0xFFFFFFFF Inc
-	Positionierung Positions-Sollwert	0x00000000 Inc
A	BM_ud_PPosSetValue	1:1 Inc

Also see operating mode «Setting target position (positioning)» from page 119.

Scaling:

One turn of the motor accords to internally **65536** increments.

Within a positioning-setpoint and an -actual value the motor angle is in the low word and the number of the whole revolution is in the high word.



P0463

P0464	Positioning control speed set value	-13200 bis 13200 Inc/ms	
-	Positionierung Geschwindigkeit-Sollwert	0 Inc/ms	
A	BM_i_PPosSpeedSetValue	1:1 Inc/ms	-

Also see operating mode «Setting target position (positioning)» from page 119.

In this parameter, the current set speed specified by the positioning is displayed in Inc/ms.

P0466	Spindle positioning status	0x0000 bis 0xFFFF	
-	Spindelpositionierung Status	0x0000	
A	BM_w_SPosStatus	1:1	-

Specifies the internal status of the function module.

Bit no.	Meaning	
0	0	State Stop
	1	State Run
7...4	0 0 0 1	Checking of actual speed
	0 0 1 0	Acceleration max. to Spindle positioning speed
	0 0 1 1	Braking to spindle positioning speed
	0 1 0 0	Calculation braking distance and target position
	0 1 0 1	Positioning to target position
	0 1 1 0	Set Bit In Position dependent on pos. window and pos. window time
	0 1 1 1	Waiting for the first zero pulse or switching edge
	1 0 0 0	Error status
8	1	Trigger position (zero pulse or switching input) is known
12	1	Setpoint reached

P0467	Spindle positioning effective target position	0x00000000 bis 0xFFFFFFFF Inc	
-	Spindelpositionierung wirksame Zielposition	0x00000000 Inc	
A	BM_ud_SPosEffectiveTarget	1:1 Inc	-

This is the calculated target position in the format 16-bit revolutions and 16-bit angle.

P0470	Synchronous operation status	0x0000 bis 0xFFFF
-	Gleichlauf Status	0x0000
A	BM_u_SynCtrlStatus	1:1

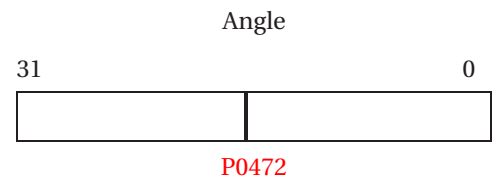
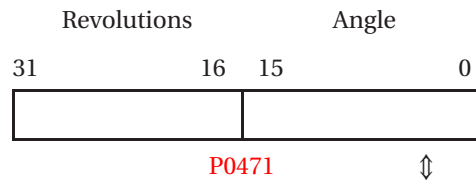
Bit no.	Meaning
5	Homing on zero pulse of master axis has reached the predetermined tolerance threshold. (in homing on zero pulse of the leading axis mode only)
6	Homing on zero pulse of the master axis is completed (only in the mode homing on zero pulse of the master axis)
8	Synchronous setpoint is initialized (only in the mode synchronous setpoint assignments)
9	A current synchronous setpoint is present
10	Synchronous extrapolation is active
12	Phasing module: Module is switched on
13	Phasing module: A new positioning request has been calculated and is waiting for processing
14	Phasing module: A positioning request is processed active
15	Phasing module: The last positioning request has been completed. There is no new positioning request present

P0471	Synchronous operation position set value	0x00000000 bis 0xFFFFFFFF	
-	Gleichlauf Lage-Sollwert	0x00000000	
	BM_ud_SynCtrlPosSetValue	1:1	CW

This parameter serves as a setpoint input in the synchronous operation mode Synchronous operation with synchronous setpoint setting.

In the synchronous operation mode Relative angular synchronism via this parameter a superimposed movement can be achieved.

Scaling:

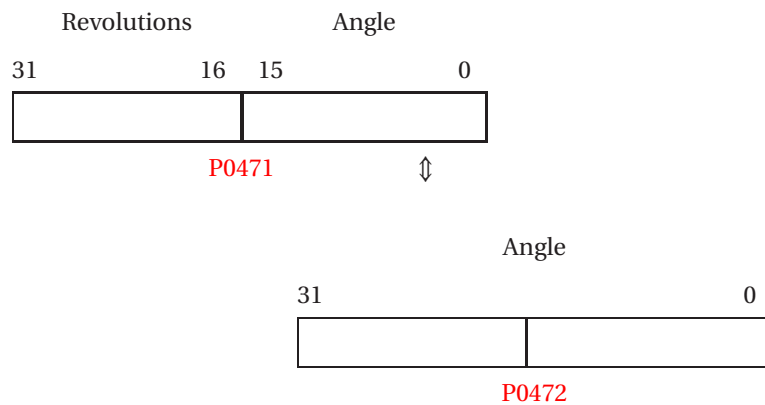


P0472	Synchronous operation angle set value	0x00000000 bis 0xFFFFFFFF	
-	Gleichlauf Winkel-Sollwert	0x00000000	
	BM_ud_SynCtrlSetAngle	1:1	CW

This parameter serves as a setpoint input in the synchronous operation mode Synchronous operation with synchronous setpoint setting.

In the synchronous operation mode Relative angular synchronism via this parameter a superimposed movement can be achieved.

Scaling:



P0473	Synchronous operation delta angle	0x80000000 bis 0x7FFFFFFF	
-	Gleichlauf Sync.-Delta	0x00000000	
	BM_di_SynCtrlSetDeltaAngle	1:1	CW

This parameter serves as a setpoint input in the synchronous operation mode Synchronous operation with synchronous setpoint setting via position delta input.

The positioning delta refers to the control cycle (0.125 ms).

In the synchronous operation mode Synchronous operation with synchronous setpoint setting and relative angular synchronism it only serves as display of the angle difference calculated by the interpolator.

The value shows the interpolated setpoint change ($\text{angle-delta} / T_{\text{control}}$) on the control interval.

$$\text{Sync.Delta} = \frac{(\phi_{\text{Setpoint}_{\text{new}}} - \phi_{\text{Setpoint}_{\text{old}}}) \cdot T_{\text{control}}}{T_{\text{sync}}}$$

P0474	Synchronous operation speed set value	-100,00 bis +100,00 %	
-	Gleichlauf Drehzahl-Sollwert	0,00 %	
	BM_di_SynCtrlSpeedSetValue	0x40000000:100 %	CW
	Setpoint input for the function Virtual master axis (synchronism mode 5 and 6).		
	Scaling: 100% \longleftrightarrow maximum motor speed P1031		
P0476	start activ movement	0 bis 1	
-	Start aktiver Verfahrenvorgang	0	
	BM_u_PhaseControl	1:1	CW
	By writing 1 to the parameter value or at a parameter value equal 1, positioning is started, if an offset angle is present which has not yet been processed.		
	A positioning which has once been started cannot be interrupted.		
	In a running positioning only changes of the maximum positioning speed as well as changes of the positioning speed modes are considered.		
	Changes of other parameters of the phasing module become effective in the next positioning.		
	Modifying the register offset angle during a positioning results in a generation of a new positioning request immediately after completion of a procedure.		
	Under the terms mentioned above this is started immediately.		
P0477	Register angle set value absolute	0 bis 0xFFFFFFFF Inc	
-	Register-Winkel Sollwert Absolut	0 Inc	
	BM_ud_PhaseRegisterSetAngle	1:1 Inc	CW
	The parameter is scaled to 32 bit angle, the value range accords to 0 to 360° and is an absolute angle.		
	In this parameter an angular value can be entered, which remains as a constant offset angle between the master axis position setpoint and the position setpoint of the axis.		

P0480	Power Unit status	0x0000 bis 0xFFFF	
-	Leistungsteil Status	0x0000	
A	BM_w_AmpStatus	1:1	-

Status messages from power unit.

Bit no.	Meaning	
8	1	There is no error message from the power unit.
15, 14, 9	0 0 0	Power unit switching frequency: 4 kHz
	0 0 1	Power unit switching frequency: 8 kHz
	0 1 0	Power unit switching frequency: 16 kHz
	1 0 0	Power unit switching frequency: 2 kHz
10	1	Pulses are enabled, power unit is operating in the switching mode (checkback from the power unit)
11	0	Normal operation, no current reduction of Ixt-monitoring
	1	Ixt over the limit value, active current reducing, current reducing to 100%
13	0	24V is switched off
	1	24V is okay

P0481	Power Unit internal device actual temperature	0 bis 125 °C	
-	Leistungsteil Geräte-Innentemperatur-Istwert	0 °C	
A	BM_u_AmpActAmbientTemp	1:1 °C	-

Display of controller board temperature (does not accord to environmental temperature, value is mainly determined by the electronic losses of the controller card).

P0482	Power Unit heatsink actual temperature	0 bis 125 °C	
-	Leistungsteil Kühlkörpertemperatur-Istwert	0 °C	
A	BM_u_AmpActHeatsinkTemp	1:1 °C	-

Display of power unit heatsink temperature.

P0484	Power Unit DC link actual voltage	0,00 bis 200,00 %	
-	Leistungsteil Uzk-Istwert	0,00 %	
A	BM_u_AmpActDCLinkVolt	0x4000: 100 %	-
	Measured actual value of DC link voltage. 100% accord to value of P0020 .		
P0485	Power Unit Ixt actual value	0,0 bis 400,0 %	
-	Leistungsteil Ixt-Istwert	0,0 %	
A	BM_u_AmpAct_Ixt	0x2000: 100 %	-
	This parameter shows the actual Ixt value from the power unit overload monitoring (result of calculation of an internal temperature model of heatsink and IGBT).		
	At a value of 100% the current limit is made to the power unit nominal current P0010 , P0012 or P0032 .		
	If the Ixt-value falls below 95%, the current limit is set to the power unit maximum current of the drive P1241 .		
	Internal the value for all 3 phases is calculated, the highest load is displayed.		
P0486	Mains drop-out supervision time	0,000 bis 6,000 s	
EE	Netzausfall-Überwachungszeit	0,000 s	
	BM_u_AmpNetFailReactDelay	1000:1 s	CW
	Delay, on which the drive reacts on a mains failure.		
	During the assigned time the drive remains in the enabled condition, but no motoring operation is possible anymore. After this time is expired the selected error (E64) reaction is activated.		
	If the mains is available again within the assigned time, no error message is reported and also a motoring operation is possible again.		
	If the drive is inhibited (with command or hardware input) at mains loss during this time, also no error message is initiated.		
	The warning <i>Mains failure</i> (W4) (P0261) is immediately signalized at recognition of mains failure independent from the set time.		
	Also see P4080 .		
P0488	Maximum modulation index	80,00 bis 110,00 %	
EE	Maximale Aussteuerung der Modulation	100,00 %	
	BM_u_PWM_IndexMax	0x4000:100 %	-
	This parameter is not used.		

P0490	Power Supply Unit status	0x0000 bis 0xFFFF	
-	Einspeiseeinheit Status	0x0000	
A	BM_w_PSU_Status	1:1	-

Status messages from power supply unit.

Bit no.	Meaning
8	Message mains failure
14	Chopper resistor overload

P0500	Motor status	0x0000 bis 0xFFFF	
-	Motor Status	0x0000	
A	BM_w_MotorStatus	1:1	-

Bit no.	Meaning
4	Motor brake: 0 Motor brake is applied 1 Motor brake is opened

P0501	Motor status notch position	0x0000 bis 0xFFFF	
-	Motor Rastwinkel-Status	0x0000	
A	BM_w_MotorNotchPosStatus	1:1	-

Status word for notch position search (also see [P0094](#)).

Bit no.	Meaning
0	0 Inactive 1 Active
2	1 At P0094 = 2: Step 2 active
4	1 Notch position was found (methods 0, 1, 2) 0 Notch position still is unknown
5...15	Reserved

P0502	Motor I²t actual value	0,0 bis 40000,0 %
-	Motor I ² t-Istwert	0,0 %
A	BM_ud_MotorAct_I2t	0x4000: 100 %

Also see «Motor overload monitoring» from page 57.

Output of PT1 element for overload monitoring.

Scaling at 40°C ambient temperature:

0% ↔ 40°C

100% ↔ 155°C

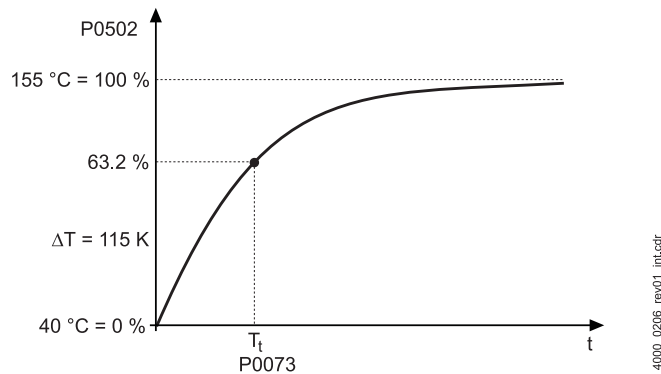


Figure 7.4: Motor I²t-monitoring

If ParamMotorNomCurrent (P0054) < 0.07 ParamCurrentDriveMax (P1241) the model is limited (I²t-values incorrect).

P0503	Motor actual temperature	-30 bis 251 °C
-	Motor Temperatur-Istwert	0 °C
A	BM_i_MotorActTemp	1:1 °C

Measured motor temperature according to the used temperature sensor P0084.

P0504	Motor actual slip frequency	0,00 bis 655,35 Hz
-	Aktuelle Schlupffrequenz	0,00 Hz
A	BM_u_MotorActSlipFreq	100:1 Hz

At asynchronous machines this parameter shows the actual calculated slip frequency (temperature tracing).

P0506	Calculated motor magnetizing current	0,0 bis 6553,5 A	
-	Berechneter Motor Magnetisierungsstrom	0,0 A	
A	BM_u_CalcMagnetCurrent	10:1 A	-
P0507	Calculated motor electrical power	-2000000,0 bis 2000000,0 W	
-	Berechnete elektrische Leistung	0,0 W	
A	BM_di_ElectPowerAct	10:1 W	-
P0508	Calculated torque actual value	-20000,000 bis 20000,000 Nm	
-	Berechneter Momenten-Istwert	0,000 Nm	
A	BM_di_TrqActValueNm	1000:1 Nm	-
P0509	Maximum set torque	0,000 bis 20000,000 Nm	
-	Maximal einstellbares Moment	0,000 Nm	
A	BM_ud_TrqSetMaxNm	1000:1 Nm	-
P0520	Flux set value	0,00 bis 125,00 %	
-	Fluß-Sollwert	100,00 %	
A	BM_u_FluxSetValue	0x4000: 100 %	-
P0521	Flux actual value	0,00 bis 150,00 %	
-	Fluß-Istwert	0,00 %	
A	BM_u_FluxActValue	0x4000: 100 %	-
P0522	Rotor time constant actual value	0 bis 4000 ms	
-	Istwert Rotorzeitkonstante	0 ms	
A	BM_u_TimeRotorActValue	1:1 ms	-
	Actual value of the rotor time constant (Tr) at synchronous machines.		

P0523	Flux set value reduce	20,0 bis 100,00 %	
-	Reduktion des Flußsollwerts	100,00 %	
	BM_u_FluxSetReduce	0x4000: 100 %	CW

Reduction of the flux setpoint at asynchronous machines.

With the help of this parameter the flux setpoint can be limited, in order to reduce the loss at no-load or at light load. Therefore is to be considered, that the motor at reduced flow, can generate only a low torque.

Flow-reducing therefore must be completed on time (at least 3 x rotor time constant), before a greater torque is necessary.

P0530	Synchronization status	0x0000 bis 0xFFFF	
-	Synchronisations-Status		
A	BM_w_SyncStatus	1:1	-

Also see «Synchronization» from page 85.

Display of synchronization status.

Bit no.	Meaning
0	0 Drive not synchronous
	1 Drive is synchronous
1	1 Drive is synchronized with a longer control cycle
2	1 Drive is synchronized with shorter control cycle
3	0 No synchronization signal received
	1 Synchronization signal was recognized
15...12	Reserved

Notes:

- Bit0

The bit is set, as soon as the drive runs synchronous to the external signal.

That means, that the last two edges of the synchronization signal are within the valid range and the point of time of the falling edge is within the range determined by parameter **Sync tolerance P0533** (offset to control cycle).

- Bit1

The bit is set, if the synchronization signal was valid (distance between the edges within the tolerance), but the synchronization edge has appeared only after the adjusted instant.

The drive will be synchronized by extending the control cycle. This bit can simultaneously be set with Bit0, then the drive is synchronous, but must re-synchronize.

- Bit2

The bit is set, if the synchronization signal was valid (distance between the edges within the tolerance), but the synchronization edge has appeared before the adjusted instant.

The drive will be synchronized by reducing the control cycle. This bit can simultaneously be set with Bit0, then the drive is synchronous, but must re-synchronize.

- Bit3

The bit is set, if a synchronization edge was detected, not depending on if the signal lies within the tolerances or not.

P0531	Source sync signal	0 bis 8	
EE	Quelle für Sync-Signal	0	
	BM_u_SyncSource	1:1	-

Also see «Synchronization» from page 85.

Selection of the signal for the synchronization via a field bus.

Value	Meaning
0	Synchronization switched off
1	CANsync function module (Sync signal via RJ45-CAN-connectors)
2	BACI signal SYNC 1
3	BACI signal SYNC 2
4	Reserved
5	Reserved
6	Option card type 1 (reserved)
7	Option card type 2 (reserved)
8	CANopen Sync.Object (no HW-signal)

P0532	Sync interval	0 bis 8000 μ s	
EE	Sync Intervall	0 μ s	
	BM_u_SyncInterval	1:1 μ s	-

Also see «Synchronization» from page 85.

Value	Meaning
0	Synchronization switched off
250	250 μ s
500	500 μ s
1000	1 ms
2000	2 ms
4000	4 ms
8000	8 ms

P0533	Sync tolerance	0,0 bis 40,0 μ s	
EE	Sync Toleranz	12,8 μ s	
	BM_u_SyncTolerance	5:1 μ s	-

Also see «Synchronization» from page 85.

Adjustment of interval, in which the drive will be synchronous to the external signal.

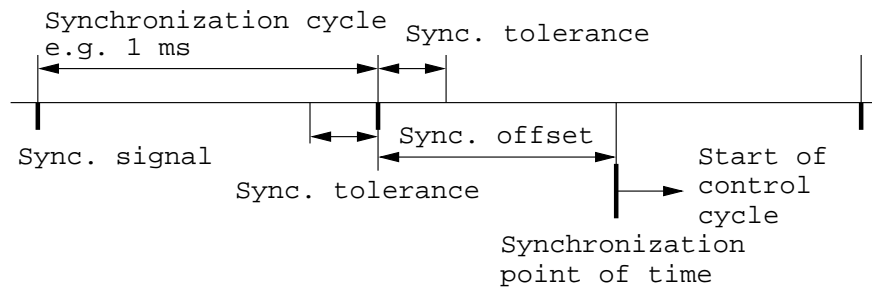


Figure 7.5: Synchronization timing

P0534	Sync offset	-4000,0 bis 4000,0 μ s	
EE	Sync Offset	0,0 μ s	
	BM_i_SyncOffset	5:1 μ s	-

Also see «Synchronization» from page 85.

Offset for the synchronization operation, that means offset between control cycle and synchronization signal.

Positive values mean shifting the controller cycle backwards.

P0540	CAN mode	0 bis 0xFFFF	
EE	CAN Modus	0	
	BM_w_CAN_Mode	1:1	-

Mode of CAN communication.

Bit no.	Meaning
0	0 Baud rate selector switch S40 is read (in parameter P0543)
	1 Baud rate is set with parameter P0542
1	0 Node number is read by selector switch S40/S41 (in parameter P0546)
	1 Node number is set by parameter P0545
2...14	Reserved
15	0 Protocol CANopen
	1 Protocol CANsync

P0541	CAN status	0x0000 bis 0xFFFF	
-	CAN-Status	0x0000	
A	BM_w_CAN_Status	1:1	-

Dependent on the actual CAN protocol the single bits of the parameters have a different meaning.

CAN status at actual Canopen protocol:

Bit no.	Meaning
1, 0	Status of module 0 0 Initialization 0 1 Operational 1 0 Stopped 1 1 Pre-Operational
2...14	Reserved
15	0 CANopen protocol active

CAN status at actual CANSync protocol:

Bit no.	Meaning
1, 0	Status of module 0 0 Initialization 0 1 Run
2...3	Reserved
4	0 Setpoint 1 not mapped 1 Setpoint 1 successfully mapped
5	0 Setpoint 2 not mapped 1 Setpoint 2 successfully mapped
6...7	Reserved
8	0 Actual value 1 not mapped 1 Actual value 1 successfully mapped
9	0 Actual value 2 not mapped 1 Actual value 2 successfully mapped
10...11	Reserved
4	0 Status word not mapped 1 Status word successfully mapped
13...14	Reserved
15	1 CANSync protocol active

P0542	CAN baudrate (config)	125 bis 1000 kBit/s	
EE	CAN Baudrate (Konfig)	125 kBit/s	
	BM_u_CAN_BaudrateSet	1:1 kBit/s	-

This parameter specifies the CAN baud rate, if in **P0540** Bit0 = 1 (setting of baud rate via parameter) is set.

The currently valid baud rate is displayed in **P0544** CAN baud rate (active).

125kBit/s, 250kBit/s, 500kBit/s and 1000kBit/s are permitted values.

P0543	CAN Baudrate (DIP-Switch)	125 bis 1000 kBit/s	
-	CAN Baudrate (DIP-Schalter)	125 kBit/s	
A	BM_u_CAN_BaudrateDIP	1:1 kBit/s	-

Display of baud rate setting of the selector switch S40.

Using the selector switch the baud rates 125kBit/s or 500kBit/s can be selected (1 bit). The baud rates 250kBit/s or 1000kBit/s can be set only via the parameter **P0542**.

The two selector switches S40 and S41 are combined.

A resolution of 8 bit (0 bis 255) results from this, whereat S41 provides the lower 4 bits and S40 provides the upper 4 bits ($value = S40 \cdot 16 + S41$).

The lower 7 bits are used of the value in order to code the node number, the 8th bit serves as switchover be 500kBit/s or 125kBit/s.

Switch	Bits	Meaning
S41	3...0	Node number Low-part
S40	3	0 Baudrate 125kBit/s
		1 Baudrate 500kBit/s

Examples:

S40	S41	Address	Baudrate [kBit/s]
0	1	1	125
8	1	1	500
7	F	127	125
F	F	127	500

P0544	CAN baudrate (active)	125 bis 1000 kBit/s	
-	CAN Baudrate (aktiv)	1000 kBit/s	
A	BM_u_CAN_BaudrateAct	1:1 kBit/s	-
Actual valid CAN baud rate. Depending on P0540 CAN mode this value can be set via the selector switch S40 or via the parameter P0542 .			
P0545	CAN slave number (config)	0 bis 128	
EE	CAN Slave Nummer (Konfig)	0	
	BM_u_CAN_SlaveNoSet	1:1	-
This parameter specifies the slave number, if in P0540 Bit1 = 1 (setting of slave number per software) is set.			
The currently valid slave number is shown in P0547 CAN slave number (active).			
P0546	CAN slave number (DIP-Switch)	0 bis 128	
-	CAN Slave Nummer (DIP-Schalter)	0	
A	BM_u_CAN_SlaveNoDIP	1:1	-
Display of slave number setting according to selector switch S40 resp. S41			
For a description of this parameter see P0543 .			
P0547	CAN slave number (active)	0 bis 128	
-	CAN Slave Nummer (aktiv)	0	
A	BM_u_CAN_SlaveNoAct	1:1	-
Actual valid slave number (dependent on P0540 CAN mode).			

P0550	Module type slot A	0x0000 bis 0xFFFF
-	Modultyp Steckplatz A	0x0000
A	BM_w_ModSlotAIdent	1:1

Hardware configuration of the encoder input 1:

Bit no.	Meaning
2...0	Encoder current supply 0 0 1 Resolver supply 0 1 0 5V 0 1 1 8V
6...3	Encoder type 0 0 0 0 No encoder 0 0 0 1 Resolver 0 0 1 0 Incremental encoder (rectangle) 0 1 1 0 Sine/cosine + QEP
9...7	Communication interface 0 0 1 Hiperface
10	0 Zero pulse is not evaluated 1 Zero pulse is evaluated

For the different encoder modules the following values are obtained:

Encoder type	Comment	P0550
A	Resolver	9
B	Sine incremental encoder (due to the hardware configuration zero pulses cannot be evaluated)	50
B	Sine encoder, 5V power supply with zero pulse	1074
C	Sine encoder, 8V power supply with HIPERFACE interface	179
E	Square wave incremental encoder	1042

Technical data of the encoder interfaces see Instruction Manual of the [b maXX® BM3400](#).

P0551	Module type slot B	0x0000 bis 0xFFFF	
-	Modultyp Steckplatz B	0x0000	
A	BM_w_ModSlotBIIdent	1:1	-

Hardware configuration of the encoder input 2:

See **P0550**.

Please note that encoder 2 cannot be a resolver.

P0552	Module type slot C	0x0000 bis 0xFFFF	
-	Modultyp Steckplatz C	0x0000	
A	BM_w_ModSlotCIIdent	1:1	-

Parameter shows the type of the option card.

Value	Meaning
0	No extender board
1	Incremental encoder emulation
2	EtherCAT-Slave

P0556	Controller Bootloader version	0x0000 bis 0xFFFF	
-	Regler Bootloader-Version	0x0000	
A	BM_u_BootloaderVersion	1:1	-

Firmware version of the bootstrap loader.

The digit in front of the comma is the version of the boot loader, the digit after the comma characterizes the function range of the boot loader.

Bit no.	Meaning
0	Bootloader supports function check.
1	Bootloader supports firmware image download in the boot loader.
2	Bootloader checks if firmware approval was made.
3	Bootloader checks if a new firmware image was written from the firmware into the flash and copies this into the internal flash for processing.
4...7	Not used.

Example The parameter contains 265_{dec} resp. 109_{hex} . After rescaling (1:256) this is 1.9.

Version 1

Funktion range $9 = 1 + 8$, i.e. Bootloader supports the function check (1) and checks new firmware image (8).

P0558	Configuration ID	0 bis 4294967295	
EE	Konfigurations-Identifikationsnummer	0	
	BM_ud_ConfigId	1:1	-
	ID to save an item number or similar in the controller.		
	This parameter acts as a storage of an item number or similar in the controller. The value is not processed by the controller, but is saved in the central data during storage of data sets.		

P0559	Drive name	20 ASCII-Zeichen	
EE	Gerätename		
	BM_s_DriveName	1:1	-
	This parameter serves as storage of a device name e.g. for system configuration.		
	The string is not evaluated by the controller, but saved during storage of data sets.		

P0560	Encoder emulation module version	0x0000 bis 0xFFFF	
-	Geber-Nachbildung Modul-Version		
A	BM_w_EncEmuModVersion	1:1	-
	Unit- and hardware version of function module incremental encoder emulation.		

Bit no.	Meaning
0...7	Software version
8...15	Hardware-ID of module

P0561	Encoder emulation status	0x0000 bis 0xFFFF	
-	Geber-Nachbildung Status	0x0000	
A	BM_w_EncEmuStatus	1:1	-
	Presently the parameter is not supported.		

P0562	Encoder emulation mode	0x0000 bis 0xFFFF
EE	Geber-Nachbildung Modus	0x0020
	BM_w_EncEmuMode	1:1 -

Mode of incremental encoder emulation.

Bit no.	Meaning
0	0 Incremental encoder emulation is coupled with position actual value G1/G2
	1 Incremental encoder emulation is coupled with position setpoint
1	0 Incremental encoder emulation is switched off
	1 Incremental encoder emulation is active
2	0 Incremental encoder emulation is coupled with encoder 1
	1 Incremental encoder emulation is coupled with encoder 2
3	Polarity inversion for incremental encoder emulation:
	0 At clockwise rotating encoder a clockwise rotating signal pattern is signaled 1 At clockwise rotating encoder a counterclockwise signal pattern is signaled
4	Reserved
5	Evaluation only, if Bit0 is 0.
	0 Activation of incremental encoder emulation after initialization and first zero pulse of the encoder (evaluation only, if an incremental encoder is coupled) 1 Activation of the incremental encoder emulation immediately after initialization of the encoder
6	0 Zero pulse synchronous to track A, B (A=1 UND B=1, length 90°, 16 bit resolution)

P0563	Encoder emulation pulses per revolution	1 bis 32767 Striche/Umdrehung
EE	Geber-Nachbildung Strichzahl	1024 Striche/Umdrehung
	BM_ud_EncEmuPulsesPerRev	1:1 - Striche/Umdrehung

Number of pulses per revolution of incremental encoder emulation.

P0564	Encoder emulation offset Zero pulse	0x00000000 bis 0xFFFFFFFF	
EE	Geber-Nachbildung Offset Nullimpuls	0x00000000	
	BM_ud_EncEmuOffsetIdxSig	1:1	-

Angle offset between zero angle of the encoder, which was selected via **P0562** and of the zero pulse of the incremental encoder emulation.

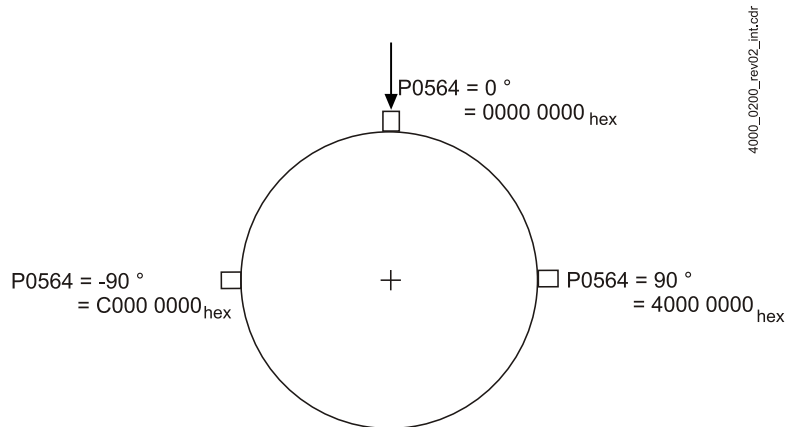


Figure 7.6: Incremental encoder emulation zero pulse

P0580	Touch probe status	0x0000 bis 0xFFFF	
-	Meßtaster Status	0x0000	
A	BM_w_TouchPrStatus	1:1	-
	This parameter is not used.		
P0581	Touch probe 1 measured value angle positive edge	0x00000000 bis 0xFFFFFFFF	
-	Meßtaster 1 Meßwert Winkel positive Flanke	0x00000000	
A	BM_ud_TouchPr1ValPhiPos	1:1	-
	This parameter is not used.		
P0582	Touch probe 1 measured value revolutions pos. edge	0x00000000 bis 0xFFFFFFFF	
-	Meßtaster 1 Meßwert Umdrehungen positive Flanke	0x00000000	
A	BM_ud_TouchPr1ValRevPos	1:1	-

This parameter is not used.

P0583	Touch probe 1 measured value angle negative edge	0x00000000 bis 0xFFFFFFFF	
-	Meßtaster 1 Meßwert Winkel negative Flanke	0x00000000	
A	BM_ud_TouchPr1ValPhiNeg	1:1	-

This parameter is not used.

P0584	Touch probe 1 measured value revolutions neg. edge	0x00000000 bis 0xFFFFFFFF	
-	Meßtaster 1 Meßwert Umdrehungen negative Flanke	0x00000000	
A	BM_ud_TouchPr1ValRevNeg	1:1	-

This parameter is not used.

P0585	Touch probe 2 measured value angle positive edge	0x00000000 bis 0xFFFFFFFF	
-	Meßtaster 2 Meßwert Winkel positive Flanke	0x00000000	
A	BM_ud_TouchPr2ValPhiPos	1:1	-

This parameter is not used.

P0586	Touch probe 2 measured value revolutions pos. edge	0x00000000 bis 0xFFFFFFFF	
-	Meßtaster 2 Meßwert Umdrehungen positive Flanke	0x00000000	
A	BM_ud_TouchPr2ValRevPos	1:1	-

This parameter is not used.

P0587	Touch probe 2 measured value angle negative edge	0x00000000 bis 0xFFFFFFFF	
-	Meßtaster 2 Meßwert Winkel negative Flanke	0x00000000	
A	BM_ud_TouchPr2ValPhiNeg	1:1	-

This parameter is not used.

P0588	Touch probe 2 measured value revolutions neg. edge	0x00000000 bis 0xFFFFFFFF	
-	Meßtaster 2 Meßwert Umdrehungen negative Flanke	0x00000000	
A	BM_ud_TouchPr2ValRevNeg	1:1	-

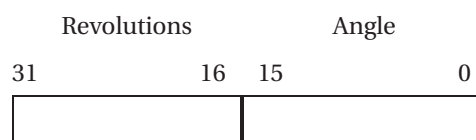
This parameter is not used.

P0590	Programmable PID controller set value	-100,00 bis +100,00 %	
-	Programmierbarer PID-Regler Sollwert	0,00 %	
	BM_di_PrPIDSetValue	0x40000000: 100 %	CW
	This parameter is not used.		
P0591	Programmable PID controller actual value	-100,00 bis +100,00 %	
-	Programmierbarer PID-Regler Istwert	0,00 %	
	BM_di_PrPIDActValue	0x40000000: 100 %	CW
	This parameter is not used.		
P0592	Programmable PID controller output	-100,00 bis +100,00 %	
-	Programmierbarer PID-Regler Ausgang	0,00 %	
A	BM_di_PrPIDOutput	0x40000000: 100 %	-
	This parameter is not used.		
P0593	Programmable PID controller integral part (hdw)	-100,00 bis 100,00 %	
-	Programmierbarer PID-Regler I-Anteil (HDW)	0 %	
	BM_di_PrPIDIntH32	0x40000000: 100 %	CW
	This parameter is not used.		
P0600	Positioning target position 0	0x00000000 bis 0xFFFFFFFF Inc	
EE	Positionierung Zielposition 0	0x00000000 Inc	
	BM_ud_PPosTarget0	1:1 Inc	CW

Also see operating mode «Setting target position (positioning)» from page 119.

Scaling:

One turn of the motor accords to internally 65536 increments. Within a positioning-setpoint and an -actual value the motor angle is in the low word and the number of the whole revolution is in the high word.



P0600

P0601	Positioning target input 0	-2 bis 13	
EE	Positionierung Zielangabe 0	0	
	BM_i_PPosTargetInput0	1:1	CW

Also see operating mode «Setting target position (positioning)» from page 119.

The target input determines, how the specified position target is interpreted.

Value	Meaning
-2	Relative to actual position in direction of smaller position setpoints (flying)
-1	Relative to target position in direction of smaller position setpoints (normal)
0	Absolute - limited to maximum positioning range
1	Relative to target position in direction of greater position setpoints (normal)
2	Relative to actual position in direction of greater position setpoints (flying)
3	Absolute in direction of the shorter distance to the target, i. e. maximum travel range can be exceeded (requirement: SW limit switch off!)
4	Relative to the target position (normal) in direction of greater or smaller position setpoints according to sign of the value of the parameter P0607.
5	Absolute - to the next defined angle in direction of greater position setpoints; from the parameters positioning target position only the angle for the next target position is used.
6	Absolute - to the next defined angle in direction of greater position set values; from the parameters positioning target position only the angle for the next target position is used.
7	Relative to target position (flying) on defined angle in direction of greater or smaller position setpoints according to the signs of the parameter Relative positioning target position.
8	Absolute positioning, with the shortest possible manner, to the defined angle (only the angle is used for the net target position).
9	CANopen mode: Target input via parameter P0607, difference absolute/relative target input via control word P0300. Shift range by 2^{31} increments.
10	Difference absolute/relative target input via P0300, target position via parameter P0600
11	Modulo positioning in direction of the shorter distance (distance optimized)

Value	Meaning
12	CANopen mode with the shortest distance at absolute target: Target input via parameter Relative Positioning control target position 0 P0607 , difference absolute/relative target via control word (P0300), shift range by 2^{31} increments, at absolute target positioning is made to shortest distance to target (i. e. maximum travel range can be exceeded; Condition: SW limit switch off!).
13	Absolute/relative positioning with shortest distance at absolute target: Target position via parameter P0600 , differentiation absolute/relative target via control word (Controlword P0300), at absolute target positioning is made towards the shortest distance to the target (i. e. maximum travel range can be exceeded; Condition: SW limit switch off!).

Note:

target input = 7:

Relative Positioning control target position 0 P0607 is used to calculate the new target position. The MSB represents the sign. The maximum travel distance per positioning here is $\pm 7FFFFFFF_{hex}$.

Position actual value P0362 is used to calculate the new target position (on the fly).

The new target position is calculated as follows:

- The Low word of **Relative Positioning control target position 0 P0607** (absolute) represents the angle to be reached.
- The High word of **Relative Positioning control target position 0 P0607** (relative) contains the revolutions still to made.
- The sign of **Relative Positioning control target position 0 P0607** defines the direction of positioning.

target input = 8:

Actual target position = $1000\ 5555_{hex}$

Target input positioning X = $5000\ AAAA_{hex}$ ▷ High word not important

$AAAA_{hex} - 5555_{hex} = 5555_{hex}$ ▷ less than 8000_{hex}

▷ shorter distance at clockwise rotation

▷ New target position = $1000\ AAAA_{hex}$

Actual target position = $1000\ 5555_{hex}$

Target input positioning X = $5000\ FFFF_{hex}$ ▷ High word not important

$FFFF_{hex} - 5555_{hex} = AAAA_{hex}$ ▷ greater than 8000_{hex}

▷ shorter distance at counterclockwise rotation

tion

▷ New target position = $0FFF\ FFFF_{hex}$

target input = 9:

CANopen mode:

The target position is specified in parameter **P0607**. The differentiation absolute/relative target input is made via Bit6 in **Controlword P0300**.

At absolute target input a range shift of 2^{31} increments is computed and the number range is interpreted as signed.

target input = 10:

Absolute/relative target input.

The specification if the target is absolute or relative (referring to the last target, is determined over the Bit6 in the control word.

If at the rising edge of New setpoint Bit6 is set, this is a relative target input. If the bit is deleted this is an absolute target.

If the bit is deleted, this is an absolute target. The target is always specified via **P0600**, at relative target the value then is interpreted signed.

target input = 11:

This positioning can be used at axes, where an endless positioning (rotary axis operations) is wanted and the target positioning shall be specified in the modulo format. The ratio of an intermediary transmission element (e. g. gear) is considered via the definition of the modulo value range (**P1239** positioning modulo position). Therefrom the controller calculates the shortest distance to the target position.

If a value is written greater or the same as modulo position into the target position, then at the starting of positioning the error 202 is displayed and it is not started.

The counting of position set values (**P0463**) and of position actual values (**P0462**) further on occurs in the normal absolute format. The conversion of actual position into the modulo format must occur controller-external.

In order to generate the reference between the normal absolute position format and the modulo format, after switch-on of controller. either homing is necessary or an absolute encoder must be used, whose absolute information is greater than the modulo position.

target input = 12:

CANopen mode with the shortest distance at absolute target:

The target position is specified in parameter **P0607**. The differentiation absolute/relative target is made via the Bit6 in **Controlword P0300**. At absolute target a range displacement of 2^{31} increments is calculated and the number range is interpreted signed. Furthermore the positioning is made at absolute target towards the shortest distance to the target, e. g. the maximum travel range can be exceeded.

target input = 13:

Absolute / relative positioning with the shortest distance at absolute target:

The specification if the target is absolute or relative (referring to the last target, is determined over the Bit6 in the control word (**P0300**). If at the rising edge of New setpoint Bit6 is set, this is a relative target input. If the bit is deleted, this is an absolute target. At absolute target inputs the positioning is made towards the shortest distance to the target, e.g. the maximum travel range can be exceeded. The target is always determined via **P0600**, at

relative target input the value is interpreted as signed.

Examples:

- Target input = 5
 - Actual target position = 1000 AAAA_{hex}
 - Positioning target position = 1234 5555_{hex} ▷ High word is not relevant
 - ▷ New target position = 1001 5555_{hex}
- Target input = 6
 - Actual target position = 3333 2222_{hex}
 - Positioning target position = 1234 5555_{hex} ▷ High word is not relevant
 - ▷ New target position = 3332 5555_{hex}
- Target input = 7
 - Current actual position = 1200 8888_{hex}
 - Relative positioning target position = 0034 5555_{hex}
 - ▷ New target position 1234 5555_{hex}
- Target input 11:
 - **P1239** Positioning Modulo-Position = 00140000_{hex} = 20 revolutions at positioning encoder
 - **P0463** Actual set position = 00221111_{hex} in normal absolute format
 - Calculation of actual set position into the modulo format:
 Set position modulo = set position absolute mod modulo position
 = 00221111_{hex} mod 00140000_{hex}
 = 000E1111_{hex}
 - First positioning:
 Positioning target position = 00063333_{hex} in the modulo format
 - New target position is calculated via the shortest distance
 - * distance to "right" (greater position set values)
 Distance on the right = Modulo position - New target position + target position modulo
 = 00140000_{hex} - 000E1111_{hex} + 00063333_{hex} = 000C2222_{hex}
 - * Distance to "left" (smaller position set values)
 Distance on the left = target position modulo - new target position
 = 000E1111_{hex} - 00063333_{hex} = 0007DDDE_{hex}
 - Distance on the left < Distance to the right

- Positioning to the left
- New target position in the normal absolute format:
 Target position absolute = set position absolute - distance on the left
 $= 00221111_{hex} - 0007DDDE_{hex}$
 $= 001A3333_{hex}$

Second positioning:

- Next target position = 00084444_{hex} in the modulo-format
 Distance on the right = $00084444_{hex} - 00063333_{hex} = 00021111_{hex}$
 Distance on the left = $00140000_{hex} - 00084444_{hex} + 00063333_{hex} = 0011EEEE_{hex}$
- Distance on the left > Distance on the right
 - Positioning to the right
 - New target position in the normal absolute format:
 Target position absolute = set position absolute - distance on the right
 $= 001A3333_{hex} + 00021111_{hex}$
 $= 001C4444_{hex}$

P0602	Positioning speed 0	1 bis 13200 Inc/ms	
EE	Positionierung Positioniergeschwindigkeit 0	100 Inc/ms	
	BM_u_PPosSetSpeed0	1:1 Inc/ms	CW

Also see operating mode «Setting target position (positioning)» from page 119.

The positioning speed is the term for the maximum positioning speed of the drive in operation mode 'positioning'.

P0603	Positioning acceleration 0	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierbeschleunigung 0	2,00 Inc/ms ²	
	BM_u_PPosAcceleration0	100:1 Inc/ms ²	CW

Also see operating mode «Setting target position (positioning)» from page 119.

Maximum acceleration of drive in operation mode positioning.

P0604	Positioning deceleration 0	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierverzögerung 0	2,00 Inc/ms ²	
	BM_u_PPosDeceleration0	100:1 Inc/ms ²	CW

Also see operating mode «Setting target position (positioning)» from page 119.

Analog to the maximum acceleration, the positioning deceleration describes the maximum deceleration of the drive in the operation mode positioning.

P0605	Positioning maximum jerk 0	0,07 bis 14,00 Inc/ms ³	
EE	Positionierung maximaler Ruck 0	1,25 Inc/ms ³	
	BM_u_PPosBend0	100:1 Inc/ms ³	CW

Also see operating mode «Setting target position (positioning)» from page 119.

With this parameter the maximum jerk (change of acceleration) for the S-curve profile (jerk-limited positioning) is set.

At usage of time-optimum positioning (trapezoidal profile) this parameter has no effects.

Example:

P0605 = 0.25 Inc/ms³ (maximum jerk)

P0603 = 10.00 Inc/ms² (permitted acceleration)

Duration after which acceleration is reached:

$$t = \frac{10,00 \cdot \frac{\text{Inc}}{\text{ms}^2}}{0,25 \cdot \frac{\text{Inc}}{\text{ms}^3}} = 40 \text{ms}$$

P0606	Positioning smoothing time 0	0 bis 8191 ms	
EE	Positionierung Verschleißzeit 0	0 ms	
	BM_u_PPosSmooth0	1:1 ms	CW

Also see operating mode «Setting target position (positioning)» from page 119.

In order to achieve a smoothing of the ramp edges a PT1-element is implemented. By use of this parameter, you can set the time constant of the PT1-element., if time optimal positioning (**P1190** positioning mode Bit2 = 0) is activated.

If the setting reads 0 ms, smoothing is switched off.

P0607	Relative Positioning control target position 0	0x80000000 bis 0x7FFFFFFF Inc	
EE	Relative Positionierung Zielposition 0 BM_di_PPosRelTarget0	0 Inc 1:1 Inc	CW
<p>Also see operating mode «Setting target position (positioning)» from page 119.</p> <p>Relative signed target position for positioning data set 0.</p> <p>This parameter is only valid for target input 4: <i>relative with signs</i>, 7: <i>relative with absolute angle</i> and 9: <i>CANopen mode</i>. The value sign of the of this parameter determines the direction of the positioning.</p> <p>In the CANopen mode the parameter is also used for absolute target inputs. In this case a range shift is calculated.</p>			
P0610	Positioning target position 1	0x00000000 bis 0xFFFFFFFF Inc	
EE	Positionierung Zielposition 1 BM_ud_PPosTarget1	0x00000000 Inc 1:1 Inc	CW
<p>For a description of this parameter see P0600.</p>			
P0611	Positioning target input 1	-2 bis 13	
EE	Positionierung Zielangabe 1 BM_i_PPosTargetInput1	0 1:1	CW
<p>For a description of this parameter see P0601.</p>			
P0612	Positioning speed 1	1 bis 13200 Inc/ms	
EE	Positionierung Positioniergeschwindigkeit 1 BM_u_PPosSetSpeed1	100 Inc/ms 1:1 Inc/ms	CW
<p>For a description of this parameter see P0602.</p>			
P0613	Positioning acceleration 1	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierbeschleunigung 1 BM_u_PPosAcceleration1	2,00 Inc/ms ² 100:1 Inc/ms ²	CW
<p>For a description of this parameter see P0603.</p>			

P0614	Positioning deceleration 1	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierverzögerung 1	2,00 Inc/ms ²	
	BM_u_PPosDeceleration1	100:1 Inc/ms ²	CW
	For a description of this parameter see P0604 .		
P0615	Positioning maximum jerk 1	0,07 bis 14,00 Inc/ms ³	
EE	Positionierung maximaler Ruck 1	1,25 Inc/ms ³	
	BM_u_PPosBend1	100:1 Inc/ms ³	CW
	For a description of this parameter see P0605 .		
P0616	Positioning smoothing time 1	0 bis 8191 ms	
EE	Positionierung Verschleißzeit 1	0 ms	
	BM_u_PPosSmooth1	1:1 ms	CW
	For a description of this parameter see P0606 .		
P0617	Relative Positioning control target position 1	0x80000000 bis 0x7FFFFFFF Inc	
EE	Relative Positionierung Zielposition 1	0 Inc	
	BM_di_PPosRelTarget1	1:1 Inc	CW
	For a description of this parameter see P0607 .		
P0620	Positioning target position 2	0x00000000 bis 0xFFFFFFFF Inc	
EE	Positionierung Zielposition 2	0x00000000 Inc	
	BM_ud_PPosTarget2	1:1 Inc	CW
	For a description of this parameter see P0600 .		
P0621	Positioning target input 2	-2 bis 13	
EE	Positionierung Zielangabe 2	0	
	BM_i_PPosTargetInput2	1:1	CW
	For a description of this parameter see P0601 .		

P0622	Positioning speed 2	1 bis 13200 Inc/ms	
EE	Positionierung Positioniergeschwindigkeit 2	200 Inc/ms	
	BM_u_PPosSetSpeed2	1:1 Inc/ms	CW
	For a description of this parameter see P0602 .		
P0623	Positioning acceleration 2	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierbeschleunigung 2	2,00 Inc/ms ²	
	BM_u_PPosAcceleration2	100:1 Inc/ms ²	CW
	For a description of this parameter see P0603 .		
P0624	Positioning deceleration 2	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierverzögerung 2	2,00 Inc/ms ²	
	BM_u_PPosDeceleration2	100:1 Inc/ms ²	CW
	For a description of this parameter see P0604 .		
P0625	Positioning maximum jerk 2	0,07 bis 14,00 Inc/ms ³	
EE	Positionierung maximaler Ruck 2	1,25 Inc/ms ³	
	BM_u_PPosBend2	100:1 Inc/ms ³	CW
	For a description of this parameter see P0605 .		
P0626	Positioning smoothing time 2	0 bis 8191 ms	
EE	Positionierung Verschleißzeit 2	0 ms	
	BM_u_PPosSmooth2	1:1 ms	CW
	For a description of this parameter see P0606 .		
P0627	Relative Positioning control target position 2	0x80000000 bis 0x7FFFFFFF Inc	
EE	Relative Positionierung Zielposition 2	0 Inc	
	BM_di_PPosRelTarget2	1:1 Inc	CW
	For a description of this parameter see P0607 .		

P0630	Positioning target position 3	0x00000000 bis 0xFFFFFFFF Inc	
EE	Positionierung Zielposition 3	0x00000000 Inc	
	BM_ud_PPosTarget3	1:1 Inc	CW
	For a description of this parameter see P0600 .		
P0631	Positioning target input 3	-2 bis 13	
EE	Positionierung Zielangabe 3	0	
	BM_i_PPosTargetInput3	1:1	CW
	For a description of this parameter see P0601 .		
P0632	Positioning speed 3	1 bis 13200 Inc/ms	
EE	Positionierung Positioniergeschwindigkeit 3	200 Inc/ms	
	BM_u_PPosSetSpeed3	1:1 Inc/ms	CW
	For a description of this parameter see P0602 .		
P0633	Positioning acceleration 3	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierbeschleunigung 3	2,00 Inc/ms ²	
	BM_u_PPosAcceleration3	100:1 Inc/ms ²	CW
	For a description of this parameter see P0603 .		
P0634	Positioning deceleration 3	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierverzögerung 3	2,00 Inc/ms ²	
	BM_u_PPosDeceleration3	100:1 Inc/ms ²	CW
	For a description of this parameter see P0604 .		
P0635	Positioning maximum jerk 3	0,07 bis 14,00 Inc/ms ³	
EE	Positionierung maximaler Ruck 3	1,25 Inc/ms ³	
	BM_u_PPosBend3	100:1 Inc/ms ³	CW
	For a description of this parameter see P0605 .		
P0636	Positioning smoothing time 3	0 bis 8191 ms	
EE	Positionierung Verschleißzeit 3	0 ms	
	BM_u_PPosSmooth3	1:1 ms	CW
	For a description of this parameter see P0606 .		

P0637	Relative Positioning control target position 3	0x80000000 bis 0x7FFFFFFF Inc	
EE	Relative Positionierung Zielposition 3 BM_di_PPosRelTarget3	0 Inc 1:1 Inc	CW
	For a description of this parameter see P0607 .		
P0640	Positioning target position 4	0x00000000 bis 0xFFFFFFFF Inc	
EE	Positionierung Zielposition 4 BM_ud_PPosTarget4	0x00000000 Inc 1:1 Inc	CW
	For a description of this parameter see P0600 .		
P0641	Positioning target input 4	-2 bis 13	
EE	Positionierung Zielangabe 4 BM_i_PPosTargetInput4	0 1:1	CW
	For a description of this parameter see P0601 .		
P0642	Positioning speed 4	1 bis 13200 Inc/ms	
EE	Positionierung Positioniergeschwindigkeit 4 BM_u_PPosSetSpeed4	200 Inc/ms 1:1 Inc/ms	CW
	For a description of this parameter see P0602 .		
P0643	Positioning acceleration 4	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierbeschleunigung 4 BM_u_PPosAcceleration4	2,00 Inc/ms ² 100:1 Inc/ms ²	CW
	For a description of this parameter see P0603 .		
P0644	Positioning deceleration 4	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierverzögerung 4 BM_u_PPosDeceleration4	2,00 Inc/ms ² 100:1 Inc/ms ²	CW
	For a description of this parameter see P0604 .		

P0645	Positioning maximum jerk 4	0,07 bis 14,00 Inc/ms ³	
EE	Positionierung maximaler Ruck 4	1,25 Inc/ms ³	
	BM_u_PPosBend4	100:1 Inc/ms ³	CW
	For a description of this parameter see P0605 .		
P0646	Positioning smoothing time 4	0 bis 8191 ms	
EE	Positionierung Verschleißzeit 4	0 ms	
	BM_u_PPosSmooth4	1:1 ms	CW
	For a description of this parameter see P0606 .		
P0647	Relative Positioning control target position 4	0x80000000 bis 0x7FFFFFFF Inc	
EE	Relative Positionierung Zielposition 4	0 Inc	
	BM_di_PPosRelTarget4	1:1 Inc	CW
	For a description of this parameter see P0607 .		
P0650	Positioning target position 5	0x00000000 bis 0xFFFFFFFF Inc	
EE	Positionierung Zielposition 5	0x00000000 Inc	
	BM_ud_PPosTarget5	1:1 Inc	CW
	For a description of this parameter see P0600 .		
P0651	Positioning target input 5	-2 bis 13	
EE	Positionierung Zielangabe 5	0	
	BM_i_PPosTargetInput5	1:1	CW
	For a description of this parameter see P0601 .		
P0652	Positioning speed 5	1 bis 13200 Inc/ms	
EE	Positionierung Positioniergeschwindigkeit 5	200 Inc/ms	
	BM_u_PPosSetSpeed5	1:1 Inc/ms	CW
	For a description of this parameter see P0602 .		

P0653	Positioning acceleration 5	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierbeschleunigung 5	2,00 Inc/ms ²	
	BM_u_PPosAcceleration5	100:1 Inc/ms ²	CW
	For a description of this parameter see P0603 .		
P0654	Positioning deceleration 5	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierverzögerung 5	2,00 Inc/ms ²	
	BM_u_PPosDeceleration5	100:1 Inc/ms ²	CW
	For a description of this parameter see P0604 .		
P0655	Positioning maximum jerk 5	0,07 bis 14,00 Inc/ms ³	
EE	Positionierung maximaler Ruck 5	1,25 Inc/ms ³	
	BM_u_PPosBend5	100:1 Inc/ms ³	CW
	For a description of this parameter see P0605 .		
P0656	Positioning smoothing time 5	0 bis 8191 ms	
EE	Positionierung Verschleißzeit 5	0 ms	
	BM_u_PPosSmooth5	1:1 ms	CW
	For a description of this parameter see P0606 .		
P0657	Relative Positioning control target position 5	0x80000000 bis 0x7FFFFFFF Inc	
EE	Relative Positionierung Zielposition 5	0 Inc	
	BM_di_PPosRelTarget5	1:1 Inc	CW
	For a description of this parameter see P0607 .		
P0660	Positioning target position 6	0x00000000 bis 0xFFFFFFFF Inc	
EE	Positionierung Zielposition 6	0x00000000 Inc	
	BM_ud_PPosTarget6	1:1 Inc	CW
	For a description of this parameter see P0600 .		

P0661	Positioning target input 6	-2 bis 13	
EE	Positionierung Zielangabe 6	0	
	BM_i_PPosTargetInput6	1:1	CW
	For a description of this parameter see P0601 .		
P0662	Positioning speed 6	1 bis 13200 Inc/ms	
EE	Positionierung Positioniergeschwindigkeit 6	200 Inc/ms	
	BM_u_PPosSetSpeed6	1:1 Inc/ms	CW
	For a description of this parameter see P0602 .		
P0663	Positioning acceleration 6	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierbeschleunigung 6	2,00 Inc/ms ²	
	BM_u_PPosAcceleration6	100:1 Inc/ms ²	CW
	For a description of this parameter see P0603 .		
P0664	Positioning deceleration 6	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierverzögerung 6	2,00 Inc/ms ²	
	BM_u_PPosDeceleration6	100:1 Inc/ms ²	CW
	For a description of this parameter see P0604 .		
P0665	Positioning maximum jerk 6	0,07 bis 14,00 Inc/ms ³	
EE	Positionierung maximaler Ruck 6	1,25 Inc/ms ³	
	BM_u_PPosBend6	100:1 Inc/ms ³	CW
	For a description of this parameter see P0605 .		
P0666	Positioning smoothing time 6	0 bis 8191 ms	
EE	Positionierung Verschleißzeit 6	0 ms	
	BM_u_PPosSmooth6	1:1 ms	CW
	For a description of this parameter see P0606 .		
P0667	Relative Positioning control target position 6	0x80000000 bis 0x7FFFFFFF Inc	
EE	Relative Positionierung Zielposition 6	0 Inc	
	BM_di_PPosRelTarget6	1:1 Inc	CW
	For a description of this parameter see P0607 .		

P0670	Positioning target position 7	0x00000000 bis 0xFFFFFFFF Inc	
EE	Positionierung Zielposition 7	0x00000000 Inc	
	BM_ud_PPosTarget7	1:1 Inc	CW
	For a description of this parameter see P0600 .		
P0671	Positioning target input 7	-2 bis 13	
EE	Positionierung Zielangabe 7	0	
	BM_i_PPosTargetInput7	1:1	CW
	For a description of this parameter see P0601 .		
P0672	Positioning speed 7	1 bis 13200 Inc/ms	
EE	Positionierung Positioniergeschwindigkeit 7	200 Inc/ms	
	BM_u_PPosSetSpeed7	1:1 Inc/ms	CW
	For a description of this parameter see P0602 .		
P0673	Positioning acceleration 7	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierbeschleunigung 7	2,00 Inc/ms ²	
	BM_u_PPosAcceleration7	100:1 Inc/ms ²	CW
	For a description of this parameter see P0603 .		
P0674	Positioning deceleration 7	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierverzögerung 7	2,00 Inc/ms ²	
	BM_u_PPosDeceleration7	100:1 Inc/ms ²	CW
	For a description of this parameter see P0604 .		
P0675	Positioning maximum jerk 7	0,07 bis 14,00 Inc/ms ³	
EE	Positionierung maximaler Ruck 7	1,25 Inc/ms ³	
	BM_u_PPosBend7	100:1 Inc/ms ³	CW
	For a description of this parameter see P0605 .		
P0676	Positioning smoothing time 7	0 bis 8191 ms	
EE	Positionierung Verschleißzeit 7	0 ms	
	BM_u_PPosSmooth7	1:1 ms	CW
	For a description of this parameter see P0606 .		

P0677	Relative Positioning control target position 7	0x80000000 bis 0x7FFFFFFF Inc	
EE	Relative Positionierung Zielposition 7 BM_di_PPosRelTarget7	0 Inc 1:1 Inc	CW
	For a description of this parameter see P0607 .		
P0680	Positioning target position 8	0x00000000 bis 0xFFFFFFFF Inc	
EE	Positionierung Zielposition 8 BM_ud_PPosTarget8	0x00000000 Inc 1:1 Inc	CW
	For a description of this parameter see P0600 .		
P0681	Positioning target input 8	-2 bis 13	
EE	Positionierung Zielangabe 8 BM_i_PPosTargetInput8	0 1:1	CW
	For a description of this parameter see P0601 .		
P0682	Positioning speed 8	1 bis 13200 Inc/ms	
EE	Positionierung Positioniergeschwindigkeit 8 BM_u_PPosSetSpeed8	200 Inc/ms 1:1 Inc/ms	CW
	For a description of this parameter see P0602 .		
P0683	Positioning acceleration 8	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierbeschleunigung 8 BM_u_PPosAcceleration8	2,00 Inc/ms ² 100:1 Inc/ms ²	CW
	For a description of this parameter see P0603 .		
P0684	Positioning deceleration 8	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierverzögerung 8 BM_u_PPosDeceleration8	2,00 Inc/ms ² 100:1 Inc/ms ²	CW
	For a description of this parameter see P0604 .		

P0685	Positioning maximum jerk 8	0,07 bis 14,00 Inc/ms ³	
EE	Positionierung maximaler Ruck 8	1,25 Inc/ms ³	
	BM_u_PPosBend8	100:1 Inc/ms ³	CW
	For a description of this parameter see P0605 .		
P0686	Positioning smoothing time 8	0 bis 8191 ms	
EE	Positionierung Verschleißzeit 8	0 ms	
	BM_u_PPosSmooth8	1:1 ms	CW
	For a description of this parameter see P0606 .		
P0687	Relative Positioning control target position 8	0x80000000 bis 0x7FFFFFFF Inc	
EE	Relative Positionierung Zielposition 8	0 Inc	
	BM_di_PPosRelTarget8	1:1 Inc	CW
	For a description of this parameter see P0607 .		
P0690	Positioning target position 9	0x00000000 bis 0xFFFFFFFF Inc	
EE	Positionierung Zielposition 9	0x00000000 Inc	
	BM_ud_PPosTarget9	1:1 Inc	CW
	For a description of this parameter see P0600 .		
P0691	Positioning target input 9	-2 bis 13	
EE	Positionierung Zielangabe 9	0	
	BM_i_PPosTargetInput9	1:1	CW
	For a description of this parameter see P0601 .		
P0692	Positioning speed 9	1 bis 13200 Inc/ms	
EE	Positionierung Positioniergeschwindigkeit 9	200 Inc/ms	
	BM_u_PPosSetSpeed9	1:1 Inc/ms	CW
	For a description of this parameter see P0602 .		

P0693	Positioning acceleration 9	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierbeschleunigung 9	2,00 Inc/ms ²	
	BM_u_PPosAcceleration9	100:1 Inc/ms ²	CW
	For a description of this parameter see P0603 .		
P0694	Positioning deceleration 9	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierverzögerung 9	2,00 Inc/ms ²	
	BM_u_PPosDeceleration9	100:1 Inc/ms ²	CW
	For a description of this parameter see P0604 .		
P0695	Positioning maximum jerk 9	0,07 bis 14,00 Inc/ms ³	
EE	Positionierung maximaler Ruck 9	1,25 Inc/ms ³	
	BM_u_PPosBend9	100:1 Inc/ms ³	CW
	For a description of this parameter see P0605 .		
P0696	Positioning smoothing time 9	0 bis 8191 ms	
EE	Positionierung Verschleißzeit 9	0 ms	
	BM_u_PPosSmooth9	1:1 ms	CW
	For a description of this parameter see P0606 .		
P0697	Relative Positioning control target position 9	0x80000000 bis 0x7FFFFFFF Inc	
EE	Relative Positionierung Zielposition 9	0 Inc	
	BM_di_PPosRelTarget9	1:1 Inc	CW
	For a description of this parameter see P0607 .		
P0700	Positioning target position 10	0x00000000 bis 0xFFFFFFFF Inc	
EE	Positionierung Zielposition 10	0x00000000 Inc	
	BM_ud_PPosTarget10	1:1 Inc	CW
	For a description of this parameter see P0600 .		

P0701	Positioning target input 10	-2 bis 13	
EE	Positionierung Zielangabe 10	0	
	BM_i_PPosTargetInput10	1:1	CW
	For a description of this parameter see P0601 .		
P0702	Positioning speed 10	1 bis 13200 Inc/ms	
EE	Positionierung Positioniergeschwindigkeit 10	200 Inc/ms	
	BM_u_PPosSetSpeed10	1:1 Inc/ms	CW
	For a description of this parameter see P0602 .		
P0703	Positioning acceleration 10	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierbeschleunigung 10	2,00 Inc/ms ²	
	BM_u_PPosAcceleration10	100:1 Inc/ms ²	CW
	For a description of this parameter see P0603 .		
P0704	Positioning deceleration 10	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierverzögerung 10	2,00 Inc/ms ²	
	BM_u_PPosDeceleration10	100:1 Inc/ms ²	CW
	For a description of this parameter see P0604 .		
P0705	Positioning maximum jerk 10	0,07 bis 14,00 Inc/ms ³	
EE	Positionierung maximaler Ruck 10	1,25 Inc/ms ³	
	BM_u_PPosBend10	100:1 Inc/ms ³	CW
	For a description of this parameter see P0605 .		
P0706	Positioning smoothing time 10	0 bis 8191 ms	
EE	Positionierung Verschleißzeit 10	0 ms	
	BM_u_PPosSmooth10	1:1 ms	CW
	For a description of this parameter see P0606 .		
P0707	Relative Positioning control target position 10	0x80000000 bis 0x7FFFFFFF Inc	
EE	Relative Positionierung Zielposition 10	0 Inc	
	BM_di_PPosRelTarget10	1:1 Inc	CW
	For a description of this parameter see P0607 .		

P0710	Positioning target position 11	0x00000000 bis 0xFFFFFFFF Inc	
EE	Positionierung Zielposition 11	0x00000000 Inc	
	BM_ud_PPosTarget11	1:1 Inc	CW
	For a description of this parameter see P0600 .		
P0711	Positioning target input 11	-2 bis 13	
EE	Positionierung Zielangabe 11	0	
	BM_i_PPosTargetInput11	1:1	CW
	For a description of this parameter see P0601 .		
P0712	Positioning speed 11	1 bis 13200 Inc/ms	
EE	Positionierung Positioniergeschwindigkeit 11	200 Inc/ms	
	BM_u_PPosSetSpeed11	1:1 Inc/ms	CW
	For a description of this parameter see P0602 .		
P0713	Positioning acceleration 11	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierbeschleunigung 11	2,00 Inc/ms ²	
	BM_u_PPosAcceleration11	100:1 Inc/ms ²	CW
	For a description of this parameter see P0603 .		
P0714	Positioning deceleration 11	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierverzögerung 11	2,00 Inc/ms ²	
	BM_u_PPosDeceleration11	100:1 Inc/ms ²	CW
	For a description of this parameter see P0604 .		
P0715	Positioning maximum jerk 11	0,07 bis 14,00 Inc/ms ³	
EE	Positionierung maximaler Ruck 11	1,25 Inc/ms ³	
	BM_u_PPosBend11	100:1 Inc/ms ³	CW
	For a description of this parameter see P0605 .		
P0716	Positioning smoothing time 11	0 bis 8191 ms	
EE	Positionierung Verschleißzeit 11	0 ms	
	BM_u_PPosSmooth11	1:1 ms	CW
	For a description of this parameter see P0606 .		

P0717	Relative Positioning control target position 11	0x80000000 bis 0x7FFFFFFF Inc	
EE	Relative Positionierung Zielposition 11 BM_di_PPosRelTarget11	0 Inc 1:1 Inc	CW
	For a description of this parameter see P0607 .		
P0720	Positioning target position 12	0x00000000 bis 0xFFFFFFFF Inc	
EE	Positionierung Zielposition 12 BM_ud_PPosTarget12	0x00000000 Inc 1:1 Inc	CW
	For a description of this parameter see P0600 .		
P0721	Positioning target input 12	-2 bis 13	
EE	Positionierung Zielangabe 12 BM_i_PPosTargetInput12	0 1:1	CW
	For a description of this parameter see P0601 .		
P0722	Positioning speed 12	1 bis 13200 Inc/ms	
EE	Positionierung Positioniergeschwindigkeit 12 BM_u_PPosSetSpeed12	200 Inc/ms 1:1 Inc/ms	CW
	For a description of this parameter see P0602 .		
P0723	Positioning acceleration 12	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierbeschleunigung 12 BM_u_PPosAcceleration12	2,00 Inc/ms ² 100:1 Inc/ms ²	CW
	For a description of this parameter see P0603 .		
P0724	Positioning deceleration 12	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierverzögerung 12 BM_u_PPosDeceleration12	2,00 Inc/ms ² 100:1 Inc/ms ²	CW
	For a description of this parameter see P0604 .		

P0725	Positioning maximum jerk 12	0,07 bis 14,00 Inc/ms ³	
EE	Positionierung maximaler Ruck 12	1,25 Inc/ms ³	
	BM_u_PPosBend12	100:1 Inc/ms ³	CW
	For a description of this parameter see P0605 .		
P0726	Positioning smoothing time 12	0 bis 8191 ms	
EE	Positionierung Verschleißzeit 12	0 ms	
	BM_u_PPosSmooth12	1:1 ms	CW
	For a description of this parameter see P0606 .		
P0727	Relative Positioning control target position 12	0x80000000 bis 0x7FFFFFFF Inc	
EE	Relative Positionierung Zielposition 12	0 Inc	
	BM_di_PPosRelTarget12	1:1 Inc	CW
	For a description of this parameter see P0607 .		
P0730	Positioning target position 13	0x00000000 bis 0xFFFFFFFF Inc	
EE	Positionierung Zielposition 13	0x00000000 Inc	
	BM_ud_PPosTarget13	1:1 Inc	CW
	For a description of this parameter see P0600 .		
P0731	Positioning target input 13	-2 bis 13	
EE	Positionierung Zielangabe 13	0	
	BM_i_PPosTargetInput13	1:1	CW
	For a description of this parameter see P0601 .		
P0732	Positioning speed 13	1 bis 13200 Inc/ms	
EE	Positionierung Positioniergeschwindigkeit 13	200 Inc/ms	
	BM_u_PPosSetSpeed13	1:1 Inc/ms	CW
	For a description of this parameter see P0602 .		

P0733	Positioning acceleration 13	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierbeschleunigung 13	2,00 Inc/ms ²	
	BM_u_PPosAcceleration13	100:1 Inc/ms ²	CW
	For a description of this parameter see P0603 .		
P0734	Positioning deceleration 13	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierverzögerung 13	2,00 Inc/ms ²	
	BM_u_PPosDeceleration13	100:1 Inc/ms ²	CW
	For a description of this parameter see P0604 .		
P0735	Positioning maximum jerk 13	0,07 bis 14,00 Inc/ms ³	
EE	Positionierung maximaler Ruck 13	1,25 Inc/ms ³	
	BM_u_PPosBend13	100:1 Inc/ms ³	CW
	For a description of this parameter see P0605 .		
P0736	Positioning smoothing time 13	0 bis 8191 ms	
EE	Positionierung Verschleißzeit 13	0 ms	
	BM_u_PPosSmooth13	1:1 ms	CW
	For a description of this parameter see P0606 .		
P0737	Relative Positioning control target position 13	0x80000000 bis 0x7FFFFFFF Inc	
EE	Relative Positionierung Zielposition 13	0 Inc	
	BM_di_PPosRelTarget13	1:1 Inc	CW
	For a description of this parameter see P0607 .		
P0740	Positioning target position 14	0x00000000 bis 0xFFFFFFFF Inc	
EE	Positionierung Zielposition 14	0x00000000 Inc	
	BM_ud_PPosTarget14	1:1 Inc	CW
	For a description of this parameter see P0600 .		

P0741	Positioning target input 14	-2 bis 13	
EE	Positionierung Zielangabe 14	0	
	BM_i_PPosTargetInput14	1:1	CW
	For a description of this parameter see P0601 .		
P0742	Positioning speed 14	1 bis 13200 Inc/ms	
EE	Positionierung Positioniergeschwindigkeit 14	200 Inc/ms	
	BM_u_PPosSetSpeed14	1:1 Inc/ms	CW
	For a description of this parameter see P0602 .		
P0743	Positioning acceleration 14	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierbeschleunigung 14	2,00 Inc/ms ²	
	BM_u_PPosAcceleration14	100:1 Inc/ms ²	CW
	For a description of this parameter see P0603 .		
P0744	Positioning deceleration 14	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierverzögerung 14	2,00 Inc/ms ²	
	BM_u_PPosDeceleration14	100:1 Inc/ms ²	CW
	For a description of this parameter see P0604 .		
P0745	Positioning maximum jerk 14	0,07 bis 14,00 Inc/ms ³	
EE	Positionierung maximaler Ruck 14	1,25 Inc/ms ³	
	BM_u_PPosBend14	100:1 Inc/ms ³	CW
	For a description of this parameter see P0605 .		
P0746	Positioning smoothing time 14	0 bis 8191 ms	
EE	Positionierung Verschleißzeit 14	0 ms	
	BM_u_PPosSmooth14	1:1 ms	CW
	For a description of this parameter see P0606 .		
P0747	Relative Positioning control target position 14	0x80000000 bis 0x7FFFFFFF Inc	
EE	Relative Positionierung Zielposition 14	0 Inc	
	BM_di_PPosRelTarget14	1:1 Inc	CW
	For a description of this parameter see P0607 .		

P0750	Positioning target position 15	0x00000000 bis 0xFFFFFFFF Inc	
EE	Positionierung Zielposition 15	0x00000000 Inc	
	BM_ud_PPoSTarget15	1:1 Inc	CW
	For a description of this parameter see P0600 .		
P0751	Positioning target input 15	-2 bis 13	
EE	Positionierung Zielangabe 15	0	
	BM_i_PPoSTargetInput15	1:1	CW
	For a description of this parameter see P0601 .		
P0752	Positioning speed 15	1 bis 13200 Inc/ms	
EE	Positionierung Positioniergeschwindigkeit 15	200 Inc/ms	
	BM_u_PPoSSetSpeed15	1:1 Inc/ms	CW
	For a description of this parameter see P0602 .		
P0753	Positioning acceleration 15	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierbeschleunigung 15	2,00 Inc/ms ²	
	BM_u_PPoSAcceleration15	100:1 Inc/ms ²	CW
	For a description of this parameter see P0603 .		
P0754	Positioning deceleration 15	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierverzögerung 15	2,00 Inc/ms ²	
	BM_u_PPoSDeceleration15	100:1 Inc/ms ²	CW
	For a description of this parameter see P0604 .		
P0755	Positioning maximum jerk 15	0,07 bis 14,00 Inc/ms ³	
EE	Positionierung maximaler Ruck 15	1,25 Inc/ms ³	
	BM_u_PPoS Bend15	100:1 Inc/ms ³	CW
	For a description of this parameter see P0605 .		
P0756	Positioning smoothing time 15	0 bis 8191 ms	
EE	Positionierung Verschleißzeit 15	0 ms	
	BM_u_PPoS Smooth15	1:1 ms	CW
	For a description of this parameter see P0606 .		

P0757	Relative Positioning control target position 15	0x80000000 bis 0x7FFFFFFF Inc	
EE	Relative Positionierung Zielposition 15 BM_di_PPosRelTarget15	0 Inc 1:1 Inc	CW
	For a description of this parameter see P0607 .		
P0760	Positioning target position 16	0x00000000 bis 0xFFFFFFFF Inc	
EE	Positionierung Zielposition 16 BM_ud_PPosTarget16	0x00000000 Inc 1:1 Inc	CW
	For a description of this parameter see P0600 .		
P0761	Positioning target input 16	-2 bis 13	
EE	Positionierung Zielangabe 16 BM_i_PPosTargetInput16	0 1:1	CW
	For a description of this parameter see P0601 .		
P0762	Positioning speed 16	1 bis 13200 Inc/ms	
EE	Positionierung Positioniergeschwindigkeit 16 BM_u_PPosSetSpeed16	200 Inc/ms 1:1 Inc/ms	CW
	For a description of this parameter see P0602 .		
P0763	Positioning acceleration 16	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierbeschleunigung 16 BM_u_PPosAcceleration16	2,00 Inc/ms ² 100:1 Inc/ms ²	CW
	For a description of this parameter see P0603 .		
P0764	Positioning deceleration 16	0,25 bis 450,00 Inc/ms ²	
EE	Positionierung Positionierverzögerung 16 BM_u_PPosDeceleration16	2,00 Inc/ms ² 100:1 Inc/ms ²	CW
	For a description of this parameter see P0604 .		

P0765	Positioning maximum jerk 16	0,07 bis 14,00 Inc/ms ³	
EE	Positionierung maximaler Ruck 16	1,25 Inc/ms ³	
	BM_u_PPosBend16	100:1 Inc/ms ³	CW
	For a description of this parameter see P0605 .		
P0766	Positioning smoothing time 16	0 bis 8191 ms	
EE	Positionierung Verschleißzeit 16	0 ms	
	BM_u_PPosSmooth16	1:1 ms	CW
	For a description of this parameter see P0606 .		
P0767	Relative Positioning control target position 16	0x80000000 bis 0x7FFFFFFF Inc	
EE	Relative Positionierung Zielposition 16	0 Inc	
	BM_di_PPosRelTarget16	1:1 Inc	CW
	For a description of this parameter see P0607 .		
P0800	Option module 1 master 1 cyclic time	0 bis 65535	
EE	Optionsmodul 1 Master 1 Zykluszeit	32	
	BM_u_BacilM1Period	1:1	-

This parameter is accepted after switching on, it also can be changed by the option module, but then it only acts as display.

This parameter specifies the cycle time the new setpoint-/actual values need to be transferred.

The value is a multiple of 125 μ s.

Value	Meaning
0	No cyclic data exchange
1	Not permissible
2	250 μ s
3	375 μ s
and so on	

P0801	Option module 1 master 1 parameter no. set value 1	0 bis MaxParaNr	
EE	Optionsmodul 1 Master 1 Para-Nummer Sollwert 1	0	
	BM_u_Baci1M1SetVal1	1:1	-
	Configuration of BACI for the cyclic communication with the option module.		
	Parameter number of the 1st setpoint (1...8) for the cyclic communication. Only numbers of parameters may be specified, which are cyclic writeable (attribute CW).		
	This parameter is accepted after switching on, it also can be changed by the option module, but then it only serves as display.		
P0802	Option module 1 master 1 parameter no. set value 2	0 bis MaxParaNr	
EE	Optionsmodul 1 Master 1 Para-Nummer Sollwert 2	0	
	BM_u_Baci1M1SetVal2	1:1	-
	2. Setpoint. For a description of this parameter see P0801 .		
P0803	Option module 1 master 1 parameter no. set value 3	0 bis MaxParaNr	
EE	Optionsmodul 1 Master 1 Para-Nummer Sollwert 3	0	
	BM_u_Baci1M1SetVal3	1:1	-
	3. Setpoint. For a description of this parameter see P0801 .		
P0804	Option module 1 master 1 parameter no. set value 4	0 bis MaxParaNr	
EE	Optionsmodul 1 Master 1 Para-Nummer Sollwert 4	0	
	BM_u_Baci1M1SetVal4	1:1	-
	4. Setpoint. For a description of this parameter see P0801 .		
P0805	Option module 1 master 1 parameter no. set value 5	0 bis MaxParaNr	
EE	Optionsmodul 1 Master 1 Para-Nummer Sollwert 5	0	
	BM_u_Baci1M1SetVal5	1:1	-
	5. Setpoint. For a description of this parameter see P0801 .		
P0806	Option module 1 master 1 parameter no. set value 6	0 bis MaxParaNr	
EE	Optionsmodul 1 Master 1 Para-Nummer Sollwert 6	0	
	BM_u_Baci1M1SetVal6	1:1	-
	6. Setpoint. For a description of this parameter see P0801 .		

P0807	Option module 1 master 1 parameter no. set value 7	0 bis MaxParaNr	
EE	Optionsmodul 1 Master 1 Para-Nummer Sollwert 7	0	
	BM_u_Baci1M1SetVal7	1:1	-
	7. Setpoint. For a description of this parameter see P0801 .		
P0808	Option module 1 master 1 parameter no. set value 8	0 bis MaxParaNr	
EE	Optionsmodul 1 Master 1 Para-Nummer Sollwert 8	0	
	BM_u_Baci1M1SetVal8	1:1	-
	8. Setpoint. For a description of this parameter see P0801 .		
P0809	Option module 1 master 1 parameter no. act.value 1	0 bis MaxParaNr	
EE	Optionsmodul 1 Master 1 Para-Nummer Istwert 1	0	
	BM_u_Baci1M1ActVal1	1:1	-
	Configuration of BACI for the cyclic communication with the option module.		
	Parameter number of the 1st actual value (1...8) for the cyclic communication. The specified parameter must be data type INT, UINT, DINT, UDINT, WORD or DWORD.		
	This parameter is accepted after switching on, it also can be changed by the option module, but then it only serves as display.		
P0810	Option module 1 master 1 parameter no. act.value 2	0 bis MaxParaNr	
EE	Optionsmodul 1 Master 1 Para-Nummer Istwert 2	0	
	BM_u_Baci1M1ActVal2	1:1	-
	2. Actual value For a description of this parameter see P0809 .		
P0811	Option module 1 master 1 parameter no. act.value 3	0 bis MaxParaNr	
EE	Optionsmodul 1 Master 1 Para-Nummer Istwert 3	0	
	BM_u_Baci1M1ActVal3	1:1	-
	3. Actual value For a description of this parameter see P0809 .		
P0812	Option module 1 master 1 parameter no. act.value 4	0 bis MaxParaNr	
EE	Optionsmodul 1 Master 1 Para-Nummer Istwert 4	0	
	BM_u_Baci1M1ActVal4	1:1	-
	4. Actual value For a description of this parameter see P0809 .		

P0813	Option module 1 master 1 parameter no. act.value 5	0 bis MaxParaNr	
EE	Optionsmodul 1 Master 1 Para-Nummer Istwert 5	0	
	BM_u_Baci1M1ActVal5	1:1	-
	5. Actual value For a description of this parameter see P0809 .		
P0814	Option module 1 master 1 parameter no. act.value 6	0 bis MaxParaNr	
EE	Optionsmodul 1 Master 1 Para-Nummer Istwert 6	0	
	BM_u_Baci1M1ActVal6	1:1	-
	6. Actual value For a description of this parameter see P0809 .		
P0815	Option module 1 master 1 parameter no. act.value 7	0 bis MaxParaNr	
EE	Optionsmodul 1 Master 1 Para-Nummer Istwert 7	0	
	BM_u_Baci1M1ActVal7	1:1	-
	7. Actual value For a description of this parameter see P0809 .		
P0816	Option module 1 master 1 parameter no. act.value 8	0 bis MaxParaNr	
EE	Optionsmodul 1 Master 1 Para-Nummer Istwert 8	0	
	BM_u_Baci1M1ActVal8	1:1	-
	8. Actual value For a description of this parameter see P0809 .		
P0818	Option module 1 master 1 cycle offset set values	0 bis 65535	
EE	Optionsmodul 1 Master 1 Zyklus-Offset Sollwerte	2	
	BM_u_Baci1M1CycleSetOffset	1:1	-
	Configuration of BACI for the cyclic communication with the option module.		
	Cycle offset for setpoint transmission. Exact description see software module BACI.		
	This parameter is accepted after switching on, it also can be changed by the option module, but then it only serves as display.		
P0819	Option module 1 master 1 cycle offset act. values	0 bis 65535	
EE	Optionsmodul 1 Master 1 Zyklus-Offset Istwerte	0	
	BM_u_Baci1M1CycleActOffset	1:1	-
	Configuration of BACI for the cyclic communication with the option module.		
	Cycle offset for actual value transmission. Exact description see software module BACI.		
	This parameter is accepted after switching on, it also can be changed by the option module, but then it only serves as display.		

P0830	Option module G configuration 1	0 bis 0xFFFF	
EE	Optionsmodul G-Konfiguration 1	0	
	BM_w_BaciSlaveGConfig1	1:1	-

1. word for software configuration of the optional modules. The meaning of the parameter is module-dependent and its exact use is described in the technical manual of the particular option module.

At **b maXX® BM3400** with onboard-CAN-interface here the configuration of the internal CANopen-module is made.

- CANopen

Bit no.	Meaning
0	Bootup mode 0 Bootup mode according to DS301 V3 1 Bootup mode according to DS301 V4
1..4	Reserved
5	CANopen position offset 0 Position values are interpreted in the CANopen range (INT32), i.e. for the internal processing an offset of 231 is added /subtracted. 1 Offset is not added/subtracted, i.e. Position values are interpreted as U32 values.
6..13	Reserved
14	Timeout of cyclic setpoints 0 No timeout 1 Timeout P0839 is used
15	Reserved

P0831	Option module G configuration 2	0 bis 0xFFFF	
EE	Optionsmodul G-Konfiguration 2	0	
	BM_w_BaciSlaveGConfig2	1:1	-

2. word for software configuration of the optional modules. The meaning of the parameter is module-dependent and its exact use is described in the technical manual of the particular option module.

P0832	Option module G configuration 3	0 bis 0xFFFF	
EE	Optionsmodul G-Konfiguration 3	0	
	BM_w_BaciSlaveGConfig3	1:1	-
	3. word for software configuration of the optional modules. The meaning of the parameter is module-dependent and its exact use is described in the technical manual of the particular option module.		
P0833	Option module G configuration 4	0 bis 0xFFFF	
EE	Optionsmodul G-Konfiguration 4	0	
	BM_w_BaciSlaveGConfig4	1:1	-
	4. word for software configuration of the optional modules. The meaning of the parameter is module-dependent and its exact use is described in the technical manual of the particular option module.		
P0834	Option module G configuration 5	0 bis 0xFFFF	
EE	Optionsmodul G-Konfiguration 5	0	
	BM_w_BaciSlaveGConfig5	1:1	-
	5. word for software configuration of the optional modules. The meaning of the parameter is module-dependent and its exact use is described in the technical manual of the particular option module.		
P0835	Option module G configuration 6	0 bis 0xFFFF	
EE	Optionsmodul G-Konfiguration 6	0	
	BM_w_BaciSlaveGConfig6	1:1	-
	6. word for software configuration of the optional modules. The meaning of the parameter is module-dependent and its exact use is described in the technical manual of the particular option module.		
P0836	Option module G configuration 7	0 bis 0xFFFF	
EE	Optionsmodul G-Konfiguration 7	0	
	BM_w_BaciSlaveGConfig7	1:1	-
	7. word for software configuration of the optional modules. The meaning of the parameter is module-dependent and its exact use is described in the technical manual of the particular option module.		

P0837	Option module G configuration 8	0 bis 0xFFFF	
EE	Optionsmodul G-Konfiguration 8	0	
	BM_w_BaciSlaveGConfig8	1:1	-
	8. word for software configuration of the optional modules. The meaning of the parameter is module-dependent and its exact use is described in the technical manual of the particular option module.		
P0838	Baci Setup Timeout	0 bis 65535 s	
EE	Timeout für die Hochlaufphase	60 s	
	BM_u_BaciSetupTimeout	1:1 s	-
	Timeout value for the time-monitoring of the configuration phase after a system-starting. If the value = 0, there is no time monitoring.		
P0839	Baci Cyclic Communication Timeout	0 bis 65535 ms	
EE	Timeout für zyklische Kommunikation	50 ms	
	BM_u_BaciCyclicTimeout	1:1 ms	-
	Timeout value in milliseconds for the temporal monitoring of the cyclic communication during the running operation. The controller monitors the cyclic communication over a timeout mechanism. A timeout-counter starts at the first successful cyclic setpoint transmission. Every further successful cyclic setpoint transmission retriggers this time counter. If the value = 0 there is no time monitoring.		
	The error reaction can be set via P0904 (index 52 - see BACI error).		
	The timeout monitoring for the cyclic setpoints can also be used for the onboard CAN interface in the CANopen operation (software ID 1363). Therefore Bit14 in parameter BaciSlaveGConfig1 must be set in addition. If in the state OPERATIONAL the configured timeout (value > 0) is exceeded, error 162 is enabled. The according error reaction is settable via P0902 [162].		
P0848	Baci error detection delay	0 bis 0xFFFF s	
EE	Baci Fehlermeldungsverzögerung	30 s	
	BM_u_BaciErrDelay	1:1 s	-
	The boot time of a system coupled over the BACI extends up to an application-dependent duration. During this setup, especially as long as the total system is not yet working synchronous, error messages from BACI can be unwanted. This parameter determines the time in seconds, how long the controller suppresses error messages after initialization of BACI.		

P0850	Autotuning mode	0x0000 bis 0xFFFF
EE	Selbstoptimieren Modus	0x0000
	BM_w_AutotuningMode	1:1

Description of the separate bits

Bit no.	Meaning
0	Stator resistance measurement: 0 Stator resistance is not measured 1 Stator resistance is measured
1	Leakage inductance for ASM (inductance for SM): 0 Inductance is not measured 1 Inductance is measured
2	Dead time measurement of the inverter: 0 Dead time of the inverter is not determined 1 Dead time of the inverter is determined
3	Inertia measurement of the drive: 0 Inertia of drive is not determined 1 Inertia of drive is determined

Measurements selected within this parameter are made, after starting the operating mode (P1000) Autotuning. Usage of the evaluated parameters is described at P1320 and P0310.

P0054 and P1241 must be set according to the drive task ($P0054 \leq P1241$).

Bit0 and Bit1 must be set at the same time. Dead time measurement can only be activated together with resistor- and inductance measurement or if Bit0 and Bit1 in P0852 *Autotuning executed* are set (resistor- and inductance measurement was successfully completed already).

The inertia measurement may only be activated, if P0056, P0057, the parameters of the current controller has already been set correctly.

P0851	Autotuning status	0x00000000 bis 0xFFFFFFFF
-	Selbstoptimierung Status	0x00000000
A	BM_d_AutotuningStatus	1:1 -

These bits show the status of autotuning.

Description of the separate bits

Bit no.	Meaning
0	Stator resistance measurement 1 Stator resistance measurement is successfully completed
1	Leakage inductance for ASM (inductance for SM) 1 Inductance measurement is successfully completed
2	Dead time measurement of the inverter 1 Dead time measurement is successfully completed
3	Inertia measurement of the converter 1 Torque of inertia measurement is successfully completed
16	Stator resistance measurement 1 Stator resistance measurement has just been executed
17	Leakage inductance for ASM (inductance for SM) 1 Inductance measurement has just been completed
18	Dead time measurement of the inverter 1 Dead time measurement has just been executed
19	Inertia measurement 1 Torque of inertia measurement is just being executed

P0852	Autotuning done status	0x0000 bis 0xFFFF	
EE	Selbstoptimierung Ergebnis-Status	0x0000	
	BM_w_AutotuningDone	1:1	-

Description of the separate bits

Bit no.	Meaning
0	Stator resistance measurement
	0 Stator resistance measurement has never yet been executed 1 Stator resistance has already been successfully determined
1	Leakage inductance for ASM (inductance for SM)
	0 Inductance measurement has never yet been executed 1 Inductance has already been successfully determined
2	Dead time measurement of the inverter
	0 Dead time measurement of the inverter was never yet executed 1 Dead time of the inverter already was successfully determined
3	Inertia measurement
	0 Inertia measurement was never executed 1 Inertia measurement was determined successfully already
4...15	Reserved

P0853	Measured motor stator resistance	0,000 bis 500,000 Ohm	
EE	Gemessener Motor Ständerwiderstand	0,000 Ohm	
	BM_ud_MeasuredStatorResist	1000:1 Ohm	-

The stator resistance of the single-phase equivalent circuit of the motor with autotuning.

P0854	Measured motor leakage inductance	0,00 bis 655,35 mH	
EE	Gemessene Motor Streuinduktivität	0,00 mH	
	BM_u_MeasuredLeakInduct	100:1 mH	-

The determined leakage inductance of an **ASM** or stator inductance of a **SM** made via autotuning for the single phase additional diagram.

P0855	Measured motor stator and rotor resistance	0,000 bis 500,000 Ohm	
EE	Gemessener Motor Ständer- u. Rotorwiderstand	0,000 Ohm	
	BM_ud_MeasuredRsRr	1000:1 Ohm	-
	Stator- and rotor resistance of an ASM or stator resistance of a SM , for the single phase additional diagram, which was determined with autotuning.		
P0856	Maximum speed for inertia measurement	0 bis 1500 U/min	
-	Maximaldrehzahl für Messung des Trägheitsmoments	100 U/min	
	BM_u_AutotuningSpeedMax	1:1 U/min	-
	The drive is accelerated with a speed current of peak current for the measuring of the torque inertia (P0857) to the maximum speed and then is braked to a standstill again. From the determined ramp-up- and ramp-down time the torque of inertia is calculated.		
P0857	Maximum current for inertia measurement	0,00 bis 90,00 %	
-	Maximalstrom für Messung des Trägheitsmoments	10,00 %	
	BM_u_AutotuningCurrentMax	0x4000:100 %	-
	The drive is accelerated with a speed current to the maximum speed for the measuring of the torque inertia P0856 and then is braked to standstill again. From the determined ramp-up- and ramp-down time the torque of inertia is calculated.		
	Scaling: 100% = Power unit maximum current (P1241)		
P0858	Measured drive inertia	0,000 bis 500000,0 kg*cm*cm	
EE	Gemessenes Trägheitsmoment des Antriebs	0,000 kg*cm*cm	
	BM_ud_MeasuredInertia	10:1 kg*cm*cm	-
	The torque inertia of the drive, which was determined by autotuning is shown here.		

P0880	Holding brake command	0x0000 bis 0xFFFF	
-	Haltebremse Kommando	0x0000	
	BM_w_MotBrakeManCmd	1:1	CW

Command to the motor holding brake in control mode (P1400 Automatic). Bit0 is operated from the state machine of device control . If in control mode Automatic the brake should be operated by directly writing to Bit0 (for maintenance purposes), Bit1 of P0880 must be set to 1. After the switching off of the service mode the brake remains in the actual status, i.e. the original status before the activation of the service mode is not restored.

If the motor-holding brake always is intended to be manually (P1400) controlled, the command must be made via the control word 2 (P0302).

Brake control in the automatic control mode (P1400 Bit0 = 1):

Bit no.	Meaning
0	0 Close the brake
	1 Open the brake
1	0 Switch off service mode
	1 Switch on service mode

P0881	Holding brake status	0x0000 bis 0xFFFF	
-	Haltebremse Zustand	0x0000	
A	BM_w_MotBrakeStatus	1:1	-

Bit no.	Meaning
0	Only if response is activated (P0883)
	0 Brake is closed 1 Brake is opened
1	0 Manual control 1 Automatic control
	0 Service mode off 1 Service mode on
4	1 Brake status error
8	1 Brake lining error

P0882	Holding brake actuating signal	0x00000000 bis 0x00000001	
EE	Haltebremse Stellsignal	0x00000001	
	BM_d_MotBrakeOut	1:1	-

Bit0 is used only.

- Bit0 = 0: brake control via power unit
If output is selected via power unit at devices without power unit processor (**P3379**), error DRIVE_MANAG_ERR_BRAKE_CTRL is reported.
- Bit0 = 1: brake control via digital output
The output of the brake signals via digital outputs is not made by selection in the brake manager as it is done with the b maXX BM4400. The digital output must be set manually (n is the desired output):
 - 880 is entered in the Param_DOn_SourcePxxx.
 - The associated Param_DOn_BitSelection is set to 1.
 - Param_DOn_BitPattern is set to 1, if at command: *Open brake* the output shall be set. If the output shall be set at command *Close brake*, ParamDOnBitPattern is set to 0.

P0883	Holding brake state monitoring	0x00000001 bis 0xFFFFFFFF	
EE	Haltebremse Bremszustandsrückmeldung	0x00000003	
	BM_d_MotBrakeIn	1:1	-

Bit0 must always be set. If Bit0 = 0, error DRIVE_MANAG_ERR_BRAKE_CTRL is reported.

- Bit1 = 0: Brake is open, if response signal = low
- Bit1 = 1: Brake is open, if response signal = high

Bits 16 to 18 selection of the digital input for the response. (e.g. **P0883** = 0x30001 : Brake is open, if DI3 low)

If there is no input selected, Bit0 in **P0881** is not valid.

P0884	Holding brake liner monitoring	0x00000000 bis 0xFFFFFFFF
EE	Haltebremse Bremsbelagüberwachung	0x00000001
	BM_d_MotBrakeLineMon	1:1

- Bit0 = 0: Brake lining error-free, if response signal = low
- Bit0 = 1: Brake lining error-free, if response signal = high

The selection of the digital input (1-4) for the response is determined with Bit16...Bit19.

Monitoring of brake lining can be switched off with HIWORD(P0884)= 0 and deleting of Bit2 in **Holding brake control mode P1400**.

P0902	Error reaction table	-32768 bis 32767
EE	Fehlerreaktionstabelle	0
	BM_a_ErrReaction	1:1

This array parameter has 256 elements. The data type of the array elements is INT (16 bit integer).

Each array element is linked to the error reaction of error numbers 1...255 assigned to the error parameters **P0201** to **P0216** accordantly.

Examples:

- Field for the error reaction [1] accords to error reaction of error code 1 processor error (see **P0201**), Bit1 watchdog error.
- Field for error reaction [192] accords to error reaction of error code 192 position controller error (see **P0213**), position deviation dynamic.

Note: It can only be written to a field element, if the assigned error reaction can be set (see error, **P0200** to **P0251**, reaction can be set)

Reaction code	Meaning
-32768	Error reaction is defined by parameter P1007
-1	No reaction
0	Pulse inhibit
1	Stop, braking on RFG-ramp is set via P1173
2	Quickstop, braking on quickstop ramp is set via P1174
3	Stop, ramp down at the current limit

P0903	Error reaction table function modules	-32768 bis 32767	
EE	Fehlerreaktionstabelle Funktionsmodule	0	
	BM_a_ErrReactFunctionMod	1:1	-
	<p>Contains the error reactions for the error 48. Error description as well as possible and default reactions see «Table of suberrors to error 48» from page 487.</p> <p>The error 48 signalizes errors regarding the digital inputs (see error parameters P0204, P0240).</p> <p>This array parameter has 32 elements. The data type of the array elements is INT (16 bit integer). Value table see parameter P0902.</p> <p>Each array element of the parameter Error reaction table function modules is assigned to the error reaction of an error of the sub-error numbers 1...15.</p> <p>Example:</p> <p>Error reaction code for error 48.8</p> <p>Error reaction table function module [8] refers to error reaction of error code 48:8 (P0204 Bit0 and P0240 sub-error number 8: MPTC to DI2 has responded)</p>		
P0904	Error reaction table option modules	-32768 bis 32767	
EE	Fehlerreaktionstabelle Optionsmodule	0	
	BM_a_ErrReactOptionMod	1:1	-
	<p>Contains the error reactions for the error 53 suberror < 0x2000. Error description as well as possible and default reactions see «Table of suberrors to error 53» from page 487</p>		
P0905	Error reaction table opt.-module application	-32768 bis 32767	
EE	Fehlerreaktionstabelle Opt.-Module Applikation	0	
	BM_a_ErrReactOptionAppl	1:1	-
	<p>Contains the error reactions for the errors 53 suberror from 0x2000. Error description as well as possible and default reactions see «Table of suberrors to error 53» from page 487</p>		

P1000	Operation mode desired	-7 bis 7	
DS	Soll-Betriebsart	-3	
	BM_i_DS0_OperationMode	1:1	CW

This parameter determines the operation mode of the drive.

Value	Meaning
-7	Autotuning
-6	Spindle positioning
-5	Synchronous operation with electronic gear
-4	Position control
-3	Speed control
-2	Current control
-1	Find notch position
1	Target position setpoint
2	Speed setting 1
5	Jog operation
6	Homing operation
7	Voltage-frequency control (FU-Mode)

A switchover between the operation modes is possible at the inhibited drive (Offline-mode) as well as at the released drive (Online-mode).

The operation mode Find notch position (-1) is a special case. A switching over from another operation mode into this operation mode is not applied, until the drive is inhibited. Also a switching over from Find notch position into another operation mode is not applied, until the drive is inhibited.

In order to avoid occasional inconsistencies between the operation mode and the operation-dependent bits in the control word **P0300** the switchover can be inhibited. The present status is shown in **P0308**.

If **P1030** = 0 (in all data sets), the operation mode Voltage-frequency control and at an activated FI-mode **P3419** also the operation mode Current control can be used without an active encoder.

The operation mode Speed setting 1 differs from the operation mode Speed control only by an inverted evaluation of the control bits of the ramp function generator RFG_INHIBIT, RFG_STOP, RFG_ZERO. After *pulses enable* these are always active (RFG output = 0) at Speed setting 1.

P1001	Communication source	0x0000 bis 0x007F	
DS	Kommunikationsquelle	0x007F	
	BM_w_DS0_CommSource	1:1	CW

This parameter controls the access rights of the different communication sources to parameters. Communication sources are modules, which exchange data with a superimposed control by use of a communication interface.

It is distinguished between the following communication sources:

- WinBASS II
- CAN
- BACI

Basically, read access to parameters is always possible.

At write access it is distinguished between different access modes.

The following takes effect:

- Write access using service data
- Write access using cyclic data
- Write access for motor control (to the control word)

Write access for motor control should always be granted to only one communication source, because other way write conflicts may occur.

Then the source wins, which had the last write access in the cycle, before the drive manager evaluates the control word.

Bit no.	Meaning
0	1 WinBASS II, motor control enabled ¹⁾
1	1 CAN, motor control enabled ¹⁾
2	1 CAN, write accesses via service data enabled
3	1 CAN, write accesses via cyclic communication (setpoints)
4	1 BACI, motor control enabled ¹⁾
5	1 BACI, write access using service data enabled
6	1 BACI, write access using cyclic communication (setpoints)

Note ¹⁾:

Only, if in the parameter *Communication source* all of the bits for motor control were deleted (Bit0, Bit1 and Bit4), a controller enable only by the hardware inputs *Pulses enable* and *Quickstop* is possible.

P1002	Drive manager options	0x0000 bis 0xFFFF	
DS	Antriebsmanager-Optionen	0x0000	
	BM_w_DS0_DrvManagerOptions	1:1	CW

Also see «Device management» from page 88.

Settings for the drive manager

Bit no.	Meaning	
1	1	Errors can be acknowledged via the hardware input <i>Pulse enable</i> .
2	1	NC-controlled homing according to method S.
14	0	Definition for method S.
	1	Definition for method B.
15	1	Switch off of the second status word

P1003	STOP reaction code	0 bis 3	
DS	HALT-Reaktion	0	
	BM_i_DS0_StopOptionCode	1:1	-

This parameter is not used.

P1004	QUICK STOP reaction code	0 bis 8	
DS	SCHNELLHALT-Reaktion	0	
	BM_i_DS0_QuickstopCode	1:1	-

Also see «Device management» from page 88.

This parameter determines the drive reaction in status *Quickstop*.

The reaction which was set is always valid for the digital input *Quickstop* and according to setting also for the command *Quickstop*.

For the command *Quickstop* via the parameter **P1009** a separate reaction can be set or the setting *Same reactions for command and digital input* can be selected. If another reaction is selected for the command *Quickstop* as for the digital input, the digital input is of higher priority.

For a correct function of the slowing down procedures along the quickstop or deceleration ramp the speed controller must be sufficiently parameterized.

Value	Meaning
0	Disable drive immediately
1	Ramp-down at deceleration ramp adjustable via P1173
2	Ramp-down at quickstop ramp adjustable via P1174
3	Ramp down at current limit
4	Ramp down at current limit
5	Ramp-down at deceleration ramp and remain in QUICKSTOP ACTIVE (re-enable is possible)
6	Ramp-down at quickstop ramp and remain in QUICKSTOP ACTIVE (re-enable is possible)
7	Ramp down at current limit and remain in QUICKSTOP ACTIVE (re-enable is possible)
8	Ramp down at current limit and remain in QUICKSTOP ACTIVE (re-enable is possible)

P1005	SHUTDOWN reaction code	0 bis 3	
DS	STILLSETZEN-Reaktion	0	
	BM_i_DS0_ShutdownCode	1:1	-

Also see «Device management» from page **88**.

This parameter determines the drive reaction at transition of status OPERATION ENABLED towards READY FOR SWITCH ON in the state machine of device control.

For a correct function of the slowing down procedures along the quickstop or deceleration ramp the speed controller must be sufficiently parameterized.

Value	Meaning
0	Disable drive function
1	Ramp-down at deceleration ramp of the selected RFG
2	Ramp-down at quickstop ramp (adjustable by P1174)
3	Ramp-down at current limit

P1006	DISABLE OPERATION reaction code	0 bis 3	
DS	SPERREN-Reaktion	0	
	BM_i_DS0_DisableOpCode	1:1	CW

Also see «Device management» from page 88.

This parameter determines the drive reaction at transition of status OPERATION ENABLED towards SWITCHED ON in the state machine of device control.

For a correct function of the slowing down procedures along the quickstop or deceleration ramp the speed controller must be sufficiently parameterized.

Value	Meaning
0	Inhibit drive function
1	Ramp-down at deceleration ramp of the selected RFG.
2	Ramp-down at quickstop ramp (adjustable by P1174)
3	Ramp-down at current limit

P1007	Error reaction code	-3 bis 3	
DS	Fehler-Reaktion	0	
	BM_i_DS0_ErrorReactionCode	1:1	-

With this parameter the general error reaction is set.

The following is valid for errors, whose error reaction is adjustable: The error reaction either can be defined permanently or can be referenced indirectly to this parameter.

The parameter value and therewith the error reaction of the referenced errors is changeable at run-time (via data set switch-over or writing to the parameter).

Reaction-Code	Meaning
0	Pulses inhibit
1	Stop. Ramp-down at the ramp function generator ramp P1173
2	Quickstop. Ramp-down at quickstop ramp P1174
3	Stop. Ramp-down at current limit

P1008	mask for status internal limit	0x0000 bis 0xFFFF	
DS	Maske für Status interne Begrenzung	0xFFFF	
	BM_w_DS0_InternalLimitMask	1:1	CW

This parameter selects, which internal limits are to be reported via Bit11 in **Statusword P0301**.
By default all limits are reported.

Meaning of the individual bits:

Bit no.	Meaning
0	Current limit
1	Speed setpoint limit
2	Limit of positioning speed while positioning and jogging
3	Reserved
4	Negative HW-limit switch is active
5	Positive HW-limit switch is active
6	Negative SW-limit switch is active
7	Positive SW-limit switch is active

If a bit is set to 0, the according limit is not shown in the status word anymore.

P1009	Reaction quickstop command	-1 bis 8	
DS	Reaktion Schnellhalt-Kommando	-1	
	BM_i_DS0_QuickstopCmdCode	1:1	-

Also see «Device management» from page 88.

This parameter specifies the reaction of the drive to the command Quickstop.

At selection *Same reaction as hardware input* the setting operates according to parameter *quick-stop reaction P1004*.

If here is set a different reaction than for the digital input, the digital input is of higher priority. If the hardware quickstop is enabled during the reaction to the Quickstop command, the drive changes to the reaction, which was set in *Quickstop reaction P1004*.

For a correct function of the slowing down procedures along the quickstop or deceleration ramp the speed controller must be sufficiently parameterized.

Value	Meaning
-1	Same reaction at hardware quickstop, setting is made via P1004
0	Pulse inhibit
1	Braking operation at deceleration ramp
2	Braking operation at quickstop ramp (adjustable with P1174)
3	Braking operation at current limit
4	Braking operation at voltage limit (operates like current limit)
5	Braking operation at deceleration ramp and remaining in status QUICKSTOP ACTIVE
6	Braking operation at quickstop time and remaining in status QUICKSTOP ACTIVE
7	Braking operation at current limit and remaining in status QUICKSTOP ACTIVE
8	Braking operation at voltage limit and remaining in status QUICKSTOP ACTIVE

P1010	Data set ID	0 bis 4294967295	
DS	Datensatz Identifikations-Nummer	0	
	BM_ud_DS0_RecordId	1:1	CW

Display parameter, representation decimal for a simple comparison without string functions.

Also see «Data set management» from page 19.

Free selectable identification number of saved parameter set.

P1011	Data set name	20 ASCII-Zeichen	
DS	Datensatz Name	0	
	BM_s_DS0_RecordName	1:1	-

Display parameter, name of the record. Can be freely assigned by the user.

Also see «Data set management» from page 19.

Free selectable name of record with max. 80 characters.

P1020	Current controller P-gain	0,01 bis 655,35	
DS	Stromregler P-Verstärkung	1,00	
	BM_u_DS0_CurrentCtrl_PGain	100:1	-

Proportional gain (K_p) of the current controller.

The value can be determined from the motor parameters **P0075f** or using the parameters **P0853f** (**P0310**), which were evaluated during autotuning.

P1021	Current controller integral-action time	0,0 bis 1000,0 ms	
DS	Stromregler Nachstellzeit	2,5 ms	
	BM_u_DS0_CurrentCtrl_ITime	10:1 ms	-
	Integral-action time (Ti) of current controller.		
	Value 0 means that the I-component is switched off.		
	The value can be determined from the motor parameters P0075f or using the parameters P0853f (P0310), which were evaluated during autotuning.		
P1022	Torque additional set value	-100,00 bis 100,00 %	
DS	Momenten-Zusatz-Sollwert	0,00 %	
	BM_i_DS0_TrqAddValue	0x4000: 100 %	CW
	Additional setpoint input for all operation modes.		
	100% ↔ torque at power unit maximum current P1241 (RMS value, the amplitude is $\sqrt{2}$ -times greater) at nominal energization.		
	At nominal energization the parameter accords to a current setpoint. At field weakening the current increases by the according factor (100%/ P0520).		
P1023	Current controller output limiter	0,00 bis 199,99 %	
DS	Ausgang-Grenze der Stromregler	199,99 %	
	BM_u_DS0_VdqLimit	0x4000: 100 %	-
	Voltage limiting of the current controller.		
	At 100% a maximum according to the nominal value of the DC link voltage P0020 is provided.		
	Limit of output voltage of the d- and q-current controller (the RMS value from d- and q-components can be greater accordingly).		

P1030	Speed controller mode	0x0000 bis 0xFFFF
DS	Drehzahlregler Modus	0x0001
	BM_w_DS0_SpeedCtrlMode	1:1

Speed controller mode

Bit no.	Meaning
0...1	Encoder for motor control:
	00 Rotor angle and actual speed are not obtained by an encoder (open loop)
	01 Rotor angle for motor control and for actual speed taken from encoder 1
10 Rotor angle for motor control and for actual speed taken from encoder 2	
2	0 Torque limit Mot/Gen
	1 Torque limit TD1/TD2
3	0 For speed controller block time monitoring the speed threshold is valid, which is set in the parameters open loop N=0 threshold (P1063), encoder 1 N=0 threshold (P1073) or encoder 2 N=0 threshold (P1083).
	1 For speed controller block time monitoring the speed threshold is valid, which is set in the parameter N=0 threshold block monitoring (P1261).

- Bit0 encoder for motor control

If a nonexistent encoder was set in any data set, this will result in errors, which cannot be acknowledged.

- Bit2 method of torque limitation:

The torque limiter can either be set separately for each torque direction or can be set separately for the motoring or generating operation.

Torque limit Mot/Gen Bit2 = 0

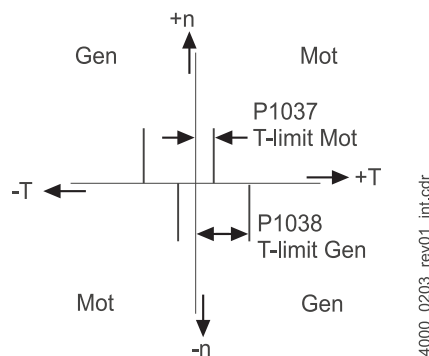


Figure 7.7: torque limit Mot/Gen

Torque limit MR1/MR2 Bit2 = 1

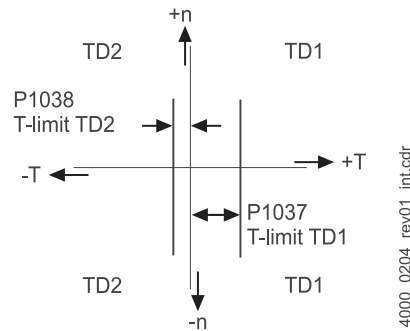


Figure 7.8: torque limit TD1/TD2

- Bit2 = 0, motoring/generating torque limit:
parameter **P1037** works as torque limit in motor operation,
Parameter **P1038** works as torque limit in generating operation.
- Bit2 = 1, dependent on torque limit:
Parameter **P1037** works as torque limit for torque direction 1,
parameter **P1038** works as torque limit for torque direction 2.

NOTE

The parameters **P1036** to **P1038** operate as current limit. In field weakening it is accordingly limited to smaller torques.

P1031	Motor maximum drive speed	20 bis 24000 U/min
DS	Motor Maximaldrehzahl des Antriebs	3000 U/min
	BM_u_DS0_SpeedMax	1:1 U/min -

Defines the maximum speed of the motor. This parameter defines the speed scaling of actual speed values and speed setpoints. Value cannot be greater than **P0072**.

P1032	Speed controller P-gain	0,0 bis 209715,1	
DS	Drehzahlregler P-Verstärkung	1,0	
	BM_ud_DS0_SpeedCtrl_PGain	10:1	-
	Proportional gain (K_p) of the speed controller.		
	The value can be determined by P0858 , which was evaluated during autotuning (P0310).		
P1033	Speed controller integral-action time	0,0 bis 2000,0 ms	
DS	Drehzahlregler Nachstellzeit	25,0 ms	
	BM_u_DS0_SpeedCtrl_ITime	10:1 ms	-
	Integral action time (T_N) of the speed controller.		
	Value 0 means that the I-component is switched off.		
	The value can be determined by P0858 , which was evaluated during autotuning (P0310).		
P1034	Torque feed forward factor	0 bis 32767	
DS	Momenten-Vorsteuerungs-Faktor	0	
	BM_u_DS0_TrqInertiaCompens	1:1	-
	Factor for torque inertia compensation of the drive line (scaling factor for the torque precontrol).		
P1036	Torque limiter bipolar	0,00 bis 100,00 %	
DS	Momenten-Grenze bipolar	100,00 %	
	BM_u_DS0_TrqLimSymmetrical	0x4000: 100 %	CW
	Operates as current limit. In field weakening it is limited to accordingly smaller torques.		
	Also see P1030 .		
	With the bipolar limit, the torque output value is limited symmetrically (equally in both torque directions).		
	The torque limiter can either be set separately for each torque direction or can be set separately for the motoring or generating operation.		
	The method of limitation according to the torque direction or with the motoring/generating operation is set via Bit2 of parameter P1030 .		
	Moreover there is a symmetric operating torque limit (P0357). Effective is always the smaller one of the adjusted limits (symmetrical or motoring/generating or MR1/MR2).		
	Scaling: 100% \longleftrightarrow torque at power unit maximum current P1241 (RMS value, the amplitude is $\sqrt{2}$ -times greater) at nominal energization.		

P1037	Torque limiter Motor/TD1	0,00 bis 100,00 %	
DS	Momenten-Grenze motorisch/MR1	100,00 %	
	BM_u_DS0_TrqLimMot_TD1	0x4000: 100 %	CW

Operates as current limit. It is limited to accordingly smaller torques in field weakening.

Also see **P1030**.

This torque limit limits the torque setpoint by the motoring operation or in torque direction 1 (according to settings in Bit2 of **P1030**).

The torque limiter can either be set separately for each torque direction or can be set separately for the motoring or generating operation. The method of limitation according to the torque direction or with the motoring/generating operation is set via Bit2 of parameter **P1030**.

Moreover there is a symmetric operating torque limit (**P0357**). Effective is always the smaller one of the adjusted limits (symmetrical or motoring/generating or MR1/MR2).

Scaling: 100% \longleftrightarrow torque at power unit maximum current **P1241** (RMS value, the amplitude is $\sqrt{2}$ -times greater) at nominal energization.

P1038	Torque limiter Generator/TD2	0,00 bis 100,00 %	
DS	Momenten-Grenze generatorisch/MR2	100,00 %	
	BM_u_DS0_TrqLimGen_TD2	0x4000: 100 %	CW

Operates as current limit. It is limited to accordantly smaller torques in field weakening.

Also see **P1030**.

This torque limit limits the torque setpoint at generating operation or in torque direction 2 (according to setting in Bit2 of **P1030**).

The torque limiter can either be set separately for each torque direction or can be set separately for the motoring or generating operation. The method of limitation according to the torque direction or with the motoring/generating operation is set via Bit2 of parameter **P1030**.

Moreover there is a symmetric operating torque limit (**P0357**). Effective is always the smaller one of the adjusted limits (symmetrical or motoring/generating or MR1/MR2).

Scaling: 100% \longleftrightarrow torque at power unit maximum current **P1241** (RMS value, the amplitude is $\sqrt{2}$ -times greater) at nominal energization.

P1039	Torque limiter hysteresis	0,00 bis 100,00 %	
DS	Momenten-Grenze Hysteresis	0,25 %	
	BM_u_DS0_TrqLimHysteresis	0x4000: 100 %	CW
	Refers to the current.		
	Also see P1030 .		
	Hysteresis for quadrant switch-over at torque limit.		
	Scaling: 100% \longleftrightarrow torque at power unit maximum current P1241 (RMS value, the amplitude is $\sqrt{2}$ -times greater) at nominal energization.		
P1040	Speed additional set value	-100,00 bis +100,00 %	
DS	Drehzahl-Zusatz-Sollwert	0,00 %	
	BM_di_DS0_SpeedSetValueAdd	0x40000000: 100 %	CW
	Total N-setpoint is limited to $\pm 100\%$!		
	Additional speed setpoint-input.		
	Scaling: 100% \longleftrightarrow Motor maximum drive speed P1031		
P1041	Speed set value positive limit	0,00 bis +100,00 %	
DS	Drehzahlsollwert positive Grenze	+100,00 %	
	BM_di_DS0_SpeedSet_ULim	0x40000000: 100 %	CW
	The speed setpoint in the positive range is limited to that value.		
P1042	Speed set value negative limit	-100,00 bis 0,00 %	
DS	Drehzahlsollwert negative Grenze	-100,00 %	
	BM_di_DS0_SpeedSet_LLim	0x40000000: 100 %	CW
	The speed setpoint in the negative range is limited to that value.		
P1043	Speed deviation limiter	0,00 bis 200,00 %	
DS	Drehzahl-Regelabweichungs-Grenze	5,00 %	
	BM_u_DS0_SpeedDevMax	0x4000: 100 %	CW
	Alarm limit for speed regulation deviation.		
	If the speed control deviation falls below this threshold parameter value, the message <i>Setpoint reached</i> is reported in Bit12 of Speed controller status P0350 and at speed-controlled operation modes also in Bit10 of Statusword P0301 .		

P1044	Cut-off frequency 2 order delay	0 bis 1250 Hz	
DS	Grenzfrequenz PT2	0 Hz	
	BM_u_DS0_CutOffFrequencyOrder2	26:1 Hz	-
	This parameter determines the base frequency of the filter 2nd order (PT2) for the current set-point of the speed controller.		
	This PT2-element is located between speed controller output and q-current controller input.		
	If the value is set to 0, the PT2-element isn't effective.		
P1045	Time for reducing torque	0 bis 8000 ms	
DS	Zeit für Momentabbau	0 ms	
	BM_u_DS0_TorqueReducingTime	1:1 ms	-
	With this parameter a smooth torque reduction can be set in combination with controlled brake operations.		
	After slowing down the drive to zero speed the torque limiter is reduced linear for the set time to 0 and then the drive is disabled.		
	This soft torque reduction operates at all controlled braking procedures by the drive manager, that means at the commands Inhibit operation, Shutdown operation, Quickstop, as long as there is an accordant command set to a braking operation with a following transition in an inhibited state.		
	Furthermore the smooth torque reduction takes effects on error reactions, which cause a braking operation.		
P1046	Symmetrical torque limiter in Nm	0,000 bis 20000,000 Nm	
DS	Symmetrische Momenten-Grenze in Nm	20000,000 Nm	
	BM_ud_DS0_TrqSymLimitNm	1000:1 Nm	CW
	This parameter is not used.		

P1050	Position controller mode	0x0000 bis 0xFFFF
DS	Lageregler Modus	0x0000
	BM_w_DS0_PosCtrlMode	1:1

Operation mode of position controller.

Bit no.	Meaning
0	1 Activation of dynamic position deviation monitoring (P1054)
1	1 Activation of the static deviation monitoring (P1055)
2	0 Position sensing is made with the encoder, which was selected for the motor control (see parameter P1030)
	1 Position sensing is made with the (second) encoder, which was NOT selected for the motor control (see parameter P1030)
The bit can only be changed, if the position controller is in state STOP	
3	0 No extrapolation, after sequence of the interpolator the delta is deleted.
	1 Extrapolation, after sequence of the interpolator the delta remains valid.
4	Mode linear interpolation
	0 Normal interpolation
	1 Distribution of torque precontrol along the bus cycle
5	1 Synchronization to actual speed value
6...15	Reserved

- Bit4, linear interpolation mode:

By setting this bit at linear interpolation, the torque precontrol value, which normally only is existent in the first controller cycle of a bus cycle, is distributed along the whole bus cycle and this in such a way, that the mean value of the torque precontrol is equal in each bus cycle. In this case the speed precontrol is not constant within a bus cycle, but linearly changes with a slope, which corresponds to the distributed torque precontrol value. This linear interpolation modification is only existent for the operating mode Position control.

- Bit5, Synchronization on actual speed value

This function allows a smooth switch-over at stable speed into the operating mode Position control (-4). It can, for example be used at the cyclic setpoint setting by a PLC via **P0369** position setpoint for interpolation or **P0370** position setpoint angle for interpolation. It makes sense to activate extrapolation (Bit3 = 1) simultaneously, if the operating mode switch-over and the setpoint setting is not simultaneously.

Additionally Bit11 in **Controlword P0300** makes it possible to inhibit the position setpoints. As long as this is set the controller does not accept the setpoints in **P0369** and **P0370** and

extrapolates further on. The setpoints are accepted from the controller not before the bit *Set values inhibited* is reset.

The speed synchronization is possible with the following operating modes:

- -6 = Spindle positioning
- -5 = Synchronous operation
- -3 = Speed control
- 1 = Position set mode
- 2 = Speed setting 1
- 5 = Jog operation
- 6 = Homing

P1051	Position controller Kv factor	0,0 bis 3276,7 1/s	
DS	Lageregler Kv-Faktor	10,0 1/s	
	BM_u_DS0_PosCtrl_KVFactor	10:1 1/s	-

Proportional-gain (K_V factor) of the position controller.

The position controller is implemented as P-controller.

This means that the position controller at ($K_V = 0$) does not have a share in the speed setpoint, because each deviation is multiplied with the (K_V factor).

P1052	Speed feed forward smoothing time	0,0 bis 50,0 ms	
DS	Drehzahl-Vorsteuerungs-Glättung	1,0 ms	
	BM_u_DS0_SpeedFeedForSmooth	10:1 ms	-

Smoothing time constant of speed precontrol.

The speed precontrol is implemented as a DT1-element.

All changes in the position setpoint are differentiated according to time and are multiplied with the parameter speed precontrol factor **P1053** and then are smoothed with the time constant in **P1052**.

P1053	Speed feed forward factor	0,00 bis 125,00 %	
DS	Drehzahl-Vorsteuerungs-Faktor	100,00 %	
	BM_u_DS0_SpeedFeedForFactor	0x4000: 100 %	-
	Weighting factor of speed precontrol.		
	The speed precontrol is implemented as a DT1-element.		
	All changes in the position setpoint are differentiated according to time and are multiplied with the parameter speed precontrol factor P1053 and then are smoothed with the time constant in P1052 .		
	This means that at speed precontrol 0% the speed precontrol does not have a share in the speed setpoint P0352 .		
	With speed precontrol = 100% and constant position setpoint change rate per time unit, the speed precontrol exactly executes the required speed setpoint. The position controller in this case contributes only the correction setpoint required for follow-up correction of angle.		
P1054	Position deviation limit dynamic	0x00000000 bis 0x7FFFFFFF	
DS	Schleppfehler-Grenze dynamisch	0x00000800	
	BM_di_DS0_PosDevLimDyn	1:1	CW

The dynamic position deviation limit becomes active as soon as there is a new position setpoint (**P0361**) to each point of sampling of the position controller.

The limits lay symmetric to the actual assigned position setpoint.

If the actual position deviation (contouring error (**P0367**) is greater than the adjusted dynamic deviation limit, this is reported by Bit4 in the position controller status **P0360**.

After timeout (**Position deviation time P1056**) additionally Bit6 is set and the drive is inhibited, if in the parameter **Position controller mode P1050** the error enable was set for the dynamic position deviation (Bit0 = 1).

Scaling: 16 bit revolutions, 16 bit angle. A motor revolution therefore accords to **65536** increments.

Switch-over between dynamic and static deviation monitoring explained by an example of a typical positioning setpoint input:

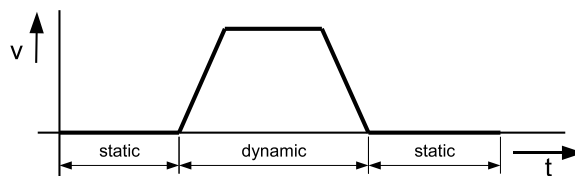


Figure 7.9: Position deviation limit static/dynamic

P1055	Position deviation limit static	0x00000000 bis 0x7FFFFFFF	
DS	Schleppfehler-Grenze statisch	0x00000100	
	BM_di_DS0_PosDevLimStatic	1:1	CW

The statical position deviation limit becomes active if the position controller either does not have a new position setpoint (**P0361**) or consistently receives the same position setpoint (also see diagram under **P1054**).

It lays symmetrical around the actual assigned position setpoint.

If the actual position deviation (deviation (**P0367**) is greater than the set position deviation limit, this is shown in the position controller status **Position controller status P0360** by the Bit5.

After timeout (**Position deviation time P1056**) additionally Bit7 is set and the drive is inhibited, if in the parameter **Position controller mode P1050** the error enable was set for the dynamic position deviation (Bit1 = 1).

Scaling: 16 bit revolutions, 16 bit angle. A motor revolution therefore accords to **65536** increments.

P1056	Position deviation time	0,000 bis 65,000 s	
DS	Schleppfehler-Zeit	1,000 s	
	BM_u_DS0_PosDevTime	1000:1 s	-

Time window for the position deviation monitoring. This time window is only effective for the message in Bit6 and Bit7 of **Position controller status P0360** as well as for the error message.

The status bits 4 and 5 always report the position deviation immediately.

Furthermore this time is important for the message *Setpoint reached* (Bit12) in the **Position controller status P0360** and in the (**Statusword P0301**), only in the operation modes Position control (operation mode -4) and Synchronous operation (operating mode -5).

The position deviation must for this time be within the according position deviation limit, then the message *Setpoint reached* is reported.

P1057	Gear factor	0,02 bis 327,67	
DS	Getriebefaktor	1,00	
	BM_u_DS0_GearFactor	100:1	-

Setting of transmission ratio between motor and load.

Only necessary if two encoders are used one for motor control and one for load-sided position sensing.

If there is a gear between motor and load, in this parameter the transmission ratio motor:load must be set.

P1058	Position deviation limit 2	0x00000000 bis 0x7FFFFFFF	
DS	Schleppfehlergrenze 2	0x00000100	
	BM_di_DS0_PosDevLim2	1:1	CW

It is valid as in the static as in the dynamic operation case. It lays symmetric around the actual assigned position setpoint.

If the actual position deviation (deviation) is greater than the set position deviation limit, this is shown in the position controller status word **P0360**.

For the position deviation limit 2 Bit9 is set.

A programmable error enable in the controller, similar to the parameters position deviation limit dynamic **P1054** and position deviation limit static **P1055** is not possible.

Scaling: 16 bit revolutions, 16 bit angle. A motor revolution therefore accords to **65536** increments.

P1059	Position set value smoothing interval	0 bis 16	
DS	Lagesollwert-Glättungsintervall	0	
	BM_u_DS0_PosSetSmoothInterval	1:1	CW

At unsmooth setpoints or in order to weaken any acceleration peaks of a specified curve, the controller makes it possible for specified cyclic synchronous setpoints, position setpoints to smooth according to the method of the sliding-type mean value generation.

This parameter determines the number of the averaged values. Value 0 means: There is no smoothing.

The following parameters can be smoothed:

- Position setpoint for interpolation **P0369** (at position control)
- Position setpoint angle for interpolation **P0370** (at position control)
- Synchronous operation position setpoint **P0471** (at synchronous operation)
- Synchronous operation angular setpoint **P0472** (at synchronous operation)

The smoothing interval refers to the time cycle, where new setpoint values are written into the controller - according to application either BACI cycle time (**P0800**) or SYNC interval (**P0532**).

Notes:

- If setpoints are not written cyclical, e.g. separately for testing via WinBASS and the smoothing interval is unequal 0, then the active setpoint in the controller due to PT1-smoothing does not reach the specified setpoint until several writing operations have been executed.
- Changing of the value at enabled drive can lead to short-time setpoint step changes.

P1061	Smooth time for open loop speed actual value	0 bis 50,0 ms	
DS	Glättungszeit Open Loop Drehzahlwert	1,0 ms	
	BM_u_DS0_OL_SpeedSmoothTime	10:1 ms	-
	Time constant of the low pass filter for the smoothing of the open loop actual speed value. Only relevant if encoderless operation is set.		
P1062	Open Loop overspeed limit	0,00 bis 200,00 %	
DS	Open Loop Überdrehzahl-Grenze	115,00 %	
	BM_u_DS0_OL_Speed_ULim	0x4000: 100 %	CW
	Limit value for overspeed monitoring in encoderless operation. At exceeding of the overspeed threshold the status bit for overspeed in P0380 speed - status open loop (Bit6) is set and an error is enabled. If the speed falls below the overspeed threshold, the status bit is reset directly (without hysteresis). Scaling: 100% → Motor maximum drive speed P1031 Only relevant if encoderless operation is set.		
P1063	Open Loop N=0 threshold	0,00 bis 25,00 %	
DS	Open Loop N=0-Schwelle	1,00 %	
	BM_u_DS0_OL_Mon_LLim	0x4000: 100 %	CW
	Speed threshold for the message <i>Speed-zero</i> . The message in P0380 speed status open loop is set, if the amount of the actual speed value falls below the adjusted threshold. The message will be reset, if the amount of the actual speed value exceeds the threshold plus a 0.5%-hysteresis. Scaling: 100% ↔ Motor maximum drive speed P1031 Only relevant if encoderless operation is set.		

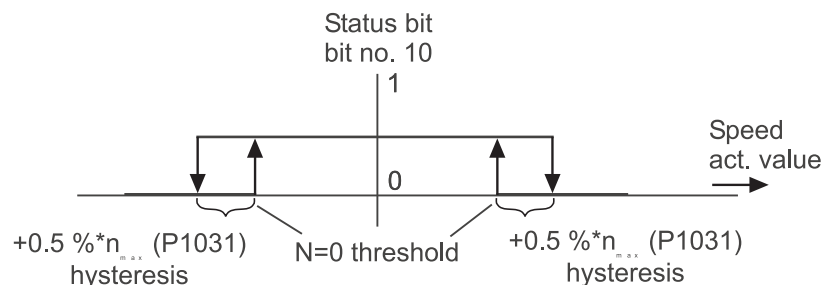


Figure 7.10: Speed threshold for zero-speed message

P1064	Open loop N>Nx ON threshold	0,00 bis 150,00 %	
DS	Open Loop N>Nx EIN-Schwelle	100,00 %	
	BM_u_DS0_OL_Mon_ULimOn	0x4000: 100 %	CW
	Freely usable speed threshold.		
	When exceeding this speed threshold (amount actual speed value > set threshold) Bit11 in P0380 speed status open loop is set.		
	The bit is only cleared, if the value falls below the threshold N > Nx OFF P1065 .		
	Scaling: 100% ↔ Motor maximum drive speed P1031		
	Only relevant if encoderless operation is set.		
P1065	Open loop N>Nx OFF threshold	0,00 bis 150,00 %	
DS	Open Loop N>Nx AUS-Schwelle	96,00 %	
	BM_u_DS0_OL_Mon_ULimOff	0x4000: 100 %	CW
	Freely usable speed threshold.		
	When falling below this speed threshold (amount actual speed value < set threshold) Bit11 in P0380 speed status open loop is cleared.		
	The bit is only set, if the threshold N > Nx ON P1064 is exceeded.		
	Scaling: 100% ↔ Motor maximum drive speed P1031		
	Only relevant if encoderless operation is set.		
P1071	Encoder 1 smoothing time constant	0,0 bis 50,0 ms	
DS	Geber 1 Glättungszeit	1,0 ms	
	BM_u_DS0_Enc1SmoothTime	10:1 ms	-
	Time constant of low-pass filter for encoder actual value smoothing.		
	To suppress high frequency disturbance of the actual speed value, here a smoothing time constant for a digital PT1-element can be assigned.		

P1072	Encoder 1 over speed limit	0,00 bis 200,00 %	
DS	Geber 1 Überdrehzahl-Grenze	115,00 %	
	BM_u_DS0_Enc1Speed_ULim	0x4000: 100 %	CW

Limit value for the overspeed monitoring of encoder 1.

When exceeding the overspeed threshold the status bit for overspeed in **P0390** encoder 1 status (Bit6) is set and an error is reported.

If the speed falls below the overspeed threshold, the status bit is cleared directly (without hysteresis).

Scaling: 100% \longleftrightarrow **Motor maximum drive speed P1031**

P1073	Encoder 1 N=0 threshold	0,00 bis 25,00 %	
DS	Geber 1 N=0-Schwelle	1,00 %	
	BM_u_DS0_Enc1Mon_LLim	0x4000: 100 %	CW

Speed threshold for the message *Zero speed*.

The message in **P0390** encoder 1 status is set, if the amount of the actual speed value falls below the adjusted threshold.

The message will be reset, if the amount of the actual speed value exceeds the threshold plus a 0.5%-hysteresis.

Scaling: 100% \longleftrightarrow **Motor maximum drive speed P1031**

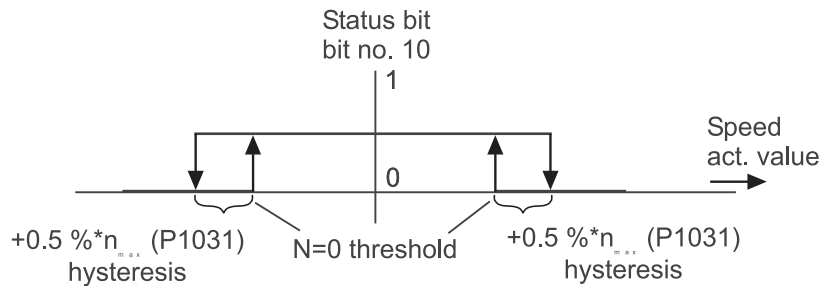
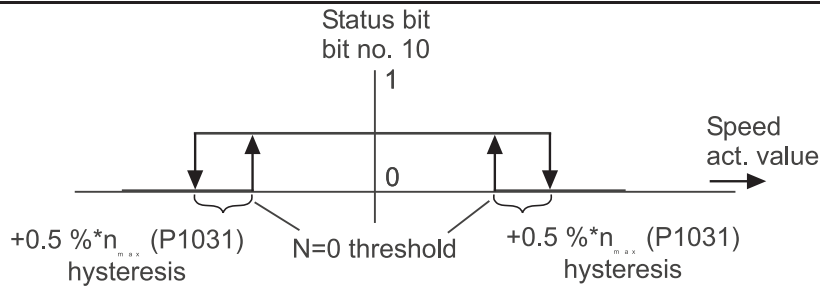


Figure 7.11: Speed threshold for zero-speed message

P1074	Encoder 1 N>Nx ON threshold	0,00 bis 150,00 %	
DS	Geber 1 N>Nx EIN-Schwelle	100,00 %	
	BM_u_DS0_Enc1Mon_ULimOn	0x4000: 100 %	CW
	Freely usable speed threshold.		
	When exceeding this speed threshold (amount actual speed value > set threshold) Bit11 in P0390 encoder 1 status is set.		
	The bit is only cleared, if the value falls below the threshold N > Nx OFF P1075 .		
	Scaling: 100% ↔ Motor maximum drive speed P1031		
P1075	Encoder 1 N>Nx OFF threshold	0,00 bis 150,00 %	
DS	Geber 1 N>Nx AUS-Schwelle	96,00 %	
	BM_u_DS0_Enc1Mon_ULimOff	0x4000: 100 %	CW
	Freely usable speed threshold.		
	When falling below this speed threshold (amount actual speed value < set threshold) Bit11 in P0390 encoder 1 status is deleted.		
	The bit is only set, if the threshold N > Nx ON P1074 is exceeded.		
	Scaling: 100% ↔ Motor maximum drive speed P1031		
P1076	Encoder 1 sin²x upper limit	85 bis 110 %	
DS	Geber 1 Sin ² x Obergrenze	100 %	
	BM_u_DS0_Enc1Sin2xUpperLimit	GUI = $\frac{\sqrt{(Para * 10000/512)}}{\%}$	-
	Upper limit of sin ² x monitoring of the encoder 1.		
	It is recommended, that the encoder amplitude does not exceed 95% of the measuring range. If it is higher then the encoder signals cannot be exactly scanned anymore. This leads to a speed- or position error with a quadruple encoder period.		
	To activate the sin ² x monitoring Bit7 must be set in P0150 or P0160 .		
P1077	Encoder 1 time frame for Sin²x-amplitude supervision	0 bis 4000 ms	
DS	Geber 1 Sin ² x-Grenze Überwachungszeitfenster	0 ms	
	BM_u_DS0_Enc1AmpErrTimeLim	8:1 ms	-
	Parameter is not used yet.		

P1078	Encoder 2 time frame for Sin²x-amplitude supervision	0 bis 4000 ms	
DS	Geber 2 Sin ² x-Grenze Überwachungszeitfenster	0 ms	
	BM_u_DS0_Enc2AmpErrTimeLim	8:1 ms	-
	Parameter is not used yet.		
P1079	max. encoder 1 frequency for offsetcorrection	0 bis 0xFFFF	
DS	max. Geber 1 frequenz für Offsetkorrektur	2	
	BM_u_DS0_GEB1_maxf	1:1	-
	Internal parameter for the offset correction at encoder types <i>B</i> and <i>C</i> .		
P1081	Encoder 2 smoothing time constant	0,0 bis 50,0	
DS	Geber 2 Glättungszeit	1,0	
	BM_u_DS0_Enc2SmoothTime	10:1	-
	Time constant of low-pass filter for encoder actual value smoothing.		
	To suppress high frequency disturbance of the actual speed value, here you can assign a smoothing time constant for a digital PT1-element.		
P1082	Encoder 2 over speed limit	0,00 bis 200,00 %	
DS	Geber 2 Überdrehzahl-Grenze	115,00 %	
	BM_u_DS0_Enc2Speed_ULim	0x4000: 100 %	CW
	Limit value for the overspeed monitoring of encoder 2.		
	When exceeding the overspeed threshold the status bit for overspeed in P0400 encoder 2 status (Bit6) is set and an error is reported.		
	If the speed falls below the overspeed threshold, the status bit is cleared directly (without hysteresis).		
	Scaling: 100% ↔ Motor maximum drive speed P1031		
P1083	Encoder 2 N=0 threshold	0,00 bis 25,00 %	
DS	Geber 2 N=0-Schwelle	1,00 %	
	BM_u_DS0_Enc2Mon_LLim	0x4000: 100 %	CW
	Speed threshold for the message <i>Zero speed</i> .		
	The message in P0400 encoder 2 status is set, if the amount of the actual speed value falls below the adjusted threshold.		
	The message will be reset, if the amount of the actual speed value exceeds the threshold plus a 0.5%-hysteresis.		
	Scaling: 100% ↔ Motor maximum drive speed P1031		



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Figure 7.12: Encoder 2 zero-speed threshold

P1084	Encoder 2 N>Nx ON threshold	0,00 bis 150,00 %	
DS	Geber 2 N>Nx EIN-Schwelle	100,00 %	
	BM_u_DS0_Enc2Mon_ULimOn	0x4000: 100 %	CW
	Freely usable speed threshold.		
	When exceeding this speed threshold (amount actual speed value > set threshold) Bit11 in P0400 encoder 2 status is set. The bit is only cleared, if the value falls below the threshold N > Nx OFF P1085 .		
	Scaling: 100% ↔ P1031		
P1085	Encoder 2 N>Nx OFF threshold	0,00 bis 150,00 %	
DS	Geber 2 N>Nx AUS-Schwelle	96,00 %	
	BM_u_DS0_Enc2Mon_ULimOff	0x4000: 100 %	CW
	Freely usable speed threshold.		
	When falling below this speed threshold (amount actual speed value < set threshold) Bit11 in P0400 encoder 2 status is deleted. The bit is only set, if the threshold N > Nx ON P1084 is exceeded.		
	Scaling: 100% ↔ P1031		
P1086	Encoder 2 sin²x upper limit	85 bis 110 %	
DS	Geber 2 Sin ² x Obergrenze	100 %	
	BM_u_DS0_Enc2Sin2xUpperLimit	GUI = $\frac{\sqrt{(Para * 10000/512)}}{\%}$	-
	Upper limit of sin ² x monitoring of the encoder 2.		
	See P1076 .		

P1087	Field angle monitor threshold	0 bis 50 %	
DS	Feldwinkel Überwachung Schwelle	10 %	
	BM_u_DS0_FieldAngMonitorThresh	0x4000: 100 %	CW
	Speed threshold from which on field angle monitoring is active. Below the threshold no field angle monitoring is executed. Also see «Encoder monitoring» from page 48.		
P1089	max. encoder 2 frequency for offsetcorrection	0 bis 0xFFFF	
DS	max. Geber 2 frequenz für Offsetkorrektur	2	
	BM_u_DS0_GEB2_maxf	1:1	-
	See P1079.		
P1091	Target number: digital input 1	0 bis MaxParaNr	
DS	Zielnummer digitaler Eingang 1	0	
	BM_u_DS0_DI1_TargetPxxx	1:1	-
	Number of parameter to be changed by digital input 1. (Only writable 16 bit parameters. Not array parameters.) Input can also be used as brake signal or limit- or zero point switch (P0883, P0884, P1214, P1215, P1216).		
P1092	Bit selection digital input 1	0x0000 bis 0xFFFF	
DS	Bit-Auswahl digitaler Eingang 1	0	
	BM_w_DS0_DI1_BitSelection	1:1	CW
	Selection of target parameter bits to be changed by digital input 1.		
P1093	Set bit pattern for LOW state digital input 1	0x0000 bis 0xFFFF	
DS	Bit-Muster bei LOW des digitalen Eingang 1	0	
	BM_w_DS0_DI1_LowPattern	1:1	CW
	Bit pattern, to be written to target parameter if digital input 1 is LOW.		
P1094	Set bit pattern for HIGH state digital input 1	0x0000 bis 0xFFFF	
DS	Bit-Muster bei HIGH des digitalen Eingang 1	0	
	BM_w_DS0_DI1_HighPattern	1:1	CW
	Bit pattern, to be written to target parameter if digital input 1 is HIGH.		

P1096	Target number: digital input 2	0 bis MaxParaNr	
DS	Zielnummer digitaler Eingang 2	0	
	BM_u_DS0_DI2_TargetPxxx	1:1	-
	Number of parameter to be changed by digital input 2. (Only writable 16 bit parameters. Not array parameters.)		
	Input can also be used as brake signal or limit- or zero point switch (P0883 , P0884 , P1214 , P1215 , P1216).		
	For the hardware version use of DI4 as PTC or MKSL evaluation can be activated by setting P1106 = 503 (P0503 MotorActTemp). At overtemperature the error 48.8 is reported, whose error reaction can be set in any way.		
P1097	Bit selection digital input 2	0x0000 bis 0xFFFF	
DS	Bit-Auswahl digitaler Eingang 2	0	
	BM_w_DS0_DI2_BitSelection	1:1	CW
	Selection of target parameter bits to be changed by digital input 2.		
P1098	Set bit pattern for LOW state digital input 2	0x0000 bis 0xFFFF	
DS	Bit-Muster bei LOW des digitalen Eingang 2	0	
	BM_w_DS0_DI2_LowPattern	1:1	CW
	Bit pattern, to be written to target parameter if digital input 2 is LOW.		
P1099	Set bit pattern for HIGH state digital input 2	0x0000 bis 0xFFFF	
DS	Bit-Muster bei HIGH des digitalen Eingang 2	0	
	BM_w_DS0_DI2_HighPattern	1:1	CW
	Bit pattern, to be written to target parameter if digital input 2 is HIGH.		
P1101	Target number: digital input 3	0 bis MaxParaNr	
DS	Zielnummer digitaler Eingang 3	0	
	BM_u_DS0_DI3_TargetPxxx	1:1	-
	Number of parameter to be changed by digital input 3. (Only writable 16-bit parameters. No array parameters.)		
	Input can also be used as brake signal or limit- or zero point switch (P0883 , P0884 , P1214 , P1215 , P1216).		

P1102	Bit selection digital input 3	0x0000 bis 0xFFFF	
DS	Bit-Auswahl digitaler Eingang 3	0	
	BM_w_DS0_DI3_BitSelection	1:1	CW
	Selection of target parameter bits to be changed by digital input 3.		
P1103	Set bit pattern for LOW state digital input 3	0x0000 bis 0xFFFF	
DS	Bit-Muster bei LOW des digitalen Eingang 3	0	
	BM_w_DS0_DI3_LowPattern	1:1	CW
	Bit pattern, to be written to target parameter if digital input 3 is LOW.		
P1104	Set bit pattern for HIGH state digital input 3	0x0000 bis 0xFFFF	
DS	Bit-Muster bei HIGH des digitalen Eingang 3	0	
	BM_w_DS0_DI3_HighPattern	1:1	CW
	Bit pattern, to be written to target parameter if digital input 3 is HIGH.		
P1106	Target number: digital input 4	0 bis MaxParaNr	
DS	Zielnummer digitaler Eingang 4	0	
	BM_u_DS0_DI4_TargetPxxx	1:1	-
	Number of the parameter to be changed by digital input 4. (Only writable 16-bit parameters. No array parameters.)		
	Input can also be used as brake signal or limit- or zero point switch (P0883 , P0884 , P1214 , P1215 , P1216).		
P1107	Bit selection digital input 4	0x0000 bis 0xFFFF	
DS	Bit-Auswahl digitaler Eingang 4	0	
	BM_w_DS0_DI4_BitSelection	1:1	CW
	Selection of the bits of the target parameters to be changed by digital input 4.		
P1108	Set bit pattern for LOW state digital input 4	0x0000 bis 0xFFFF	
DS	Bit-Muster bei LOW des digitalen Eingang 4	0	
	BM_w_DS0_DI4_LowPattern	1:1	CW
	Bit pattern, to be written to target parameter if digital input 4 is LOW.		

P1109	Set bit pattern for HIGH state digital input 4	0x0000 bis 0xFFFF	
DS	Bit-Muster bei HIGH des digitalen Eingang 4	0	
	BM_w_DS0_DI4_HighPattern	1:1	CW
	Bit-pattern, to be written to target parameter if digital input 4 is HIGH.		
P1111	Source number digital output 1	0 bis MaxParaNr	
DS	Quellnummer digitaler Ausgang 1	0	
	BM_u_DS0_DO1_SourcePxxx	1:1	-
	Number of the parameter to be output by digital output 1. Only 16-bit parameters are permitted.		
P1112	Bit selection digital output 1	0x0000 bis 0xFFFF	
DS	Bit-Auswahl digitaler Ausgang 1	0	
	BM_w_DS0_DO1_BitSelection	1:1	CW
	Selection of the bits in source parameter to be compared for digital output 1.		
P1113	Bit pattern digital output 1	0x0000 bis 0xFFFF	
DS	Bit-Muster digitaler Ausgang 1	0	
	BM_w_DS0_DO1_BitPattern	1:1	CW
	Bit pattern to be compared with the bit-pattern of source parameter for digital output 1.		
P1115	Source number digital output 2	0 bis MaxParaNr	
DS	Quellnummer digitaler Ausgang 2	0	
	BM_u_DS0_DO2_SourcePxxx	1:1	-
	Number of the parameter to be output by digital output 2. Only 16-bit parameters are permitted.		
P1116	Bit selection digital output 2	0x0000 bis 0xFFFF	
DS	Bit-Auswahl digitaler Ausgang 2	0	
	BM_w_DS0_DO2_BitSelection	1:1	CW
	Selection of bits in source parameter to be compared for digital output 2.		

P1117	Bit pattern digital output 2	0x0000 bis 0xFFFF	
DS	Bit-Muster digitaler Ausgang 2	0	
	BM_w_DS0_DO2_BitPattern	1:1	CW
	Bit-pattern to be compared with the bit pattern of source parameter for digital output 2.		
P1119	Source number digital output 3	0 bis MaxParaNr	
DS	Quellnummer digitaler Ausgang 3	0	
	BM_u_DS0_DO3_SourcePxxx	1:1	-
	Number of the parameter to be output by digital output 3. Only 16-bit parameters are permitted.		
P1120	Bit selection digital output 3	0x0000 bis 0xFFFF	
DS	Bit-Auswahl digitaler Ausgang 3	0	
	BM_w_DS0_DO3_BitSelection	1:1	CW
	Selection of bits in source parameter to be compared for digital output 3.		
P1121	Bit pattern digital output 3	0x0000 bis 0xFFFF	
DS	Bit-Muster digitaler Ausgang 3	0	
	BM_w_DS0_DO3_BitPattern	1:1	CW
	Bit pattern to be compared with the bit pattern of source parameter for digital output 3.		
P1123	Source number digital output 4	0 bis MaxParaNr	
DS	Quellnummer digitaler Ausgang 4	0	
	BM_u_DS0_DO4_SourcePxxx	1:1	-
	Number of the parameter to be output by digital output 4. Only 16-bit parameters are permitted.		
P1124	Bit selection digital output 4	0x0000 bis 0xFFFF	
DS	Bit-Auswahl digitaler Ausgang 4	0	
	BM_w_DS0_DO4_BitSelection	1:1	CW
	Selection of the bits in source parameter to be compared for digital output 4.		

P1125	Bit pattern digital output 4	0x0000 bis 0xFFFF	
DS	Bit-Muster digitaler Ausgang 4	0	
	BM_w_DS0_DO4_BitPattern	1:1	CW
	Bit pattern to be compared with the bit-pattern of source parameter for digital output 4.		
P1130	Selection analog input 1	0x0000 bis 0xFFFF	
DS	Auswahl analoger Eingang 1	0	
	BM_w_DS0_AI1_InputChannel	1:1	-
	1 Aktivation of analog input.		
P1131	Smoothing time analog input 1	0 bis 30 ms	
DS	Glättungszeit analoger Eingang 1	1 ms	
	BM_u_DS0_AI1_Smoothing	1:1 ms	-
	Smoothing time of analog input 1.		
	If the analog input signal is disturbed, smoothing is possible by applying a smoothing time constant in ms.		
	The smoothing is switched off, if the respective parameter value is set to 0.		
P1132	Scaling factor analog input 1	-2,00 bis 2,00	
DS	Skalierungsfaktor analoger Eingang 1	1,0	
	BM_i_DS0_AI1_Scaling	0x3FFF:1	-
	Scaling factor analog input 1. These parameters enable the scaling of analog input values.		
	The scaling factor determines, which analog input voltage is necessary to reach the maximum values of the target parameter. In order to reach output values between minimum and maximum of the parameter, which was set in P1133 at an input voltage range of $\pm 10V$ and offset P1134 of 0V a scaling factor of about 1.27 must be set. (At b maXX[®] BM4400 this is the case at a scaling factor of 1.)		
	The ADC-input has an accuracy of about $\pm 5\%$ (0.5V). This means that also deviations from device to device are permitted within this range.		
P1133	Target number: analog input 1	0 bis MaxParaNr	
DS	Zielnummer analoger Eingang 1	0	
	BM_u_DS0_AI1_TargetPxxx	1:1	-
	Number of the parameter, which is to be changed by analog input 1. The parameter must have the property FAST_WRITE.		

P1134	Offset analog input 1	-100,00 bis 100,00 %	
DS	Offset analoger Eingang 1	0 %	
	BM_i_DS0_AI1_Offset	0x7FFF: 100 %	CW
	Offset correction of analog input 1.		
P1135	Threshold value analog input 1	0,00 bis 100,00 %	
DS	Schwellenwert analoger Eingang 1	0 %	
	BM_u_DS0_AI1_Threshold	0x7FFF: 100 %	CW
	Threshold value analog input 1. Using the threshold value the sensitivity of the input can be adjusted.		
P1136	Selection analog input 2	0x0000 bis 0xFFFF	
DS	Auswahl analoger Eingang 2	0	
	BM_w_DS0_AI2_InputChannel	1:1	-
	This parameter is not used.		
P1137	Smoothing time analog input 2	0 bis 30 ms	
DS	Glättungszeit analoger Eingang 2	1 ms	
	BM_u_DS0_AI2_Smoothing	1:1 ms	-
	This parameter is not used.		
P1138	Scaling factor analog input 2	-2,00 bis 2,00	
DS	Skalierungsfaktor analoger Eingang 2	1,00	
	BM_i_DS0_AI2_Scaling	0x3FFF:1	-
	This parameter is not used.		
P1139	Target number analog input 2	0 bis MaxParaNr	
DS	Zielnummer analoger Eingang 2	0	
	BM_u_DS0_AI2_TargetPxxx	1:1	-
	This parameter is not used.		

P1140	Offset analog input 2	-100,00 bis 100,00 %	
DS	Offset analoger Eingang 2	0 %	
	BM_i_DS0_AI2_Offset	0x7FFF: 100 %	CW
	This parameter is not used.		
P1141	Threshold value analog input 2	0,00 bis 100,00 %	
DS	Schwellenwert analoger Eingang 2	0 %	
	BM_u_DS0_AI2_Treshold	0x7FFF: 100 %	CW
	This parameter is not used.		
P1150	Selection fast analog output 1	0x0000 bis 0xFFFF	
DS	Auswahl schneller analoger Ausgang 1	0	
	BM_w_DS0_AOF1_OutputChannel	1:1	-
	For analog output of parameter values Bit15 of (P1151) has to be cleared.		
	HINWEIS If Bit15 is set, voltages other than 0V will be delivered. With a cleared Bit15 and P1155 = 0 the output will deliver 0V.		
	For configuration and scaling see «Analog outputs» from page 69.		
P1151	Source number fast analog output 1	0 bis MaxParaNr	
DS	Quellnummer schneller analoger Ausgang 1	0	
	BM_u_DS0_AOF1_SourcePxxx	1:1	-
	Selection of the parameter (parameter number) for output 1		
	For filtered output see P2040.		
P1152	Offset fast analog output 1	-10,00 bis 10,00 V	
DS	Offset schneller analoger Ausgang 1	0 V	
	BM_i_DS0_AOF1_Offset	0x7FFF: 10 V	CW
	Offset correction of analog output 1.		
P1153	Scaling factor fast analog output 1	-67108863,00 bis 67108863,00	
DS	Skalierungsfaktor schneller analoger Ausgang 1	1,00	
	BM_di_DS0_AOF1_Scaling	32:1	CW
	Scaling factor of analog output 1.		

P1154	Selection fast analog output 2	0x0000 bis 0xFFFF	
DS	Auswahl schneller analoger Ausgang 2	0	
	BM_w_DS0_AOF2_OutputChannel	1:1	-
	For analog output of parameter values Bit15 of (P1151) has to be cleared.		
	HINWEIS If Bit15 is set, voltages other than 0V will be delivered. With a cleared Bit15 and P1155 = 0 the output will deliver 0V.		
	For configuration and scaling see «Analog outputs» from page 69.		
P1155	Source number fast analog output 2	0 bis MaxParaNr	
DS	Quellnummer schneller analoger Ausgang 2	0	
	BM_u_DS0_AOF2_SourcePxxx	1:1	-
	Selection of the parameter (parameter number) for output 1		
	For filtered output see P2040.		
P1156	Offset fast analog output 2	-10,00 bis 10,00 V	
DS	Offset schneller analoger Ausgang 2	0 V	
	BM_i_DS0_AOF2_Offset	0x7FFF: 10 V	CW
	Offset correction of analog output 2.		
P1157	Scaling factor fast analog output 2	-67108863,00 bis 67108863,00	
DS	Skalierungsfaktor schneller analoger Ausgang 2	1	
	BM_di_DS0_AOF2_Scaling	32:1	CW
	Scaling factor of analog output 2.		

P1170	Ramp Function Generator mode	0x0000 bis 0xFFFF	
DS	Hochlaufgeber Modus	0x0000	
	BM_w_DS0_RFGMode	1:1	CW

Settings for ramp function generator.

Bit no.	Meaning
3	1 Negative setpoints disabled
4	1 Positive setpoints are disabled
5	1 Polarity reversal of the current setpoint
6	0 Trapezoidal speed profile with ramp function generator-smoothing (PT1-element)
	1 S-curve with square speed profile
7	P1174 Ramp function generator stop time refers to:
	0 Setpoint change of 100% to 0%
	1 Setpoint change of actual setpoint to 0%
8	Selection of the input parameters
	0 P1171 Ramp function generator input (16-bit resolution; 100% = 4000hex)
	1 P1179 Ramp function generator input (32-bit resolution; 100% = 40000000hex)
9	Interpolation of the output setpoint to the control cycle
	0 No interpolation
	1 Interpolation active

Notes:

- Bit3 to Bit5

The internal bit processing sequence is as follows:

1. Inhibit positive or negative setpoints: (Bit3 or Bit4)
2. Polarity reversal of the actual setpoint (Bit5)

- Bit7 = 1:

The 0%-setpoint is reached independent of the actual setpoint according to the set value in **P1174** ramp function generator stop time.

If the trapezoidal speed profile (**P1170** ramp function generator mode Bit6 = 0) is set, then the stop time is only valid for the not smoothed curve. With smoothing (**P1175** ramp function generator smoothing > 0) the stop time is extended dependent on the size of the adjusted smoothing.

If the S-curve profile (**P1170** ramp function generator mode Bit6 = 1) is set, slowing down takes place with trapezoidal speed profile. A set smoothing takes no effect.

- Bit8 = 1:

At the set Bit8 the high-resolution input setpoint **P1179** is activated. In this case it is to be considered that the function setpoint generator with target ramp function generator input does not operate. Both functions always write on the 16 bit standard input of the ramp function generator **P1171**.

- Bit9 = 1:

Each change of rotational speed is interpolated linear at the ramp function generator output to the control cycle time (125 μ s). In case of acceleration the speed controller then has a new setpoint in each cycle and the noise of the current setpoint is significantly reduced.

Due to interpolation the active set value reaches the speed controller delayed by a ramp function generator cycle (500 μ s).

P1171	Ramp Function Generator input	-100,00 bis 100,00 %	
DS	Hochlaufgeber Eingang	0,00 %	
	BM_i_DS0_RFG1Input	0x4000: 100 %	CW
	100% = 0x4000, -100% = 0xC000		
	Ramp function generator input value (100.00% \rightarrow 4000 _{hex} -100.00% \rightarrow C000 _{hex}).		
	Scaling: 100% \leftrightarrow motor maximum speed of the drive P1031		
P1172	Ramp Function Generator ramp-up time	0,00 bis 650,00 s	
DS	Hochlaufgeber Hochlaufzeit	0,00 s	
	BM_u_DS0_RFG1RampUpTime	100:1 s	CW
	Acceleration ramp for speed-controlled operation modes.		
	The time selected here corresponds to 100% setpoint change.		
P1173	Ramp Function Generator ramp-down time	0,00 bis 650,00 s	
DS	Hochlaufgeber Rücklaufzeit	0,00 s	
	BM_u_DS0_RFG1RampDownTime	100:1 s	CW
	Deceleration ramp for speed-controlled operation modes.		
	The time selected here corresponds to 100% setpoint change.		

P1174	Ramp Function Generator quick stop time	0,00 bis 650,00 s	
DS	Hochlaufgeber Schnellhaltzeit	0,00 s	
	BM_u_DS0_RFG1StopTime	100:1 s	CW
	<p>The quickstop ramp is effective in all quickstop procedures, not only in the speed-controlled operation modes.</p> <p>The time selected here corresponds to 100% setpoint change.</p> <p>For a correct function of the slowing down procedures along the quickstop or deceleration ramp the speed controller must be sufficiently parameterized.</p>		
P1175	Ramp Function Generator smoothing	0 bis 32000 ms	
DS	Hochlaufgeber Verschleiß	0 ms	
	BM_u_DS0_RFG1Smoothing	1:1 ms	-
	<p>In order to achieve a smoothing of the travel ramp edges, a PT1-element has been implemented. By use of this parameter the time constant of the PT1-element can be adjusted. Smoothing is effective only if a trapezoidal profile is set as ramp form.</p>		
P1176	Ramp Function Generator S-curve ramp-up time	0,00 bis 650,00 s	
DS	Hochlaufgeber S-Kurvenhochlaufzeit	0,00 s	
	BM_u_DS0_RFG1SCurveUpTime	100:1 s	CW
	<p>Smoothing of the ramp edges in the ramp-up for the speed controlled operation modes.</p> <p>The time selected here corresponds to 100% setpoint change.</p> <p>The selected S-curve ramp-up time should be less than the selected ramp-up time, so that the defined ramp times can be adhered to:</p> $T_{totalaccelerationtime} = T_{accelerationtime} + TSC_{Accelerationtime}$		
P1177	Ramp Function Generator S-curve ramp-down time	0,00 bis 650,00 s	
DS	Hochlaufgeber S-Kurvenrücklaufzeit	0,00 s	
	BM_u_DS0_RFG1SCurveDownTime	100:1 s	CW
	<p>Smoothing of the ramp edges in the ramp-down for the speed controlled operation modes.</p> <p>The time selected here corresponds to 100% setpoint change.</p> <p>The selected S-curve ramp-down time should be less than the selected ramp-down time, so that the defined ramp times can be adhered to:</p> $T_{decelerationtotaltime} = T_{decelerationtime} + TSC_{decelerationtime}$		

P1178	Ramp Function Generator Set Value Zone	0,00 bis 200,00 %	
DS	Hochlaufgeber Sollwert-Erreicht-Band	0,00 %	
	BM_u_DS0_RFG1SetValZone	0x4000: 100 %	CW
	This parameter defines the message threshold of the ramp function generator status <i>Setpoint reached</i> (see ramp function generator-status word P0430 , Bit12).		
	The status bit <i>Setpoint reached</i> is set if the following is valid:		
	Ramp function generator-output - ramp function generator-input ≤ ramp function generator setpoint-reached-bandwidth		
P1179	Ramp Function Generator input 32-bit	-100,00 bis +100,00 %	
DS	Hochlaufgeber Eingang 32-Bit	0,00 %	
	BM_di_DS0_RFG1Input32	0x40000000: 100 %	CW
	Ramp function generator input value with 32-bit resolution (+100,00 % ↔ 4000 0000 _{hex} -100,00 % ↔ C000 0000 _{hex}).		
	The activation of the input is made via P1170 ramp function generator mode Bit8 = 1.		
	Scaling: 100% ↔ motor maximum speed of the drive (P1031)		
P1180	Ramp Function Generator ramp-up time 32-bit	0,000 bis 650,000 s	
DS	Hochlaufgeber Hochlaufzeit 32-Bit	0,000 s	
	BM_ud_DS0_RFG1RampUpTime32	1000:1 s	CW
P1181	Ramp Function Generator ramp-down time 32-bit	0,000 bis 650,000 s	
DS	Hochlaufgeber Rücklaufzeit 32-Bit	0,000 s	
	BM_ud_DS0_RFG1RampDownTime32	1000:1 s	CW
P1182	Ramp Function Generator S-curve ramp-up time 32-bit	0,000 bis 650,000 s	
DS	Hochlaufgeber S-Kurvenhochlaufzeit 32-Bit	0,000 s	
	BM_ud_DS0_RFG1SCurveUpTime32	1000:1 s	CW

P1183	Ramp Function Generator S-curve ramp-down time 32-bit	0,000 bis 650,000 s	
DS	Hochlaufgeber S-Kurvenrücklaufzeit 32-Bit	0,000 s	
	BM_ud_DS0_RFG1SCurveDownTime32	1000:1 s	CW
P1189	speed of virtual master	0x8000 bis 0x7FFF	
DS	Geschwindigkeit virtuelle Leitachse	0	
	BM_i_DS0_CamSpeedVirtualMaster	1:1	CW
	See chapter «CAM disk» from page 108.		
P1190	Positioning mode	0x0000 bis 0xFFFF	
DS	Positionierung Modus	0x0001	
	BM_w_DS0_PPosMode	1:1	-

Also see «Setting target position (positioning)» from page 119.

Mode of positioning.

With this parameter among others the functions can be switched on or off.

Bit no.	Meaning	Target position set	Jog operation	Homing
0	1 Function of software limit switch active	X	X	
1	1 Function of hardware limit switch active	X	X	
2	1 Synchronization on actual speed value	X	X	X
3...4	Speed profile: 00 Trapezium 01 S-curve 10 Sin2 11 Reserved	X	X	X
5	Adjustable performance, if a new target is outside the software limit switch: 0 Travelling on software limit switch; Positioning status Bit5 = 1 1 No movement; error message; Positioning status Bit5 = 1	X		

Bit no.	Meaning	Target position set	Jog operation	Homing
6	Error tripping at moving in hardware limit switch 0 No error 1 Error is activated	X		
7	Starting performance at controller enable 0 After enable a positive edge in the start bit is necessary 1 After enable it it immediately started if a start bit was set	X		
8	0 No homing for positioning is necessary 1 Homing for positioning is necessary	X		
9	0 Starting of a travel request over Bit4 (new setpoint) in the control word. 1 Start of positioning via Bit11 (start positioning) in the control word (original starting performance).	X		
10	Speed profile at stop, only at Sin2-curve 0 Comply with the Sin2-profile at stop 1 Brake with S-curve at stop	X		
11	Automatic start of positioning after changing of the positioning set: 0 After switchover of the actual positioning set P1191 one edge in Bit4 (or Bit11 at mode original performance) is necessary, in order to take over a new positioning set and to start positioning. 1 If at switchover of the current positioning set the Bit4 'New setpoint' is set (or Bit11 'Start positioning' at original behavior), the new positioning set is automatically accepted and the positioning is started.	X		
12	Homing with or without the setting of homing position 0 At the end of homing the homing position is set, i. e. the position actual values and setpoints with homing position are overwritten. 1 Homing position is not set, the prior position value remains after reaching the homing position.			X

Explanatory notes:

• Bit0:

With Bit0 the monitoring of the software limit switch for the operation modes Setting target position and Jogging is switched on.

– Bit0 = 0:

The monitoring of the software limit switch is deactivated.

– Bit0 = 1:

The monitoring of the software limit switch is activated. The exact behaviour in the operation mode Setting target position depends on the setting of Bit5 and also is explained there. In the operation mode Jogging the drive is braked to 0 if it has reached a limit switch. The limit switch must be configured in **P1214** and **P1215** (no error / warning if not made).

• Bit1:

With Bit1 the monitoring of the HW limit switch for the operating modes Setting target position and Jogging is switched on.

– Bit1 = 0:

HW limit switch monitoring inactive.

– Bit1 = 1:

HW limit switch monitoring active. If reaching a limit switch the drive is slowed down to zero speed. With Bit6 also can be set if in this case an error shall be reported.

• Bit2:

If the function Synchronization on actual speed value is activated, it is possible to switch jerk-free from any operation mode (except Find notch position) into one of the position-controlled operation modes (Position control, Position set mode, Synchronous operation, Jog operation and Homing). The speed setpoint of the new operation mode is *synchronized* upon the immediate speed actual value. After that, the drive will be accelerated or decelerated, with the ramp adjusted in the new operation mode, to the preselected set speed. Limit: Only operates at Positioning setting if trapezium- or S-curve profile (Bit3 = 0 and Bit4 = 0) has been set.

• Bit3 and Bit4:

Via these bits the speed profile for positioning is selected.

Bit4	Bit3	Description
0	0	Trapezoidal profile
0	1	S-curve profile
1	0	Sine2 profile
1	1	reserved

- Bit5:

With Bit5 the behaviour at starting of a positioning can be set, if a new target position is outside the software limit switch range and this also is switched active.

- Bit5 = 0:

- * If new target position outside:

- Travel to next software limit switch; Positioning switch status Bit4 or Bit5 = 1

- * If current position already outside and the new target position inside: Travel to target position; Positioning status Bit4 or Bit5 = 0

- * If current position already outside and new target outside: Travel to next software limit switch; Positioning switch status Bit4 or Bit5 = 1

- Bit5 = 1:

- * If new target position outside: no movement; Positioning switch status Bit4 or Bit5 = 1; Error 196 or 197

- * If current position is already outside and the new target position is within travel to target position; Positioning status Bit4 or Bit5 = 0

- * If current position is already outside and new target position outside no movement; Positioning switch status Bit4 or Bit5 = 1; Error 196 or 197

The generated error does not result in a *Pulse inhibit*. It must be accepted, before a new travel starting request is accepted. With each start there is a new software limit switch check. Error 196: Software limit switch 1 active error 197: Software limit switch 2 active

- Bit6:

With Bit6 it is set if the drive with reaching of a HW limit switch shall report an error or not. The setting of Bit6 is only then effective, if the HW-limit switch monitoring was activated (see description according Bit1).

- Bit6 = 0:

- HW-limit switch monitoring does not report an error, the drive is only braked to zero speed. New positioning requests are only executed, if the starting direction leads away from the limit switch.

- Bit6 = 1:

- After passing over the HW limit switch the drive is braked to zero speed and an error (error 198 or 199) is reported. This error does not result in a pulse inhibit, but it first must be accepted, before a new travel request is accepted. New positioning requests are only executed, if the starting direction leads away from the limit switch.

- Bit7:

With Bit7 starting performance at controller enable can be set.

- Bit7 = 0:

After *Controller enable* a positive edge in the start bit is required, so that the values from the positioning data set X can be overtaken into the positioning data set 0 and so that a relative positioning can be started.

- Bit7 = 1:

If the start bit is set at *Controller enable*, the data is immediately accepted at controller enable. Also a relative positioning is immediately started.

- Bit8:

With Bit8 it is determined if the drive accepts positionings, if no homing has taken place yet.

- Bit8 = 0:

In order to operate in the operation mode Positioning no homing is necessary

- Bit8 = 1:

If the drive is enabled in operation mode positioning, without taking place of homing, an error message (error 200) is generated and the drive remains position-controlled in the current position. Positioning requests are not executed. Not until homing has been executed (once after switching on), positioning requests are executed.

- Bit9:

Starting behavior of positioning

The starting behavior of positioning is influenced with Bit9. It is distinguished between the *V-controller* behaviour resp. /bmaXX3 version 1 and the new start- and handshake mechanism, which accords to the procedure as is the case with CANopen or Drivecom.

- Bit9 = 0:

New starting- and handshake procedure: starting of positioning and handshake in order to accept data operates with Bit4 in the control word. The Bit11 in the control word has no meaning.

- Bit9 = 1:

Start- and handshake-procedure as with the *V-controller* or **b maXX[®] BM3400** version 1: Start of positioning is made via Bit11 in the control word 2. The Bit4 in the control word (new setpoint) serves only as a handshake procedure and does not have a direct influence on the positioning.

In this case the mode immediately change set (set of setpoints) can not be used.

- Bit10:

- Here the behavior can be set at a stop during a running Sin² positioning. Bit10 = 0: Braking with Sin² profile; Deceleration value of the current positioning is valid.

- Bit10 = 1:

Braking with S-curve; The delay value from **Positioning stop deceleration P1213** is valid. With this profile a stop can only be activated with a hardware limit switch. This stop is not to be mixed up with Quickstop! At Quickstop the positioning incl. the position control is switched off, speed-controlled via ramp function generator or braked directly at the current limit and then the drive is inhibited (torque-free).

- Bit12:

Homing with or without the setting of homing position

By default after reaching homing position, the actual values and setpoints are set to homing position. For a few applications especially with multiturn-absolute value encoders it can be useful, to only determine the actual position value of the encoder at the reference point in order to consider it automatically in a control. For this purpose the setting of homing position can be deactivated. The drive executes homing completely, the position values however, are not set to the adjusted homing position, but remains unchanged. The control can now read out the actual position value at the homing position.

The parameter Positioning mode can also be written at enabled drive, in order to change the positioning profile online. The changes are only then modified after a complete ending of an active positioning operation - that means with the starting of the next positioning operation. Changes at the settings for the monitoring of the hard- and software limit switches should, however, not be executed at enabled drive, due to safety reasons.

P1191	Positioning record number actual	0 bis 16	
DS	Positionierung aktuelle Satznummer	1	
	BM_u_DS0_PPosActRecordNumber	1:1	CW

Also see «Setting target position (positioning)» from page 119.

With this parameter the actual positioning set is selected. With Bit11 of positioning mode **P1190** can be selected, if at change of the active positioning set this automatically is started or if a starting edge in the control word is necessary.

Value	Meaning
0	Positioning data set 0 active, no data is copied into positioning set 0 from other positioning sets.
1...16	Accordant positioning set (1...16) active

P1192	Positioning scaling numerator	1 bis 65535 Inc	
DS	Positionierung Lagenormierung Zähler	1 Inc	
	BM_u_DS0_PPoSScalingNumer	1:1 Inc	CW
	Scaling factors not active.		
P1193	Positioning scaling denominator	1 bis 32768 Inc	
DS	Positionierung Lagenormierung Nenner	1 Inc	
	BM_u_DS0_PPoSScalingDenom	1:1 Inc	CW
	Scaling factors not active.		
P1194	Positioning window	0x00000000 bis 0xFFFFFFFF Inc	
DS	Positionierung Positionier-Fenster	0x00001000 Inc	
	BM_ud_DS0_PPoSWindow	1:1 Inc	CW

Scaling: 0x10000 Inc = 1 revolution.

Also see «Setting target position (positioning)» from page 119.

If the drive reaches a window around the new target position, the bit *Target position reached* in the status word P0301 is set.

The positioning window lies symmetrical around the target position.

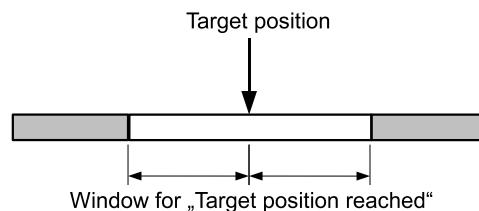


Figure 7.13: Positioning window

P1195	Positioning window time	1 bis 65535 ms	
DS	Positionierung Positionier-Fensterzeit	10 ms	
	BM_u_DS0_PPoSWindowTime	1:1 ms	-

Also see «Setting target position (positioning)» from page 119.

In order to avoid the bit *Target position reached* to be set during short-time overshooting of the positioning window, you can use this parameter to set a period, while the drive must be within the positioning window, until the correct positioning is displayed.

P1196	Positioning software limit switch 1	0x00000000 bis 0xFFFFFFFF Inc
DS	Positionierung Software-Endschalter 1	0x00010000 Inc
	BM_ud_DS0_PPosSWLimitSwitch1	1:1 Inc

Scaling: 0x10000 Inc = 1 revolution.

Also see «Setting target position (positioning)» from page 119.

Both of these parameters limit the permissible travel distance in the operation modes Position set mode and Jog operation.

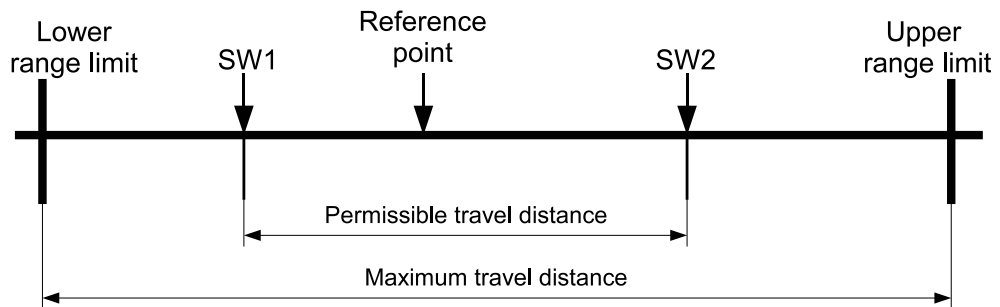


Figure 7.14: Positioning travel distance

Lower range limit = 00000000_{hex}

Upper range limit = FFFFFFFF_{hex}

The SW limit switch 1 holds the value for the permissible travel distance origin, the SW limit switch 2 holds the value for the permissible travel distance end.

For correct functioning of the software limit switches the following preconditions are required:

- In the parameter **P1190** positioning mode Bit0 must be set.
- At use of incremental encoders or singleturn encoders Homing is necessary in order to establish a connection between the actual position value and the actual position. During homing operation the SW limit switches are inactive!
- $0 < \text{SW end switch 1} < \text{Homing position} < \text{SW end switch 2} < \text{upper range limit}$.
- The maximum travel distance must not be exceeded in any operation mode (except Homing).

Function of software limit switch:

- in the operating mode position set mode: **P1000** = 1:

In position set mode it will be checked, if the new target position is outside the permissible travel distance. If this is the case, it will be positioned to the SW limit switch, which value had been intended to cross. Additionally in the positioning switch status **P0461** either the Bit4 for the SW limit switch 1 or Bit5 for the SW limit switch 2 is set.

If the value of a SW limit switch is changed after Homing, the drive may stand outside the new permissible travel distance. The actualization of the display in Positioning status as well as the validity of the new value is executed at the next data acceptance. Independently of the target input, it will be positioned to the accordant SW limit switch, if the assigned target position also is laying outside.

- in the operating mode Jog operation **P1000** = 5:

As soon as a software limit switch is attained, the drive brakes with the **Positioning stop deceleration P1213**, which was set and the according bit in the positioning switch status is set. A travelling now is only possible in the opposite direction.

If the value of a SW limit switch is changed after Homing, the drive may stand outside the new permissible travel distance. The update of the display in the positioning status is made as soon as a Jog operation is made.

P1197	Positioning software limit switch 2	0x00000000 bis 0xFFFFFFFF Inc	
DS	Positionierung Software-Endschalter 2	0xFFFF0000 Inc	
	BM_ud_DS0_PPoSSWLimitSwitch2	1:1 Inc	-
	Scaling: 0x10000 Inc = 1 revolution.		
	Also see «Setting target position (positioning)» from page 119 .		
	Description see P1196 .		
P1198	Positioning clip environment 1	0x00000001 bis 0xFFFFFFFF Inc	
DS	Positionierung Clip-Umgebung 1	0x00010000 Inc	
	BM_ud_DS0_PPoSClipEnvironment1	1:1 Inc	CW
	Scaling: 0x10000 Inc = 1 revolution.		
	Also see «Setting target position (positioning)» from page 119 .		
	If the actual value of the position reaches a window near the target position, the bit <i>clip-environment 1 reached</i> (Bit13 in the parameter positioning status P0460) is set.		
	This window is in symmetrical position near the target position, its size is determined by the parameter <i>clip-environment 1</i> .		

P1199	Positioning clip environment 2	0x00000001 bis 0xFFFFFFFF Inc	
DS	Positionierung Clip-Umgebung 2	0x00010000 Inc	
	BM_ud_DS0_PPosClipEnvironment2	1:1 Inc	CW
	Also see «Setting target position (positioning)» from page 119.		
	If the actual value of the position reaches a window near the target position, the bit <i>clip-environment 2 reached</i> (Bit14 in the parameter positioning status P0460) is set.		
	This window is in symmetrical position near the target position, its size is determined by the parameter <i>clip-environment 2</i> .		
P1200	Positioning homing position	0x00000000 bis 0xFFFFFFFF Inc	
DS	Positionierung Referenzpunkt	0x00020000 Inc	
	BM_ud_DS0_PPosHomePosition	1:1 Inc	CW
	Also see «Setting target position (positioning)» from page 119.		
	The homing position is the position value reflecting the absolute position of the drive at the homing position.		
	This value must be set before homing.		
	If the drive has reached the homing position point after homing, the immediate position set-point and the position actual value are set to the homing position value.		
	The value of the reference point must be within the permitted travelling range, i.e. between the software limit switches (P1196 and P1197).		
P1201	Positioning homing speed	1 bis 13200 Inc/ms	
DS	Positionierung Referenzgeschwindigkeit	500 Inc/ms	
	BM_u_DS0_PPosHomingSpeed	1:1 Inc/ms	CW
	Also see «Setting target position (positioning)» from page 119.		
	The homing speed reflects the absolute value of the drive's maximum travel speed in operation mode Homing.		
	With this speed, the reference switch will be reached.		
P1202	Positioning homing final speed	1 bis 50 Inc/ms	
DS	Positionierung Referenz-Endgeschwindigkeit	10 Inc/ms	
	BM_u_DS0_PPosHomingFinalSpeed	1:1 Inc/ms	CW
	Also see «Setting target position (positioning)» from page 119.		
	The homing limit speed specifies the positioning speed, which the drive shall take to reach the encoder zero angle or zero pulse. This parameter is only effective in operation mode Homing.		

P1203	Positioning homing acceleration	0,25 bis 450,00 Inc/ms ²	
DS	Positionierung Referenzbeschleunigung	5,00 Inc/ms ²	
	BM_u_DS0_PPosHomingAcceler	100:1 Inc/ms ²	CW

Also see «Setting target position (positioning)» from page 119.

The homing acceleration reflects the maximum acceleration of the drive in operation mode Homing.

For slowing down the drive in operation mode Homing the homing deceleration value is valid P1204.

P1204	Positioning homing deceleration	0,25 bis 450,00 Inc/ms ²	
DS	Positionierung Referenzverzögerung	5,00 Inc/ms ²	
	BM_u_DS0_PPosHomingDeceler	100:1 Inc/ms ²	CW

Also see «Setting target position (positioning)» from page 119.

The homing deceleration reflects the maximum deceleration of the drive in operation mode Homing.

P1205	Positioning homing mode	-10 bis 35
DS	Positionierung Referenzfahrmodus	1
	BM_i_DS0_PPosHomingMode	1:1 -

Also see «Setting target position (positioning)» from page 119.

This parameter specifies the sequenz of homing procedure. This covers the reaching direction of homing position and the homing initiator evaluation.

Value	Meaning
-10	Approaching of the mechanic limit stop with zero pulse or zero encoder pulse, counter-clockwise direction
-9	Approaching of mechanic limit stop with zero pulse or zero encoder pulse, clockwise rotation
-8	Reaching of the mechanical limit stop, counter-clockwise
-7	Reaching of the mechanical limit stop, clockwise rotation
-6	Reaching of the next encoder zero angle
-5	Reaching of positive limit switch (= 18)
-4	Reaching of negative limit switch (= 17)
-3	Setting of homing position (= 35)
-2	Approaching the zero encoder angle or Zero pulse with counter-clockwise rotation (= 33)
-1	Approaching the zero encoder angle or zero pulse with clockwise rotation (= 34)
0	Reserved
1	Negative limit switch with zero pulse or zero encoder angle
2	Positive limit switch mit zero pulse or zero encoder angle
3	Positive zero point switch with zero pulse or Zero encoder angle, counter-clockwise rotation
4	Positive zero point switch with zero pulse or Zero encoder angle, clockwise rotation
5	Negative zero point switch with zero pulse or Zero encoder angle, clockwise rotation
6	Negative zero point switch with zero pulse or Zero encoder angle, counter-clockwise rotation
7	Zero point switch, counter-clockwise from edge A, with zero pulse or zero encoder angle, clockwise rotation
8	Zero point switch, clockwise from edge A, with zero pulse or zero encoder angle, clockwise rotation

9	Zero point switch, counter-clockwise from edge B, with zero pulse or zero encoder angle, clockwise rotation
10	Zero point switch, clockwise from edge B, with zero pulse or zero encoder angle, clockwise rotation
11	Zero point switch, clockwise from edge B, with zero pulse or zero encoder angle, counter-clockwise rotation
12	Zero point switch, counter-clockwise from edge B, with zero pulse or zero encoder angle, counter-clockwise rotation
13	Zero point switch, clockwise from edge A, with zero pulse or zero encoder angle, counter-clockwise rotation
14	Zero point switch, counter-clockwise from edge A, with zero pulse or zero encoder angle, counter-clockwise rotation
15...16	reserved
17	Negative limit switch
18	Positive limit switch
19	Positive zero point switch, counter-clockwise rotation
20	Positive zero point switch, clockwise rotation
21	Negative zero point switch, clockwise rotation
22	Negative zero point switch, counter-clockwise
23	Zero point switch, on the left of edge A, clockwise rotation
24	Zero point switch, on the right of edge A, clockwise rotation
25	Zero point switch, on the left of edge B, clockwise rotation
26	Zero point switch, on the right of edge B, clockwise rotation
27	Zero point switch, on the right of edge B, counter-clockwise
28	Zero point switch, on the left of edge B, counter-clockwise
29	Zero point switch, on the right of edge A, counter-clockwise
30	Zero point switch, on the left of edge A, counter-clockwise
31...32	reserved
33	Next zero pulse or zero encoder angle, counter-clockwise rotation
34	Next zero pulse or zero encoder angle, clockwise rotation
35	Setting of homing position

At homing modes with homing on zero pulse or zero angle it is always referenced to the zero pulse by an incremental encoder and by an absolute encoder always to the zero angle.

Exception is the homing mode -6, where also with an incremental encoder is referenced to the

zero angle.

Notes:

- Due to compatibility reasons the homing modes 5 to 1 are still available. They accord to the specified modes.
- The modes 1 to 14 use the zero pulse or zero angle as an additional signal. With zero angle the mechanic zero angle is meant, that means 0° in the mechanic angle (P0393 or P0403).
- The modes 17 to 30 in principle agree to the modes 1 to 14, except that there is no zero angle or zero pulse used. In these modes referencing refers exclusively to the switch.
- The modes 33 to 35 do not use a switch.

P1206	Positioning homing encoder input	0 bis 2	
DS	Positionierung Gebereingang Referenzfahrt	0	
	BM_u_DS0_PPosHomingEncInp	1:1	CW

Also see «Setting target position (positioning)» from page 119.

Selection of encoder input for homing.

Value	Meaning
0	Automatic selection of the encoder input. Always this encoder is selected, which is assigned for position control.
1	Encoder input 1
2	Encoder input 2

P1208	Positioning switch mode	0x0000 bis 0xFFFF	
DS	Positionierung Schalter-Modus	0x0000	
	BM_w_DS0_PPosSwitchMode	1:1	-

Also see «Setting target position (positioning)» from page 119.

With this parameter, you can set for each reference initiator separately, if it is a normally open or normally closed contact.

Bit no.	Meaning
0	Mode limit switch positive
	0 Switch is NO-contact
	1 Switch is NC-contact
1	Mode limit switch negative
	0 Switch is NO-contact
	1 Switch is NC-contact
2	Mode zero point switch
	0 Switch is NO-contact
	1 Switch is NC-contact

Wiring of digital inputs (to be predefined because of wire break):

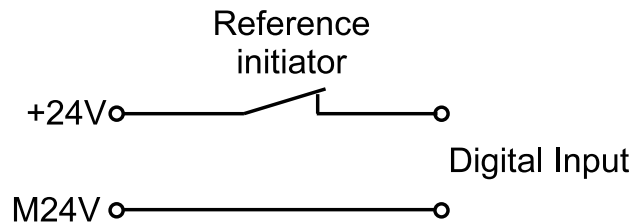


Figure 7.15: Wiring of digital inputs

P1209	Positioning encoder offset	0x0000 bis 0xFFFF Inc	
DS	Positionierung Geberoffset	0x0000 Inc	
	BM_u_DS0_PPosEncoderOffset	1:1 Inc	CW

Also see «Setting target position (positioning)» from page 119.

During Homing, the encoder offset is added to the actual encoder angle, thus enabling zero angle signal shifting. Thus the zero angle signal can be positioned outside the switching tolerances of the reference initiator.

P1210	Positioning jogging speed	1 bis 13200 Inc/ms	
DS	Positionierung Tippgeschwindigkeit	500 Inc/ms	
	BM_u_DS0_PPosJoggingSpeed	1:1 Inc/ms	CW
	Also see «Setting target position (positioning)» from page 119.		
	The jogging speed reflects the positioning speed of the drive in operation mode Jogging.		
P1211	Positioning jogging acceleration	0,25 bis 450,00 Inc/ms ²	
DS	Positionierung Tippbeschleunigung	2,00 Inc/ms ²	
	BM_u_DS0_PPosJoggingAcceler	100:1 Inc/ms ²	-
	Also see «Setting target position (positioning)» from page 119.		
	The jogging acceleration reflects the the max acceleration of the drive in operation mode Jogging.		
P1212	Positioning jogging deceleration	0,25 bis 450,00 Inc/ms ²	
DS	Positionierung Tippverzögerung	2,00 Inc/ms ²	
	BM_u_DS0_PPosJoggingDeceler	100:1 Inc/ms ²	-
	Also see «Setting target position (positioning)» from page 119.		
	The jogging deceleration reflects the maximum deceleration of the drive in operation mode Jogging.		
P1213	Positioning stop deceleration	0,25 bis 450,00 Inc/ms ²	
DS	Positionierung Halt-Verzögerung	5,00 Inc/ms ²	
	BM_u_DS0_PPosStopDeceleration	100:1 Inc/ms ²	-
	Also see «Setting target position (positioning)» from page 119.		
	The parameter becomes active, as soon as the drive exceeds a software- or hardware limit switch.		
	The drive then decelerates with the preadjusted stop deceleration down to zero speed.		
	However it remains in the status ENABLE_OPERATION.		

P1214 Digital input channel for positive limit switch 0x0000 bis 4

DS	Auswahl digitaler Eingang für positiven Endschalter	0	
	BM_w_DS0_DI_PosLimitSwitch	1:1	-

Number of the dig. input for the positive hardware limit switch. Activation see [P1190](#).

Value	Meaning
1	Selection digital input 1
2	Selection digital input 2
3	Selection digital input 3
4	Selection digital input 4

P1215 Digital input channel for negative limit switch 0x0000 bis 4

DS	Auswahl digitaler Eingang für negativen Endschalter	0	
	BM_w_DS0_DI_NegLimitSwitch	1:1	-

Number of the dig. input for the negative hardware limit switch. Activation see [P1190](#).

Value	Meaning
1	Selection digital input 1
2	Selection digital input 2
3	Selection digital input 3
4	Selection digital input 4

P1216 Digital input channel for origin switch 0x0000 bis 4

DS	Auswahl digitaler Eingang für Nullpunkt-Schalter	0	
	BM_w_DS0_DI-OriginSwitch	1:1	-

Number of the digital input, which is to be used for the zero point switch.

Value	Meaning
0	No input selected
1	Selection digital input 1
2	Selection digital input 2
3	Selection digital input 3
4	Selection digital input 4

P1217	Positioning homing blocking time	0,01 bis 655,35 s	
DS	Positionierung Referenzfahrt Blockierzeit	1,00 s	
	BM_u_DS0_PPosHomingBlockTime	100:1 s	CW

Also see «Setting target position (positioning)» from page 119.

Adjustable blocking time only at homing modes to the mechanical limit stop.

The parameter specifies, after which time the mechanical limit stop is recognized, at blocking of the drive. The requirements for a blocking are drive at the current limit (speed controller status **P0350** Bit13 = 1) and simultaneously existing zero speed message (encoder 1 status **P0390** or encoder 2 status **P0400** Bit10).

Homing block time must be less than **P1260** blocking time as it otherwise causes an error reaction „drive blocked“ (**P0214** error speed controller).

P1218	Positioning homing torque limit	0,00 bis 100,00 %	
DS	Positionierung Referenzfahrt Momentengrenze	25,00 %	
	BM_u_DS0_PPosHomingTrqLim	0x4000: 100 %	CW

Also see «Setting target position (positioning)» from page 119.

Limitation of torque only for homing modes to the mechanical limit stop.

Limitation begins with the starting of homing and is cancelled with recognition of the mechanic limit stop.

P1219	Positioning feedrate override	0,00 bis 655,35 %	
DS	Positionierung Vorschub-Override	100,00 %	
	BM_u_DS0_PPosFeedrateOverride	100:1 %	CW

With this parameter a setpoint speed, which was set beforehand, can be adjusted online (during movement). The factor operates on the following speeds:

- Maximum positioning speed of the active positioning set in the operation mode Setting target position (positioning)

$$v_{max} = \frac{v_{maxPosSatz} \cdot \text{Feedrate-Override}[\%]}{100\%} = \frac{v_{maxPosSatz} \cdot P1219}{100\%}$$

- Jog speed **P1210** in the operating mode jog operation

$$v_{max} = \frac{v_{maxTipp} \cdot \text{Feedrate-Override}[\%]}{100\%} = \frac{P1210 \cdot P1219}{100\%}$$

The limit to the maximum speed of the drive **P1031** is made after multiplication with the feedrate-override.

Special cases in operation mode Setting target position (positioning):

- The parameter does not operate online, if the sin²-profile was set.
- If multiplying with the feedrate-override results in a maximum speed of 0 Inc/ms, then it is moved with a speed of 1 Inc/ms. That means, that it is not stopped! (0x10000 Inc = 1 revolution)

P1220	Synchronous operation mode	0x0000 bis 0xFFFF	
DS	Gleichlauf Mode	0x0000	
	BM_w_DS0_SynCtrlMode	1:1	-

Also see «Synchronous operation» from page 150.

Mode of synchronous control

Bit no.	Meaning
	Synchronous operation modes
3...0	0000 Speed synchronous operation (Kv=0) or relative synchronous angle operation (Kv>0)
	0011 Synchronous operation with setpoint via position parameters
	0100 Synchronous operation with synchronous setpoint setting via position delta input
	0101 Virtual master axis without ramp function generator
	0110 Virtual master axis with ramp generator

Bit no.	Meaning	
4	0	Transparent-mode - changes for parameter values for the gear factors are accepted and in the transmission ratio are immediately active
	1	Edit mode: Changes of the gear factors are accepted in the parameter values only. The active transmission ratio remains unchanged.
	1 → 0	Falling edge: The modified parameter rev. Slave axis and rev. Master axis is simulataneously accepted.
5	0	No extrapolation
	1	Extrapolation activated
8	1	Phasing module: Module is switched on
10...9	0 0	Phasing module: relative travelling direction shortest distance
	0 1	Phasing module: relative travelling direction always positive
	1 0	Phasing module: relative travelling direction always negative
	1 1	Phasing module: relative travelling direction always positive
11	1	Phasing module: At active movement a minimum resulting speed axis, due to the movement, is not under-run.
12	1	Phasing module: The maximum positioning speed is adjusted with a factor dynamically to the set speed. The Bit11 is thereby not considered.
13	1	Phasing-Module: Positioning is always activated, if a not yet positioned offset angle is existent - also without explicit command in order to start the phasing module (setting of Bit0 in parameter (setting of Bit0 in parameter P0476).

Explanatory notes:

- Bit3...Bit0: Mode of the synchronous operation
 - 0000: Relative angular synchronism

The setpoint for the slave axis is predetermined in this mode directly over the encoder input. At enable of the drive in operation mode Synchronous operation or at switch-over in this operation mode in the running operation the angle between master- and slave axis is fixed. This means, that the master axis and the slave axis have, at this point of time, a permanent but not defined angular reference to each other. When the controller is inhibited or when changing to another operation mode the existing reference of the angle between the master- and the slave axis gets lost. With help of the phasing module an absolute angular synchronous operation (defined angle between master- and slave axis) can be reached. Additionally to the setpoint via the encoder input via a synchronous setpoint assignment an overlaid movement is able to be implemented. The setpoint specified via parameters **P0471** or **P0472** is interpolated by setting interval (sync-interval, **P0532**) to the control cycle and additively takes effects to setpoint via the encoder input.

- 0011: Synchronous operation with synchronous setpoint assignment over position parameter

The absolute position setpoints are directly specified, e. g. via a field bus. The setpoint assignment operates via the parameters **P0471** or **P0472** and thereby must take place in a fixed interval. The setpoint is interpolated via the interpolator from the setting interval (sync-interval, **P0532**) on the control cycle.

- 0100: Synchronous operation with synchronous setpoint setting via position delta input

Parameter **P0473** is used for setpoint assignment. A position delta is specified (setpoint change). The specified position delta is not interpolated, it must be specified referring to the control cycle (0.125 ms).

- 0101: Virtual master axis without ramp function generator

Operating principle is the same as with the virtual master axis with ramp generator, only that in this case the ramp generator is by-passed. Parameter **P0474** synchronous speed setpoint is used for setpoint assignment.

- 0110: Virtual master axis with ramp function generator

A speed setpoint is specified via the ramp function generator input **P1171**. In the drive a virtual master axis (that means a position setpoint) is calculated. Then the drive follows this virtual master axis via a synchronous operation. This mechanism makes sense, if there still are further axes e.g. via an encoder emulation connected as slave axes. These axes then receive the setpoint of the virtual master axis as input. There-with all axes follow the same position setpoint - also the axis which calculates the virtual master axis at its own.

- Bit5: Extrapolation at setpoint failure

- Only important at synchronous setpoint setting via position parameters or relative angular synchronous operation with overlaid synchronous setpoint setting. If the bit has been set, at a failure of setpoint setting the last setpoint changing is continuously calculated (extrapolated). The last speed therewith remains.



NOTE

Extrapolation is not time-limited, if the setpoint completely fails, the latter speed remains.

If the bit is not set at a setpoint failure it is not extrapolated. The last position setpoint remains.

Thus the drive comes to a sudden stop during the time of the failure.

P1221	Synchronous operation revolution of slave	-32767 bis 32767	
DS	Gleichlauf Umdrehung der Folgeachse	3000	
	BM_i_DS0_SynCtrlRevSlave	1:1	CW

Also see «Synchronous operation» from page 150.

Numerator in transmission ratio of electronic gearing.

P1222	Synchronous operation revolution of master	1 bis 32767	
DS	Gleichlauf Umdrehung der Leitachse	3000	
	BM_i_DS0_SynCtrlRevMaster	1:1	CW

Also see «Synchronous operation» from page 150.

Denominator in transmission ratio of electronic gearing. The transmission ratio of the electronic gear function is calculated with the following equation:

$$i = \frac{Rev.Slaveaxis}{Rev.Masteraxis} = \frac{P1221}{P1222} \quad (7.1)$$

Denominator and numerator of the transmission ratio consist of integers without decimal places. The nominator may also be negative. This way the function of a reverse gear can be realized.

It is recommended to select for the required transmission ratio the smallest possible values for **P1221** or **P1222**.

In the following table some transmission ratios and the respective parameter values are presented.

I	Rev. Master axis	Rev. Slave axis
0.2	10	2
-0.78	100	-78
1.15	100	115
9,452	1000	9452
0.3333	10	3

Example: Reversal of transmission ratio from 0.8 to 1.15

with edit mode = 0 (transparent mode)

Rev. Master axis	Rev. Slave axis	Edit mode	Transmission ratio i
10	8	0	0.8
10 → 100	8	0	0.8 → 0.08
100	8 → 115	0	0.08 → 1.15

Rev. Master axis	Rev. Slave axis	Edit mode	Transmission ratio i
10	8	0	0.8
10	8 → 115	0	0.8 → 11.5
10 → 100	115	0	11.5 → 1.15

NOTE



In transparent mode unwanted transmission ratios may occur!

with edit mode = 1

Rev. Master axis	Rev. Slave axis	Edit mode	Transmission ratio i
10	8	0	0.8
10	8	→ 1	0.8
10 → 100	8	1	0.8
100	8 → 115	1	0.8
100	115	1 → 0	1.15

If you select edit mode = 1 no unwanted transmission ratios will occur!

P1223	Maximum driving speed	1 bis 1193048 Inc/ms	
DS	Maximale Verfahrgeschwindigkeit	298256 Inc/ms	
	BM_ud_DS0_PhaseSpeed	1:1 Inc/ms	CW
<p>The range of values of the parameter is 1 to 1193048 INC/ms, whereat the increments refer to 32 bit angles ($360^\circ = 2^{32}$ Inc).</p> <p>This accords to about $8.4 \cdot 10^{-5}$ degrees/s to about 100 degree/s.</p> <p>The standard value accords to 25 degrees/s.</p> <p>With this parameter the maximum positioning speed at the trapezoidal procedure of the angular sum is adjustable.</p> <p>If Bit12 in parameter P1220 is set (dynamic maximum positioning speed) the parameter is not effective.</p>			
P1224	Acceleration	12,50 bis 11930,50 Inc/ms ²	
DS	Beschleunigung	716,00 Inc/ms ²	
	BM_ud_DS0_PhaseAccel	100:1 Inc/ms ²	CW
<p>The range of values of the parameter is 12.50 to 1193.50 Inc/ms², whereat the increments refer to 32 bit angles ($360^\circ = 2^{32}$ Inc). This accords to about 1.05 degrees/s² to about 1000.00 degrees/s². The standard value accords to 60.01 degrees/s².</p> <p>With the parameter the acceleration on the ramps is adjustable with the trapezoidal procedure of the angular sum.</p> <p>Negative accelerations, which result when changing the positioning speed by change of maximum positioning speed (Bit11 or Bit12 in the parameter P1220 is set), are not limited by this parameter.</p>			
P1225	Minimal total speed	0 bis 4294968 Inc/ms	
DS	Minimal resultierende Geschwindigkeit	0 Inc/ms	
	BM_ud_DS0_PhaseMinResSpeed	1:1 Inc/ms	CW
<p>The range of values of the parameter is 0 to 4294968 Inc/ms, whereat the increments refer to 32 bit angles ($360^\circ = 2^{32}$ Inc). This accords to 0 degrees/s to about. 360 degrees/s. The standard value corresponds to 0 degrees/s. The selected value is considered as absolute value independent from sign.</p> <p>With this parameter a minimum total axis speed is adjustable, which may not be under-run by an additive overlaid movement.</p> <p>This parameter is only then active if Bit11 was set and Bit12 was not set in parameter P1220.</p>			

P1226	Speedfactor	0x0000 bis 0x4000 %	
DS	Geschwindigkeitsfaktor	0 %	
	BM_u_DS0_PhaseSpeedFactor	0x4000: 100 %	CW

If Bit12 is set in parameter **P1220** the maximum positioning speed of the phasing module is adjusted dynamic to the speed setpoint of the axis. The maximum positioning speed then is computed as follows:

$$\text{MaximumPositioningspeed} = \frac{\text{Speedsetvalue} \cdot \text{Parameter1226}[\%]}{100}$$

All values are calculated as absolute values and therewith are independent from the direction of rotation.

P1230	Position switch mode	0 bis 0xFFFF	
DS	Endschalter Modus	0	
	BM_w_DS0_PosSwitchMode	1:1	CW

This parameter is not used.

P1239	Positioning modulo position	0x00010000 bis 0xFFFFFFFF Inc	
DS	Positionierung Modulo Position	0x00010000 Inc	
	BM_ud_DS0_PPosModuloLimPos	1:1 Inc	-

With this parameter the modulo value range for the modulo positioning method is determined.

A change of the parameter is only effective after a pre-established controller inhibit.

Details for modulo positioning are under **P0601** positioning target input.

P1240	Power Unit PWM frequency	2 bis 16 kHz	
DS	Leistungsteil PWM Frequenz	8 kHz	
	BM_u_DS0_PWM_Frequency	1:1 kHz	-

The power units can be operated with the switch frequencies 2kHz, 4kHz, 8kHz and 16kHz. The nominal- and peak currents as well as the power unit time constants are dependent on the switch frequency (**P0010** - **P0015**, **P0032** - **P0034**).

For 2kHz there is no nominal current parameter. The nominal current is

$$(\text{AmpNomCurrent16kHz} * 8 + 3 * \text{AmpNomCurrent4kHz}) / 4.$$

The switching frequency can only be changed in drive inhibited status.

P1241	Power Unit max. drive current	0,1 bis 6553,5 A	
DS	Leistungsteil Maximalstrom des Antriebs	2,5 A	
	BM_u_DS0_CurrentDriveMax	10:1 A	-
	Maximum current output of power unit.		
	This parameter defines the current scaling, i.e. it is the reference value for all percental current parameters.		
	P1241 is displayed as effective value, all parameter, which are scaled to P1241 , are also effective values (the amplitude is $\sqrt{2}$ -times greater).		
	The adjustable maximum value is the actual peak current (dependent on the PWM-frequency (P1240)).		
P1242	DC link voltage lower limit	0 bis 100 %	
DS	Abschaltschwelle Unterspannung Uzk	75 %	
	BM_u_DS0_DCLinkmin	0x4000: 100 %	-
	The undervoltage limit is specified percental to Power Unit DC link nominal voltage P0020 .		
	If the according bits in P3377f are activated then at P0484 < P1242 E94 is initiated.		
P1250	DC link controller set value	150 bis 900 V	
DS	Uzk-Regler Sollwert	850 V	
	BM_u_DS0_DCLinkCtrlVoltSet	1:1 V	-
	Maximum value of DC link voltage.		
	When the drive is slowing down, energy from the motor is fed back into DC link, which is charged further by this.		
	Systems without energetic recovery can dissipate that energy only by use of a chopper resistor.		
	To avoid the DC link voltage from rising too high, a regulation is applied which limits it to a preadjusted maximum value. This is achieved, if required, by reducing the deceleration torque of the drive, so the DC link voltage will not rise further.		
	Especially for devices with power unit processor (P3379) also see «DC link controller» from page 113 .		
P1251	DC link controller P-gain	1,0 bis 255,9	
DS	Uzk-Regler P-Verstärkung	50,0	
	BM_u_DS0_DCLinkCtrl_PGain	10:1	-
	P-gain of the DC link controller.		

Parameter ID	Parameter Name	Value Range	Unit	Notes
P1252	DC link controller integral-action time	0,2 bis 1000,0	ms	
DS	Uzk-Regler Nachstellzeit	20,0	ms	
	BM_u_DS0_DCLinkCtrl_ITime	10:1	ms	-
	Integral action time of the DC link controller.			
P1253	ballast resist	0,1 bis 750,0	Ohm	
DS	Groesse angeschlossener Bremswiderstand	300	Ohm	
	BM_u_DS0_BallastResist	10:1	Ohm	-
	This parameter is not used.			
P1254	continous brake power	0 bis 600000	W	
DS	Dauerbremsleistung	30	W	
	BM_ud_DS0_ContBrakePower	1:1	W	-
	This parameter is not used.			
P1255	Energy Storage Capacity	0 bis 100000	Ws	
DS	Energiespeicherkapazitaet	5000	Ws	
	BM_ud_DS0_EnergyStorCapacity	1:1	Ws	-
	This parameter is not used.			
P1260	blocking time	0,0 bis 6500,0	s	
DS	Blockierzeit	10,0	s	
	BM_u_DS0_BlockingTime	10:1	s	-
	Tripping time of blocking monitor.			
	The block monitoring is active, if the drive controller is at the current limit (speed controller status, P0350 , Bit13 = 1) and at the same time there is a zero speed message (encoder 1 status P0390 or encoder 2 status P0400 , Bit10 or Bit9, according to condition of Bit3 in parameter Speed controller mode P1030).			
	A blocked drive is displayed via Bit4 in Speed controller status P0350 .			
	When the tripping time of the blocking monitoring is up, the drive will be switched off and an error message is generated.			
	If blocking time = 0.0 s, the block monitoring is switched off.			

P1261	N=0 threshold blocking time	0,00 bis 100,00 %	
DS	N=0 Schwelle Blockierüberwachung	1,00 %	
	BM_u_DS0_Mon_LLimBlocking	0x4000: 100 %	CW
	Speed-zero-threshold only for speed controller block monitoring in % of the maximum speed.		
	For the speed controller block monitoring via this parameter an own zero speed threshold can be set, independent on the parameters open loop N=O threshold (P1063), encoder 1 N=0 threshold (P1073) and encoder 1 N=0 threshold (P1083). The activation of this threshold occurs with the setting of Bit3 in parameter speed controller mode (P1030).		
	This parameter does not effect the operating modes:		
	<ul style="list-style-type: none"> • Homing on mechanic stop, • Positioning, • controlled brake procedures. 		
P1270	Field weakening controller P-gain	0,0 bis 127,9	
DS	Feldschwächregler P-Verstärkung	2,0	
	BM_u_DS0_FieldWeakCtrl_PGain	10:1	-
P1271	Field weakening controller integral-action time	0,0 bis 1000,0 ms	
DS	Feldschwächregler Nachstellzeit	20,0 ms	
	BM_u_DS0_FieldWeakCtrl_ITime	10:1 ms	-
P1272	Flux controller P-gain	0,0 bis 127,9	
DS	Flußregler P-Verstärkung	3,0	
	BM_u_DS0_FluxCtrl_PGain	10:1	-
P1273	Flux controller integral-action time	0,2 bis 1000,0 ms	
DS	Flußregler Nachstellzeit	20,0 ms	
	BM_u_DS0_FluxCtrl_ITime	10:1 ms	-

P1290	Parameter selection statusbit 14	0 bis MaxParaNr	
DS	Parameterauswahl Statusbit 14	0	
	BM_u_DS0_StatusB14_IdSelect	1:1	-
	Selection of the parameter for the freely defined status Bit14 in the drive manager status word P0301 .		
	If in the selected parameter a bit from the mask P1291 is set, Bit14 in the status word is set.		
P1291	Bit mask for statusbit 14	0x0000 bis 0xFFFF	
DS	Bitmaske für Statusbit 14	0	
	BM_w_DS0_StatusB14_Mask	1:1	-
	Mask for the freely defined status Bit14 in the drive manager status word P0301 .		
	If in the selected parameter P1290 a bit from the mask is set, Bit14 in the status word is set.		
P1292	Parameter selection statusbit 15	0 bis MaxParaNr	
DS	Parameterauswahl Statusbit 15	0	
	BM_u_DS0_StatusB15_IdSelect	1:1	-
	Selection of the parameter for the freely defined status Bit15 in the drive manager status word P0301 .		
	If in the selected parameter a bit from the mask P1293 is set, Bit15 in status word is set.		
P1293	Bit mask for statusbit 15	0x0000 bis 0xFFFF	
DS	Bitmaske für Statusbit 15	0	
	BM_w_DS0_StatusB15_Mask	1:1	-
	Mask for the freely defined status Bit15 in the drive manager status word P0301 .		
	If in the selected parameter P1292 a bit from the mask is set, Bit15 in status word is set.		
P1310	Touch probe mode	0x0000 bis 0xFFFF	
DS	Messtaster Modus	0	
	BM_w_DS0_TouchPrMode	1:1	-
	This parameter is not used.		

P1320	Use autotuning parameter	0x0000 bis 0xFFFF	
DS	Anwenden der selbstoptimierten Parameter	0x0000	
	BM_w_DS0_AutotuningApplication	1:1	-

Meaning of the single bits.

Bit no.	Meaning
0	Stator resistance: 0 Measured stator resistance is not used 1 Measured stator resistance is used in motor control
1	Leakage inductance for ASM (inductance for SM): 0 Measured inductance is not used 1 Measured inductance is used in motor control
2	Dead time measurement of the inverter: 0 Measured dead time of the inverter is not compensated 1 Measured dead time of the inverter is compensated

The measured motor parameters are used in the motor control and the dead time compensation is activated, if the according bits were set.

The setting of the bits is only then permitted, if the according bit *Autotuning executed* in **P0852** already was set.

If the according bit is zero, motor control uses the resistance or the inductance from the motor data sheet.

P1360	Programmable PID controller mode	0x0000 bis 0xFFFF	
DS	Programmierbarer PID-Regler Modus	0x0300	
	BM_w_DS0_PrPIDCtrlMode	1:1	-

This parameter is not used.

P1361	Source number: programmable PID controller set value	0 bis MaxParaNr	
DS	Quellnummer programmierbarer PID-Regler Sollwert	0	
	BM_u_DS0_PrPID_SetValuePxxx	1:1	-

This parameter is not used.

P1362	Source number: programmable PID controller act. Value	0 bis MaxParaNr	
DS	Quellnummer programmierbarer PID-Regler Istwert	0	
	BM_u_DS0_PrPID_ActValuePxxx	1:1	-
	This parameter is not used.		
P1363	Programmable PID controller P-gain	0,00 bis 327,67	
DS	Programmierbarer PID-Regler P-Verstärkung	0,00	
	BM_u_DS0_PrPIDCtrl_PGain	100:1	-
	This parameter is not used.		
P1364	Programmable PID controller integral-action time	0 bis 7200000 ms	
DS	Programmierbarer PID-Regler Nachstellzeit	0 ms	
	BM_ud_DS0_PrPIDCtrl_ITime	1:1 ms	-
	This parameter is not used.		
P1365	Programmable PID controller derivative time	0 bis 60000,000 ms	
DS	Programmierbarer PID-Regler Vorhaltzeit	0 ms	
	BM_ud_DS0_PrPIDCtrl_DTime	1000:1 ms	-
	This parameter is not used.		
P1366	Programmable PID controller smoothing time	0 bis 2000,0 ms	
DS	Programmierbarer PID-Regler Glättungszeit	0 ms	
	BM_u_DS0_PrPID_SmoothTime	10:1 ms	-
	This parameter is not used.		
P1367	Upper limiter programmable PID controller output	-100,00 bis 100,00 %	
DS	Obere Begrenzung des programmierbaren PID-Regler Ausganges	100,00 %	
	BM_i_DS0_PrPID_OutULimit	0x4000: 100 %	CW
	This parameter is not used.		

P1368	Lower limiter programmable PID controller output	-100,00 bis 100,00 %	
DS	Untere Begrenzung des programmierbaren PID-Regler Ausganges	-100,00 %	
	BM_i_DS0_PrPID_OutLLimit	0x4000: 100 %	CW
	This parameter is not used.		
P1369	Target number: programmable PID controller	0 bis MaxParaNr	
DS	Zielnummer programmierbarer PID-Regler	0	
	BM_u_DS0_PrPID_TargetPxxx	1:1	-
	This parameter is not used.		
P1370	Center frequency of speed set value notchfilter	0 bis 4000 Hz	
DS	Sperrfrequenz des Drehzahlsollwert-Notchfilters	0 Hz	
	BM_u_DS0_SpeedSetFcenter	1:1 Hz	-
	See «Notch filter» from page 87.		
P1371	Bandwidth of speed set value notchfilter	10 bis 2000 Hz	
DS	Bandbreite des Drehzahlsollwert-Notchfilters	100 Hz	
	BM_u_DS0_SpeedSetBandwidth	1:1 Hz	-
	See «Notch filter» from page 87.		
P1372	Center frequency of speed act. value notchfilter	0 bis 4000 Hz	
DS	Sperrfrequenz des Drehzahlistwert-Notchfilters	0 Hz	
	BM_u_DS0_SpeedActFcenter	1:1 Hz	-
	See «Notch filter» from page 87.		
P1373	Bandwidth of speed act. value notchfilter	10 bis 2000 Hz	
DS	Bandbreite des Drehzahlistwert-Notchfilters	100 Hz	
	BM_u_DS0_SpeedActBandwidth	1:1 Hz	-
	See «Notch filter» from page 87.		
P1374	Center frequency of Iq set value notchfilter	0 bis 8000 Hz	
DS	Sperrfrequenz des Iq-Sollwert Notchfilters	0 Hz	
	BM_u_DS0_IqSetFcenter	1:1 Hz	-
	See «Notch filter» from page 87.		

P1375	Bandwidth of Iq set value notchfilter	20 bis 4000 Hz	
DS	Bandbreite des Iq-Sollwert Notchfilters	100 Hz	
	BM_u_DS0_IqSetBandwidth	1:1 Hz	-
	See «Notch filter» from page 87.		
P1380	Parameter number input value two-level-controller 1	0 bis MaxParaId	
DS	Parameternummer Istwert 2-Punkt-Regler1	0	
	BM_ud_DS0_TLC_In	1:1	-
	Parameter number of the two-level-controller 1 input.		
	With value 0 there is no comparison to absolute thresholds.		
	If the selected parameter is a signed value (data type INT, DINT), the comparison with the absolute switching thresholds takes place signed too. In the other case if the selected parameter is unsigned (data type UINT, UDINT, WORD, DWORD), the comparison with the absolute switching thresholds happens unsigned.		
	If memory addresses directly shall be accessed to, see procedure at P2000 (may be blocked in WinBASS/Prodrive or adjustable only via the parameter table).		
	At 32 bit parameters only the upper 16 bits are evaluated.		
P1381	Parameter num relative compare value two-level-controller 1	0 bis MaxParaId	
DS	Parameternummer relativer Vergleichswert 2-Punkt-Regler1	0	
	BM_ud_DS0_TLC_InRel	1:1	-
	Parameter number of the relative compare value of the two-level-controller 1.		
	With value 0 there is no comparison to relative thresholds.		
	If memory addresses directly shall be accessed to, see procedure at P2000 (may be blocked in WinBASS/Prodrive or adjustable only via the parameter table).		
	At 32 bit parameters only the upper 16 bits are evaluated.		
P1382	Lower threshold absolute two-level-controller 1	-32768 bis 32767	
DS	Untere absolute Schaltschwelle 2-Punkt-Regler1	0	
	BM_i_DS0_TLC_AbsLowerThreshold	1:1	-
	Lower absolute switch threshold of the 2-level controller 1 referring to the parameter, which was entered in P1380.		
	Bit0 of parameter TLC_mode (P1384) must be set, to let the 2-level controller 1 operate with absolute comparison thresholds.		
	The two-level-controller 1 switches on, if the following is true:		
	Parameter actual value $1 \leq$ 2-level controller lower absolute switch threshold		

P1383	Upper threshold absolute two-level-controller1	-32768 bis 32767	
DS	Obere absolute Schaltschwelle 2-Punkt-Regler1	0	
	BM_i_DS0_TLC_AbsUpperThreshold	1:1	-

Upper absolute switch threshold of the 2-level controller 1 referring to the parameter, which was entered in **P1380**.

Bit0 of parameter TLC_mode (**P1384**) must be set, to let the 2-level controller 1 operate with absolute comparison thresholds.

The two-level-controller 1 switches off, if the following is true:

Parameter actual value $1 \geq 2$ -level controller upper absolute switch threshold

P1384	Mode two-level-controller1	0 bis 0xFFFF	
DS	Betriebsart 2-Punkt-Regler1	0	
	BM_w_DS0_TLC_Mode	1:1	-

Bit no.	Meaning
0	0 Comparison actual value to absolute thresholds inactive (see P1382 and P1383)
	1 Comparison actual value to absolute thresholds active
1	0 Comparison actual value to relative thresholds inactive (see P1385 and P1386)
	1 Comparison actual value to relative thresholds active
2	0 No absolute-value generation at actual value (comparison signed)
	1 Absolute-value generation at actual value (symmetric monitoring)

If Bit0 and Bit1 are set, the switching thresholds of the relative and absolute comparators are considered so that the characteristic of the relative threshold can be limited and monitored by a fixed, absolute threshold. The output of the two-level controller 1 thus switches on, if the actual value falls below the relative and absolute lower threshold and switches off, if the actual value exceeds the relative or absolute upper threshold (NOR logic).

If Bit2 is set, the two-level-controller 1 generates the absolute value of the actual value and compares this with the thresholds, which also must be positive. Applications for this are e.g. speed monitoring (independent from pos. and neg. direction).

P1385	Lower threshold relative two-level-controller1	-32768 bis 32767	
DS	Untere relative Schaltschwelle 2-Punkt-Regler1	0	
	BM_i_DS0_TLC_RelLowerThreshold	1:1	-
	Lower relative switching threshold of the 2-level controller 1 referring to the parameters, which were entered in P1381 .		
	Bit1 of parameter TLC_mode (P1384) must be set, to let the 2-level controller 1 operate with relative comparison thresholds.		
	The two-level-controller 1 switches on, if the following is true:		
	Parameter actual value $1 \leq \text{P1381} + \text{lower relative switching threshold}$		
P1386	Upper threshold relative two-level-controller1	-32768 bis 32767	
DS	Obere relative Schaltschwelle 2-Punkt-Regler1	0	
	BM_i_DS0_TLC_RelUpperThreshold	1:1	-
	Upper relative switching threshold of the 2-level controller 1 referring to the parameters, which were entered in P1381 .		
	Bit1 of parameter TLC_mode (P1384) must be set, to let the 2-level-controller 1 operate with absolute comparison thresholds.		
	The two-level-controller 1 switches off, if the following is true:		
	Parameter actual value $1 \geq \text{P1381} + \text{upper relative switching threshold}$		
P1387	Target number two-level-controller1 output	0 bis MaxParaNr	
DS	Zielnummer 2-Punkt-Regler1-Ausgang	0	
	BM_u_DS0_TLC_TargetPxxx	1:1	-
	Number of the parameter to be changed by the 2-level controller output.		
	If the SW-option 2-level controller is not enabled, the parameter cannot be written (error 43).		
	If the 2-level controller shall be used to switch between data sets, see «Switching to data set 1 to 8» from page 34 .		
P1388	Bit selection two-level-controller1 output	0 bis 0xFFFF	
DS	Bit-Auswahl 2-Punkt-Regler1-Ausgang	0	
	BM_w_DS0_TLC_BitSelection	1:1	CW
	Selection of the bits of the target parameter to be changed by the two-level controller 1 output.		

P1389	Set bit pattern for LOW state two-level-controller1 output	0 bis 0xFFFF	
DS	Bitmuster bei LOW 2-Punkt-Regler1-Ausgang	0	
	BM_w_DS0_TLC_LowPattern	1:1	CW
	Bit pattern which is written to the target parameter (only bits according to P1388) at 2-level-controller 1 output LOW (negative edge).		
P1390	Set bit pattern for HIGH state two-level-controller1 output	0 bis 0xFFFF	
DS	Bitmuster bei HIGH 2-Punkt-Regler1-Ausgang	0	
	BM_w_DS0_TLC_HighPattern	1:1	CW
	Bit pattern which is written to the target parameter (only bits according to P1388) at 2-level-controller 1 output HIGH (positive edge).		
P1400	Holding brake control mode	0x0000 bis 0xFFFF	
DS	Haltebremse Ansteuerungsart	0x0000	
	BM_w_DS0_MotBrakeMode	1:1	-

Bit no.	Meaning
0	Control mode 0 Manual 1 Automatic
1	Brake control in automatic control mode (Bit0 = 1) Brake status monitoring 0 Brake status is not monitored, status of brake is not evaluated 1 Brake status is monitored (e.g. start drive only, if the brake is released), If setpoint- and actual status don't match, an error message (P0211) is generated after expiration of timeout (P1404).
2	Brake pad monitoring 0 Brake pad checkback signal is not read, brake pad is not monitored. 1 Brake pad checkback signal is read out, brake pad is monitored. If the signal reports an error, an error message (P0211) is generated.

P1401	Holding brake control automatic	0x0000 bis 0xFFFF	
DS	Haltebremse Ansteuerungsart Automatik	0x0000	
	BM_w_DS0_MotBrakeAutoMode	1:1	-

Control of motor holding brake in automatic mode (P1400 Bit0 = 1).

Bit no.	Meaning
0	Brake release mode 0 Without holding torque input 1 With holding torque input from P1402
1	Evaluation only if Bit0 = 1 Release the brake if 0 Drive torque = holding torque P1402 1 Time of P1407 has expired after starting of the holding torque setup.
2	Applying the brake at pulse inhibit 0 Brake applies immediately at pulse inhibit. 1 Brake closes at pulse inhibit, as soon as the momentary speed (amount) has fallen below the speed threshold (P1403).

P1402	Holding brake torque threshold	-100,00 bis 100,00 %	
DS	Haltebremse Drehmomentschwelle	100,00 %	
	BM_i_DS0_MotBrakeTorque	0x4000: 100 %	CW

Torque threshold for torque-controlled opening of holding brake in automatic operation (P1400 Bit0 = 1).

This torque is generated before the opening of the brake, if the according mode was selected (P1401 Bit0 = 1).

Also see «Brake management» from page 99.

P1403	Holding brake speed threshold	0,50 bis 100,00 %	
DS	Haltebremse Drehzahlschwelle	1,00 %	
	BM_u_DS0_MotBrakeSpeedLim	0x4000: 100 %	-

Threshold value for speed-dependent intervention of motor holding brake in automatic mode (P1400 Bit0 = 1).

The brake is applied in the following cases, as soon as the amount of the current speed falls below the threshold value:

- Drive brakes active (stop at the ramp)
- Drive is torque-free (pulses are disabled, P1401 Bit2 must be 1)

P1404	Holding brake timeout check-back signal	100 bis 1000 ms	
DS	Haltebremse Timeout Rückmeldesignal	1000 ms	
	BM_u_DS0_MotBrakeInTimeout	1:1 ms	-

Timeout for the evaluation of the checkback signal.

If the expected brake status (opened/applied) is not recognized within the timeout period, an error reaction occurs.

P1405	Pulse inhibit delay	0 bis 1000 ms	
DS	Verzögerung Impulssperre	500 ms	
	BM_u_DS0_MotBrakeCloseDelay	1:1 ms	-

Delay time in consideration of brake applying time and if necessary of the dead time by a relay in the automatic mode (P1400 Bit0=1).

After applying the brake during an active brake operation (e.g. Quickstop at ramp) the pulses are inhibited not until expiration of the time, which was set in P1405. Therewith it can be assured, that the drive only then becomes zero-torque, if the holding brake has generated its complete mechanical brake power.

- The evaluation of brake status is switched off (P1400 Bit1 = 0):
After a brake command the pulse inhibit is activated at the first after expiration of the time, which was set in P1405.

- The evaluation of the brake status is activated: (P1400 Bit1 = 1):
The drive at the first becomes torque-free after expiration of the time set in P1405 starting with receiving of the response *Brake is applied*.

Also see «Brake management» from page 99.

P1406	Start of motion delay	0 bis 1000 ms	
DS	Verzögerung des Starts der Bewegung	500 ms	
	BM_u_DS0_MotBrakeOpenDelay	1:1 ms	-

Delay time for consideration of brake opening time and if necessary the dead time by a relay in the automatic mode (P1400 Bit0=1).

After opening of brake there is an acceleration at the earliest after set time in P1406 delay of start of movement. Therewith it can be ensured, that the drive does not work against the holding brake, which possibly has not been completely opened.

- The evaluation of brake status is switched off (P1400 Bit1 = 0):
After a brake command acceleration at the first takes place after expiration of the time, which was set in P1406.
- The evaluation of the brake status is activated: (P1400 Bit1 = 1):
The drive at the first is accelerated after expiration of the time set in P1405 starting with receiving of the response *Brake is released*.

Also see «Brake management» from page 99.

P1407	Holding brake opening delay	0 bis 1000 ms	
DS	Haltebremse Verzögerung Bremse öffnen	5 ms	
	BM_u_DS0_MotBrakeOpenCmdDelay	1:1 ms	-

Delay between build up of torque and command *Open the brake* in automatic operation of the brake (P1400 Bit0 = 1).

Is only then evaluated if before releasing the brake a torque shall be generated and the brake shall open after a parameter-driven time (P1401 Bit1...0 = 3). P1407 after beginning of the holding torque setup the command *Open the brake* is issued.

Also see «Brake management» from page 99.

P1415	Parameter number input value two-level-controller 2	0 bis MaxParaNr	
DS	Parameternummer Istwert 2-Punkt-Regler 2	0	
	BM_ud_DS0_TLC2_In	1:1	-
	Parameter number of the two-level-controller 2 input.		
	With value 0 there is no comparison to absolute thresholds.		
	If the selected parameter is a signed value (data type INT, DINT), the comparison with the absolute switching thresholds takes place signed too. In the other case if the selected parameter is unsigned (data type UINT, UDINT, WORD, DWORD), the comparison with the absolute switching thresholds happens unsigned.		
	If memory addresses directly shall be accessed to, see procedure at P2000 (may be blocked in WinBASS/Prodrive or adjustable only via the parameter table).		
	At 32 bit parameters only the upper 16 bits are evaluated.		
P1416	Lower threshold absolute two-level-controller 2	-32768 bis 32767	
DS	Untere absolute Schaltschwelle 2-Punkt-Regler 2	0	
	BM_i_DS0_TLC2_LowerThreshold	1:1	-
	Lower absolute switch threshold of the 2-level controller 2 referring to the parameter, which was entered in P1415 .		
	Bit0 of parameter TLC2_mode (P1418) must be set, to let the 2-level controller 2 operate with absolute comparison thresholds.		
	The two-level-controller 2 switches on, if the following is true:		
	P1415 ≤ lower absolute switch threshold		
P1417	Upper threshold absolute two-level-controller 2	-32768 bis 32767	
DS	Obere absolute Schaltschwelle 2-Punkt-Regler 2	0	
	BM_i_DS0_TLC2_UpperThreshold	1:1	-
	Upper absolute switch threshold of the 2-level controller 1 referring to the parameter, which was entered in P1415 .		
	Bit0 of parameter TLC2_mode (P1418) must be set, to let the 2-level controller 2 operate with absolute comparison thresholds.		
	The two-level-controller 2 switches off, if the following is true:		
	P1415 ≥ upper absolute switching threshold		

P1418	Mode two-level-controller 2	0 bis 0xFFFF
DS	Betriebsart 2-Punkt-Regler 2	0
	BM_w_DS0_TLC2_Mode	1:1

Bit no.	Meaning
0	0 Inactive
	1 Active
2	0 No absolute-value generation at actual value (comparison signed)
	1 Absolute-value generation at actual value (symmetric monitoring)
3...4	Behaviour of the two-level-controller 2 output
	0 0 Standard behaviour (switch on accordant hysteresis)
	0 1 2-Set two-level-controller 2 output only once
	1 0 2-Reset two-level-controller 2 output only once
5	1 1 Reserved
	0 No automatic reset by status word Bit15
	1 Automatic reset by status word P0301 Bit15

If Bit2 is set the controller generates the actual value amount and compares it with the thresholds, which also must be positive. Applications for this e.g. speed monitoring (independent of pos. and neg. speed direction).

If Bit3 is set and Bit4 is not set, then the two-level-controller 2 output is set once, if the actual value falls below the value of the lower threshold for the first time. The output value remains, also if the actual value exceeds the upper threshold. This status can be canceled by resetting Bit3 or by resetting Bit0.

If Bit4 is set and Bit3 is not set, then the two-level-controller 2 output is reset once, if the actual value exceeds the upper threshold the first time. The output value remains 0, also if the actual value is below the lower threshold. This status can be canceled by resetting Bit4 or by resetting Bit0.

Bit5 controls if the latch behavior of the 2-level controller 2 (see mode Bit3 and Bit4) is reset, if the freely parameterizable Bit15 of the status word (**P0301**) is set. The evaluation of Bit15 of the status word occurs level-sensitive, not edge-sensitive. This means, that at the set Bit15 of the status word of the two-level-controller 2 always works as standard-two-level-controller, also if Bit3 or Bit4 is set in the mode.

P1419	Target number two-level-controller 2 output	0 bis MaxParaNr	
DS	Zielnummer 2-Punkt-Regler2-Ausgang	0	
	BM_u_DS0_TLC2_TargetPxxx	1:1	-
	Number of the parameter to be changed by the 2-level controller output.		
	Only writable 16-bit parameters are permitted, not array parameters.		
	If the SW-option 2-level controller is not enabled, the parameter cannot be written to (error 43).		
	If the 2-level controller shall be used to switch between data sets, see «Switching to data set 1 to 8» from page 34.		
P1420	Bit selection two-level-controller2 output	0 bis 0xFFFF	
DS	Bit-Auswahl 2-Punkt-Regler2-Ausgang	0	
	BM_w_DS0_TLC2_BitSelection	1:1	-
	Selection of the bits of the target parameter to be changed by the two-level controller 2 output.		
P1421	Set bit pattern for LOW state two-level-controller2 output	0 bis 0xFFFF	
DS	Bitmuster bei LOW 2-Punkt-Regler2-Ausgang	0	
	BM_w_DS0_TLC2_LowPattern	1:1	-
	Bit pattern which is written to the target parameter (only bits accord to P1420) at the 2-level controller 2 output LOW (negative edge).		
P1422	Set bit pattern for HIGH state two-level-controller2 output	0 bis 0xFFFF	
DS	Bitmuster bei HIGH 2-Punkt-Regler2-Ausgang	0	
	BM_w_DS0_TLC2_HighPattern	1:1	-
	Bit pattern, which is written to the target parameter (only the bits according to P1420) at 2-level controller 2 output HIGH (positive edge).		

P1425	Spindle positioning mode	0x0000 bis 0xFFFF	
DS	Spindelpositionierung Modus	0x0000	
	BM_w_DS0_SPosMode	1:1	CW

Bit no.	Meaning
1...0	0 0 Clockwise rotation with increasing position values
	0 1 Counter-clockwise rotation with decreasing position values
	1 0 Shortest distance
3...2	0 0 Positioning to the set angle target
	0 1 Positioning to zero pulse of the position encoder + offset
	1 0 Positioning to digital input 1 + offset
	1 1 Positioning to zero pulse of the positioning encoder with qualification signal (dig. Input 1 High level)
4	0 Absolute positioning
	1 Relative positioning
5	0 Trapezoidal profile
	1 S-curve
8	1 Zero pulse or switch detection is forced; Flag <i>bNPAnglePosKnown</i> for <i>NP position known</i> is not set.
9	1 Offline measuring of NP- or switch position (offline here means that the operation mode spindle positioning is not active)
10	1 Additional automatic homing of actual position value at the trigger signal
11	0 Homing position is at active target position
	1 Homing position is at the trigger signal position at time of saving.

Only the mode Spindle positioning to target angle is supported. Due to a missing touch probe function it cannot be positioned to trigger signals (zero pulse, switching signal at the digital input). The setting of the mode Positioning to the trigger signal therewith is forbidden!

P1426	Spindle positioning target angle	0x00000000 bis 0xFFFFFFFF Inc	
DS	Spindelpositionierung Zielwinkel	0x0 Inc	
	BM_ud_DS0_SPosTargetAngle	1:1 Inc	CW
<p>This is the absolute angle position to be moved to, referring to the homing position P1200, that means to the position of the encoder for position sensing (P1050 position controller mode Bit2). The Low-Word of the parameter is entered in the lower 16-bits (angle) of the effective target position P0467. The High-Word of the parameter is not used at the moment and is to be set to zero.</p>			
P1427	Spindle positioning speed	0,01 bis 100,00 %	
DS	Spindelpositioniergeschwindigkeit	1,00 %	
	BM_u_DS0_SPosSpeed	0x4000: 100 %	-
<p>If the operating mode Spindle positioning is activated, the drive brakes to the spindle positioning speed or it keeps up its specified speed. If you switch from standstill to the operating mode Spindle positioning, the drive accelerates to a maximum of the spindle positioning speed. 100% spindle positioning speed correspond to the set motor maximum speed of the drive P1031.</p> <p>It must be considered that there is an internal limit of speed synchronization to 14999 RPM. If the spindle positioning speed, which was set has a speed greater than 14999 RPM, then at switchover to spindle positioning is synchronized to a maximum of 14999 RPM.</p>			
P1428	Spindle positioning deceleration	0,25 bis 450,00 Inc/ms ²	
DS	Spindelpositionierverzögerung	2,00 Inc/ms ²	
	BM_u_DS0_SPosDeceleration	100:1 Inc/ms ²	-
<p>Here the maximum drive delay in the operating mode spindle positioning can be set. The value at the same time is also valid for the acceleration of N=0 to the spindle positioning speed P1427.</p>			
P1429	Spindle positioning timeout triggersignal	0 bis 65535 ms	
DS	Spindelpositionierung Timeout Triggersignal	0 ms	
	BM_u_DS0_SPosTimeoutTrigger	1:1 ms	-
<p>Spindle positioning to trigger signal is not supported</p>			

		Parameters description	
P1430	Spindle positioning relative offset	0x00000000 bis 0xFFFFFFFF	
DS	Spindelpositionierung relativer Offset	0x0	
	BM_ud_DS0_SPosRelativOffset	1:1	CW
	Spindle positioning to trigger signal is not supported		
P1431	Spindle positioning smoothing time	0 bis 8191 ms	
DS	Spindelpositionierung Verschleißzeit	0 ms	
	BM_u_DS0_SPosSmooth	1:1 ms	CW

In order to achieve a smoothing of the ramp edges a PT1-element is implemented. By use of this parameter, you can set the time constant of the PT1-element. Smoothing is switched off by setting the value to zero.

P1503	Frequency independent voltage	0 bis 199,99 %	
DS	Frequenzunabhängige Spannung	0 %	
	BM_i_DS0_FU_Uoffset	0x4000: 100 %	-

At voltage frequency control (P1000 = 7) independent of an encoder a voltage is provided, which is proportional to the speed setpoint P0332 in voltage and frequency plus a voltage offset (P1503). The offset always acts increasing to amplitudes.

Scaling: 100% means that nominal DC link voltage is provided as voltage amplitude (P0020).

The proportional factor is P1504. This value corresponds to the voltage at maximum frequency (adjustable as maximum speed in P1031) referring to P0020.

Output frequency = (number of pole pairs P0065)*(speed setpoint P0332)

For the setting of voltage/frequency the speed controller parameters P0331 and P1040 as well as the ramp function generator P0431 can be used.

NOTE



- In the FU mode the current is not limited.
- Synchronous machines can pull out of step, which results in higher currents.
- If currents ≥ 200 % occur (P1241 was set too small) the I^2t model does not operate correctly.

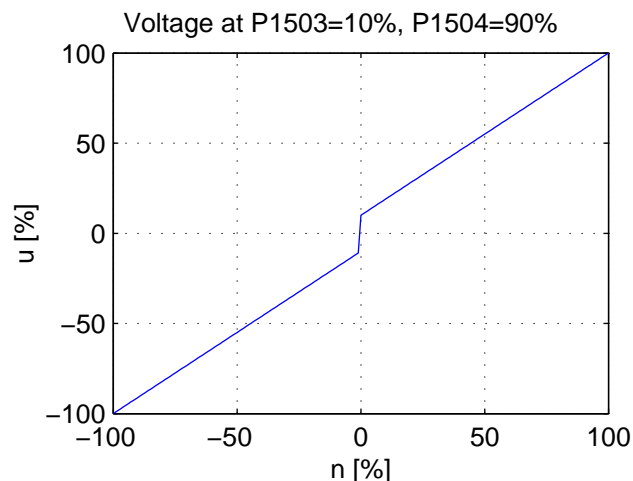


Figure 7.16: Voltage output in the FU mode

P1504	Frequency dependent voltage by maximum speed	0 bis 199,99 %	
DS	Frequenzabhängige Spannung bei Maximaldrehzahl	0 %	
	BM_u_DS0_FU_V_bei_nmax	0x4000: 100 %	-

See **P1503**.

P2000	Oscilloscope source channel 1	0 bis MaxParaNr	
EE	Quellnummer Oszilloskop, Kanal 1	0	
	BM_ud_Transient_Source1Pxxx	1:1	-

Parameter numbers of the recorded parameters (1...8) for the oscilloscope function.

For recording all 16- and 32-bit parameters can be used. String and array parameters cannot be used for oscilloscope recording.

At 0 the channel is switched off.

If Bit31 is set, the bits 0 to 28 are interpreted as memory address.

Data type at direct memory access:

Bit no.	Meaning
29	0 unsigned
	1 signed
30	0 16 bit
	1 32 bit

NOTE



Recording of data sets: Only the values of the valid data sets are recorded at time of beginning.

P2001	Oscilloscope source channel 2	0 bis MaxParaNr	
EE	Quellnummer Oszilloskop, Kanal 2	0	
	BM_ud_Transient_Source2Pxxx	1:1	-
	For a description of this parameter see P2000 .		
P2002	Oscilloscope source channel 3	0 bis MaxParaNr	
EE	Quellnummer Oszilloskop, Kanal 3	0	
	BM_ud_Transient_Source3Pxxx	1:1	-
	For a description of this parameter see P2000 .		
P2003	Oscilloscope source channel 4	0 bis MaxParaNr	
EE	Quellnummer Oszilloskop, Kanal 4	0	
	BM_ud_Transient_Source4Pxxx	1:1	-
	For a description of this parameter see P2000 .		
P2004	Oscilloscope source channel 5	0 bis MaxParaNr	
EE	Quellnummer Oszilloskop, Kanal 5	0	
	BM_ud_Transient_Source5Pxxx	1:1	-
	For a description of this parameter see P2000 .		
P2005	Oscilloscope source channel 6	0 bis MaxParaNr	
EE	Quellnummer Oszilloskop, Kanal 6	0	
	BM_ud_Transient_Source6Pxxx	1:1	-
	For a description of this parameter see P2000 .		
P2006	Oscilloscope source channel 7	0 bis MaxParaNr	
EE	Quellnummer Oszilloskop, Kanal 7	0	
	BM_ud_Transient_Source7Pxxx	1:1	-
	For a description of this parameter see P2000 .		
P2007	Oscilloscope source channel 8	0 bis MaxParaNr	
EE	Quellnummer Oszilloskop, Kanal 8	0	
	BM_ud_Transient_Source8Pxxx	1:1	-
	For a description of this parameter see P2000 .		

P2008	Oscilloscope trigger source 1	0 bis MaxParaNr	
EE	Quellnummer Triggerquelle 1	0	
	BM_ud_Transient_TriggerSrc1Pxxx	1:1	-
	Number of the parameter of the first trigger source for the oscilloscope function. All 16- and 32-bit parameters can be used as a trigger source parameter. String- and array parameters cannot be used as trigger. If the value is 0, it can not be triggered.		
P2009	Oscilloscope trigger source 2	0 bis MaxParaNr	
EE	Quellnummer Triggerquelle 2	0	
	BM_ud_Transient_TriggerSrc2Pxxx	1:1	-
	Number of the parameter of the second trigger source for the oscilloscope function. All 16- and 32-bit parameters can be used as a trigger source parameter. String- and array parameters cannot be used as trigger. If the value is 0, it can not be triggered.		
P2010	Mask trigger source 1	0 bis 0xFFFFFFFF	
EE	Maske Triggerquelle 1	0xFFFFFFFF	
	BM_d_Transient_TriggerMask1	1:1	-
	Mask for trigger source 1. At evaluation of trigger condition there is a bitwise AND operation of the first trigger source parameter with this bit mask and than the comparison with the trigger comparison value1.		
P2011	Mask trigger source 2	0 bis 0xFFFFFFFF	
EE	Maske Triggerquelle 2	0xFFFFFFFF	
	BM_d_Transient_TriggerMask2	1:1	-
	Mask for trigger source 2. At evaluation of trigger condition there is a bitwise AND operation of the first trigger source parameter with this bit mask and than the comparison with the trigger comparison value2.		

P2012	Trigger compare operator 1	0 bis 3	
EE	Trigger-Vergleichsoperator 1	0	
	BM_u_Transient_TriggerOp1	1:1	-

The transient operator is used to combine the trigger source with the trigger compare value according to the following formula:

Trigger result 1 = (content of source number trigger source 1 **P2008** AND mask trigger source 1 **P2010**) OPERATOR 1 → Trigger comparison value 1 **P2014**.

Trigger result 2 = (content of source number trigger source 2 **P2009** AND mask trigger source 2 **P2011**) OPERATOR 2 → Trigger comparison value 2 **P2015**.

According to data type of the trigger source parameter the comparison operation is signed or unsigned 16-bitwise or 32-bitwise.

Value	Operation
0	Greater than
1	Less than
2	Equal
3	Not equal

P2013	Trigger compare operator 2	0 bis 3	
EE	Trigger-Vergleichsoperator 2	0	
	BM_u_Transient_TriggerOp2	1:1	-

For a description of this parameter see **P2012**.

P2014	Trigger compare value 1	0 bis 0xFFFFFFFF	
EE	Trigger-Vergleichswert 1	0	
	BM_ud_Transient_TriggerCmpVal1	1:1	-

P2015	Trigger compare value 2	0 bis 0xFFFFFFFF	
EE	Trigger-Vergleichswert 2	0	
	BM_ud_Transient_TriggerCmpVal2	1:1	-

P2016 Trigger source combination operator 1 bis 4

EE	Triggerquellen-Verknüpfungs-Operator	1	
	BM_u_Transient_TriggerCombi	1:1	-

The operator is used to combine the results of both trigger conditions and sets the trigger, if the result of the logic operation is true.

Trigger = trigger result 1 OPERATOR trigger result 2

Value	Operation
1	AND
2	OR
3	Exclusively-OR
4	Edge: first trigger1, in the following cycle trigger2

P2017 Trigger delay in % 0 bis 100

EE	Triggerzeitpunkt in % der Speichertiefe	0	
	BM_u_Transient_TriggerDelay	1:1	-

This parameter specifies, how many data is to be recorded **before** the trigger event. The percent specification refers to the entire recording memory.

Examples:

Using a value of 0%, the controller saves all values starting from the trigger event.

Using a value of 33%, the trigger event is to be found after the first third of the whole recording window.

P2018 Trigger status 0 bis 0xFFFF

-	Status der Triggerung	0	
A	BM_u_Transient_TriggerStatus	1:1	-

Value	Status
1	Idle
2	Trigger monitoring ready, but no recording
3	Recording started
4	Recording completed
5	Preparations to save are completed
6	Recording interrupted - drop memory contents
7	Recording started (pre-trigger-history), waiting for the trigger event

P2019	Trigger command	1 bis 11	
-	Trigger-Kommando	1	
	BM_u_Transient_TriggerCommand	1:1	-

This parameter controls the oscilloscope function.

Value	Command
1	IDLE command
2	Stop recording
3	Start trigger monitoring
4	Start recording independent on trigger event
5	Recording data assured, transition to IDLE
6	Resetting of state machine, setting of standard value for source- and trigger parameter

P2020	Memory capacity per channel	0 bis 0xFFFFFFFF	
-	Speichertiefe pro Kanal	0	
A	BM_ud_Transient_Samples	1:1	-

After a recording this parameter provides the number of saved measuring points.

The number possible sample values depends on:

- the capacity of the allocated data memory (see parameter size oscilloscope memory **P2023**),
- the number and
- the word length of each parameter, which is to be recorded.

P2021	Sample rate	0,0625 bis 4095 ms	
EE	Abtastrate	0,0625 ms	
	BM_u_Transient_SampleTime	1: 0,0625 ms	-

Sampling rate in multiples of 62.5µs.

P2022	Measurement time	0 bis 0xFFFFFFFF ms	
-	Aufzeichnungsdauer	0 ms	
A	BM_ud_Transient_Duration	1:1 ms	-
<p>After a recording this parameter shows the recording duration of the prior measurement. This value is calculated from: (memory depth per channel P2020) * (sampling rate P2021)</p>			
P2023	Oscilloscope memory length	1 bis 128	
EE	Größe Oszilloskopspeicher	16	
	BM_ud_Transient_Memory	1024:1	-
<p>This parameter defines the memory depth used for the oscilloscope function in 16 bit words. The greater the memory depth, the longer data transmission of controller to WinBASS lasts.</p>			
P2024	Oscilloscope memory start address	0 bis 0xFFFFFFFF	
-	Startadresse Oszilloskopspeicher	0	
A	BM_ud_Transient_MemoryStartAdr	1:1	-
<p>Constant to specify the starting address of the memory used to store the sampled data.</p>			
P2025	Oscilloscope error code	0 bis 0xFFFF	
-	Oszilloskop Fehlercode	0x0000	
A	BM_u_Transient_ErrorCode	1:1	-

Value	Error
0	No error
1...8	Parameter for corresponding data source incorrect
9	Parameter for data- or Trigger source incorrect
10	Parameter for trigger source 1 incorrect
11	Parameter for trigger source 2 incorrect
12	Wrong trigger operator
13	No source parameter specified

P2030	password	0 bis 65535	
-	Passwort	0	
	BM_u_Password	1:1	-
<p>When writing to the parameter with the valid <i>Password (level 1)</i> the parameter is set to value 1. This is the precondition to acknowledge the error E179 (P0212) without saving the data set.</p>			
P2031	system command	0 bis 65535	
-	System-Kommando	0	
	BM_w_SystemCommand	1:1	-
<p>This parameter is not used.</p>			
P2032	system time	0 bis 0xFFFFFFFF s	
-	Systemzeit in Sekunden	0 s	
	BM_ud_SystemTime	1:1 s	-
<p>This parameter contains the system time in seconds. The time is incremented each second at the switched on controller.</p> <p>The system time can be set to any time by writing to the parameter (until to the next reboot, the value is not saved). The format is seconds since the 01.01.1970 0:00:00 Uhr, which also is usual in the PC world.</p> <p>Every 780s the <i>Internal time (value not visible)</i> is saved, after reboot the parameter starts with the <i>Internal time</i>.</p>			
P2033	System Time (ms)	0 bis 999 ms	
-	System Zeit (ms)	0 ms	
A	BM_u_SystemTimeLow	1:1 ms	-
<p>Number of milliseconds within the actual second.</p>			
P2034	Time since last boot	0 bis 0xFFFFFFFF s	
-	Zeit seit letztem Boot-Vorgang	0 s	
A	BM_ud_UpTime	1:1 s	-
<p>The operating time since the last switch-on in seconds is showed by this parameter. Time starts at each boot procedure with 0.</p>			

P2035	power on seconds	0 bis 0xFFFFFFFF s	
-	Betriebs-Sekundenzähler	0 s	
A	BM_ud_UpTimeSum	1:1 s	-
The total number of seconds the controller was switched on. Value is periodically saved all 780s.			
P2036	power unit on time	0 bis 0xFFFFFFFF s	
-	Leistungsteil Betriebszeit	0 s	
A	BM_ud_LtOnTime	1:1 s	-
Sum of time in operating status 4. Value is periodically saved all 780s.			
P2040	Source number display filter 1	0 bis MaxParaNr	
EE	Quellnummer Anzeigefilter 1	0	
	BM_u_ParaFilter1SourcePxxx	1:1	-
2 parameter, which are output via the RS323 ¹ (operating program), Analogout, BACI or CAN, can be filtered with a PT1-element. The parameter numbers are to be entered in P2040 or P2041, the filter time constants in P2045 and P2046. At filtering of analog output signals first of all the parameter numbers have to be entered in P1151 or P1155, then in P2040 or P2041.			
P2041	Source number display filter 2	0 bis MaxParaNr	
EE	Quellnummer Anzeigefilter 2	0	
	BM_u_ParaFilter2SourcePxxx	1:1	-
For a description of this parameter see P2040.			
P2045	Time const parameter filter 1	0,000 bis 32,767 s	
EE	Zeitkonstante Parameterfilter 1	2,000 s	
	BM_u_ParaFilterTime1	1000:1 s	-
For a description of this parameter see P2040.			
P2046	Time const parameter filter 2	0,000 bis 32,767 s	
EE	Zeitkonstante Parameterfilter 2	2,000 s	
	BM_u_ParaFilterTime2	1000:1 s	-
For a description of this parameter see P2040.			

¹ab FW2.02

P2050	Error Reaction Return Motion Mode	0 bis 0xFFFF	
EE	Fehlerreaktion Rückzug Modus	0	
	BM_w_RetMotionMode	1:1	-
	This parameter is not used.		
P2051	Error Reaction Return Motion Status	0 bis 0xFFFF	
-	Fehlerreaktion Rückzug Status	0	
A	BM_w_RetMotionStatus	1:1	-
	This parameter is not used.		
P2052	Error Reaction Return Motion Target Position	0 bis 0xFFFFFFFF Inc	
EE	Fehlerreaktion Rückzug Zielposition	0 Inc	
	BM_ud_RetMotionDest	1:1 Inc	-
	This parameter is not used.		
P2053	Error Reaction Return Motion abs. max. Speed	1 bis 13200 Inc/ms	
EE	Fehlerreaktion Rückzug Betrag maximale Drehzahl	1000 Inc/ms	
	BM_u_RetMotionSpeed	1:1 Inc/ms	-
	This parameter is not used.		
P2054	Error Reaction Return Motion abs. max. Acceleration	0,25 bis 450,00 Inc/ms ²	
EE	Fehlerreaktion Rückzug Betrag maximale Beschleunigung	2,00 Inc/ms ²	
	BM_u_RetMotionAcc	100:1 Inc/ms ²	-
	This parameter is not used.		
P2056	Mainsmonitor mode	0x0000 bis 0xFFFF	
EE	Netzmonitor Modus	0x0000	
	BM_w_MainsMonitorMode	1:1	CW
	The mains monitor functions for the most part are correct only for devices without power unit processor (P3379). In the FW 2.0 not all functions are activated.		

Bit no.	Meaning
0	0 Mains monitor off
	1 Mains monitor on
1	1 Reset of extremums of mains voltage and mains frequency
2	1 Activate error for mains failure

Bit no.	Meaning
3	1 Activate error for phase failure
4	1 Activate error for undervoltage
5	1 Activate error for overvoltage
6	1 Activate error for frequency undershooting
7	1 Activate error for frequency exceeding
8	Mains monitor is operating: 0 Only in the states 3 (SWITCHED ON), 4 (OPERATION ENABLED), 5 (INHIBIT OPERATION ACTIVE), 6 (DRIVE SHUT DOWN), 7 (QUICKSTOP ACTIVE) and E (ERROR REACTION ACTIVE) of unit control. 1 In each unit control state
11	1 Single-phase operation

Explanatory notes:

• Bit0:

Mains monitoring is activated with Bit0 = 1.

If the Bit0 = 0, mains monitoring is switched off via the mains monitor. The measured extremums for the mains voltage and the mains frequency remain, but can be reset via Bit1 = 1.

• Bit4...Bit7:

Selection of errors, where „Error mains supply E79“ incl. the sub-error message in **P0236** is reported.

• Bit8:

Here can be selected, if the mains monitor always should operate or only during selected drive states.

• Bit11:

Operates on devices with power unit processor (**P3379**):

- Mains monitor is switched off,
- **P2064** is calculated from the **Power Unit DC link actual voltage P0484**.

Therewith 3-phase devices can be operated at a single-phased mains supply at derated output power. When the DC link ripple is too high the error E79, **P0236** = 66 occurs.

P2057	Mainsmonitor status	0 bis 0xFFFFFFFF	
-	Netzmonitor Status	0	
A	BM_d_MainsMonitorStatus	1:1	-

Bit no.	Meaning
1...0	Status of the mains monitor 0 0 Off - mains monitor switched off 0 1 RUN - mains monitor is switched on and is operating 1 0 Not assigned 1 1 Stand-by - mains monitor switched on, but does not operate due to the drive status
3	1 P2064 is in the range of 90% - 110%, condition to bypass the precharge resistors
4	1 Mains monitor group error 79 was activated
5	1 Error limit for mains failure reached
6	1 Error limit for phase failure reached
7	1 Warning limit P2058 for mains undervoltage has fallen below
8	1 Fall below error limit P4080 for mains undervoltage
9	1 Warning limit P2059 for mains overvoltage exceeded
10	1 Error limit P4081 for mains overvoltage exceeded
11	1 Lower warning limit for the mains frequency P2060 has fallen below
12	1 Lower error limit for the mains frequency P4082 has fallen below
13	1 Upper warning limit for the mains frequency P2061 exceeded
14	1 Upper error limit for the mains frequency P4083 exceeded
16	1 Counter-clockwise rotating supply field

P2058	Warning limit undervoltage	65,4 bis 104,8 %	
EE	Warngrenze Unterspannung	96,9 %	
	BM_u_MaMoVoltageWarnLLim	0x4000: 100 %	CW
Adjustable lower warning limit for RMS value of mains voltage.			
Reference value is P0035 .			

P2059	Warning limit overvoltage	104,8 bis 144,0 %	
EE	Warngrenze Überspannung	115,2 %	
	BM_u_MaMoVoltageWarnULim	0x4000: 100 %	CW
	Adjustable upper warning limit for RMS of mains voltage. Reference value is P0035 .		
P2060	Warning lower limit frequency	40,0 bis 60,0 Hz	
EE	Untere Warngrenze Frequenz	47,0 Hz	
	BM_u_MaMoFreqWarnLLim	10:1 Hz	CW
	Adjustable lower warning limit for frequency of mains voltage.		
P2061	Warning upper limit frequency	45,0 bis 70,0 Hz	
EE	Obere Warngrenze Frequenz	52,0 Hz	
	BM_u_MaMoFreqWarnULim	10:1 Hz	CW
	Adjustable upper warning limit for frequency of mains voltage.		
P2062	Mainsmonitor warnings mask	0x0000 bis 0xFFFF	
EE	Netzmonitor Warnungs Maske	0xFFFF	
	BM_w_MaMoWarningMask	1:1	-
	Mask to activate or deactivate several mains monitor warnings.		

Bit no.	Meaning
0	1 Activation warning mains failure
1	1 Activation warning phase failure
2	1 Activation warning mains undervoltage P2058
3	1 Activation warning mains overvoltage P2059
4	1 Activation lower warning limit for the frequency P2060 has fallen below
5	1 Activation of upper warning limit for the frequency P2061 is exceeded

P2063	Mainsmonitor mains failure reaction delay	0,000 bis 6,000 s	
EE	Netzmonitor Netzfehler-Reaktionsverzögerung	0,000 s	
	BM_u_MaMoNetFailReactDelay	1000:1 s	CW
	Delay time for mains failure reaction of monitoring module mains monitor. See also P0486 .		
P2064	Mainsmonitor mains voltage actual value	0,0 bis 200,0 %	
-	Netzmonitor Netzspannung-Istwert	0,0 %	
A	BM_u_MaMoActMainsVoltage	0x4000: 100 %	-
	This value is related to P0035 . The parameter is calculated from P0484 .		
P2065	Mainsmonitor mains frequency actual value	0,1 bis 312,5 Hz	
-	Netzmonitor Netzfrequenz-Istwert	Hz	
A	BM_u_MaMoActMainFreq	10:1 Hz	-
	Only at devices with power unit processor (P3379).		
P2066	Maximum mains voltage actual value	0,0 bis 200,0 %	
-	Maximaler Netzspannung-Istwert	0,0 %	
A	BM_u_MaMoMaxActMainsVolt	0x4000: 100 %	-
	From the monitoring module mains monitor since last reset measured maximum mains voltage actual value (RMS). A reset via P2056 mains monitor mode Bit1 = 1 sets the parameter to 0V. Reference value is P0035 .		
P2067	Minimum mains voltage actual value	0,0 bis 200,0 %	
-	Minimaler Netzspannung-Istwert	200,0 %	
A	BM_u_MaMoMinActMainsVolt	0x4000: 100 %	-
	From the monitoring module Mains monitor since last reset measured minimum mains voltage actual value (RMS). A reset via P2056 mains monitor mode Bit1 = 1 sets the parameter to 763.6 V. Reference value is P0035 .		
P2068	Maximum mains frequency actual value	0,1 bis 312,5 Hz	
-	Maximaler Netzfrequenz-Istwert	0,1 Hz	
A	BM_u_MaMoMaxActMainFreq	10:1 Hz	-
	From the monitoring module mains monitor since last reset measured maximum mains frequency actual value. A reset via P2056 mains monitor mode Bit1 = 1 sets the parameter to 0.1 Hz.		

P2069	Minimum mains frequency actual value	0,1 bis 312,5 Hz	
-	Minimaler Netzfrequenz-Istwert	312,5 Hz	
A	BM_u_MaMoMinActMainFreq	10:1 Hz	-
	From the monitoring module mains monitor since last reset measured minimum mains frequency actual value . A reset via P2056 mains monitor mode Bit1 = 1 sets the parameter to 312.5 Hz.		
P2070	Parking axis control word	0 bis 0xFFFF	
-	Parkende Achse Steuerwort	0	
	BM_w_ParkingAxisControl	1:1	-
	This parameter is not used.		
P2071	Parking axis status	0 bis 0xFFFF	
-	Parkende Achse Statuswort	0	
A	BM_w_ParkingAxisStatus	1:1	-
	This parameter is not used.		
P2072	Parking axis restore state	0 bis 0xFFFF	
EE	Parkende Achse Zustand wiederherstellen	0	
	BM_w_ParkingAxisRestStat	1:1	-
	This parameter is not used.		
P2080	count of valid CAM table entries	1 bis 1024	
EE	Anzahl der gültigen Tabelleneinträge für den Kurvengenera	512	
	BM_u_CamMaxIndex	1:1	-
	Number of valid table entries (sample positions) for the curve generator. See «CAM disk» from page 108 .		
P2081	actual CAM table index	0 bis 1023	
-	aktueller Tabellenindex für Kurvengenerator	0	
A	BM_u_CamActIndex	1:1	-
	Actual table index for the curve generator. See «CAM disk» from page 108 .		

P2082	CAM Input Parameter number	0 bis MaxParaNr	
EE	Parameter Nummer des Eingangsparameters	0	
	BM_u_CamInParameter	1:1	-
	Parameter number of the curve generator input at parameter-controlled processing of CAM disk. The value of the specified parameters is as position or master axis angle interpreted. It is converted to an index for the CAM disk table and in that way determines the calculation of the slave axis positions, which are used for the sample positions (table entries).		
	See «CAM disk» from page 108.		
P2083	CAM Output Parameter number	0 bis MaxParaNr	
EE	Parameter Nummer des Ausgangsparameters	0	
	BM_u_CamOutParam	1:1	-
	Target parameter of the curve generator.		
	The target parameter must have the attribute CW .		
	See «CAM disk» from page 108.		
P2084	CAM Reference Parameter number	0 bis MaxParaNr	
EE	Parameter Nummer des Bezugsparameters	0	
	BM_u_CamRelParam	1:1	-
	Parameter number of the reference parameter for the CAM disk. In the relative mode the value of this parameter is read when the CAM disk function starts and is used as offset for the output values of the CAM generator.		
	See «CAM disk» from page 108.		
P2085	Basic Value of CAM Input (Offset)	0x80000000 bis 0x7FFFFFFF	
EE	Basiswert für Indexberechnung	0	
	BM_di_CamIdxBaseValue	1:1	CW
	Base value for the index calculation at parameter-controlled processing of CAM disk. This value is like a fixed offset of master axis referring to the beginning of curve (index 0 in the table of sample positions).		
	See «CAM disk» from page 108.		

P2086	Shift Factor for Normalising CAM-Input	0 bis 32	
EE	Verschiebefaktor für Indexberechnung	23	
	BM_u_CamIdxShiftFactor	1:1	-
<p>Shift factor for the index calculation at parameter-controlled processing of CAM disk. This factor scales the input values to the number of sample positions (exact calculating formula see in chapter «CAM disk» from page 108. Because of low processing time reserves here only a shift operation can be used.</p>			
P2087	CAM Mode	0 bis 0xFFFF	
EE	Mode für den Kurvengenerator	0	
	BM_u_CamMode	1:1	CW

The parameter CamMode serves as control and configuration of curve slice.

Meaning of bits in parameter CamMode

Bit no.	Meaning
Control bits	
0	Activation 0 Inactive: Status CURVE_IDLE 1 Active: At a correct configuration edge leads in status CURVE_IDLE to status CURVE_INIT_START and initializes internal variables
1	Start bit for the setpoint setting 0 Completes the cyclic time-controlled processing at the end of table 1 Low-high edge in the status CURVE_INIT_START leads to status CURVE_RUN (start of setpoint setting)
2	Reset bit 1 Interrupts the setpoint setting and resets the index, leads from the status CURVE_RUN to status CURVE_INIT_START
3	Stop 1 Interrupts in status CURVE_RUN at time control the index commutation or stops the virtual master axis

Bit no.	Meaning
Configuration bits	
8	Selection of index control 0 Mode time-controlled processing 1 Mode parameter-controlled processing
9	0 At time control fixed sequence via a table index 1 Time control with virtual master axis
10	0 No interpolation 1 Interpolation (at a plain table processing generally there is no interpolation)
11	0 Linear interpolation 1 square interpolation
12	Relative mode 0 Curve value (possibly with cycl. offset) is directly written to output parameter 1 At the activation of curve the curve values are interpreted relatively to the value of the parameter CamRelParam
13	Unique/cyclic run through the table 0 After run through the table providing of set values is stopped and status is changed to CURVE_INIT_START 1 Providing set values is cyclic continued, when exceeding a cycle limit a cyclic offset is considered
15	Mode auto-offset (at parameter-controlled processing) 0 Permanent offset (basic value) for the index calculation 1 At starting time automatically an input offset (=input value) is determined, so that the curve always starts with index 0.

See «CAM disk» from page 108.

P2088	CAM State	0 bis 0xFFFF	
-	Status des Kurvengenerators	0	
A	BM_u_CamState	1:1	-

The parameter CamState is used to display status and detailed error messages. The lower 8 bits are used for the status, the upper 8 bits for the error messages.

Bit no.	Meaning	
Status bits		
0...7	0	CURVE_IDLE
	1	CURVE_INIT_START
	3	CURVE_RUN
Error bits		
8	1	Error at target parameter P2083 (no CW)
9	1	Error at index source
10	1	Error at reference source for relative setpoints
12	1	Table index greater than table size
13	1	Invalid CAM disk table

See «CAM disk» from page 108.

P2089	position virtual master of CAM Module	0 bis 130944	
-	Position virtuelle Leitachse für Kurvengenerator	0	
A	BM_di_CamPosVirtualMaster	1:1	-

Position of virtual master axis for the control of CAM disk.

See «CAM disk» from page 108.

P2090	CAM Output Cycle Offset	0 bis 0xFFFFFFFF	
EE	Offset der Kurve je Zyklus	0	
	BM_ud_CamOffset	1:1	-

Offset of the CAM disk, is added in the cyclic operation after each revolution to the output. This value is automatically determined at the use of ProCAM and is set at download of CAM disk table.

See «CAM disk» from page 108.

P2100	PLC Control word	0 bis 0xFFFF	
EE	PLC Steuerwort	0	
	BM_w_PlControl	1:1	CW
P2101	PLC task control word	0 bis 0xFFFF	
EE	PLC Task-Steuerwort	0x8000	
	BM_w_PlTaskControl	1:1	CW
P2102	PLC Task Status	0 bis 0xFFFF	
-	PLC task status	0	
A	BM_w_PlTaskStatus	1:1	-
P2103	Write event parameter UINT	0 bis 0xFFFF	
EE	Schreib-Ereignis-Parameter UINT	0	
	BM_u_PlEventWrUint	1:1	CW
P2104	Write event parameter UDINT	0 bis 0xFFFFFFFF	
EE	Schreib-Ereignis-Parameter UDINT	0	
	BM_ud_PlEventWrUdint	1:1	CW
P2105	Number of erroneous PLC module	-1 bis 32767	
-	Nummer des fehlerhaften PLC-Moduls	-1	
A	BM_i_PlcErrModulNo	1:1	-
P2106	Number of erroneous code line	-1 bis 32767	
-	Fehler-Zeilenummer	-1	
A	BM_i_PlcErrLineNo	1:1	-

		Parameters description	
P2107	Additional error info	0 bis 65535	
-	Fehler-Zusatz-Information	0	
A	BM_w_PlErrInfo	1:1	-
P2108	Error code	-32768 bis 32767	
-	Regler-PLC Fehlercode	0	
A	BM_i_PlErrorCode	1:1	-
P2109	Cycle time default task	0 bis 32767 ms	
-	Zykluszeit Default-Task	0 ms	
A	BM_u_PlCycleTimeDefault	1:1 ms	-
P2110	Default task run mode	0 bis 0xFFFF	
EE	Default-Task Ablaufbetriebsart	0	
	BM_w_PlRunModeDefault	1:1	-
P2111	Program counter default task	0 bis 65535	
-	Programmzähler Default-Task	0	
	BM_u_PlPcDefault	1:1	-
P2120	Frequency of current -find notch position M2 S1	125,000 bis 1562,500 Hz	
EE	Frequenz des Stromes -Rastlagensuche M2 S1	906,250 Hz	
	BM_u_NotchFreqModulation1	100:3125 Hz	-

Frequency of current in step 1 of the find notch position with method 2 (P0094).

Normally this parameter should not be changed. If necessary the parameter can be reduced, if the reachable current is not sufficient (amplitude of voltage - notch position search M2 S1 P2122 at maximum, but in spite of that errors at notch position search Bit2 = 1 P0237).

P2121	Frequency of current -find notch position M2 S2	31,250 bis 1000,000 Hz
EE	Frequenz des Stromes -Rastlagensuche M2 S2	250,000 Hz
	BM_u_NotchFreqModulation2	GUI = (2 ^{Para})*3125/100 Hz -

Frequency of current in step 2 of the find notch position with method 2 (P0094).

Normally this parameter should not be changed. If necessary the parameter can be reduced, if the reachable current is not sufficient (amplitude of voltage - notch position search M2 S1 P2123 at maximum, but in spite of that errors at notch position search Bit3 = 1 P0237).

Only values 31.25 Hz * 2n with n = 1, 2, 3, 4, 5, 6 are permitted.

P2122	Amplitude of voltage -find notch position M2 S1	0,00 bis 100,00 %
EE	Amplitude der Spannung -Rastlagensuche M2 S1	0,00 %
	BM_u_NotchVoltModulation1	0xFFFF: 100 % -

Voltage in step 1 of find notch position with method 2 (P0094).

This parameter shall be set in such a way, that about the peak current is flows.

This can be checked via the oscilloscope function (P0336, current controller ID actual value, trigger to P0501 = 5).

The scaling: 2¹⁶ Inc = 100% referring to DC link nominal voltage P0020 (i.e. 100% = P0020/√2 effective conductor - conductor - voltage).

P2123	Amplitude of voltage -find notch position M2 S2	0,00 bis 100,00 %
EE	Amplitude der Spannung -Rastlagensuche M2 S2	0,00 %
	BM_u_NotchVoltModulation2	0xFFFF: 100 % -

Voltage in step 2 of find notch position with method 2 (P0094).

This parameter shall be set in such a way, that about the peak current flows.

This can be checked via the oscilloscope function (P0336, current controller ID actual value, trigger to P0501 = 5).

The scaling: 2¹⁶ Inc = 100% referring to DC link nominal voltage P0020 (i.e. 100% = P0020/√2 effective conductor - conductor - voltage).

P2124	Gain of tracking controller -find notch position M2	0x00000000 bis 0x00040000
EE	Verstärkung des Folgereglers -Rastlagensuche M2	0x00002710
	BM_ud_NotchVp	1:1 -

Gain of tracking controller at find notch position with method 2 (P0094).

The setting normally should not be changed.

P2125	Minimal saturation level -find notch position M2	0x00000000 bis 0x00400000	
EE	Mindestsättigungspegel -Rastlagensuche M2	0x00040000	
	BM_ud_MinOS2	1:1	-
	Determines the minimum saturation at notch position search with method 2 (P0094), which is necessary for a valid result.		
	The setting normally should not be changed.		
	A value, which is too small can result in incorrect notch positions, that differ from the correct value by 180°.		
P2126	Scaling factor current controller Kp -find notch position M0	0,00 bis 100,00 %	
EE	Skalierungsfaktor Stromregler Kp -Rastlagensuche M0	20,00 %	
	BM_u_PGainNotchPosM0	0xFFFF: 100 %	-
	Reducing of current controller gain at notch position search with method 0 (P0094). If this notch position search is made with standard current controller gain P1020, current waves can occur due to saturation appearances. Therefore the gain is reduced.		
P2127	Wait-time after current stop until N=0	0 bis 2000 ms	
EE	Wartezeit nach Stromabschaltung bis N=0	100 ms	
	BM_u_NotchSlowDownTime	1: 2 ms	CW
	For synchronous machines the parameter is used as waiting time at notch position search with method 1 (P0094 = 1).		
P2128	angle for notch methode 1	0 bis 15 °	
EE	Verfahrwinkel bei Rastlagensuche mit Methode 1	0,5 °	
	BM_u_NotchDeltaPhiMechM1	0x10000: 360 °	CW
	At the notch position search with method 1 (P0094 = 1) the limit for drive movement.		
P2130	encoder 1 resolution	0,001 bis 200000,000 µm	
EE	Geber 1 Teilung Wegmeßsystem	20,000 µm	
	BM_ud_Enc1PitchPosMeas	1000:1 µm	-
	Number of pulse intervals linear encoder 1		

P2135	encoder 2 resolution	0,001 bis 200000,000 μm	
EE	Geber 2 Teilung Wegmeßsystem	20,000 μm	
	BM_ud_Enc2PitchPosMeas	1000:1 μm	-
	Number of pulse intervals linear encoder 2		
P3000	Torque reducing factor	0,00 bis 100,00 %	
-	Momenten Reduzierungsfaktor	100,00 %	
A	BM_u_ScalingKtFactor	0x4000: 100 %	-
	Scaling factor current limit, usually 100%. < 100 % at overload of power unit.		
P3001	Current U-phase (AD-Value)	-100,00 bis 100,00 %	
-	Strom Phase U (AD-Wert)	0,00 %	
A	BM_i_Iu_AD	0x8000: 100 %	-
	Offset-free current actual value phase U referring to measuring range of the current sensor. Scaling: 0x8000 = 100% (100%=P0022)		
P3002	Current V-phase (AD-Value)	-100,00 bis 100,00 %	
-	Strom Phase V (AD-Wert)	0,00 %	
A	BM_i_Iv_AD	0x8000: 100 %	-
	Offset-free current actual value phase referring to the measuring range of the current sensor. Scaling: 0x8000 = 100% (100%=P0022)		
P3003	Current offset U (AD-Value)	-200,00 bis 200,00 %	
-	Strom-Offset U (AD-Wert)	0,00 %	
A	BM_u_Offset_IuAD	0x4000: 100 %	-
	Current offset referring to measuring range of current converter. Scaling: 0x8000 = 0%, 0xffff = 100%, 0= -100%, i.e. Value=(inc-0x8000)/0x8000*100% (100%=P0022), Value range: -100%...+100%		

P3004	Current offset V (AD-Value)	-200,00 bis 200,00 %	
-	Strom-Offset V (AD-Wert)	0,00 %	
A	BM_u_Offset_IvAD	0x4000: 100 %	-
	Current offset referring to measuring range of current converter.		
	Scaling: 0x8000 = 0%, 0xffff = 100%, 0 = -100%, i.e. Value = (inc-0x8000)/0x8000*100% (100% = P0022), Value range: -100%...+100%		
P3005	Cosrho	-100,00 bis 100,00 %	
-	Cosrho	0,00 %	
A	BM_i_CosRho	0x8000: 100 %	-
P3006	Sinrho	-100,00 bis 100,00 %	
-	Sinrho	0,00 %	
A	BM_i_SinRho	0x8000: 100 %	-
P3007	Current Iq controller Integral part	-200,00 bis 200,00 %	
-	Strom Iq-Regler I-Anteil	0,00 %	
A	BM_di_Int_isq_D	0x40000000: 100 %	-
P3008	Current Id controller Integral part	-200,00 bis 200,00 %	
-	Strom Id-Regler I-Anteil	0,00 %	
A	BM_di_Int_isd_D	0x40000000: 100 %	-
P3009	Current Iq set value unlimited	-200,00 bis +200,00 %	
-	Stom Iq-Sollwert unbegrenzt	0,00 %	
A	BM_i_IqSetUnlim	0x4000: 100 %	-

P3010	Current Id set value unlimited	-100,00 bis 100,00 %	
-	Strom Id-Sollwert unbegrenzt	0,00 %	
A	BM_i_IdSetUnlim	0x4000: 100 %	-
P3011	Voltage reference V-alpha	-200,00 bis 200,00 %	
-	Spannung-Sollwert U-alpha	0,00 %	
A	BM_i_Usalpha_ref	0x4000: 100 %	-
P3012	Voltage reference V-beta	-200,00 bis 200,00 %	
-	Spannung-Sollwert U-beta	0,00 %	
A	BM_i_Usbeta_ref	0x4000: 100 %	-
	Internal variable calculated value		
P3013	System load	0 bis 65535	
-	Systemauslastung	0	
A	BM_u_SystemCapacity	1:1	-
P3014	Current Isq positive limit	0,00 bis +200,00 %	
-	Strom Begrenzung Iq positiv	+100,00 %	
A	BM_i_IqULimit	0x4000: 100 %	-
	Result of torque limits.		
P3015	Current Isq negative limit	-200,00 bis 0,00 %	
-	Strom Begrenzung Iq negativ	-100,00 %	
A	BM_i_IqLLimit	0x4000: 100 %	-
	Result of torque limits.		
P3016	Encoder 2 deltaphi_D	-2147483648 bis 2147483647	
-	Geber 2 deltaphi_D	0	
A	BM_di_G2deltaphi_D	1:1	-
	Angle change of encoder tracks between two encoder samplings (as position parameter there is another scaling).		

P3017	Speed controller integral part (hw)	-100,00 bis 100,00 %	
-	Drehzahlregler I-Anteil (HW)	0 %	
	BM_di_Int_n_HD	0x40000000: 100 %	CW
	More significant component of the 48-bit integrator.		
P3018	Speed controller integral part (lw)	bis	
-	Drehzahlregler I-Anteil (LW)		
A	BM_i_Int_n_L	1:1	-
	Less significant part of the 48 bit integrator.		
P3019	Delta_phi_ref_D	0x80000000 bis 0x7FFFFFFF	
-	Delta_phi_ref_D	0x00000000	
A	BM_di_Delta_phi_ref_D	1:1	-
	Changes of the position setpoint (angle...) in a sampling.		
P3020	Rho electrical	0,0 bis 360,0 °	
-	Rho elektrisch	0,0 °	
A	BM_u_Rho	65536: 360 °	-
	Commutation angle This angle is used for the transformation of the $\alpha\beta$ coordinates to dq coordinates.		
P3021	Delta I	3,0 bis 152,6 %/s	
EE	Delta I	15,3 %/s	
	BM_u_CurrentDiffPST	0x4000: 50000 %/s	CW
	Current increase at notch position search with method 0 and 1 (P0094). 1 inc = 3%/s.		
P3022	Delta rho	2,7 bis 137,3 °/s	
EE	Delta Rho	13,7 °/s	
	BM_u_RhoDiffPST	0x10000: 180000 °/s	CW
	Angle speed of the electric angle of notch position search with method 1 (P0094). 1 inc = 2.75°/s.		

P3023	Encoder 1 latched digital count value	0x0000 bis 0xFFFF	
-	Geber 1 Digitaler-Zählwert	0x0000	
A	BM_u_G1cntlt	1:1	-
	Digital encoder 1 - count value		
P3024	Encoder 1 cos (AD-Value)	0x8000 bis 0x7FFF	
-	Geber 1 Cos AD-Meßwert	0x0000	
A	BM_i_Enc1TrackA	1:1	-
	Measured encoder track ADC value * 8 value range -0x4000...0x4000.		
P3025	Encoder 1 sin (AD-Value)	0x8000 bis 0x7FFF	
-	Geber 1 Sin AD-Meßwert	0x0000	
A	BM_i_Enc1TrackB	1:1	-
	Measured encoder track ADC-Value * 8 Value range -0x4000 .. 0x4000.		
P3026	Encoder 1 pos_D	0x00000000 bis 0xFFFFFFFF	
-	Geber 1 pos_D	0x00000000	
A	BM_ud_G1pos_D	1:1	-
	Encoder value digital + analog from previous sampling.		
P3027	Encoder 1 deltaphi_D	0x80000000 bis 0x7FFFFFFF	
-	Geber 1 deltaphi_D	0x00000000	
A	BM_di_G1deltaphi_D	1:1	-
	Angle-diff. acc. to the last sampling.		
P3028	Encoder 2 cos (AD-Value)	0x8000 bis 0x7FFF	
-	Geber 2 Cos (AD-Wert)		
A	BM_i_Enc2TrackA	1:1	-
	Measured encoder track ADC value * 8 (range of values: -0x4000...0x4000).		

P3029	Encoder 2 sin (AD-Value)	0x8000 bis 0x7FFF	
-	Geber 2 Sin (AD-Wert)		
A	BM_i_Enc2TrackB	1:1	-
	Measured encoder track ADC value * 8 (range of values: -0x4000...0x4000).		
P3030	Correction factor of the ADC	0 bis 200,00 %	
EE	Korrekturfaktor des ADC	100,00 %	
	BM_u_ADCorrection	0x4000: 100 %	-
	Gain correction between A- and B-track of the encoder 1 (only at resolver).		
	Is calculated if encoder adjustment is executed (P3438).		
P3031	Position interpolation angle	0x80000000 bis 0x7FFFFFFF	
-	Lage-Interpolationswinkel	0x00000000	
	BM_di_PosIpCalcAngle	1:1	CW
	Actual calculated position data difference for the speed synchronization at switchover to position control (see P1050)		
P3032	Current Iq actual value in milli ampere	-2147483647 bis 2147483647 A	
-	Aktueller Querstrom im Milli Ampere	0 A	
A	BM_di_IqActmA	1:1 A	-
	Actual cross current in mA.		
P3033	Signal selection	0 bis 0xFFFF	
EE	Signalauswahl der Messausgänge	0x0100	
	BM_w_SignalSelect	1:1	-
	This parameter is not used.		

P3035	Reg_ctrl	0x0000 bis 0xFFFF	
-	Reg_ctrl	0x0000	
A	BM_w_Reg_ctrl	1:1	-

Bits in the internal control bit bar Param_Reg_ctrl

Bit no.	Meaning
0	1 Switch over G1 in Operating mode notch position
1	1 Activate current controller
2	1 Speed controller active
3	1 Activate position controller
4	0 Position controller with encoder 1 1 Position controller to G2
5	1 Position setpoint interpolator active
6	0 Motor control via encoder 1 1 Motor control via encoder 2
7	1 Field weakening for SM with a consistent Id
8	1 Enable of the Iq-setpoint
9	0 Control structure ASM 1 Control structure SM
10	0 Clockwise rotating field 1 Counter-clockwise rotating field
11	1 Invert polarity of the L-controller setting of value
12	0 Incremental encoder-couple emulation to encoder 1 1 Connect to encoder 2
13	1 Polarity inversion for incremental encoder emulation
14	1 Activate open loop model for asynchronous machines
15	1 Incremental encoder-emulation on

P3037	Enc_mode	0x0000 bis 0xFFFF	
-	Geb_mode	0x0000	
A	BM_w_Geb_mode	1:1	-

Encoder-SET-control flags

Bit no.	Meaning	
0	1	Encoder 1: SINCOS
1	1	Encoder 1: Resolver
2	1	Encoder 1: Polarity reversal
3	1	Encoder 1: Speed polarity conversion
4	1	Encoder 1: Multiplier of number of pulses 8
5	1	Encoder 1: Motor control with encoder 1
8	1	Encoder 2: SINCOS
10	1	Encoder 2: Polarity reversal
11	1	Encoder 2: Speed polarity conversion
12	1	Encoder 2: Multiplier of number of pulses 8
13	1	Encoder 2: Motor control with encoder 1
15	1	Synchronous operation: Delta-Phi-switch-in

P3039	Encoder 2 latched digital count value	0x0000 bis 0xFFFF	
-	Geber 2 Digitaler-Zählwert	0x0000	
A	BM_u_G2cntlt	1:1	-

P3040	Memory address for analog output 1	0 bis 0xFFFFFFFF	
EE	Speicheradresse Analogausgang 1	0	
	BM_d_AOF1_DirectMemAddr	1:1	-

Operates if in **Selection fast analog output 1 P1150** Bit15 was set.

P3041	Memory address for analog output 2	0 bis 0xFFFFFFFF	
EE	Speicheradresse Analogausgang 2	0	
	BM_d_AOF2_DirectMemAddr	1:1	-

Operates if in **Selection fast analog output 2 P1154** Bit15 was set.

P3042	Amp status register	0x0000 bis 0xFFFF	
-	LT Statusregister	0x0000	
A	BM_w_Lt_StatusReg	1:1	-
P3043	Amp mode register	0x0000 bis 0xFFFF	
-	LT Mode Register	0x0000	
A	BM_w_Lt_ModeReg	1:1	-

Bit no.	Meaning
1	1 PWM switching frequency 8kHz
2	0 Power supply unit
	1 External DC link supply
3	0 Fan control via temperature
	1 with mains - on
4	0 Mains monitoring internal (mains)
	1 external (mains bus)
8	1 PWM switching frequency 16kHz

P3044	Amp warning register	0x0000 bis 0xFFFF
-	LT Warnungs-Register	0x0000
A	BM_w_Lt_WarningsReg	1:1

Presence of power unit warnings (P0261f).

Only activated bits can occur in P3378.

Bit no.	Meaning
1	1 Temperature threshold of the heatsink exceeded
9	1 Mains failure
11	1 Safety relay is not connected, 24V missing or defective
13	1 Mains undervoltage
14	1 Mains overvoltage
15	1 Undervoltage U DC link

P3045	Amp error register	0x0000 bis 0xFFFF
-	LT Fehler Register	0x0000
A	BM_w_Lt_ErrorReg	1:1

Presence of power unit errors.

Only activated bits can occur in P3377.

Internal error register for power unit communication PU warning at a set warning bit can also generate error messages.

Bit no.	Meaning
2	1 Chopper resistor overload
3	1 In a non-enabled status: Safety relay: defective or not supplied
8	1 Overtemperature of the heatsink
9	1 Overcurrent DC link
10	1 Overcurrent in motor phase
11	1 Ground current
12	1 Overtemperature internal air
13	1 Cable break heatsink temperature sensor
15	1 Safety relay : defective or not supplied

P3046	Reg_Ctrl2	0x0000 bis 0xFFFF	
-	Reg_Ctrl2	0x0000	
A	BM_w_Reg_Ctrl2	1:1	-

Second controller-internal SET control flage for the control unit of firmware; only for display.

Bit no.	Meaning
0	1 Enable the addition of additional torque setpoint
1	1 Enable the addition of additional speed setpoint
10	Nominal mains frequency setting for mains frequency measurement (PLL) 0 Set to 50 Hz 1 Set to 60 Hz
12	1 Activate speed search for open loop
13	1 Switchover of speed search for open loop active

P3048	status internal limits	0x0000 bis 0xFFFF	
-	Status interne Begrenzungen	0x0000	
A	BM_w_InternalLimitStatus	1:1	-

Bit no.	Meaning
0	1 Current-, torque-limiter
1	1 Speed limit
2	1 Positioning- jog speed limited
4	1 Negative HW-limit switch is set (also if there is no limitation)
5	1 Positiver HW limit switch is set (also if there is no limit)
6	1 Negative SW limit switch (SollPos was outside, is limited)
7	1 Positive SW limit switch (SetPos was outside, is limited)

P3050	Position scaling in user units	1 bis 16777215	
EE	Lagenormierung in Benutzereinheiten	65536	
	BM_ud_PosScalingUserUnit	1:1	-
	This parameter is not used.		
P3051	Position scaling number of revolutions	1 bis 255	
EE	Lagenormierung Anzahl der Umdrehungen	1	
	BM_u_PosScalingRevolution	1:1	-
	This parameter is not used.		
P3052	Positioning acceleration set value	0x8000 bis 0x7FFF	
-	Positionierung Beschleunigungs-Sollwert	0	
A	BM_i_PPosAccelerSetVal	1:1	-
P3060	PsiAlpha	0x80000000 bis 0x7FFFFFFF	
-	PsiAlpha	0x00000000	
A	BM_di_PsiAlpha	1:1	-
P3061	PsiBeta	0x80000000 bis 0x7FFFFFFF	
-	PsiBeta	0x00000000S	
A	BM_di_PsiBeta	1:1	-
P3062	open loop startup status	0x0000 bis 0xFFFF	
-	Drehzahlsuchen Status Open Loop	0x0000	
A	BM_w_OL_StartUpStatus	1:1	-
P3064	Alpha component for dead time compensation	0xC000 bis 0x4000	
-	Alpha-Komponente für Totzeitkompensation	0x0000	
A	BM_i_DeltaUsAlpha	1:1	-

P3065	Beta component for dead time compensation	0xC000 bis 0x4000	
-	Beta-Komponente für Totzeitkompensation	0x0000	
A	BM_i_DeltaUsBeta	1:1	-
P3066	Torque-building current integral part (hw)	-2147483,647 bis 2147483,647 A	
-	Drehmomentbildender Strom I-Anteil (HW)	0 A	
A	BM_di_TrqCurrent	1000:1 A	-
P3067	Max. torque-building current	-2147483,647 bis 2147483,647 A	
-	Max. Drehmomentbildender Strom	0 A	
A	BM_di_TrqCurrentMax	1000:1 A	-
P3100	Current Isbeta actual value	-120 bis 120 %	
-	Strom Isbeta-Istwert	%	
A	BM_i_Is_beta	0x4000: 100 %	-
	Beta components of the motor current.		
P3101	Encoder 2 pos_D	0 bis 0xFFFFFFFF	
-	Geber 2 pos_D		
A	BM_ud_G2pos_D	1:1	-
	Encoder value 'digital + analog' from previous sampling.		
P3106	Normalized leakage inductance	0 bis 32767	
-	Normierte Streuinduktivität	0	
A	BM_u_Norm_dls	1:1	-
	Scaled leakage inductance.		
P3107	Normalized Rs	0x0000 bis 0x7FFF	
-	Normierter Rs	0x0000	
A	BM_u_Norm_rs	1:1	-
	Scaled stator resistance.		

P3109	Normalized Tab / Ls	0 bis 0x7FFF	
-	Normierte Tab / Ls	0	
A	BM_u_Norm_tab_dls	1:1	-
	Scaled value of sampling time by stator leakage inductance.		
P3110	Encoder 1 mask	0 bis 0xFFFF	
-	Geber 1 Maske	0x3FFF	
A	BM_w_G1mask	1:1	-
	Internal parameter, mask for encoder evaluation, is determined of encoder type (P0550). 0xFFF0 resolver 0x0000 incremental encoder 0x3FF0 sincos encoder		
P3111	Encoder 2 mask	0x0000 bis 0xFFFF	
-	Geber 2 Maske	0x3FFF	
A	BM_w_G2mask	1:1	-
	Internal parameter, mask for encoder evaluation, is determined of encoder type (P0551). 0x0000 incremental encoder 0x3FF0 sincos encoder		
P3120	Encoder emulation test send value	0x00000000 bis 0xFFFFFFFF	
-	Inkrementalgeber-Nachbildung Sende-Wert	0x00000000	
	BM_ud_IKGN_Test_Transmit	1:1	CW
	This parameter is not used.		
P3121	Encoder emulation test reception value	0x00000000 bis 0xFFFFFFFF	
-	Inkrementalgeber-Nachbildung Empfangs-Wert	0x00000000	
A	BM_ud_IKGN_Test_Receive	1:1	-
	This parameter is not used.		

P3122	Encoder emulation K-factor	1 bis 8191	
EE	Inkrementalgeber-Nachbildung K-Faktor	781	
	BM_ud_EncEmuKGN_Kfac	1:1	CW
	This parameter is not used.		
P3123	Encoder emulation control word	0x00000000 bis 0xFFFFFFFF	
EE	Inkrementalgeber-Nachbildung Steuerwort	0x00000000	
	BM_ud_EncEmuKGN_Ctrl	1:1	CW
	This parameter is not used.		
P3124	Encoder emulation status	0x00000000 bis 0xFFFFFFFF	
-	Inkrementalgeber-Nachbildung Status	0x00000000	
A	BM_ud_EncEmuKGN_Status	1:1	-
	This parameter is not used.		
P3130	Actual start angle offset	0 bis 0xFFFFFFFF Inc	
-	Aktueller Start-Winkeloffset	0 Inc	
A	BM_ud_PhaseOffsetAngle	1:1 Inc	-
	Actual start angle offset for absolute angular synchronism.		
P3131	Summary angel absolute	0 bis 0xFFFFFFFF Inc	
-	Gesamtwinkel Absolut	0 Inc	
A	BM_ud_PhaseSumAngle	1:1 Inc	-
	Sum angle (Register + internal angle offset) in operation mode Absolute Angular synchronism.		
P3141	Warning Mask 1	0 bis 0xFFFF	
EE	Warnungs Maske 1	0xFFFF	
	BM_w_WarningMask1	1:1	CW
	Mask to activate/deactivate PSU warnings (P0261).		

P3142	Warning Mask 2	0 bis 0xFFFF	
EE	Warnungs Maske 2	0xFFFF	
	BM_w_WarningMask2	1:1	CW
	Mask to activate/deactivate LT warnings (P0262).		
P3143	Warning Mask 3	0 bis 0xFFFF	
EE	Warnungs Maske 3	0xFFFF	
	BM_w_WarningMask3	1:1	CW
	Mask to activate/deactivate motor warnings (P0263).		
P3144	Warning Mask 4	0 bis 0xFFFF	
EE	Warnungs Maske 4	0xFFFF	
	BM_w_WarningMask4	1:1	CW
	Mask to activate/deactivate drive warnings (P0264).		
	P3144 has an exceptional position amongst the WarningMasks. In this range there are 2 warnings, which cannot be deleted (49, 50). The writefcn avoids deleting of the accordant bits.		
P3145	Error Invocation	0 bis 0xFFFF	
-	Fehler-Aktivierung	0	
	BM_u_SetError	1:1	-
	Parameter is only used at the BACI version (SoftwarId P0003=1460).		
	This parameter allows the option module to release an error in the controller.		
P3150	Memcopy startaddress	0 bis 0xFFFFFFFF	
-	Speichertransfer Startadresse	0	
	BM_ud_MCP_Address	1:1	-
P3151	Memcopy count	0 bis 0xFFFFFFFF	
-	Speichertransfer Anzahl	0	
	BM_ud_MCP_Count	1:1	-

P3152	Memcopy control word	0 bis 0xFFFF	
-	Speichertransfer Befehl	0	
	BM_u_MCP_Control	1:1	-
P3153	Memcopy status	0 bis 0xFFFF	
-	Speichertransfer-Status	0x0000	
A	BM_u_MCP_Status	1:1	-
P3154	Memcopy buffer 1	20 ASCII-Zeichen	
-	Speichertransfer-Puffer 1	0	
	BM_s_MCP_Data1	1:1	-
P3155	Memcopy buffer 2	20 ASCII-Zeichen	
-	Speichertransfer-Puffer 2	0	
	BM_s_MCP_Data2	1:1	-
P3156	Memcopy buffer 3	20 ASCII-Zeichen	
-	Speichertransfer-Puffer 3	0	
	BM_s_MCP_Data3	1:1	-
P3157	Memcopy buffer 4	20 ASCII-Zeichen	
-	Speichertransfer-Puffer 4	0	
	BM_s_MCP_Data4	1:1	-
P3158	Memcopy buffer 5	20 ASCII-Zeichen	
-	Speichertransfer-Puffer 5	0	
	BM_s_MCP_Data5	1:1	-

		Parameters description	
P3159	Memcopy buffer 6	20 ASCII-Zeichen	
-	Speichertransfer-Puffer 6	0	
	BM_s_MCP_Data6	1:1	-
P3160	Memcopy buffer 7	20 ASCII-Zeichen	
-	Speichertransfer-Puffer 7	0	
	BM_s_MCP_Data7	1:1	-
P3161	Memcopy buffer 9	20 ASCII-Zeichen	
-	Speichertransfer-Puffer 8	0	
	BM_s_MCP_Data8	1:1	-
P3162	Memcopy buffer 9	20 ASCII-Zeichen	
-	Speichertransfer-Puffer 9	0	
	BM_s_MCP_Data9	1:1	-
P3163	Memcopy buffer 10	20 ASCII-Zeichen	
-	Speichertransfer-Puffer 10	0	
	BM_s_MCP_Data10	1:1	-
P3164	Memcopy buffer 11	20 ASCII-Zeichen	
-	Speichertransfer-Puffer 11	0	
	BM_s_MCP_Data11	1:1	-
P3165	Memcopy buffer 12	20 ASCII-Zeichen	
-	Speichertransfer-Puffer 12	0	
	BM_s_MCP_Data12	1:1	-

P3166	Memcopy buffer 13	20 ASCII-Zeichen	
-	Speichertransfer-Puffer 13	0	
	BM_s_MCP_Data13	1:1	-
P3167	Memcopy buffer 14	20 ASCII-Zeichen	
-	Speichertransfer-Puffer 14	0	
	BM_s_MCP_Data14	1:1	-
P3168	Memcopy buffer 15	20 ASCII-Zeichen	
-	Speichertransfer-Puffer 15	0	
	BM_s_MCP_Data15	1:1	-
P3169	Memcopy buffer 16	20 ASCII-Zeichen	
-	Speichertransfer-Puffer 16	0	
	BM_s_MCP_Data16	1:1	-
P3170	Memcopy buffer 17	20 ASCII-Zeichen	
-	Speichertransfer-Puffer 17	0	
	BM_s_MCP_Data17	1:1	-
P3171	Memcopy buffer 18	20 ASCII-Zeichen	
-	Speichertransfer-Puffer 18	0	
	BM_s_MCP_Data18	1:1	-
P3172	Memcopy buffer 19	20 ASCII-Zeichen	
-	Speichertransfer-Puffer 19	0	
	BM_s_MCP_Data19	1:1	-

P3173	Memcopy buffer 20	20 ASCII-Zeichen	
-	Speichertransfer-Puffer 20	0	
	BM_s_MCP_Data20	1:1	-
P3174	Memcopy buffer 21	20 ASCII-Zeichen	
-	Speichertransfer-Puffer 21	0	
	BM_s_MCP_Data21	1:1	-
P3175	Memcopy buffer 22	20 ASCII-Zeichen	
-	Speichertransfer-Puffer 22	0	
	BM_s_MCP_Data22	1:1	-
P3176	Memcopy buffer 23	20 ASCII-Zeichen	
-	Speichertransfer-Puffer 23	0	
	BM_s_MCP_Data23	1:1	-
P3177	Memcopy buffer 24	20 ASCII-Zeichen	
-	Speichertransfer-Puffer 24	0	
	BM_s_MCP_Data24	1:1	-
P3200	PSU Ualpha A/D value	0,0 bis 100,0 V	
-	Einspeiseeinheit Ualpha A/D-Wert	0,0 V	
A	BM_u_PSU_Ualpha_AD	10:1 V	-
	This parameter is not used.		
P3201	PSU Ubeta A/D value	0,0 bis 100,0 V	
-	Einspeiseeinheit Ubeta A/D-Wert	0,0 V	
A	BM_u_PSU_Ubeta_AD	10:1 V	-
	This parameter is not used.		

P3205	PSU PLL Counter	0x0000 bis 0xFFFF	
-	Einspeiseeinheit PLL Zähler	0x0000	
A	BM_w_PSU_PLL_Counter	1:1	-
	This parameter is not used.		
P3209	PSU Ualpha offset	-200,00 bis 200,00 %	
-	Einspeiseeinheit Ualpha Offset	0,00 %	
A	BM_i_PSU_Offset_UalphaAD	0x4000: 100 %	-
	This parameter is not used.		
P3210	PSU Ubeta offset	-200,00 bis 200,00 %	
-	Einspeiseeinheit Ubeta Offset	0,00 %	
A	BM_i_PSU_Offset_UbetaAD	0x4000: 100 %	-
	This parameter is not used.		
P3211	PSU main frequency internal counter	0x0000 bis 0xFFFF	
-	Einspeiseeinheit interner Zähler für Netzfrequenz	0x0000	
A	BM_w_PSU_FreqCounter	1:1	-
	This parameter is not used.		
P3240	Parameter no. 1. set value	0 bis MaxParaNr	
EE	Para-Nummer 1. Sollwert	0	
	BM_u_CAN_Zk0	1:1	CW
	CANsync mapping: Parameter number 1. Setpoint		
P3241	Parameter no. 2. set value	0 bis MaxParaNr	
EE	Para-Nummer 2. Sollwert	0	
	BM_u_CAN_Zk1	1:1	CW
	CANsync mapping: Parameter number 2. Setpoint		
P3242	Mapping 1. set value	0x0000 bis 0xFFFF	
EE	Mapping 1. Sollwert	0	
	BM_w_CAN_Zk4	1:1	CW

CANsync mapping 1. Setpoint

Bit no.	Meaning
0	Validity
	0 Setpoint is invalid
	1 Setpoint is valid
1...2	Position in the set- or actual value telegram
	0 0 Setpoint begins with word 0 (byte 0) in the set- or actual value telegram
	0 1 Setpoint begins with word 1 (byte 2) in the set- or actual value telegram
	1 0 Setpoint begins with word 2 (byte 4) in the set- or actual value telegram
	1 1 Setpoint begins with word 3 (byte 6) in the set- or actual value telegram*
	*(only format word)
3...5	Set- or actual value telegram no.
	0 0 0 Setpoint is in the setpoint- or actual value telegram 1
	0 0 1 Setpoint is in the setpoint- or actual value telegram 2
	0 1 0 Reserved
	...
1 1 1 Reserved	
6	Format
	0 Setpoint has format word
	1 Setpoint has format double word
7	Set-/actual value telegram
	0 Setpoint is in a setpoint telegram
	1 Setpoint is in an actual value telegram
8...12	CANsync slave number if bit7 = 1
	0 0 0 0 0 CANsync slave number 0
	0 0 0 0 1 CANsync slave number 1
	...
	1 1 1 1 0 CANsync slave number 30
1 1 1 1 1 CANsync slave number 31	
13...15	Reserved

P3243	Mapping 2. set value	0x0000 bis 0xFFFF	
EE	Mapping 2. Sollwert	0	
	BM_w_CAN_Zk5	1:1	CW
	CANsync mapping 2. Setpoint See P3242		
P3244	Parameter no. 1. actual value	0 bis MaxParaNr	
EE	Para-Nummer 1. Istwert	0	
	BM_u_CAN_Zk16	1:1	CW
	CANsync mapping: Parameter number 1. Actual value		
P3245	Parameter no. 2. actual value	0 bis MaxParaNr	
EE	Para-Nummer 2. Istwert	0	
	BM_u_CAN_Zk17	1:1	CW
	CANsync mapping: Parameter number 2. Actual value		

P3246	Mapping 1. actual value	0x0000 bis 0xFFFF	
EE	Mapping 1. Istwert	0	
	BM_w_CAN_Zk20	1:1	CW

CANsync mapping 1. Actual value

Bit no.	Meaning
0	Validity
	0 Actual value is invalid
	1 Actual value is valid
1...2	Position in the actual value telegram
	0 0 Actual value begins with word 0 (byte 0) in the actual value telegram
	0 1 Actual value begins with word 1 (byte 2) in the actual value telegram
	1 0 Actual value begins with word 2 (byte 4) in the actual value telegram
	1 1 Actual value begins with word 3 (byte 6) in the actual value telegram* *(only format word)
3..4	Actual value telegram no.
	0 0 Actual value is in the actual value telegram 1
	0 1 Actual value is in the actual value telegram 2
	1 0 Reserved
	1 1 Reserved
5	Reserved
6	Format
	0 Actual value has format word
	1 Actual value has format double word
7...15	Reserved

P3247	Mapping 2. actual value	0x0000 bis 0xFFFF	
EE	Mapping 2. Istwert	0	
	BM_w_CAN_Zk21	1:1	CW

CANsync mapping 2. Actual value See [P3247](#)

P3248	Mapping statusword	0x0000 bis 0xFFFF	
EE	Mapping Statuswort	0	
	BM_w_CAN_Zk25	1:1	CW

CANsync mapping status word:

Bit no.	Meaning
0	Validity
	0 Mapping status word is invalid 1 Mapping status word is valid
1...2	Position in the actual value telegram
	0 0 Status word begins with word 0 (byte 0) in the actual value telegram
	0 1 Status word begins with word 1 (byte 2) in the actual value telegram
	1 0 Status word begins with word 2 (byte 2) in the actual value telegram
3...4	Actual value telegram no.
	0 0 Status word is in the actual value telegram 1
	0 1 Status word is in the actual value telegram 2
	1 0 Reserved
5	Reserved
	1 1 Reserved
6	Format
	0 Status word always has format word
7...15	Reserved

P3249	Max. number of set value interruptions	0 bis 65535	
EE	Anzahl zulässiger Sollwertausfälle	0	
	BM_u_CAN_Zk26	1:1	CW

This parameter is not used.

P3250	IPM set value buffer	0 bis 0xFFFFFFFF	
-	Sollwert-Puffer für IPM	0	
	BM_ud_IPMDataBuffer	1:1	CW

P3251	Iterpolated position mode status	0 bis 0xFFFF	
-	Status des Interpolated Position Mode	0	
A	BM_u_IPMState	1:1	-
	This parameter is not used.		
P3300	Build time stamp of b maXX firmware	20 ASCII-Zeichen	
-	Generierungs-Zeitstempel b maXX Firmware	0	
A	BM_s_ControllerSWBuild	1:1	-
	Version, time, author of actual firmware are contained in the string.		
P3304	Controller interrupt time	0,00 bis 1310,70 μ s	
-	Dauer Regelungsinterrupt	0 μ s	
A	BM_u_ISRTime	1000: 20 μ s	-
P3305	Controller interrupt max. time	0 bis 1310,70 μ s	
-	Maximale Dauer Regelungstask	0 μ s	
	BM_u_ISRTimeMax	1000: 20 μ s	CW
	1 inc = 20ns		
	Theoretical 100% = 62500/20 = 3125 inc		
	Writeable in order to reset max-value		
	From time-controlled interrupt to completion of time slice, e.g. Current control, AD-converter-init, according time slice.		
P3306	Controller interrupt error counter	0 bis 65535	
-	ISR Zeitfehler-Zähler	0	
	BM_u_ISRTimeErrorCnt	1:1	CW
	Writeable in order to reset max-value		
P3309	Torque direct upper limit (TD1)	-100,00 bis 100,00 %	
-	Obere direkte Momentengrenze (MR1)	100,00 %	
	BM_i_TrqDirectULim	0x4000: 100 %	CW
	Directly operating torque limit MR1, no conversion, no saving.		

P3310	Torque direct lower limit (TD2)	-100,00 bis 100,00 %	
-	Untere direkte Momentengrenze (MR2)	-100,00 %	
	BM_i_TrqDirectLLim	0x4000: 100 %	CW
	Directly operating torque limit MR2, no conversion, no saving.		
P3311	Time measurement time slot	0 bis 8	
-	Zeitmessung Zeitscheibe	0	
	BM_u_MeasureTimeSlice	1:1	CW
P3312	Time measurement time slot function	0 bis 10	
-	Zeitmessung Zeitscheibenfunktion	0	
	BM_u_MeasureTSFct	1:1	CW
P3313	LED status	0 bis 0xFFFF	
-	LED Status	0x0000	
A	BM_w_LEDStatus	1:1	-
	Status of the LEDs and of the 7-segment-display:		
	SEG_DP 0x800 error without reaction		
	SEG_A 0x400		
	SEG_B 0x200		
	SEG_C 0x100		
	SEG_D 0x080		
	SEG_E 0x040		
	SEG_F 0x020		
	SEG_G 0x010		
	LED_1 0x001 torque limit attained		
	LED_2 0x002 torque clockwise		
	LED_3 0x004 torque counter-clockwise		
	LED_4 0x008 slow flashing (> 1Hz) alive, quick flashing (< 1Hz) at saving procedures		

P3314	Application parameter 1	-2147483648 bis 2147483647	
EE	Applikationsparameter 1	0	
	BM_di_ApplicationParam1	1:1	CW
	Application parameter at ones own disposal, e.g.:		
	<ul style="list-style-type: none"> • Linking of in- and outputs • Access via field busses or PLC 		
	All Application parameters are saved when saving the data sets.		
P3315	Application parameter 2	-2147483648 bis 2147483647	
EE	Applikationsparameter 2	0	
	BM_di_ApplicationParam2	1:1	CW
	For a description of this parameter see P3314 .		
P3316	Application parameter 3	-2147483648 bis 2147483647	
EE	Applikationsparameter 3	0	
	BM_di_ApplicationParam3	1:1	CW
	For a description of this parameter see P3314 .		
P3317	Application parameter 4	-2147483648 bis 2147483647	
EE	Applikationsparameter 4	0	
	BM_di_ApplicationParam4	1:1	CW
	For a description of this parameter see P3314 .		
P3318	Application parameter5	-2147483648 bis 2147483647	
EE	Applikationsparameter 5	0	
	BM_di_ApplicationParam5	1:1	CW
	For a description of this parameter see P3314 .		

P3319	Application parameter 6	-2147483648 bis 2147483647	
EE	Applikationsparameter 6	0	
	BM_di_ApplicationParam6	1:1	CW
	For a description of this parameter see P3314 .		
P3320	Application parameter 7	-2147483648 bis 2147483647	
EE	Applikationsparameter 7	0	
	BM_di_ApplicationParam7	1:1	CW
	For a description of this parameter see P3314 .		
P3321	Application parameter 8	-2147483648 bis 2147483647	
EE	Applikationsparameter 8	0	
	BM_di_ApplicationParam8	1:1	CW
	For a description of this parameter see P3314 .		
P3322	Application parameter 9	-2147483648 bis 2147483647	
EE	Applikationsparameter 9	0	
	BM_di_ApplicationParam9	1:1	CW
	For a description of this parameter see P3314 .		
P3323	Application parameter 10	-2147483648 bis 2147483647	
EE	Applikationsparameter 10	0	
	BM_di_ApplicationParam10	1:1	CW
	For a description of this parameter see P3314 .		
P3324	Application parameter 11	-2147483648 bis 2147483647	
EE	Applikationsparameter 11	0	
	BM_di_ApplicationParam11	1:1	CW
	For a description of this parameter see P3314 .		

P3325	Application parameter 12	-2147483648 bis 2147483647	
EE	Applikationsparameter 12	0	
	BM_di_ApplicationParam12	1:1	CW
	For a description of this parameter see P3314 .		
P3326	Application parameter 13	-2147483648 bis 2147483647	
EE	Applikationsparameter 13	0	
	BM_di_ApplicationParam13	1:1	CW
	For a description of this parameter see P3314 .		
P3327	Application parameter 14	-2147483648 bis 2147483647	
EE	Applikationsparameter 14	0	
	BM_di_ApplicationParam14	1:1	CW
	For a description of this parameter see P3314 .		
P3328	Application parameter 15	-2147483648 bis 2147483647	
EE	Applikationsparameter 15	0	
	BM_di_ApplicationParam15	1:1	CW
	For a description of this parameter see P3314 .		
P3329	Application parameter 16	0 bis 4294967295	
EE	Applikationsparameter 16	0	
	BM_ud_ApplicationParam16	1:1	CW
	For a description of this parameter see P3314 .		
P3330	Application parameter 17	0 bis 4294967295	
EE	Applikationsparameter 17	0	
	BM_ud_ApplicationParam17	1:1	CW
	For a description of this parameter see P3314 .		

P3331	Application parameter 18	0x00000000 bis 0xFFFFFFFF	
EE	Applikationsparameter 18	0	
	BM_d_ApplicationParam18	1:1	CW
	For a description of this parameter see P3314		
P3332	Application parameter 19	0x00000000 bis 0xFFFFFFFF	
EE	Applikationsparameter 19	0	
	BM_d_ApplicationParam19	1:1	CW
	For a description of this parameter see P3314		
P3333	Application parameter 20	-32768 bis 32767	
EE	Applikationsparameter 20	0	
	BM_i_ApplicationParam20	1:1	CW
	For a description of this parameter see P3314		
P3334	Application parameter 21	-32768 bis 32767	
EE	Applikationsparameter 21	0	
	BM_i_ApplicationParam21	1:1	CW
	For a description of this parameter see P3314		
P3335	Application parameter 22	-32768 bis 32767	
EE	Applikationsparameter 22	0	
	BM_i_ApplicationParam22	1:1	CW
	For a description of this parameter see P3314		
P3336	Application parameter 23	0 bis 65535	
EE	Applikationsparameter 23	0	
	BM_u_ApplicationParam23	1:1	CW
	For a description of this parameter see P3314		

P3337	Application parameter 24	0 bis 65535	
EE	Applikationsparameter 24	0	
	BM_u_ApplicationParam24	1:1	CW
	For a description of this parameter see P3314		
P3338	Application parameter 25	0 bis 65535	
EE	Applikationsparameter 25	0	
	BM_u_ApplicationParam25	1:1	CW
	For a description of this parameter see P3314		
P3340	SyncCapture	0 bis 65535	
-	SyncCapture	0	
A	BM_u_SyncCapture	1:1	-
P3341	SyncTimer	0 bis 65535	
-	SyncTimer	0	
A	BM_u_SyncTimer	1:1	-
P3342	TS-function time	0 bis 65535 μ s	
-	Dauer ZS-Funktion	0 μ s	
A	BM_u_MeasureTSFctTime	1:1 μ s	-
	The time-slice function, to be measured is set via the parameter MeasureTimeSlice and MeasureTSFct		
P3343	TS-function max. time	0 bis 65535 μ s	
-	Max Zeit für ZS-Funktion	0 μ s	
	BM_u_MeasureTSFctTimeMax	1:1 μ s	CW
	The time-slice function, to be measured is set via the parameter MeasureTimeSlice and MeasureTSFct		
P3344	BACI status	0x0000 bis 0xFFFF	
-	BACI Status	0	
A	BM_u_BaciStatus	1:1	-

P3345	BACI Access Errors Slot G	0x0000 bis 0xFFFF	
-	BACI Zugriffsfehler Steckplatz G	0	
A	BM_w_BaciCntrAccessErrG	1:1	-
P3346	BACI Alive Counter Error Slot G	0x0000 bis 0xFFFF	
-	BACI Zugriffsfehler AliveCounter Steckplatz G	0	
A	BM_w_BaciCntrAliveG	1:1	-
P3347	BACI-Reconfiguration Counter Slot G	0x0000 bis 0xFFFF	
-	Zähler für BACI-Rekonfigurierungsvorgänge Steckplatz G	0	
A	BM_w_BaciCntrReconfigG	1:1	-
P3348	BACI Setdata Exchange Counter Slot G	0 bis 65535	
-	Zähler zyklischer Austausch von BACI-Sollwerten Steckplatz	0	
A	BM_u_BaciCntrCyclSetValG	1:1	-
P3349	BACI Actdata Exchange Counter Slot G	0 bis 65535	
-	Zähler zyklischer Austausch von BACI-Istwerten Steckplatz G	0	
A	BM_u_BaciCntrCyclActValG	1:1	-
P3350	BACI-Command Counter Slot G	0x0000 bis 0xFFFF	
-	BACI-Kommandozähler Steckplatz G	0	
A	BM_w_BaciCntrCmdG	1:1	-
P3351	Counter Service Data Access Slot G	0x0000 bis 0xFFFF	
-	Zähler Bedarfsdatenzugriffe Steckplatz G	0	
A	BM_w_BaciCntrSrvDataG	1:1	-

P3352	Memory address	0x00000000 bis 0xFFFFFFFF	
EE	Speicheradresse	0x00000000	
	BM_d_DirectMemoryAddress	1:1	CW
	The content of the entered memory address is shown in P3353 .		
P3353	Contents memory address	0 bis 0xFFFF	
-	Inhalt Speicheradresse	0x0000	
A	BM_w_DirectMemoryValue	1:1	-
	Display of the content of memory address, which was set in P3352 .		
P3354	Service data parameter number 1	0 bis MaxParaNr	
-	Bedarfsdaten Parameternummer1	0	
	BM_u_RequestParaId1	1:1	-
	Service data communication for WinBASSnew		
P3355	Service data array index 1	0 bis 65535	
-	Bedarfsdaten Array Index1	0	
	BM_u_RequestParaArrayIdx1	1:1	-
	Array index for array parameter at service data communication		
P3356	Service data parameter value 1	0 bis 4294967295	
-	Bedarfsdaten Parameterwert1	0	
	BM_ud_RequestParaBuf1	1:1	-
	Service data communication for WinBASSnew:		
	Contains parameter value, which was saved by the writing of a parameter number to parameter RequestParaId into this 32-bit value. At 16-bit values the high word is zero.		

P3357	Service data status 1	0x0000 bis 0xFFFF	
-	Bedarfsdaten Status1	0x0000	
A	BM_w_RequestParaStatus1	1:1	-

Assignment of status bits:

Bit no.	Meaning
0 ... 5	Data type (if bit-15 = 0) or error no. (if bit-15 = 1)
8 ... 11	Write counter
14	Zero flag (read value=0)
15	Error bit

When writing (writing to buffer) a write counter must be incremented. This is a component of the status write to RequestParaId with value = 0 and ensures a reset of the write count. Each writing (even if writing caused an error) causes incrementation.

With each reading the write count is reported unchanged in the status. At reading (write to ID) in the status parameter an additional flag must be set, if the value = 0.

Before table version 105:

0 = no meaning / not defined

1 ... 20 data type identification according to IEC_TYPE or TDataType

FFFF = Invalid parameter number

FFFE = Data type (e.g. string) is not supported

P3358	Service data parameter number 2	0 bis MaxParaNr	
-	Bedarfsdaten Parameternummer2	0	
	BM_u_RequestParaId2	1:1	-

Service data communication for WinBASSnew channel-2

P3359	Service data array index 2	0 bis 65535	
-	Bedarfsdaten Array Index2	0	
	BM_u_RequestParaArrayIdx2	1:1	-

Array index channel 2 for array parameter at service data communication

Parameter ID	Parameter Name	Value Range	Access
P3360	Service data parameter value 2	0 bis 4294967295	
-	Bedarfsdaten Parameterwert2	0	
	BM_ud_RequestParaBuf2	1:1	-
Service data communication for WinBASSnew channel-2			
P3361	Service data status 2	0x0000 bis 0xFFFF	
-	Bedarfsdaten Status2	0x0000	
A	BM_w_RequestParaStatus2	1:1	-
Assignment of status bits:			
Bit no.	Meaning		
0...5	Data type (if bit-15 = 0) or error no. (if bit-15 = 1)		
8...11	Write counter		
14	Zero flag (read value=0)		
15	Error bit		
When writing (writing to buffer) a write counter must be incremented.			
This is a component of the status write to RequestParaId with value = 0 and ensures a reset of the write count.			
Each writing (even if writing caused an error) causes incrementation.			
With each reading the write count is reported unchanged in the status.			
At reading (write to ID) in the status parameter an additional flage must be set, if the value = 0.			
Before table version 105:			
0 = no meaning / not defined			
1 ... 20 data type identification according to IEC_TYPE or TDataType			
FFFF = Invalid parameter number			
FFFE = Data type (e.g. string) is not supported			
P3362	Measure time slice total	0 bis 2	
-	Messung Gesamtdauer ZS ein	0	
	BM_u_MeasureTSliceTotal	1:1	CW
If the parameter is > 0, time slice measuring is active.			

P3363	Time 250μs timeslice	0 bis 1310,70 μ s	
-	Dauer 250 μ s Zeitscheibe	0 μ s	
A	BM_u_TSlice025_Time	1000: 20 μ s	-
	Activation of time-slice measuring with P3362		
	Scaling 1 inc = 20ns		
	The time, which is available for time slice processing + current controller, ADC-init = 62500 ns/20 inc/ns= 3125 inc.		
	See P3305		
P3364	Maximum time 250μs timeslice	0 bis 1310,70 μ s	
-	Maximale Dauer 250 μ s Zeitscheibe	0 μ s	
	BM_u_TSlice025_TimeMax	1000: 20 μ s	CW
	Scaling see P3363		
P3365	Time 500μs timeslice	0 bis 1310,70 μ s	
-	Dauer 500 μ s Zeitscheibe	0 μ s	
A	BM_u_TSlice05_Time	1000: 20 μ s	-
	Scaling see P3363		
P3366	Maximum time 500μs timeslice	0 bis 1310,70 μ s	
-	Maximale Dauer 500 μ s Zeitscheibe	0 μ s	
	BM_u_TSlice05_TimeMax	1000: 20 μ s	CW
	Scaling see P3363		
P3367	Time 1ms timeslice	0 bis 1310,70 μ s	
-	Dauer 1ms Zeitscheibe	0 μ s	
A	BM_u_TSlice1_Time	1000: 20 μ s	-
	Scaling see P3363		
P3368	Maximum time 1ms timeslice	0 bis 1310,70 μ s	
-	Maximale Dauer 1ms Zeitscheibe	0 μ s	
	BM_u_TSlice1_TimeMax	1000: 20 μ s	CW
	Scaling see P3363		

P3369	Time 2ms timeslice	0 bis 1310,70 μ s	
-	Dauer 2ms Zeitscheibe	0 μ s	
A	BM_u_TSslice2_Time	1000: 20 μ s	-
	Scaling see P3363		
P3370	Maximum time 2ms timeslice	0 bis 1310,70 μ s	
-	Maximale Dauer 2ms Zeitscheibe	0 μ s	
	BM_u_TSslice2_TimeMax	1000: 20 μ s	CW
	Scaling see P3363		
P3371	Time 4ms timeslice	0 bis 1310,70 μ s	
-	Dauer 4ms Zeitscheibe	0 μ s	
A	BM_u_TSslice4_Time	1000: 20 μ s	-
	Scaling see P3363		
P3372	Maximum time 4ms timeslice	0 bis 1310,70 μ s	
-	Maximale Dauer 4ms Zeitscheibe	0 μ s	
	BM_u_TSslice4_TimeMax	1000: 20 μ s	CW
	Scaling see P3363		
P3373	Time 8ms timeslice	0 bis 1310,70 μ s	
-	Dauer 8ms Zeitscheibe	0 μ s	
A	BM_u_TSslice8_Time	1000: 20 μ s	-
	Scaling see P3363		
P3374	Maximum time 8ms timeslice	0 bis 1310,70 μ s	
-	Maximale Dauer 8ms Zeitscheibe	0 μ s	
	BM_u_TSslice8_TimeMax	1000: 20 μ s	CW
	Scaling see P3363		
P3375	Time 16ms timeslice	0 bis 1310,70 μ s	
-	Dauer 16ms Zeitscheibe	0 μ s	
A	BM_u_TSslice16_Time	1000: 20 μ s	-
	Scaling see P3363		

P3376	Maximum time 16ms timeslice	0 bis 1310,70 μ s	
-	Maximale Dauer 16ms Zeitscheibe	0 μ s	
	BM_u_TSlice16_TimeMax	1000: 20 μ s	CW
	Scaling see P3363		

P3377	Power Unit Error Mask	0 bis 0xFFFF	
EE	Leistungsteil Fehlermaske	0xFF40	
	BM_w_AmpErrorMask	1:1	-
	Mask of power unit warnings, which should be issued as errors; (see P0206). Influences P3045 .		

Bit no.	Meaning
4	Warning device temperature
5	Warning mains undervoltage (P0261) display as error (E89)
6	Warning mains overvoltage P0261 display as error (E89)
7	Warning P0484 < P1242 DC link undervoltage (E94)

If a mask bit is set, additionally to the warning an error is enabled in the designated event in the table.

Additionally it is necessary, that in **P3378** the according bits (Bit8...Bit15) are set.

P3378	Power Unit Warning Mask	0 bis 0xFFFF	
EE	Leistungsteil Warnungsmaske	0xFFFF	
	BM_w_AmpWarningMask	1:1	-
	Mask of power unit warnings, that should be issued (see P0261f). Operates on P3044 . Operates on P3045 from Bit8 , if bit in P3377 is activated.		

Bit no.	Meaning
1	Warning heatsink temperature exceeded (P0262 W17)
11	Safety relay open or it has no voltage (P0262 W20), therefore a safety relay error can be released in spite of an inhibited condition.
13	Mains undervoltage (P0261 W2)
14	Mains overvoltage (P0261 W3)
15	DC link undervoltage (P0262 W23)

P3379	Amplifier power type	0 bis 0xFFFF	
-	Leistungsteil Typkennung	0	
A	BM_w_AmpPowerType	1:1	-
	The high byte specifies the size and the low byte the current step.		
	Devices from size 2 on have a power unit processor.		
P3380	System special function index	0 bis 65535	
EE	System Spezial-Funktionsindex	0	
	BM_u_SysSpecFunc	1:1	-
P3381	Client alive counter	0 bis 0xFFFF	
-	Protokoll-Überwachungszähler	0	
	BM_u_ClientAliveCntr	1:1	CW
	Parameter for telegram monitoring:		
	WinBASS updates <i>ClientAliveCntr</i> and the controller checks from the first writing of this parameter the further writing.		
	If after the timeout-time, which is determined by <i>ClientAliveTimeout</i> (P0290), no telegrams arrive anymore, an error reaction of the controller occurs.		
	There is no checking, if <i>ClientAliveTimeout</i> == 0.		
P3384	Baci error mode	0 bis 0xFFFF	
EE	Baci Fehlermodus	0	
	BM_w_BaciErrMode	1:1	CW
P3392	Max. cyclic access errors	0 bis 65535	
EE	Max. zulässige zyklische Zugriffsfehler	0	
	BM_u_MaxCyclicConflicts	1:1	-
P3400	Time 125μs timeslice	0 bis 65535 μ s	
-	Dauer 125 μ s Zeitscheibe	0 μ s	
A	BM_u_TSlice0125_Time	1:1 μ s	-
	Scaling see P3363		

P3401	Maximum time 125μs timeslice	0 bis 65535 μ s	
-	Maximale Dauer 125 μ s Zeitscheibe	0 μ s	
	BM_u_TSlice0125_TimeMax	1:1 μ s	CW
	Scaling see P3363		
P3402	Point of discontinuity 1 -find notch position M2	0,0 bis 360,0 °	
EE	Unstetigkeitsstelle 1 -Rastlagensuche M2	0,5 °	
	BM_u_NotchKorrWinkel1	65536: 360 °	-
	Meaning is dependent on notch position search mode (P0094).		
	P0094 = 0		
	With P3020 = NotchKorrWinkel1 the drive is carrying current in the first step.		
	P0094 = 2		
	First point of discontinuity at notch position search with method 2.		
	Linear motors can have a periodically inductance deviation with the pole division. This results in notch angle errors in the same cycle.		
	With P3402 - P3404 the error can be compensated.		
	Procedure of parameterization:		
	<ul style="list-style-type: none"> • Acceptance of notch position via the Param_Rho (P3020) • P3402 = Rho at first point of discontinuity • P3403 = Rho at second point of discontinuity • P3404 = Notch position at first point of discontinuity - notch position at second point of discontinuity 		
P3403	Point of discontinuity 2 -find notch position M2	0,0 bis 360,0 °	
EE	Unstetigkeitsstelle 2 -Rastlagensuche M2	90,5 °	
	BM_u_NotchKorrWinkel2	65536: 360 °	-
	Meaning is dependent on notch position search mode (P0094).		
	P0094 = 0		
	With P3020 = NotchKorrWinkel2 the drive is carrying current in the second step.		
	P0094 = 1		
	No meaning.		
	P0094 = 2		
	point of discontinuity 2 at notch position search with method 2		
	See P3402 .		

P3404	Delta notch position -find notch position M2	-45,0 bis 45,0 °	
EE	Deltanotchwinkel -Rastlagensuche M2	0 °	
	BM_i_NotchKorrDelta	65536: 360 °	-
	Delta notch angle at notch position search with method 2.		
	See P3402 .		
P3416	Current W-phase (AD-Value)	-200,00 bis 200,00 %	
-	Strom Phase W (AD-Wert)	0,00 %	
A	BM_di_Iw_AD	0x8000: 100 %	-
	Current Phase W in Q15 of the measurable current Param_Amp_BurdenFactorIac).		
	Non-scaled current value, a value of 0x60F8 corresponds to current I _{max} of the power unit.		
P3418	limit encoder wire break	0 bis 100 %	
EE	Abschaltschwelle Geber Leitungsbruch	30 %	
	BM_i_ENC_BREAK_LIM	0x4000: 100 * sqrt(2) %	-
	Encoder cable break limit for encoders with sin- and cos-track, resolver (encoder types A, B, C) referring to the measuring range of the ADC.		
	For rectangular encoder (type E) see P3433f .		
P3419	Activation frequency-current-mode	0 bis 65535	
-	Aktivierung FI-Betrieb	0	
	BM_w_FI_MODE	1:1	-
	Activation of FI-operation.		
	At P3419 = 1 the drive can be in current control (P1000 = -2) operated without (if P1030 = 0 (in all data sets)) /independent on the encoder.		
	A current rotating field with the		
	Output frequency = (number of pole pairs P0065)*(speed setpoint P0332)		
	impressed.		
	For the setting of frequency the speed controller parameters P0331 and P1040 can be used.		
	In the FI operation without encoder the P0067 must be set to zero, otherwise happens an incorrect voltage precontrol.		
	The FI-mode cannot be saved. The parameter is also reset at a change into another operation mode.		

P3420	DC link active power	-200 bis 200 %	
-	Wirkleistung Zwischenkreis	0 %	
A	BM_di_APower	0x10000000: 100 %	-
	Active power in Q14.		
	Positive = motoring operation.		
	Scaling:		
	100% $\longleftrightarrow \sqrt{3/2}$ Nominal DC link voltage P0020 * ParamCurrentDriveMax P1241		
	Also see P3442 .		
P3421	Write command for direct memory access	0 bis 0xFFFF	
-	Schreibkommando bei direktem Speicherzugriff	0	
	BM_w_WriteSet	1:1	-
	At setting of P3421 = 1 the value of P3422 is written into P3352 , which contains the address. After writing the parameter is set to 0 again.		
P3422	set value for direct memory access	0 bis 0xFFFF	
-	Sollwert für direkten Speicherzugriff	0	
	BM_u_WriteVal	1:1	-
	See P3421 .		
P3433	offset wire break limit	-100 bis 100	
EE	Offset IGR Leitungsbruchgrenze	0	
	BM_i_IGR_SignalOffset	0x4000: 100	-
	Encoder cable break limit for rectangular encoder (type E) referring to measuring range of the ADC.		
	For other encoder types see P3418 .		
P3434	IGR wire break limit	0 bis 100	
EE	Abschaltschwelle IGR Leitungsbruchgrenze	20	
	BM_i_IGR_BREAK_LIM	0x4000: 100	-
	Shutdown threshold referring to the ADC measure range.		

P3435	CAN receive counter	0 bis 65535	
-	CAN Zähler für Empfangstelegramme	0	
A	BM_u_Count_CAN_Receive	1:1	-
P3436	CAN transmit counter	0 bis 65535	
-	CAN Zähler für Sendetelegramme	0	
A	BM_u_Count_CAN_Transmit	1:1	-
P3438	encoder adjustment	0 bis 9	
-	Geberabgleich	0	
	BM_w_Geberabgleich	1:1	-
<p>Both encoder signals can have different amplitudes due to different reasons. With the encoder adjustment this can be compensated.</p> <p>Activation and status encoder adjustment (only resolver):</p> <ul style="list-style-type: none"> • The parameterized, movable drive must be switched on in operation mode Position control. • P3438 is set to 1. The drive approaches the amplitudes of the encoder signals. P3438 is incremented. • The drive is switched off automatically. P3030 is calculated from the differences of the two encoder tracks. • As P3030 can be saved the encoder adjustment is necessary at first commissioning only. 			
P3439	FU-mode sinustable index	0 bis 360 °	
-	Index Sinustabelle im FU-Mode	0 °	
	BM_ud_FU_tabindex	0x400000: 360 °	CW
<p>Index for angle table (commutation angle at FU-, FI mode).</p>			
P3441	CANopen dummy	0x00000000 bis 0xFFFFFFFF	
-	CANopen Dummy-Parameter	0	
	BM_ud_CANopenDummy	1:1	CW

P3442	reactive power motor	-200 bis 200 %	
-	Blindleistung Motor	0 %	
A	BM_di_RPower	0x10000000: 100 %	-
Reactive power output in Q14.			
Scaling:			
100% $\longleftrightarrow \sqrt{3/2}$ Nominal DC link voltage P0020 * Param_CurrentDriveMax P1241			
Also see P3420 .			
P3443	Resolver excitation	0 bis 100 %	
EE	Resolvererregung	70,3 %	
	BM_u_Resolver_Erreg	0x7FFF: 100 %	-
Different resolvers have different impedances. In order to maintain the encoder signals on a reasonable level (85 - 90% of the ADC-control range) the energization voltage must be adapted to.			
The energization control is activated with Bit11 of the P0150 .			
The control can be switched off and can be saved, after an optimum value was found.			
At encoder cable break the control does not operate. If this is the case, a reasonable value (so that $\sqrt{P3024^2 + P3025^2} = 14000$) has to be entered manually.			
P3444	Limit overcurrent software	0 bis 200 %	
EE	Abschaltschwelle Überstrom SW	100 %	
	BM_u_I _{max} SW	0x8000: 100 %	-
Setting of overcurrent threshold for the controller software.			
100% means that overcurrent switch-off at a torque value of current of a phase is greater than the amplitude at maximum current of the device, i.e. greater than $\sqrt{2}$ P0011 .			
In opposition to the hardware monitoring, phase W (i.e. the calculated value) is monitored here also.			
The overcurrent is not recognized if the switch-off threshold is beyond the detected range (detected range is dependent on phase position, because of 2-phase detection, (P0022) is not directly the measurement range).			
P3445	error memory status	0 bis 1	
EE	Status Fehlerspeicher	0	
A	BM_u_ErrMemStatus	1:1	-

P3446	number of saved errors	0 bis 65535	
-	Anzahl Fehler im Fehlerspeicher	0	
A	BM_u_ErrMemEntry	1:1	-
P4080	Error limit undervoltage	0,0 bis 104,8 %	
EE	Fehlergrenze Unterspannung	75,0 %	
	BM_u_MaMoVoltageErrLLim	0x4000: 100 %	CW

Adjustable lower error limit (E64) for RMS of mains voltage.

The error enable is delayed accordant to **P0486**.

Also see **P2056**, **P2064**.

The parameter is also used for the control of the precharge relay (if Bit4 in **P3043** is not set).

The precharge relay is switched on (precharge resistor bypassed), if **P2064** is greater than **P4080**, smaller than **P4081** and **P0484** does not significantly increase.

The precharge relay is switched off, if **P2064** is smaller than **P4080**.

NOTE

The correct setting of this parameter is important to avoid overloading of power supply, precharge relays or DC link capacitors.

P4081	Error limit overvoltage	0,0 bis 144,0 %	
EE	Fehlergrenze Überspannung	110,0 %	
	BM_u_MaMoVoltageErrULim	0x4000: 100 %	CW

Adjustable upper error limit for RMS of mains voltage.

Reference value is **P0035**.

Also see **P2056**.

The parameter is also used for the control of the precharge relay.

See **P4080**.

P4082	Error lower limit frequency	40,0 bis 60,0 Hz	
EE	Untere Fehlergrenze Frequenz	45,0 Hz	
	BM_u_MaMoFreqErrLLim	10:1 Hz	CW
	Adjustable lower error limit for frequency of mains voltage.		
P4083	Error upper limit frequency	45,0 bis 70,0 Hz	
EE	Obere Fehlergrenze Frequenz	55,0 Hz	
	BM_u_MaMoFreqErrULim	10:1 Hz	CW
	Adjustable upper error limit for frequency of the mains voltage.		
P4096	Statistic mean value	0 bis 0xFFFFFFFF	
-	Statistik Mittelwert	0	
A	BM_di_Statistik_m	1:1	-
	Calculated mean value shifted to the left by 16 bits (the upper 16 bits at 32 bit parameter) of the parameter in P4106 or of the address P3352 .		
P4097	Statistic mean square value	0 bis 0xFFFFFFFF	
-	Statistik quadratischer Mittelwert	0	
A	BM_ud_Statistik_m2	1:1	-
	Calculated root mean square value (of the upper 16 bits at 32 bit parameters) of the parameter in P4106 or of the address P3352 .		
P4098	Output voltage by voltage-frequency-mode	0 bis 200 %	
-	Ausgangsspannung bei FU-Betrieb	0 %	
A	BM_di_FU_U_Soll	0x4000: 100 %	-
	Output voltage Q14(U-nominal) at voltage frequency control.		
P4101	Statistic maximum value	0 bis 0xFFFFFFFF	
-	Statistik Maximalwert	0	
A	BM_di_Statistik_max	1:1	-
	Maximum value of parameter in P4106 within $2^{Param_Statistik_n}$ samples.		

P4102	Statistic minimum value	0 bis 0xFFFFFFFF									
-	Statistik Minimalwert	0									
A	BM_di_Statistik_min	1:1	-								
	Minimum value of parameter in P4106 within $2^{Param_Statistik_n}$ samples.										
P4103	Statistic number of samples	0 bis 15									
EE	Statistik Stichprobengröße	0									
	BM_u_Statistik_n	1:1	-								
	$2^{Param_Statistik_n}$ = Anzahl der Stichproben pro Berechnung										
	The statistical values P4096 , P4097 , P4101 , P4102 are determined for the parameter in P4106 using a count of 2^{P4103} samples.										
P4106	Statistic parameter number	0 bis MaxParaNr									
EE	Statistik Parameternummer	484									
	BM_u_Statistik_Pxxx	1:1	-								
	Contains the parameter number of the parameter, which is statistically evaluated.										
P4107	Statistic mode	0 bis 2									
EE	Statistik Mode	0									
	BM_u_Statistik_Mode	1:1	-								
	<table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>No evaluation</td> </tr> <tr> <td>1</td> <td>Single evaluation (Triggerfcn)</td> </tr> <tr> <td>>= 2</td> <td>Continuous evaluation</td> </tr> </tbody> </table>			Value	Meaning	0	No evaluation	1	Single evaluation (Triggerfcn)	>= 2	Continuous evaluation
Value	Meaning										
0	No evaluation										
1	Single evaluation (Triggerfcn)										
>= 2	Continuous evaluation										
P4111	Correction factor of the ADC	0 bis 200,00 %									
EE	Korrekturfaktor des ADC	100,00 %									
	BM_u_ADCCorrection2	0x4000: 100 %	-								
	This parameter is not used.										

P4116	Power Unit serial number	20 ASCII-Zeichen	
-	Leistungsteil Seriennummer	""	
A	BM_s_LT_SNr	1:1	-
P4117	Power unit articell number	20 ASCII-Zeichen	
-	Leistungsteil Artikelnummer	""	
A	BM_s_LT_ArtNr	1:1	-
P4118	Device Serial Number	20 ASCII-Zeichen	
-	Geräte Seriennummer	""	
A	BM_s_Geraet_SNr	1:1	-
P4119	Control Board Serial Number	20 ASCII-Zeichen	
-	Regler Seriennummer	""	
A	BM_s_Regler_SNr	1:1	-
P4120	Typ of Option Board	20 ASCII-Zeichen	
-	Typ Optionsplatine	""	
A	BM_s_OptionTyp	1:1	-



Complete list of errors

Table of errors

Error reactions are selectable using **P0902**.

No.	Meaning	Allowed reactions	Specifying parameter.Bit	Remarks	Default reaction
1	Watchdog error	Pulses inhibit	P0201.1		Pulses inhibit
16	Error during boot procedure	Pulses inhibit	P0202.0		Pulses inhibit
17	Software error (b.a. switch)	Pulses inhibit	P0202.1		Pulses inhibit
18	Error at time slice system configuration	Pulses inhibit	P0202.2		Pulses inhibit
19	Time slice time error	Pulses inhibit	P0202.3		Pulses inhibit
20	No mememory available	Pulses inhibit	P0202.4		Pulses inhibit
21	Invalid errorcode	Pulses inhibit	P0202.5		Pulses inhibit
22	Invalid warningcode	Pulses inhibit	P0202.6		Pulses inhibit
23	Not all necessary type plates could be loaded	Pulses inhibit	P0202.7	Error while reading electronic type plate. If erasing the EEPROM (P0310 = 3) doesn't solve the problem, the device must be repaired by manufacturer.	Pulses inhibit
24	Error while write access from two-level-controller output to target parameter	Pulses inhibit	P0202.8		Pulses inhibit
32	Timeout Proprog protocol	all	P0203.0		No reaction
33	Protocol error	all	P0203.1		No reaction

No.	Meaning	Allowed reactions	Specifying parameter.Bit	Remarks	Default reaction
34	Wrong module type	all	P0203.2		No reaction
35	Too much data in list or telegram	all	P0203.3		No reaction
36	Not enough data in list or telegram	all	P0203.4		No reaction
37	Invalid operand	all	P0203.5		No reaction
38	LC only supports VARSTAT_MEMORY	all	P0203.6		No reaction
39	Invalid operand address (log. address)	all	P0203.7		No reaction
40	Value less than minimum value	all	P0203.8		No reaction
41	Value greater than maximum value	all	P0203.9		No reaction
42	Read only parameter	all	P0203.10		No reaction
43	Parameter can't be changed due to operation status	all	P0203.11		No reaction
44	Invalid parameter	all	P0203.12		No reaction
45	WinBASS is disconnected or doesn't respond anymore	all	P0203.13		Fehlerreaktion siehe P1007
48	Error in funktion module A (I/O-Board)	all	P0204.0	Siehe Fehler48 (S. 487).	Pulses inhibit
53	Error in BACI_Modul G	all	P0204.5	Meaning at CANopen firmware (P0003=1363): Is only triggered if Stop, ramp down at the RFG ramp is selected as error reaction. At BACI firmware (P0003=1460) the corresponding suberrors and reactions will be applied (Fehler53 (S. 487)).	Pulses inhibit
59	BACI-Bootsequence: Timeout while waiting for slaves RST signal	Pulses inhibit	P0204.11		Pulses inhibit
64	Mains failure	all	P0205.0	P2064 < P4080	Pulses inhibit
65	Phase failure	Pulses inhibit	P0205.1	See chapter «Mains monitoring» from page 157.	Pulses inhibit
68	Under voltage 24V	Pulses inhibit	P0205.4		Pulses inhibit
78	ADC-offset	Pulses inhibit	P0205.14	Hardware error at current measurement, will be triggered if abs(P3003 - 0x8000) or abs(P3004 - 0x8000) > 800.	Pulses inhibit
79	Mains monitor-combined error -> details see sub error list	all	P0205.15	For details see P0236.	No reaction

No.	Meaning	Allowed reactions	Specifying parameter.Bit	Remarks	Default reaction
80	Kommunikation error according to Hiperface-spezifikation	Pulses inhibit	P0206.0	For details see P0233.	Pulses inhibit
81	Temperature threshold of heatsink exceeded	Pulses inhibit	P0206.1		Pulses inhibit
82	Overvoltage DC link	Pulses inhibit	P0206.2	For devices with power unit mikrocontroller see «DC link controller» from page 113.	Pulses inhibit
83	Overcurrent in power unit	Pulses inhibit	P0206.3		Pulses inhibit
84	Earth current	Pulses inhibit	P0206.4		Pulses inhibit
85	Temperature threshold of air inside the box exceeded	Pulses inhibit	P0206.5		Pulses inhibit
86	Line break temperature sensor from heat sink	Pulses inhibit	P0206.6		Pulses inhibit
87	Failure safety relay	Pulses inhibit	P0206.7	At <i>Pulses enabled</i> if the safety relay isn't activated or is defect, if <i>Pulses inhibit</i> only warning (no. 20).	Pulses inhibit
89	No <i>Ready for operation</i> from power unit	Pulses inhibit	P0206.9	Causes see P3377.	Pulses inhibit
94	Undervoltage DC link	Pulses inhibit	P0206.14	Conditions see P3377.	Pulses inhibit
95	Chopper resistor overload	all	P0206.15		Pulses inhibit
96	Short circuit at motor temperature sensor (Tmp <= -30°C)	all	P0207.0		No reaction
97	Motor temperature sensor not connected (Tmp > +260 °C)	all	P0207.1		No reaction
98	Error motor temperature. Cutoff threshold exceeded	Pulses inhibit	P0207.2		Pulses inhibit
99	Error I2t > 100%	Pulses inhibit	P0207.3	See «Motor overload monitoring» from page 57.	Pulses inhibit
101	SW-overcurrent	Pulses inhibit	P0207.5	Error threshold P3444.	Pulses inhibit
102	Notch position search	Pulses inhibit	P0207.6	For details see P0094, suberror number in P0237.	Pulses inhibit
112	Kommunikation error	Pulses inhibit	P0208.0		Pulses inhibit
115	Line break encoder 1	Pulses inhibit	P0208.3	Error limit P3418 resp. P3433f.	Pulses inhibit
116	Overspeed encoder 1	Pulses inhibit	P0208.4		Pulses inhibit
117	Line break monitoring sin2 + cos2	Pulses inhibit	P0208.5	See P0150 and P1076.	Pulses inhibit
118	Unknown encoder type	Pulses inhibit	P0208.6		Pulses inhibit
123	Error field angle monitoring	Pulses inhibit	P0208.11		Pulses inhibit
128	Kommunikation error	Pulses inhibit	P0209.0		Pulses inhibit
131	Line break encoder 2	Pulses inhibit	P0209.3	Error limit P3418 resp. P3433f.	Pulses inhibit

No.	Meaning	Allowed reactions	Specifying parameter.Bit	Remarks	Default reaction
132	Overspeed encoder 2	Pulses inhibit	P0209.4		Pulses inhibit
133	Line break monitoring sin2 + cos2	Pulses inhibit	P0209.5	See P0160 and P1086.	Pulses inhibit
134	Unknown encoder type	Pulses inhibit	P0209.6		Pulses inhibit
139	Error field angle monitoring	Pulses inhibit	P0209.11		Pulses inhibit
144	Absolute position encoder 1 unknown	Pulses inhibit	P0210.0	See P0150.	Pulses inhibit
145	Absolute position encoder 2 unknown	Pulses inhibit	P0210.1	See P0150.	Pulses inhibit
146	Encoder module 1 missing	Pulses inhibit	P0210.2		Pulses inhibit
147	Encoder module 2 missing	Pulses inhibit	P0210.3		Pulses inhibit
152	IKN-module missing	Pulses inhibit	P0210.8		Pulses inhibit
153	Encoder module 1 missing	Pulses inhibit	P0210.9		Pulses inhibit
154	Encoder module 2 missing	Pulses inhibit	P0210.10		Pulses inhibit
157	Option <i>Start after first zero pulse</i> selected for non-incremental encoder	Pulses inhibit	P0210.13		Pulses inhibit
160	Time monitoring Proprog communication	all	P0211.0		No reaction
161	Time monitoring BACI communication	all	P0211.1		No reaction
162	Time monitoring at cyclic communication	all	P0211.2		No reaction
163	Time monitoring service data transfer	all	P0211.3		No reaction
164	Fieldbus error	all	P0211.4		No reaction
165	Controller not synchronous to external signal	all	P0211.5		Pulses inhibit
166	Error at brake control	Pulses inhibit	P0211.6	In manual mode (P1400 Bit0 = 0): in P0883 Bit0 not set.	Pulses inhibit
167	Brake not opened	Pulses inhibit	P0211.7	In automatic mode (P1400 Bit0 = 1)	Pulses inhibit
168	Brake not closed	all	P0211.8	In automatic mode (P1400 Bit0 = 1)	No reaction
169	Error response from cyclic brake status monitoring	all	P0211.9	In automatic mode (P1400 Bit0 = 1)	Fehlerreaktion siehe P1007
170	Error response from cyclic brake pad monitoring	all	P0211.10		No reaction
171	Missing DIO-module for brake control/response	Pulses inhibit	P0211.11		Pulses inhibit
172	Holding torque not reached before opening the brake	Pulses inhibit	P0211.12		Pulses inhibit
177	Timeout during EEPROM write access	all	P0212.1		Pulses inhibit

No.	Meaning	Allowed reactions	Specifying parameter.Bit	Remarks	Default reaction
178	EEPROM checksum error	Pulses inhibit	P0212.2		Pulses inhibit
179	No boot data set	Pulses inhibit	P0212.3	See P2030.	Pulses inhibit
180	Inkompatible SW	Pulses inhibit	P0212.4		Pulses inhibit
181	Switchover between data sets: DS not exists	all	P0212.5		No reaction
182	PSI checksum error	Pulses inhibit	P0212.6		Pulses inhibit
183	PSI deleted	Pulses inhibit	P0212.7		Pulses inhibit
184	Invalid PSI data	Pulses inhibit	P0212.8		Pulses inhibit
185	Invalid autotuning tables - Repeat autotuning	all	P0212.9		No reaction
187	EEPROM deleted	Pulses inhibit	P0212.11		Pulses inhibit
192	Contouring error dynamic	all	P0213.0		Fehlerreaktion siehe P1007
193	Contouring error static	all	P0213.1		Fehlerreaktion siehe P1007
194	Encoder 1 selected for position control, but not active	Pulses inhibit	P0213.2	Error is also responded, if the wrong setting is within one of the inactive data sets.	Pulses inhibit
195	Encoder 2 selected for position control, but not active	Pulses inhibit	P0213.3	Error is also responded, if the wrong setting is within one of the inactive data sets.	Pulses inhibit
196	Software limit switch monitoring 1 active	all	P0213.4		No reaction
197	Software limit switch monitoring 2 active	all	P0213.5		No reaction
198	Hardware limit switch monitoring 1 active	all	P0213.6		No reaction
199	Hardware limit switch monitoring 2 active	all	P0213.7		No reaction
200	Homing necessary but not yet carried out	all	P0213.8		No reaction
201	Set value arrived delayed in operation mode Set of setpoints	all	P0213.9		No reaction
202	Monitoring of modulo position active: Target position > Modulo position	all	P0213.10		No reaction
203	Spindle positioning: Error during trigger initialization	all	P0213.11		No reaction
204	Spindle positioning: Timeout at trigger signal (zero puls/digital input)	all	P0213.12		No reaction
208	Drive blocked	all	P0214.0		Pulses inhibit
209	Encoder 1 selected for motor control, but not active	Pulses inhibit	P0214.1	Error is also responded, if the wrong setting is within one of the inactive data sets.	Pulses inhibit

No.	Meaning	Allowed reactions	Specifying parameter.Bit	Remarks	Default reaction
210	Encoder 2 selected for motor control, but not active	Pulses inhibit	P0214.2	Error is also responded, if the wrong setting is within one of the inactive data sets.	Pulses inhibit
211	Overspeed Openloop	Pulses inhibit	P0214.3		Pulses inhibit
224	PLC translation error	all	P0215.0	Error info see P2105...P2108.	No reaction
225	PLC runtime error	all	P0215.1	Error info see P2105...P2108.	Pulses inhibit
239	Application error (caused by controlword 2)	all	P0215.15	P0302 Bit1	Pulses inhibit
240	Initializing the CAN controller	all	P0216.0		No reaction
241	Transmission / Receive of telegrams	all	P0216.1		No reaction
242	Invalid position of set point	all	P0216.2		No reaction
243	Invalid parameter number of set value	all	P0216.3		No reaction
244	Invalid position of actual value	all	P0216.4		No reaction
245	Invalid parameter number of actual value	all	P0216.5		No reaction

Table of suberrors to error 48

Error reactions are selectable using **P0903**. Suberror number is to be found in **P0240**.

No.	Meaning	Allowed reactions	Remarks	Default reaction
4	Wrong target parameter value caused by digital input	all		No reaction
8	MKSL at DI2 has been triggered	all		No reaction

Table of suberrors to error 53

Error reactions are selectable using **P0904**[Index] (Fehler < 8192) resp. **P0905**[Index]. Suberror number is to be found in **P0245**.

No.	Index	Meaning	Allowed reactions	Remarks	Default reaction
4096	0	Wrong parameter ID at set value parameter 1	all		No reaction
4097	1	Wrong parameter ID at set value parameter 2	all		No reaction
4098	2	Wrong parameter ID at set value parameter 3	all		No reaction
4099	3	Wrong parameter ID at set value parameter 4	all		No reaction
4100	4	Wrong parameter ID at set value parameter 5	all		No reaction
4101	5	Wrong parameter ID at set value parameter 6	all		No reaction
4102	6	Wrong parameter ID at set value parameter 7	all		No reaction
4103	7	Wrong parameter ID at set value parameter 8	all		No reaction
4104	8	Wrong parameter ID at set value parameter 9	all		No reaction
4105	9	Wrong parameter ID at set value parameter 10	all		No reaction
4106	10	Wrong parameter ID at set value parameter 11	all		No reaction
4107	11	Wrong parameter ID at set value parameter 12	all		No reaction
4108	12	Wrong parameter ID at set value parameter 13	all		No reaction
4109	13	Wrong parameter ID at set value parameter 14	all		No reaction
4110	14	Wrong parameter ID at set value parameter 15	all		No reaction
4111	15	Wrong parameter ID at set value parameter 16	all		No reaction
4112	16	Wrong parameter ID at actual value parameter 1	all		No reaction
4113	17	Wrong parameter ID at actual value parameter 2	all		No reaction
4114	18	Wrong parameter ID at actual value parameter 3	all		No reaction
4115	19	Wrong parameter ID at actual value parameter 4	all		No reaction
4116	20	Wrong parameter ID at actual value parameter 5	all		No reaction
4117	21	Wrong parameter ID at actual value parameter 6	all		No reaction
4118	22	Wrong parameter ID at actual value parameter 7	all		No reaction
4119	23	Wrong parameter ID at actual value parameter 8	all		No reaction
4120	24	Wrong parameter ID at actual value parameter 9	all		No reaction
4121	25	Wrong parameter ID at actual value parameter 10	all		No reaction

No.	Index	Meaning	Allowed reactions	Remarks	Default reaction
4122	26	Wrong parameter ID at actual value parameter 11	all		No reaction
4123	27	Wrong parameter ID at actual value parameter 12	all		No reaction
4124	28	Wrong parameter ID at actual value parameter 13	all		No reaction
4125	29	Wrong parameter ID at actual value parameter 14	all		No reaction
4126	30	Wrong parameter ID at actual value parameter 15	all		No reaction
4127	31	Wrong parameter ID at actual value parameter 16	all		No reaction
4128	32	Invalid value at set value parameter 1	all		No reaction
4129	33	Invalid value at set value parameter 2	all		No reaction
4130	34	Invalid value at set value parameter 3	all		No reaction
4131	35	Invalid value at set value parameter 4	all		No reaction
4132	36	Invalid value at set value parameter 5	all		No reaction
4133	37	Invalid value at set value parameter 6	all		No reaction
4134	38	Invalid value at set value parameter 7	all		No reaction
4135	39	Invalid value at set value parameter 8	all		No reaction
4136	40	Invalid value at set value parameter 9	all		No reaction
4137	41	Invalid value at set value parameter 10	all		No reaction
4138	42	Invalid value at set value parameter 11	all		No reaction
4139	43	Invalid value at set value parameter 12	all		No reaction
4140	44	Invalid value at set value parameter 13	all		No reaction
4141	45	Invalid value at set value parameter 14	all		No reaction
4142	46	Invalid value at set value parameter 15	all		No reaction
4143	47	Invalid value at set value parameter 16	all		No reaction
4144	48	Wrong value for period set values	all		No reaction
4145	49	Wrong value for period actual values	all		No reaction
4146	50	Wrong value for cyclic offset set values	all		No reaction
4147	51	Wrong value for cyclic offset actual values	all		No reaction
4148	52	BACI timeout at cyclic data	all		No reaction
4149	53	BACI timeout at service data	all		No reaction
4150	54	Validation returned wrong checksum	Pulses inhibit		Pulses inhibit
4151	55	Boot sequence: timeout while waiting for slave type	all	While waiting for reset the config pending flag	No reaction
4152	56	Wrong data transfer structure type	all		No reaction
4153	57	Internal error: Wrong BACI status	all		No reaction
4154	58	Access violation with slave at cyclic communication	all		No reaction
4155	59	Error cyclic Kommunikation: wrong parameter value	all		No reaction
4156	60	Error cyclic Kommunikation: Alive counter konflikt	all		No reaction
4157	61	Cmd-Interface: Wron channel number (0 or > 6)	all		No reaction

No.	Index	Meaning	Allowed reactions	Remarks	Default reaction
4158	62	Cmd-Interface: Selected channel doesn't exist	all		No reaction
4159	63	Cmd-Interface: Internal error - Wrong pointer	all		No reaction
4160	64	Cmd-Interface: Internal error - Wrong status	all		No reaction
4161	65	Cmd-Interface: Wrong package number	all		No reaction
4162	66	Cmd-Interface: Wrong command number	all		No reaction
4163	67	Cmd-Interface: Wrong status at package handling	all		No reaction
4164	68	Cmd-Interface: Timeout at command processing	all		No reaction
4165	69	Cmd-Interface: Wrong package length	all		No reaction
4166	70	Cmd-Interface: No descriptor available anymore	all		No reaction
4167	71	Cmd-Interface: Wrong package type	all		No reaction
4168	72	Cmd-Interface: Checksum error	all		No reaction
4169	73	Module descriptor: PCI error during read access	all		No reaction
4170	74	Module descriptor: PCI error during write access	all		No reaction
4171	75	Module descriptor: common error during read access	all		No reaction
4172	76	Module descriptor: common error during write access	all		No reaction
4173	77	internal error	all		No reaction
4174	78	Konfiguration cyclic services: Parameter nicht bzw.	all		No reaction
4175	79	Konfiguration cyclic services: Invalid parameters	all		No reaction
4176	80	Wrong extension module error code	all		No reaction
8192	0	CANopen error - Timeout at CAN bus	all		Error reaction see P1007
8193	1	CANopen error - Telegram failure	all		Error reaction see P1007



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Parameter	Range of values	Default value	Internal scaling	Page	
P0001	ControllerType	0 to 0xFFFF		1:1	166
P0002	SoftwareType	0 to 65535	0	1:1	166
P0003	SoftwareID	0 to 65535		1:1	166
P0004	SoftwareVersion	00.00 to 99.99	00.00	100:1	167
P0005	ParamTableVersion	0 to 65535	1	1:1	167
P0006	AmpType	to		1:1	167
P0007	AmpSerialNo	0 to 4294967295	0	1:1	167
P0008	AmpDataConfig	0 to 65535	0	1:1	167
P0009	AmpSW_Version	0 to 65535	0	1:1	168
P0010	AmpNomCurrent4kHz	0.0 to 6553.5 A	2.5 A	10:1 A	168
P0011	AmpPeakCurrent4kHz	0.0 to 6553.5 A	2.5 A	10:1 A	168
P0012	AmpNomCurrent8kHz	0.0 to 6553.5 A	2.5 A	10:1 A	168
P0013	AmpPeakCurrent8kHz	0.0 to 6553.5 A	2.5 A	10:1 A	168
P0014	AmpTimeConst1	0.00 to 655.35 s	1.00 s	100:1 s	169
P0015	AmpTimeConst2	0.00 to 655.35 s	1.00 s	100:1 s	169
P0016	AmpAmbientWarnTemp	0 to 125 °C	80 °C	1:1 °C	169
P0017	AmpAmbientMaxTemp	0 to 125 °C	0 °C	1:1 °C	169
P0018	AmpHeatsinkWarnTemp	0 to 125 °C	75 °C	1:1 °C	169
P0019	AmpHeatsinkMaxTemp	0 to 125 °C	0 °C	1:1 °C	170
P0020	AmpNomDcLinkVolt	280 to 1000 V	540 V	1:1 V	170
P0021	AmpDeadTime	0.0 to 6553.5 μs	0.0 μs	10:1 μs	170

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Parameter	Range of values	Default value	Internal scaling	Page	
P0022	AmpBurdenFactor_Iac	0.1 to 45 A	0.1 A	10:1 A	170
P0023	AmpBurdenFactor_Vdc	1 to 900 V	1 V	1:1 V	170
P0024	AmpMode	0 to 1	1	1:1	171
P0025	PSU_Mode	0x0000 to 0xFFFF	0x0000	1:1	171
P0026	AmpPhaseErrMaxDelayTime	0 to 65535 ms	0 ms	1:1 ms	171
P0028	AmpPhaseErrMaxCurrent	0.0 to 6553.5 A	0.0 A	10:1 A	172
P0030	AmpBurdenFactor_Main	0 to 65535 V	0 V	1:1 V	172
P0032	AmpNomCurrent16kHz	0.0 to 6553.5 A	2.5 A	10:1 A	172
P0033	AmpPeakCurrent16kHz	0.0 to 6553.5 A	2.5 A	10:1 A	172
P0034	AmpTimeConst3	0.00 to 655.35 s	1.00 s	100:1 s	172
P0035	LineVolt	1 to 519 V	400 V	1:1 V	172
P0036	AmpMaxDcLinkVolt	280 to 1000 V	749 V	1:1 V	173
P0050	MotorType	to	0	1:1	173
P0051	MotorSerialNo	0 to 4294967295	0	1:1	173
P0052	MotorDataConfig	0 to 65535	0	1:1	173
P0053	MotorNomVolt	0.0 to 6553.5 V	0.0 V	10:1 V	174
P0054	MotorNomCurrent	0.1 to 6553.5 A	0.1 A	10:1 A	174
P0055	MotorNomOpMode	0 to 65535	0	1:1	174
P0056	MotorNomPower	0.00 to 655.35 kW	0.0 kW	100:1 kW	175
P0057	MotorNomSpeed	1 to 24000 U/min	1 U/min	1:1 U/min	175
P0058	MotorPowerFactor	0.00 to 1.00	0.00	100:1	175
P0059	MotorSlipFrequency1	0.00 to 655.35 Hz	0.00 Hz	100:1 Hz	175
P0060	MotorSlipFrequency2	0.00 to 655.35 Hz	0.00 Hz	100:1 Hz	176
P0061	MotorNomFrequency	0.0 to 6553.5 Hz	0.0 Hz	10:1 Hz	176
P0062	MotorTemp1	0 to 65535 °C	0 °C	1:1 °C	176
P0063	MotorTemp2	0 to 65535 °C	0 °C	1:1 °C	176
P0064	MotorFrictionMoment	0.00 to 655.35 Nm	0.00 Nm	100:1 Nm	177
P0065	MotorPolePairs	1 to 120	3	1:1	177
P0066	MotorMagnetCurrent	0.0 to 6553.5 A	0.0 A	10:1 A	177
P0067	MotorKeFactor	0.0 to 6553.5 V / 1000/min	0.0 V / 1000/min	10:1 V / 1000/min	178
P0068	MotorAttenuationFact	0.00 to 655.35 Nm / 1000/min	0.00 Nm / 1000/min	100:1 Nm / 1000/min	178
P0069	MotorPeakCurrent	0.0 to 6553.5 A	0.0 A	10:1 A	178
P0070	MotorPeakTrq	0.00 to 42949672.95 Nm	0.00 Nm	100:1 Nm	179
P0071	MotorMaxSpeedElectr	1 to 36000 U/min	3000 U/min	1:1 U/min	179
P0072	MotorMaxSpeedMech	1 to 36000 U/min	3000 U/min	1:1 U/min	179

Parameter	Range of values	Default value	Internal scaling	Page	
P0073	MotorTimeConstant_I2t	0 to 3600 s	0 s	1:1 s	179
P0074	MotorFlags	0x0000 to 0xFFFF	0x0001	1:1	179
P0075	MotorStatorResist	0.000 to 500.000 Ohm	0.000 Ohm	1000:1 Ohm	180
P0076	MotorStatorLeakInduct	0.00 to 655.35 mH	0.00 mH	100:1 mH	180
P0077	MotorRotorResist	0.000 to 500.000 Ohm	0.000 Ohm	1000:1 Ohm	180
P0078	MotorRotorLeakInduct	0.00 to 655.35 mH	0.00 mH	100:1 mH	180
P0079	MotorMagnetInduct	0.00 to 655.35 mH	0.00 mH	100:1 mH	180
P0080	MotorLqInduct	0.00 to 655.35 mH	0.00 mH	100:1 mH	181
P0081	MotorLdInduct	0.00 to 655.35 mH	0.00 mH	100:1 mH	181
P0082	MotorNotchPos	0.0 to 360.0 °	240.0 °	65536: 360 °	181
P0083	MotorTrqInertia	0.00 to 42949672.95 kg*cm*cm	0.00 kg*cm*cm	100:1 kg*cm*cm	181
P0084	MotorTempSensorType	0x0000 to 0x00FF	0x0000	1:1	182
P0085	MotorBrakeVolt	0.0 to 1000.0 V	24.0 V	10:1 V	182
P0086	MotorBrakeTrqInertia	0.00 to 42949672.95 kg*cm*cm	0.00 kg*cm*cm	100:1 kg*cm*cm	183
P0087	MotorRotatingField	0 to 1	1	1:1	183
P0088	MotorWarnTemp1	-80 to 250 °C	125 °C	1:1 °C	183
P0089	MotorWarnTemp2	-80 to 250 °C	125 °C	1:1 °C	183
P0090	MotorMaxTemp	-80 to 250 °C	150 °C	1:1 °C	183
P0091	MotorMonHysteresis	0 to 5 °C	5 °C	1:1 °C	183
P0092	MotorI2t_ULim	0.0 to 100.0 %	80.0 %	0x4000: 100 %	184
P0093	MotorMode	0x0000 to 0xFFFF	0x0000	1:1	184
P0094	MotorNotchPosMode	0x0000 to 0x0002	0x0000	1:1	186
P0095	SmFieldWeakeningCurrent	0.0 to 6553.5 A	0.0 A	10:1 A	190
P0096	MotorArticleNumber	0 to 4294967295	0	1:1	190
P0097	MotorStandstillCurr	0.0 to 6553.5 A	0.0 A	10:1 A	190
P0098	MotorStandstillTrq	0.00 to 42949672.95 Nm	0.00 Nm	100:1 Nm	190
P0099	MotorBrakeTrq	0.0 to 6553.5 Nm	0.0 Nm	10:1 Nm	191
P0100	MotorGearFactor	0 to 65535	257	1:1	191
P0103	MotorPolePitch	0.01 to 200.00 mm	36.00 mm	100:1 mm	191
P0150	Enc1Mode	0x0000 to 0xFFFF	0x0001	1:1	191
P0151	Enc1Type	to		1:1	195
P0152	Enc1PulsesPerRev	1 to 32767	1	1:1	195
P0153	Enc1NomRev	0 to 65535	1	1:1	195
P0154	Enc1Offset	0x80000000 to 0x7FFFFFFF	0	1:1	195
P0155	Sin1Offset	1548 to 2548	2048	1:1	196

Parameter	Range of values	Default value	Internal scaling	Page	
P0156	Cos1Offset	1548 to 2548	2048	1:1	196
P0160	Enc2Mode	0x0000 to 0xFFFF	0x0000	1:1	197
P0161	Enc2Type	to		1:1	197
P0162	Enc2PulsesPerRev	1 to 32767	1	1:1	197
P0163	Enc2NomRev	0 to 65535	1	1:1	197
P0164	Enc2Offset	0x80000000 to 0x7FFFFFFF	0	1:1	197
P0165	Cos2Offset	1548 to 2548	2048	1:1	197
P0166	Sin2Offset	1548 to 2548	2048	1:1	198
P0200	SysError1	0x00000000 to 0xFFFFFFFF	0x00000000	1:1	198
P0201	ProcessorSysError	0x0000 to 0xFFFF	0x0000	1:1	199
P0202	OperatingSysError	0x0000 to 0xFFFF	0x0000	1:1	199
P0203	ProprogSysError	0x0000 to 0xFFFF	0x0000	1:1	199
P0204	ExtendedModuleError	0x0000 to 0xFFFF	0x0000	1:1	199
P0205	PSU_SysError	0x0000 to 0xFFFF	0x0000	1:1	199
P0206	AmpSysError	0x0000 to 0xFFFF	0x0000	1:1	199
P0207	MotorSysError	0x0000 to 0xFFFF	0x0000	1:1	199
P0208	Enc1SysError	0x0000 to 0xFFFF	0x0000	1:1	200
P0209	Enc2SysError	0x0000 to 0xFFFF	0x0000	1:1	200
P0210	EncManagSysError	0x0000 to 0xFFFF	0x0000	1:1	200
P0211	DriveManagSysError	0x0000 to 0xFFFF	0x0000	1:1	200
P0212	DataRecSysError	0x0000 to 0xFFFF	0x0000	1:1	200
P0213	PosCtrlSysError	0x0000 to 0xFFFF	0x0000	1:1	200
P0214	SpeedCtrlSysError	0x0000 to 0xFFFF	0x0000	1:1	200
P0215	FreeCtrlSecSysError	0x0000 to 0xFFFF	0x0000	1:1	201
P0216	CANsyncError	0x0000 to 0xFFFF	0x0000	1:1	201
P0233	AmpHiperfaceError	0x0000 to 0xFFFF	0x0000	1:1	201
P0234	Enc1SerComError	0x0000 to 0xFFFF	0x0000	1:1	201
P0235	Enc2SerComError	0x0000 to 0xFFFF	0x0000	1:1	202
P0236	MainsMonitorError	0x0000 to 0xFFFF	0x0000	1:1	203
P0237	RastRefError	0x0000 to 0xFFFF	0x0000	1:1	204
P0240	SmallModuleErrorA	0x0000 to 0xFFFF	0	1:1	204
P0241	SmallModuleErrorB	0x0000 to 0xFFFF	0	1:1	204
P0242	SmallModuleErrorC	0x0000 to 0xFFFF	0	1:1	204
P0243	SmallModuleErrorD	0x0000 to 0xFFFF	0	1:1	204
P0244	SmallModuleErrorE	0x0000 to 0xFFFF	0	1:1	204
P0245	BigModuleErrorG	0 to 65535	0	1:1	205
P0251	ProprogCmdErrId	0 to MaxParaNr	0	1:1	205

Parameter	Range of values	Default value	Internal scaling	Page	
P0260	SysWarning1	0x0000 to 0xFFFF	0x0000	1:1	205
P0261	PSU_Warning	0x0000 to 0xFFFF	0x0000	1:1	206
P0262	AmpWarning	0x0000 to 0xFFFF	0x0000	1:1	206
P0263	MotorWarning	0x0000 to 0xFFFF	0x0000	1:1	207
P0264	DriveWarning	0x0000 to 0xFFFF	0x0000	1:1	207
P0265	MainsMonitorWarning	0x0000 to 0xFFFF	0x0000	1:1	208
P0290	ClientAliveTimeout	0 to 65535 ms	0 ms	1:1 ms	208
P0291	ProprogCharTimeout	300 to 65535 ms	500 ms	1:1 ms	208
P0296	ErrReaction_BusCommLost	0 to 3	0	1:1	209
P0297	ErrReactionMainsFailure	-2 to 3	0	1:1	209
P0298	ErrReactionBaci	-1 to 3	-1	1:1	209
P0299	ErrReactionSync	-1 to 3	0	1:1	209
P0300	Controlword	0x0000 to 0xFFFF	0x0000	1:1	209
P0301	Statusword	0x0000 to 0xFFFF	0x0000	1:1	215
P0302	Controlword2	0x0000 to 0xFFFF	0x0000	1:1	220
P0303	Statusword2	0x0000 to 0xFFFF	0x0000	1:1	221
P0304	OperationModeAct	-7 to 7	-3	1:1	222
P0305	DriveStatus	0x0000 to 0xFFFF	0	1:1	223
P0306	DI_StatusDrvControl	0x0000 to 0xFFFF	0x0000	1:1	223
P0307	DI_QuickstopDelay	0 to 65535 ms	0 ms	1:1 ms	224
P0308	Statusword3	0 to 0xFFFF	0	1:1	224
P0310	RecordCommand	0 to 30	0	1:1	224
P0311	RecordStatus	0 to 0xFFFF	0	1:1	226
P0312	ActiveDataSet	1 to 8	1	1:1	227
P0313	ValidDataSets	0 to 0xFFFF	1	1:1	227
P0314	RecCmdSource	0 to 8	0	1:1	227
P0315	RecCmdDestination	0 to 8	0	1:1	227
P0316	RecCmdError	1 to MaxParaNr		1:1	228
P0317	EepromWriteCount	1 to 65535		1:1	228
P0318	PsiWriteCount	0 to 65535		1:1	228
P0319	PsiParameterId	1 to MaxParaNr	1	1:1	228
P0320	PsiArrayIdx	0 to 65535	0	1:1	228
P0321	PsiDataSize	0 to 65535		1:1	229
P0322	PsiData32	0 to 4294967295		1:1	229
P0323	PsiDataString	to		1:1	229
P0324	PsiDatasetSelect	1 to 8	1	1:1	229
P0325	PsiValidDataset	0x0000 to 0x00FF		1:1	229
P0326	DataSetMode	0x0000 to 0xFFFF	0x0000	1:1	229

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Parameter	Range of values	Default value	Internal scaling	Page	
P0327	BootDataset	1 to 8	1	1:1	230
P0330	CurrentCtrlStatus	0x0000 to 0xFFFF	0x0000	1:1	230
P0331	TrqSetValue	-100.00 to 100.00 %	0.00 %	0x4000: 100 %	230
P0332	IqSetLimited	-200.00 to +200.00 %	0.00 %	0x4000: 100 %	230
P0333	IqAct	-200.00 to +200.00 %	0.00 %	0x4000: 100 %	231
P0334	CtrlOut_Uq	-200.00 to +200.00 %	0.00 %	0x4000: 100 %	231
P0335	IdSetLimited	-100.00 to 100.00 %	0.00 %	0x4000: 100 %	231
P0336	IdAct	-200.00 to +200.00 %	0.00 %	0x4000: 100 %	231
P0337	IdOut	-200.00 to +200.00 %	0.00 %	0x4000: 100 %	231
P0338	VemfSet	-200.00 to +200.00 %	0.00 %	0x4000: 100 %	232
P0339	VqSet	-200.00 to +200.00 %	0.00 %	0x4000: 100 %	232
P0340	VdSet	-200.00 to +200.00 %	0.00 %	0x4000: 100 %	232
P0341	IphaseU	-200.00 to 200.00 %	0.00 %	0x4000: 100 %	232
P0342	IphaseV	-200.00 to 200.00 %	0.00 %	0x4000: 100 %	232
P0343	Iamplitude	0.00 to 200.00 %	0.00 %	0x4000: 100 %	233
P0344	TorqueAct	-2000.00 to 2000.00 %	0.00 %	0x0666: 100 %	233
P0345	IamplitudeIqSign	-200.00 to 200.00 %	0.00 %	0x4000: 100 %	233
P0350	SpeedCtrlStatus	0x0000 to 0xFFFF	0x0000	1:1	234
P0351	SpeedSetValue	-200.00 to +200.00 %	0.00 %	0x40000000: 100 %	235
P0352	SpeedSetValueTotal	-100.00 to +100.00 %	0.00 %	0x40000000: 100 %	235
P0353	SpeedActValue	-200.00 to +200.00 %	0.00 %	0x40000000: 100 %	235
P0354	SpeedCtrlDev	-200.00 to +200.00 %	0.00 %	0x4000: 100 %	235
P0355	TrqFeedFor	-200.00 to +200.00 %	0.00 %	0x4000: 100 %	236
P0356	SpeedCtrlOut	-100.00 to 100.00 %	0.00 %	0x4000: 100 %	236
P0357	TrqSymDirect	0.00 to 100.00 %	100.00 %	0x4000: 100 %	236
P0358	SpeedActNotchOut	-200.00 to +200.00 %	0.00 %	0x40000000: 100 %	238
P0359	ScalingSpeedSetValue	0.00 to 100.00 %	100.00 %	0x4000: 100 %	238
P0360	PosCtrlStatus	0x0000 to 0xFFFF	0x0000	1:1	239
P0361	PosSetValue	0x00000000 to 0xFFFFFFFF	0x00000000	1:1	240
P0362	PosActValue	0x00000000 to 0xFFFFFFFF	0x00000000	1:1	241
P0363	PosSetAngle	0x00000000 to 0xFFFFFFFF	0x00000000	1:1	242
P0364	PosSetRev	0x00000000 to 0xFFFFFFFF	0x00000000	1:1	242
P0365	SpeedFeedFor	-200.00 to 200.00 %	0.00 %	0x40000000: 100 %	243
P0366	PosCtrlOut	-200.00 to 200.00 %	0.00 %	0x40000000: 100 %	243
P0367	PosCtrlDev	0x80000000 to 0x7FFFFFFF	0x00000000	1:1	243

Parameter	Range of values	Default value	Internal scaling	Page	
P0368	PosCtrlDevAngle	0x80000000 to 0x7FFFFFFF	0x00000000	1:1	244
P0369	PosIpSetValue	0x00000000 to 0xFFFFFFFF	0x00000000	1:1	244
P0370	PosIpSetAngle	0x00000000 to 0xFFFFFFFF	0x00000000	1:1	244
P0371	MechAngleRefSwitch	0x0000 to 0xFFFF	0x0000	1:1	245
P0380	OL_SpeedStatus	0x0000 to 0xFFFF	0x0000	1:1	245
P0381	OL_StartUpTime	500 to 30000 ms	2000 ms	1:1 ms	246
P0382	OL_TorqueBoost	0.00 to 40.00 %	0.00 %	0x4000:100 %	246
P0383	OL_TrqBoostEndSpeed	0.00 to 20.00 %	0.00 %	0x4000:100 %	246
P0390	Enc1Status	0x0000 to 0xFFFF	0x0000	1:1	247
P0391	Enc1ActAngle	0x00000000 to 0xFFFFFFFF	0x00000000	1:1	248
P0392	Enc1ActRev	0x00000000 to 0xFFFFFFFF	0x00000000	1:1	248
P0393	Enc1MechAngle	0x00000000 to 0xFFFFFFFF	0x00000000	1:1	248
P0394	Enc1ActSpeed	-200.00 to +200.00 %	0.00 %	0x40000000: 100 %	248
P0395	Enc1ActPos16	0x0000 to 0xFFFF	0x0000	1:1	249
P0400	Enc2Status	0x0000 to 0xFFFF	0x0000	1:1	249
P0401	Enc2ActAngle	0x00000000 to 0xFFFFFFFF	0x00000000	1:1	250
P0402	Enc2ActRev	0x00000000 to 0xFFFFFFFF	0x00000000	1:1	250
P0403	Enc2MechAngle	0x00000000 to 0xFFFFFFFF	0x00000000	1:1	250
P0404	Enc2ActSpeed	-200.00 to +200.00 %	0.00 %	0x40000000: 100 %	250
P0405	Enc2ActPos16	0x0000 to 0xFFFF	0x0000	1:1	251
P0410	DI_Status_SlotA	0x0000 to 0xFFFF	0x0000	1:1	251
P0415	DO_Status_SlotA	0x0000 to 0xFFFF	0x0000	1:1	251
P0420	AI1_Value	-100.00 to 100.00 %	0.00 %	0x7FFF: 100 %	252
P0421	AI2_Value	-100.00 to 100.00 %	0.00 %	0x7FFF: 100 %	252
P0430	RFGStatus	0x0000 to 0xFFFF	0x0000	1:1	252
P0431	RFGOutput	-100.00 to 100.00 %	0.00 %	0x40000000: 100 %	253
P0440	SvgMode	0x0000 to 0xFFFF	0x0000	1:1	253
P0441	SvgTime1	0.008 to 65.535 s	1.000 s	1000:1 s	254
P0442	SvgSetValue1	-100.00 to +100.00 %	+100.00 %	0x4000: 100 %	254
P0443	SvgTime2	0.008 to 65.535 s	1.000 s	1000:1 s	254
P0444	SvgSetValue2	-100.00 to +100.00 %	0.00 %	0x4000: 100 %	254
P0445	SvgTime3	0.008 to 65.535 s	1.000 s	1000:1 s	255
P0446	SvgSetValue3	-100.00 to +100.00 %	-100.00 %	0x4000: 100 %	255

Parameter	Range of values	Default value	Internal scaling	Page	
P0447	SvgTime4	0.008 to 65.535 s	1.000 s	1000:1 s	255
P0448	SvgSetValue4	-100.00 to +100.00 %	0.00 %	0x4000: 100 %	255
P0449	SvgOutput	-100.00 to +100.00 %	0.00 %	0x4000: 100 %	255
P0460	PPosStatus	0x0000 to 0xFFFF	0x0000	1:1	256
P0461	PPosSwitchStatus	0x0000 to 0xFFFF	0x0000	1:1	258
P0462	PPosActValue	0x00000000 to 0xFFFFFFFF Inc	0x00000000 Inc	1:1 Inc	259
P0463	PPosSetValue	0x00000000 to 0xFFFFFFFF Inc	0x00000000 Inc	1:1 Inc	259
P0464	PPosSpeedSetValue	-13200 to 13200 Inc/ms	0 Inc/ms	1:1 Inc/ms	260
P0466	SPosStatus	0x0000 to 0xFFFF	0x0000	1:1	260
P0467	SPosEffectiveTarget	0x00000000 to 0xFFFFFFFF Inc	0x00000000 Inc	1:1 Inc	260
P0470	SynCtrlStatus	0x0000 to 0xFFFF	0x0000	1:1	261
P0471	SynCtrlPosSetValue	0x00000000 to 0xFFFFFFFF	0x00000000	1:1	262
P0472	SynCtrlSetAngle	0x00000000 to 0xFFFFFFFF	0x00000000	1:1	263
P0473	SynCtrlSetDeltaAngle	0x80000000 to 0x7FFFFFFF	0x00000000	1:1	263
P0474	SynCtrlSpeedSetValue	-100.00 to +100.00 %	0.00 %	0x40000000:100 %	264
P0476	PhaseControl	0 to 1	0	1:1	264
P0477	PhaseRegisterSetAngle	0 to 0xFFFFFFFF Inc	0 Inc	1:1 Inc	264
P0480	AmpStatus	0x0000 to 0xFFFF	0x0000	1:1	265
P0481	AmpActAmbientTemp	0 to 125 °C	0 °C	1:1 °C	265
P0482	AmpActHeatsinkTemp	0 to 125 °C	0 °C	1:1 °C	265
P0484	AmpActDCLinkVolt	0.00 to 200.00 %	0.00 %	0x4000: 100 %	266
P0485	AmpAct_Ixt	0.0 to 400.0 %	0.0 %	0x2000: 100 %	266
P0486	AmpNetFailReactDelay	0.000 to 6.000 s	0.000 s	1000:1 s	266
P0488	PWM_IndexMax	80.00 to 110.00 %	100.00 %	0x4000:100 %	266
P0490	PSU_Status	0x0000 to 0xFFFF	0x0000	1:1	267
P0500	MotorStatus	0x0000 to 0xFFFF	0x0000	1:1	267
P0501	MotorNotchPosStatus	0x0000 to 0xFFFF	0x0000	1:1	267
P0502	MotorAct_I2t	0.0 to 40000.0 %	0.0 %	0x4000: 100 %	268
P0503	MotorActTemp	-30 to 251 °C	0 °C	1:1 °C	268
P0504	MotorActSlipFreq	0.00 to 655.35 Hz	0.00 Hz	100:1 Hz	268
P0506	CalcMagnetCurrent	0.0 to 6553.5 A	0.0 A	10:1 A	269
P0507	ElectPowerAct	-2000000.0 to 2000000.0 W	0.0 W	10:1 W	269
P0508	TrqActValueNm	-20000.000 to 20000.000 Nm	0.000 Nm	1000:1 Nm	269

Parameter	Range of values	Default value	Internal scaling	Page	
P0509	TrqSetMaxNm	0.000 to 20000.000 Nm	0.000 Nm	1000:1 Nm	269
P0520	FluxSetValue	0.00 to 125.00 %	100.00 %	0x4000: 100 %	269
P0521	FluxActValue	0.00 to 150.00 %	0.00 %	0x4000: 100 %	269
P0522	TimeRotorActValue	0 to 4000 ms	0 ms	1:1 ms	269
P0523	FluxSetReduce	20.0 to 100.00 %	100.00 %	0x4000: 100 %	270
P0530	SyncStatus	0x0000 to 0xFFFF		1:1	270
P0531	SyncSource	0 to 8	0	1:1	271
P0532	SyncInterval	0 to 8000 μ s	0 μ s	1:1 μ s	272
P0533	SyncTolerance	0.0 to 40.0 μ s	12.8 μ s	5:1 μ s	272
P0534	SyncOffset	-4000.0 to 4000.0 μ s	0.0 μ s	5:1 μ s	273
P0540	CAN_Mode	0 to 0xFFFF	0	1:1	273
P0541	CAN_Status	0x0000 to 0xFFFF	0x0000	1:1	273
P0542	CAN_BaudrateSet	125 to 1000 kBit/s	125 kBit/s	1:1 kBit/s	275
P0543	CAN_BaudrateDIP	125 to 1000 kBit/s	125 kBit/s	1:1 kBit/s	275
P0544	CAN_BaudrateAct	125 to 1000 kBit/s	1000 kBit/s	1:1 kBit/s	276
P0545	CAN_SlaveNoSet	0 to 128	0	1:1	276
P0546	CAN_SlaveNoDIP	0 to 128	0	1:1	276
P0547	CAN_SlaveNoAct	0 to 128	0	1:1	276
P0550	ModSlotAldent	0x0000 to 0xFFFF	0x0000	1:1	277
P0551	ModSlotBldent	0x0000 to 0xFFFF	0x0000	1:1	278
P0552	ModSlotCldent	0x0000 to 0xFFFF	0x0000	1:1	278
P0556	BootloaderVersion	0x0000 to 0xFFFF	0x0000	1:1	278
P0558	ConfigId	0 to 4294967295	0	1:1	279
P0559	DriveName	to		1:1	279
P0560	EncEmuModVersion	0x0000 to 0xFFFF		1:1	279
P0561	EncEmuStatus	0x0000 to 0xFFFF	0x0000	1:1	279
P0562	EncEmuMode	0x0000 to 0xFFFF	0x0020	1:1	280
P0563	EncEmuPulsesPerRev	1 to 32767 Striche/Umdrehung	1024 Striche/Umdrehung	1:1 Striche/Umdrehung	280
P0564	EncEmuOffsetIdxSig	0x00000000 to 0xFFFFFFFF	0x00000000	1:1	281
P0580	TouchPrStatus	0x0000 to 0xFFFF	0x0000	1:1	281
P0581	TouchPr1ValPhiPos	0x00000000 to 0xFFFFFFFF	0x00000000	1:1	281
P0582	TouchPr1ValRevPos	0x00000000 to 0xFFFFFFFF	0x00000000	1:1	281
P0583	TouchPr1ValPhiNeg	0x00000000 to 0xFFFFFFFF	0x00000000	1:1	282
P0584	TouchPr1ValRevNeg	0x00000000 to 0xFFFFFFFF	0x00000000	1:1	282

Parameter	Range of values	Default value	Internal scaling	Page	
P0585	TouchPr2ValPhiPos	0x00000000 to 0xFFFFFFFF	1:1	282	
P0586	TouchPr2ValRevPos	0x00000000 to 0xFFFFFFFF	1:1	282	
P0587	TouchPr2ValPhiNeg	0x00000000 to 0xFFFFFFFF	1:1	282	
P0588	TouchPr2ValRevNeg	0x00000000 to 0xFFFFFFFF	1:1	282	
P0590	PrPIDSetValue	-100.00 to +100.00 %	0.00 %	0x40000000: 100 %	283
P0591	PrPIDActValue	-100.00 to +100.00 %	0.00 %	0x40000000: 100 %	283
P0592	PrPIDOutput	-100.00 to +100.00 %	0.00 %	0x40000000: 100 %	283
P0593	PrPIDIntH32	-100.00 to 100.00 %	0 %	0x40000000: 100 %	283
P0600	PPosTarget0	0x00000000 to 0xFFFFFFFF Inc	1:1 Inc	283	
P0601	PPosTargetInput0	-2 to 13	0	1:1	284
P0602	PPosSetSpeed0	1 to 13200 Inc/ms	100 Inc/ms	1:1 Inc/ms	288
P0603	PPosAcceleration0	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	288
P0604	PPosDeceleration0	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	289
P0605	PPosBend0	0.07 to 14.00 Inc/ms ³	1.25 Inc/ms ³	100:1 Inc/ms ³	289
P0606	PPosSmooth0	0 to 8191 ms	0 ms	1:1 ms	289
P0607	PPosRelTarget0	0x80000000 to 0x7FFFFFFF Inc	0 Inc	1:1 Inc	290
P0610	PPosTarget1	0x00000000 to 0xFFFFFFFF Inc	0x00000000 Inc	1:1 Inc	290
P0611	PPosTargetInput1	-2 to 13	0	1:1	290
P0612	PPosSetSpeed1	1 to 13200 Inc/ms	100 Inc/ms	1:1 Inc/ms	290
P0613	PPosAcceleration1	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	290
P0614	PPosDeceleration1	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	291
P0615	PPosBend1	0.07 to 14.00 Inc/ms ³	1.25 Inc/ms ³	100:1 Inc/ms ³	291
P0616	PPosSmooth1	0 to 8191 ms	0 ms	1:1 ms	291
P0617	PPosRelTarget1	0x80000000 to 0x7FFFFFFF Inc	0 Inc	1:1 Inc	291
P0620	PPosTarget2	0x00000000 to 0xFFFFFFFF Inc	0x00000000 Inc	1:1 Inc	291
P0621	PPosTargetInput2	-2 to 13	0	1:1	291
P0622	PPosSetSpeed2	1 to 13200 Inc/ms	200 Inc/ms	1:1 Inc/ms	292
P0623	PPosAcceleration2	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	292

Parameter	Range of values	Default value	Internal scaling	Page	
P0624	PPosDeceleration2	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	292
P0625	PPosBend2	0.07 to 14.00 Inc/ms ³	1.25 Inc/ms ³	100:1 Inc/ms ³	292
P0626	PPosSmooth2	0 to 8191 ms	0 ms	1:1 ms	292
P0627	PPosRelTarget2	0x80000000 to 0x7FFFFFFF Inc	0 Inc	1:1 Inc	292
P0630	PPosTarget3	0x00000000 to 0xFFFFFFFF Inc	0x00000000 Inc	1:1 Inc	293
P0631	PPosTargetInput3	-2 to 13	0	1:1	293
P0632	PPosSetSpeed3	1 to 13200 Inc/ms	200 Inc/ms	1:1 Inc/ms	293
P0633	PPosAcceleration3	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	293
P0634	PPosDeceleration3	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	293
P0635	PPosBend3	0.07 to 14.00 Inc/ms ³	1.25 Inc/ms ³	100:1 Inc/ms ³	293
P0636	PPosSmooth3	0 to 8191 ms	0 ms	1:1 ms	293
P0637	PPosRelTarget3	0x80000000 to 0x7FFFFFFF Inc	0 Inc	1:1 Inc	294
P0640	PPosTarget4	0x00000000 to 0xFFFFFFFF Inc	0x00000000 Inc	1:1 Inc	294
P0641	PPosTargetInput4	-2 to 13	0	1:1	294
P0642	PPosSetSpeed4	1 to 13200 Inc/ms	200 Inc/ms	1:1 Inc/ms	294
P0643	PPosAcceleration4	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	294
P0644	PPosDeceleration4	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	294
P0645	PPosBend4	0.07 to 14.00 Inc/ms ³	1.25 Inc/ms ³	100:1 Inc/ms ³	295
P0646	PPosSmooth4	0 to 8191 ms	0 ms	1:1 ms	295
P0647	PPosRelTarget4	0x80000000 to 0x7FFFFFFF Inc	0 Inc	1:1 Inc	295
P0650	PPosTarget5	0x00000000 to 0xFFFFFFFF Inc	0x00000000 Inc	1:1 Inc	295
P0651	PPosTargetInput5	-2 to 13	0	1:1	295
P0652	PPosSetSpeed5	1 to 13200 Inc/ms	200 Inc/ms	1:1 Inc/ms	295
P0653	PPosAcceleration5	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	296
P0654	PPosDeceleration5	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	296
P0655	PPosBend5	0.07 to 14.00 Inc/ms ³	1.25 Inc/ms ³	100:1 Inc/ms ³	296
P0656	PPosSmooth5	0 to 8191 ms	0 ms	1:1 ms	296

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P0657	PPosRelTarget5	0x80000000 to 0x7FFFFFFF Inc	0 Inc	1:1 Inc	296
P0660	PPosTarget6	0x00000000 to 0xFFFFFFFF Inc	0x00000000 Inc	1:1 Inc	296
P0661	PPosTargetInput6	-2 to 13	0	1:1	297
P0662	PPosSetSpeed6	1 to 13200 Inc/ms	200 Inc/ms	1:1 Inc/ms	297
P0663	PPosAcceleration6	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	297
P0664	PPosDeceleration6	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	297
P0665	PPosBend6	0.07 to 14.00 Inc/ms ³	1.25 Inc/ms ³	100:1 Inc/ms ³	297
P0666	PPosSmooth6	0 to 8191 ms	0 ms	1:1 ms	297
P0667	PPosRelTarget6	0x80000000 to 0x7FFFFFFF Inc	0 Inc	1:1 Inc	297
P0670	PPosTarget7	0x00000000 to 0xFFFFFFFF Inc	0x00000000 Inc	1:1 Inc	298
P0671	PPosTargetInput7	-2 to 13	0	1:1	298
P0672	PPosSetSpeed7	1 to 13200 Inc/ms	200 Inc/ms	1:1 Inc/ms	298
P0673	PPosAcceleration7	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	298
P0674	PPosDeceleration7	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	298
P0675	PPosBend7	0.07 to 14.00 Inc/ms ³	1.25 Inc/ms ³	100:1 Inc/ms ³	298
P0676	PPosSmooth7	0 to 8191 ms	0 ms	1:1 ms	298
P0677	PPosRelTarget7	0x80000000 to 0x7FFFFFFF Inc	0 Inc	1:1 Inc	299
P0680	PPosTarget8	0x00000000 to 0xFFFFFFFF Inc	0x00000000 Inc	1:1 Inc	299
P0681	PPosTargetInput8	-2 to 13	0	1:1	299
P0682	PPosSetSpeed8	1 to 13200 Inc/ms	200 Inc/ms	1:1 Inc/ms	299
P0683	PPosAcceleration8	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	299
P0684	PPosDeceleration8	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	299
P0685	PPosBend8	0.07 to 14.00 Inc/ms ³	1.25 Inc/ms ³	100:1 Inc/ms ³	300
P0686	PPosSmooth8	0 to 8191 ms	0 ms	1:1 ms	300
P0687	PPosRelTarget8	0x80000000 to 0x7FFFFFFF Inc	0 Inc	1:1 Inc	300
P0690	PPosTarget9	0x00000000 to 0xFFFFFFFF Inc	0x00000000 Inc	1:1 Inc	300
P0691	PPosTargetInput9	-2 to 13	0	1:1	300

Parameter	Range of values	Default value	Internal scaling	Page	
P0692	PPosSetSpeed9	1 to 13200 Inc/ms	200 Inc/ms	1:1 Inc/ms	300
P0693	PPosAcceleration9	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	301
P0694	PPosDeceleration9	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	301
P0695	PPosBend9	0.07 to 14.00 Inc/ms ³	1.25 Inc/ms ³	100:1 Inc/ms ³	301
P0696	PPosSmooth9	0 to 8191 ms	0 ms	1:1 ms	301
P0697	PPosRelTarget9	0x80000000 to 0x7FFFFFFF Inc	0 Inc	1:1 Inc	301
P0700	PPosTarget10	0x00000000 to 0xFFFFFFFF Inc	0x00000000 Inc	1:1 Inc	301
P0701	PPosTargetInput10	-2 to 13	0	1:1	302
P0702	PPosSetSpeed10	1 to 13200 Inc/ms	200 Inc/ms	1:1 Inc/ms	302
P0703	PPosAcceleration10	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	302
P0704	PPosDeceleration10	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	302
P0705	PPosBend10	0.07 to 14.00 Inc/ms ³	1.25 Inc/ms ³	100:1 Inc/ms ³	302
P0706	PPosSmooth10	0 to 8191 ms	0 ms	1:1 ms	302
P0707	PPosRelTarget10	0x80000000 to 0x7FFFFFFF Inc	0 Inc	1:1 Inc	302
P0710	PPosTarget11	0x00000000 to 0xFFFFFFFF Inc	0x00000000 Inc	1:1 Inc	303
P0711	PPosTargetInput11	-2 to 13	0	1:1	303
P0712	PPosSetSpeed11	1 to 13200 Inc/ms	200 Inc/ms	1:1 Inc/ms	303
P0713	PPosAcceleration11	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	303
P0714	PPosDeceleration11	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	303
P0715	PPosBend11	0.07 to 14.00 Inc/ms ³	1.25 Inc/ms ³	100:1 Inc/ms ³	303
P0716	PPosSmooth11	0 to 8191 ms	0 ms	1:1 ms	303
P0717	PPosRelTarget11	0x80000000 to 0x7FFFFFFF Inc	0 Inc	1:1 Inc	304
P0720	PPosTarget12	0x00000000 to 0xFFFFFFFF Inc	0x00000000 Inc	1:1 Inc	304
P0721	PPosTargetInput12	-2 to 13	0	1:1	304
P0722	PPosSetSpeed12	1 to 13200 Inc/ms	200 Inc/ms	1:1 Inc/ms	304
P0723	PPosAcceleration12	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	304
P0724	PPosDeceleration12	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	304

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P0725	PPosBend12	0.07 to 14.00 Inc/ms ³	1.25 Inc/ms ³	100:1 Inc/ms ³	305
P0726	PPosSmooth12	0 to 8191 ms	0 ms	1:1 ms	305
P0727	PPosRelTarget12	0x80000000 to 0x7FFFFFFF Inc	0 Inc	1:1 Inc	305
P0730	PPosTarget13	0x00000000 to 0xFFFFFFFF Inc	0x00000000 Inc	1:1 Inc	305
P0731	PPosTargetInput13	-2 to 13	0	1:1	305
P0732	PPosSetSpeed13	1 to 13200 Inc/ms	200 Inc/ms	1:1 Inc/ms	305
P0733	PPosAcceleration13	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	306
P0734	PPosDeceleration13	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	306
P0735	PPosBend13	0.07 to 14.00 Inc/ms ³	1.25 Inc/ms ³	100:1 Inc/ms ³	306
P0736	PPosSmooth13	0 to 8191 ms	0 ms	1:1 ms	306
P0737	PPosRelTarget13	0x80000000 to 0x7FFFFFFF Inc	0 Inc	1:1 Inc	306
P0740	PPosTarget14	0x00000000 to 0xFFFFFFFF Inc	0x00000000 Inc	1:1 Inc	306
P0741	PPosTargetInput14	-2 to 13	0	1:1	307
P0742	PPosSetSpeed14	1 to 13200 Inc/ms	200 Inc/ms	1:1 Inc/ms	307
P0743	PPosAcceleration14	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	307
P0744	PPosDeceleration14	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	307
P0745	PPosBend14	0.07 to 14.00 Inc/ms ³	1.25 Inc/ms ³	100:1 Inc/ms ³	307
P0746	PPosSmooth14	0 to 8191 ms	0 ms	1:1 ms	307
P0747	PPosRelTarget14	0x80000000 to 0x7FFFFFFF Inc	0 Inc	1:1 Inc	307
P0750	PPosTarget15	0x00000000 to 0xFFFFFFFF Inc	0x00000000 Inc	1:1 Inc	308
P0751	PPosTargetInput15	-2 to 13	0	1:1	308
P0752	PPosSetSpeed15	1 to 13200 Inc/ms	200 Inc/ms	1:1 Inc/ms	308
P0753	PPosAcceleration15	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	308
P0754	PPosDeceleration15	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	308
P0755	PPosBend15	0.07 to 14.00 Inc/ms ³	1.25 Inc/ms ³	100:1 Inc/ms ³	308
P0756	PPosSmooth15	0 to 8191 ms	0 ms	1:1 ms	308
P0757	PPosRelTarget15	0x80000000 to 0x7FFFFFFF Inc	0 Inc	1:1 Inc	309

Parameter	Range of values	Default value	Internal scaling	Page	
P0760	PPosTarget16	0x00000000 to 0xFFFFFFFF Inc	0x00000000 Inc	1:1 Inc	309
P0761	PPosTargetInput16	-2 to 13	0	1:1	309
P0762	PPosSetSpeed16	1 to 13200 Inc/ms	200 Inc/ms	1:1 Inc/ms	309
P0763	PPosAcceleration16	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	309
P0764	PPosDeceleration16	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	309
P0765	PPosBend16	0.07 to 14.00 Inc/ms ³	1.25 Inc/ms ³	100:1 Inc/ms ³	310
P0766	PPosSmooth16	0 to 8191 ms	0 ms	1:1 ms	310
P0767	PPosRelTarget16	0x80000000 to 0x7FFFFFFF Inc	0 Inc	1:1 Inc	310
P0800	BacilM1Period	0 to 65535	32	1:1	310
P0801	BacilM1SetVal1	0 to MaxParaNr	0	1:1	311
P0802	BacilM1SetVal2	0 to MaxParaNr	0	1:1	311
P0803	BacilM1SetVal3	0 to MaxParaNr	0	1:1	311
P0804	BacilM1SetVal4	0 to MaxParaNr	0	1:1	311
P0805	BacilM1SetVal5	0 to MaxParaNr	0	1:1	311
P0806	BacilM1SetVal6	0 to MaxParaNr	0	1:1	311
P0807	BacilM1SetVal7	0 to MaxParaNr	0	1:1	312
P0808	BacilM1SetVal8	0 to MaxParaNr	0	1:1	312
P0809	BacilM1ActVal1	0 to MaxParaNr	0	1:1	312
P0810	BacilM1ActVal2	0 to MaxParaNr	0	1:1	312
P0811	BacilM1ActVal3	0 to MaxParaNr	0	1:1	312
P0812	BacilM1ActVal4	0 to MaxParaNr	0	1:1	312
P0813	BacilM1ActVal5	0 to MaxParaNr	0	1:1	313
P0814	BacilM1ActVal6	0 to MaxParaNr	0	1:1	313
P0815	BacilM1ActVal7	0 to MaxParaNr	0	1:1	313
P0816	BacilM1ActVal8	0 to MaxParaNr	0	1:1	313
P0818	BacilM1CycleSetOffset	0 to 65535	2	1:1	313
P0819	BacilM1CycleActOffset	0 to 65535	0	1:1	313
P0830	BaciSlaveGConfig1	0 to 0xFFFF	0	1:1	314
P0831	BaciSlaveGConfig2	0 to 0xFFFF	0	1:1	314
P0832	BaciSlaveGConfig3	0 to 0xFFFF	0	1:1	315
P0833	BaciSlaveGConfig4	0 to 0xFFFF	0	1:1	315
P0834	BaciSlaveGConfig5	0 to 0xFFFF	0	1:1	315
P0835	BaciSlaveGConfig6	0 to 0xFFFF	0	1:1	315
P0836	BaciSlaveGConfig7	0 to 0xFFFF	0	1:1	315
P0837	BaciSlaveGConfig8	0 to 0xFFFF	0	1:1	316

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P0838	BaciSetupTimeout	0 to 65535 s	60 s	1:1 s	316
P0839	BaciCyclicTimeout	0 to 65535 ms	50 ms	1:1 ms	316
P0848	BaciErrDelay	0 to 0xFFFF s	30 s	1:1 s	316
P0850	AutotuningMode	0x0000 to 0xFFFF	0x0000	1:1	317
P0851	AutotuningStatus	0x00000000 to 0xFFFFFFFF	0x00000000	1:1	318
P0852	AutotuningDone	0x0000 to 0xFFFF	0x0000	1:1	319
P0853	MeasuredStatorResist	0.000 to 500.000 Ohm	0.000 Ohm	1000:1 Ohm	319
P0854	MeasuredLeakInduct	0.00 to 655.35 mH	0.00 mH	100:1 mH	319
P0855	MeasuredRsRr	0.000 to 500.000 Ohm	0.000 Ohm	1000:1 Ohm	320
P0856	AutotuningSpeedMax	0 to 1500 U/min	100 U/min	1:1 U/min	320
P0857	AutotuningCurrentMax	0.00 to 90.00 %	10.00 %	0x4000:100 %	320
P0858	MeasuredInertia	0.000 to 500000.0 kg*cm*cm	0.000 kg*cm*cm	10:1 kg*cm*cm	320
P0880	MotBrakeManCmd	0x0000 to 0xFFFF	0x0000	1:1	321
P0881	MotBrakeStatus	0x0000 to 0xFFFF	0x0000	1:1	321
P0882	MotBrakeOut	0x00000000 to 0x00000001	0x00000001	1:1	322
P0883	MotBrakeIn	0x00000001 to 0xFFFFFFFF	0x00000003	1:1	322
P0884	MotBrakeLineMon	0x00000000 to 0xFFFFFFFF	0x00000001	1:1	323
P0902	ErrReaction	-32768 to 32767	0	1:1	323
P0903	ErrReactFunctionMod	-32768 to 32767	0	1:1	324
P0904	ErrReactOptionMod	-32768 to 32767	0	1:1	324
P0905	ErrReactOptionAppl	-32768 to 32767	0	1:1	324
P1000	OperationMode	-7 to 7	-3	1:1	325
P1001	CommSource	0x0000 to 0x007F	0x007F	1:1	326
P1002	DrvManagerOptions	0x0000 to 0xFFFF	0x0000	1:1	327
P1003	StopOptionCode	0 to 3	0	1:1	327
P1004	QuickstopCode	0 to 8	0	1:1	327
P1005	ShutdownCode	0 to 3	0	1:1	328
P1006	DisableOpCode	0 to 3	0	1:1	329
P1007	ErrorReactionCode	-3 to 3	0	1:1	329
P1008	InternalLimitMask	0x0000 to 0xFFFF	0xFFFF	1:1	330
P1009	QuickstopCmdCode	-1 to 8	-1	1:1	330
P1010	RecordId	0 to 4294967295	0	1:1	331
P1011	RecordName	to	0	1:1	331
P1020	CurrentCtrl_PGain	0.01 to 655.35	1.00	100:1	331

Parameter	Range of values	Default value	Internal scaling	Page	
P1021	CurrentCtrl_ITime	0.0 to 1000.0 ms	2.5 ms	10:1 ms	332
P1022	TrqAddValue	-100.00 to 100.00 %	0.00 %	0x4000: 100 %	332
P1023	VdqLimit	0.00 to 199.99 %	199.99 %	0x4000: 100 %	332
P1030	SpeedCtrlMode	0x0000 to 0xFFFF	0x0001	1:1	333
P1031	SpeedMax	20 to 24000 U/min	3000 U/min	1:1 U/min	334
P1032	SpeedCtrl_PGain	0.0 to 209715.1	1.0	10:1	335
P1033	SpeedCtrl_ITime	0.0 to 2000.0 ms	25.0 ms	10:1 ms	335
P1034	TrqInertiaCompens	0 to 32767	0	1:1	335
P1036	TrqLimSymmetrical	0.00 to 100.00 %	100.00 %	0x4000: 100 %	335
P1037	TrqLimMot_TD1	0.00 to 100.00 %	100.00 %	0x4000: 100 %	336
P1038	TrqLimGen_TD2	0.00 to 100.00 %	100.00 %	0x4000: 100 %	336
P1039	TrqLimHysteresis	0.00 to 100.00 %	0.25 %	0x4000: 100 %	337
P1040	SpeedSetValueAdd	-100.00 to +100.00 %	0.00 %	0x40000000: 100 %	337
P1041	SpeedSet_ULim	0.00 to +100.00 %	+100.00 %	0x40000000: 100 %	337
P1042	SpeedSet_LLim	-100.00 to 0.00 %	-100.00 %	0x40000000: 100 %	337
P1043	SpeedDevMax	0.00 to 200.00 %	5.00 %	0x4000: 100 %	337
P1044	CutOffFrequencyOrder2	0 to 1250 Hz	0 Hz	26:1 Hz	338
P1045	TorqueReducingTime	0 to 8000 ms	0 ms	1:1 ms	338
P1046	TrqSymLimitNm	0.000 to 20000.000 Nm	20000.000 Nm	1000:1 Nm	338
P1050	PosCtrlMode	0x0000 to 0xFFFF	0x0000	1:1	339
P1051	PosCtrl_KVFactor	0.0 to 3276.7 1/s	10.0 1/s	10:1 1/s	340
P1052	SpeedFeedForSmooth	0.0 to 50.0 ms	1.0 ms	10:1 ms	340
P1053	SpeedFeedForFactor	0.00 to 125.00 %	100.00 %	0x4000: 100 %	341
P1054	PosDevLimDyn	0x00000000 to 0x7FFFFFFF	0x00000800	1:1	341
P1055	PosDevLimStatic	0x00000000 to 0x7FFFFFFF	0x00000100	1:1	342
P1056	PosDevTime	0.000 to 65.000 s	1.000 s	1000:1 s	342
P1057	GearFactor	0.02 to 327.67	1.00	100:1	342
P1058	PosDevLim2	0x00000000 to 0x7FFFFFFF	0x00000100	1:1	343
P1059	PosSetSmoothInterval	0 to 16	0	1:1	343
P1061	OL_SpeedSmoothTime	0 to 50.0 ms	1.0 ms	10:1 ms	344
P1062	OL_Speed_ULim	0.00 to 200.00 %	115.00 %	0x4000: 100 %	344
P1063	OL_Mon_LLim	0.00 to 25.00 %	1.00 %	0x4000: 100 %	344
P1064	OL_Mon_ULimOn	0.00 to 150.00 %	100.00 %	0x4000: 100 %	345
P1065	OL_Mon_ULimOff	0.00 to 150.00 %	96.00 %	0x4000: 100 %	345
P1071	Enc1SmoothTime	0.0 to 50.0 ms	1.0 ms	10:1 ms	345

Parameter	Range of values	Default value	Internal scaling	Page	
P1072	Enc1Speed_ULim	0.00 to 200.00 %	115.00 %	0x4000: 100 %	346
P1073	Enc1Mon_LLim	0.00 to 25.00 %	1.00 %	0x4000: 100 %	346
P1074	Enc1Mon_ULimOn	0.00 to 150.00 %	100.00 %	0x4000: 100 %	347
P1075	Enc1Mon_ULimOff	0.00 to 150.00 %	96.00 %	0x4000: 100 %	347
P1076	Enc1Sin2xUpperLimit	85 to 110 %	100 %	$GUI = \sqrt{(Para * 10000/512)} \%$	347
P1077	Enc1AmpErrTimeLim	0 to 4000 ms	0 ms	8:1 ms	347
P1078	Enc2AmpErrTimeLim	0 to 4000 ms	0 ms	8:1 ms	348
P1079	GEB1_maxf	0 to 0xFFFF	2	1:1	348
P1081	Enc2SmoothTime	0.0 to 50.0	1.0	10:1	348
P1082	Enc2Speed_ULim	0.00 to 200.00 %	115.00 %	0x4000: 100 %	348
P1083	Enc2Mon_LLim	0.00 to 25.00 %	1.00 %	0x4000: 100 %	348
P1084	Enc2Mon_ULimOn	0.00 to 150.00 %	100.00 %	0x4000: 100 %	349
P1085	Enc2Mon_ULimOff	0.00 to 150.00 %	96.00 %	0x4000: 100 %	349
P1086	Enc2Sin2xUpperLimit	85 to 110 %	100 %	$GUI = \sqrt{(Para * 10000/512)} \%$	349
P1087	FieldAngMonitorThresh	0 to 50 %	10 %	0x4000: 100 %	350
P1089	GEB2_maxf	0 to 0xFFFF	2	1:1	350
P1091	DI1_TargetPxxx	0 to MaxParaNr	0	1:1	350
P1092	DI1_BitSelection	0x0000 to 0xFFFF	0	1:1	350
P1093	DI1_LowPattern	0x0000 to 0xFFFF	0	1:1	350
P1094	DI1_HighPattern	0x0000 to 0xFFFF	0	1:1	350
P1096	DI2_TargetPxxx	0 to MaxParaNr	0	1:1	351
P1097	DI2_BitSelection	0x0000 to 0xFFFF	0	1:1	351
P1098	DI2_LowPattern	0x0000 to 0xFFFF	0	1:1	351
P1099	DI2_HighPattern	0x0000 to 0xFFFF	0	1:1	351
P1101	DI3_TargetPxxx	0 to MaxParaNr	0	1:1	351
P1102	DI3_BitSelection	0x0000 to 0xFFFF	0	1:1	352
P1103	DI3_LowPattern	0x0000 to 0xFFFF	0	1:1	352
P1104	DI3_HighPattern	0x0000 to 0xFFFF	0	1:1	352
P1106	DI4_TargetPxxx	0 to MaxParaNr	0	1:1	352
P1107	DI4_BitSelection	0x0000 to 0xFFFF	0	1:1	352
P1108	DI4_LowPattern	0x0000 to 0xFFFF	0	1:1	352
P1109	DI4_HighPattern	0x0000 to 0xFFFF	0	1:1	353
P1111	DO1_SourcePxxx	0 to MaxParaNr	0	1:1	353
P1112	DO1_BitSelection	0x0000 to 0xFFFF	0	1:1	353
P1113	DO1_BitPattern	0x0000 to 0xFFFF	0	1:1	353
P1115	DO2_SourcePxxx	0 to MaxParaNr	0	1:1	353
P1116	DO2_BitSelection	0x0000 to 0xFFFF	0	1:1	353
P1117	DO2_BitPattern	0x0000 to 0xFFFF	0	1:1	354

Parameter	Range of values	Default value	Internal scaling	Page	
P1119	DO3_SourcePxxx	0 to MaxParaNr	0	1:1	354
P1120	DO3_BitSelection	0x0000 to 0xFFFF	0	1:1	354
P1121	DO3_BitPattern	0x0000 to 0xFFFF	0	1:1	354
P1123	DO4_SourcePxxx	0 to MaxParaNr	0	1:1	354
P1124	DO4_BitSelection	0x0000 to 0xFFFF	0	1:1	354
P1125	DO4_BitPattern	0x0000 to 0xFFFF	0	1:1	355
P1130	AI1_InputChannel	0x0000 to 0xFFFF	0	1:1	355
P1131	AI1_Smoothing	0 to 30 ms	1 ms	1:1 ms	355
P1132	AI1_Scaling	-2.00 to 2.00	1.0	0x3FFF:1	355
P1133	AI1_TargetPxxx	0 to MaxParaNr	0	1:1	355
P1134	AI1_Offset	-100.00 to 100.00 %	0 %	0x7FFF: 100 %	356
P1135	AI1_Treshold	0.00 to 100.00 %	0 %	0x7FFF: 100 %	356
P1136	AI2_InputChannel	0x0000 to 0xFFFF	0	1:1	356
P1137	AI2_Smoothing	0 to 30 ms	1 ms	1:1 ms	356
P1138	AI2_Scaling	-2.00 to 2.00	1.00	0x3FFF:1	356
P1139	AI2_TargetPxxx	0 to MaxParaNr	0	1:1	356
P1140	AI2_Offset	-100.00 to 100.00 %	0 %	0x7FFF: 100 %	357
P1141	AI2_Treshold	0.00 to 100.00 %	0 %	0x7FFF: 100 %	357
P1150	AOF1_OutputChannel	0x0000 to 0xFFFF	0	1:1	357
P1151	AOF1_SourcePxxx	0 to MaxParaNr	0	1:1	357
P1152	AOF1_Offset	-10.00 to 10.00 V	0 V	0x7FFF: 10 V	357
P1153	AOF1_Scaling	-67108863.00 to 67108863.00	1.00	32:1	357
P1154	AOF2_OutputChannel	0x0000 to 0xFFFF	0	1:1	358
P1155	AOF2_SourcePxxx	0 to MaxParaNr	0	1:1	358
P1156	AOF2_Offset	-10.00 to 10.00 V	0 V	0x7FFF: 10 V	358
P1157	AOF2_Scaling	-67108863.00 to 67108863.00	1	32:1	358
P1170	RFGMode	0x0000 to 0xFFFF	0x0000	1:1	359
P1171	RFG1Input	-100.00 to 100.00 %	0.00 %	0x4000: 100 %	360
P1172	RFG1RampUpTime	0.00 to 650.00 s	0.00 s	100:1 s	360
P1173	RFG1RampDownTime	0.00 to 650.00 s	0.00 s	100:1 s	360
P1174	RFG1StopTime	0.00 to 650.00 s	0.00 s	100:1 s	361
P1175	RFG1Smoothing	0 to 32000 ms	0 ms	1:1 ms	361
P1176	RFG1SCurveUpTime	0.00 to 650.00 s	0.00 s	100:1 s	361
P1177	RFG1SCurveDownTime	0.00 to 650.00 s	0.00 s	100:1 s	361
P1178	RFG1SetValZone	0.00 to 200.00 %	0.00 %	0x4000: 100 %	362
P1179	RFG1Input32	-100.00 to +100.00 %	0.00 %	0x40000000: 100 %	362
P1180	RFG1RampUpTime32	0.000 to 650.000 s	0.000 s	1000:1 s	362

A

Appendix A - List of parameters

Parameter	Range of values	Default value	Internal scaling	Page	
P1181	RFG1RampDownTime32	0.000 to 650.000 s	0.000 s	1000:1 s	362
P1182	RFG1SCurveUpTime32	0.000 to 650.000 s	0.000 s	1000:1 s	362
P1183	RFG1SCurveDownTime32	0.000 to 650.000 s	0.000 s	1000:1 s	363
P1189	CamSpeedVirtualMaster	0x8000 to 0x7FFF	0	1:1	363
P1190	PPosMode	0x0000 to 0xFFFF	0x0001	1:1	363
P1191	PPosActRecordNumber	0 to 16	1	1:1	368
P1192	PPosScalingNumer	1 to 65535 Inc	1 Inc	1:1 Inc	369
P1193	PPosScalingDenom	1 to 32768 Inc	1 Inc	1:1 Inc	369
P1194	PPosWindow	0x00000000 to 0xFFFFFFFF Inc	0x00001000 Inc	1:1 Inc	369
P1195	PPosWindowTime	1 to 65535 ms	10 ms	1:1 ms	369
P1196	PPosSWLimitSwitch1	0x00000000 to 0xFFFFFFFF Inc	0x00010000 Inc	1:1 Inc	370
P1197	PPosSWLimitSwitch2	0x00000000 to 0xFFFFFFFF Inc	0xFFFF0000 Inc	1:1 Inc	371
P1198	PPosClipEnvironment1	0x00000001 to 0xFFFFFFFF Inc	0x00010000 Inc	1:1 Inc	371
P1199	PPosClipEnvironment2	0x00000001 to 0xFFFFFFFF Inc	0x00010000 Inc	1:1 Inc	372
P1200	PPosHomePosition	0x00000000 to 0xFFFFFFFF Inc	0x00020000 Inc	1:1 Inc	372
P1201	PPosHomingSpeed	1 to 13200 Inc/ms	500 Inc/ms	1:1 Inc/ms	372
P1202	PPosHomingFinalSpeed	1 to 50 Inc/ms	10 Inc/ms	1:1 Inc/ms	372
P1203	PPosHomingAcceler	0.25 to 450.00 Inc/ms ²	5.00 Inc/ms ²	100:1 Inc/ms ²	373
P1204	PPosHomingDeceler	0.25 to 450.00 Inc/ms ²	5.00 Inc/ms ²	100:1 Inc/ms ²	373
P1205	PPosHomingMode	-10 to 35	1	1:1	374
P1206	PPosHomingEnclnp	0 to 2	0	1:1	376
P1208	PPosSwitchMode	0x0000 to 0xFFFF	0x0000	1:1	377
P1209	PPosEncoderOffset	0x0000 to 0xFFFF Inc	0x0000 Inc	1:1 Inc	377
P1210	PPosJoggingSpeed	1 to 13200 Inc/ms	500 Inc/ms	1:1 Inc/ms	378
P1211	PPosJoggingAcceler	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	378
P1212	PPosJoggingDeceler	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	378
P1213	PPosStopDeceleration	0.25 to 450.00 Inc/ms ²	5.00 Inc/ms ²	100:1 Inc/ms ²	378
P1214	DI_PosLimitSwitch	0x0000 to 4	0	1:1	379
P1215	DI_NegLimitSwitch	0x0000 to 4	0	1:1	379
P1216	DI_OriginSwitch	0x0000 to 4	0	1:1	379

Parameter	Range of values	Default value	Internal scaling	Page	
P1217	PPosHomingBlockTime	0.01 to 655.35 s	1.00 s	100:1 s	380
P1218	PPosHomingTrqLim	0.00 to 100.00 %	25.00 %	0x4000: 100 %	380
P1219	PPosFeedrateOverride	0.00 to 655.35 %	100.00 %	100:1 %	381
P1220	SynCtrlMode	0x0000 to 0xFFFF	0x0000	1:1	381
P1221	SynCtrlRevSlave	-32767 to 32767	3000	1:1	384
P1222	SynCtrlRevMaster	1 to 32767	3000	1:1	384
P1223	PhaseSpeed	1 to 1193048 Inc/ms	298256 Inc/ms	1:1 Inc/ms	386
P1224	PhaseAccel	12.50 to 11930.50 Inc/ms ²	716.00 Inc/ms ²	100:1 Inc/ms ²	386
P1225	PhaseMinResSpeed	0 to 4294968 Inc/ms	0 Inc/ms	1:1 Inc/ms	386
P1226	PhaseSpeedFactor	0x0000 to 0x4000 %	0 %	0x4000: 100 %	387
P1230	PosSwitchMode	0 to 0xFFFF	0	1:1	387
P1239	PPosModuloLimPos	0x00010000 to 0xFFFFFFFF Inc	0x00010000 Inc	1:1 Inc	387
P1240	PWM_Frequency	2 to 16 kHz	8 kHz	1:1 kHz	387
P1241	CurrentDriveMax	0.1 to 6553.5 A	2.5 A	10:1 A	388
P1242	DCLinkmin	0 to 100 %	75 %	0x4000: 100 %	388
P1250	DCLinkCtrlVoltSet	150 to 900 V	850 V	1:1 V	388
P1251	DCLinkCtrl_PGain	1.0 to 255.9	50.0	10:1	388
P1252	DCLinkCtrl_ITime	0.2 to 1000.0 ms	20.0 ms	10:1 ms	389
P1253	BallastResist	0.1 to 750.0 Ohm	300 Ohm	10:1 Ohm	389
P1254	ContBrakePower	0 to 600000 W	30 W	1:1 W	389
P1255	EnergyStorCapacity	0 to 100000 Ws	5000 Ws	1:1 Ws	389
P1260	BlockingTime	0.0 to 6500.0 s	10.0 s	10:1 s	389
P1261	Mon_LLimBlocking	0.00 to 100.00 %	1.00 %	0x4000: 100 %	390
P1270	FieldWeakCtrl_PGain	0.0 to 127.9	2.0	10:1	390
P1271	FieldWeakCtrl_ITime	0.0 to 1000.0 ms	20.0 ms	10:1 ms	390
P1272	FluxCtrl_PGain	0.0 to 127.9	3.0	10:1	390
P1273	FluxCtrl_ITime	0.2 to 1000.0 ms	20.0 ms	10:1 ms	390
P1290	StatusB14_IdSelect	0 to MaxParaNr	0	1:1	391
P1291	StatusB14_Mask	0x0000 to 0xFFFF	0	1:1	391
P1292	StatusB15_IdSelect	0 to MaxParaNr	0	1:1	391
P1293	StatusB15_Mask	0x0000 to 0xFFFF	0	1:1	391
P1310	TouchPrMode	0x0000 to 0xFFFF	0	1:1	391
P1320	AutotuningApplication	0x0000 to 0xFFFF	0x0000	1:1	392
P1360	PrPIDCtrlMode	0x0000 to 0xFFFF	0x0300	1:1	392
P1361	PrPID_SetValuePxxx	0 to MaxParaNr	0	1:1	392
P1362	PrPID_ActValuePxxx	0 to MaxParaNr	0	1:1	393
P1363	PrPIDCtrl_PGain	0.00 to 327.67	0.00	100:1	393

Parameter	Range of values	Default value	Internal scaling	Page	
P1364	PrPIDCtrl_ITime	0 to 7200000 ms	0 ms	1:1 ms	393
P1365	PrPIDCtrl_DTime	0 to 60000.000 ms	0 ms	1000:1 ms	393
P1366	PrPID_SmoothTime	0 to 2000.0 ms	0 ms	10:1 ms	393
P1367	PrPID_OutULimit	-100.00 to 100.00 %	100.00 %	0x4000: 100 %	393
P1368	PrPID_OutLLimit	-100.00 to 100.00 %	-100.00 %	0x4000: 100 %	394
P1369	PrPID_TargetPxxx	0 to MaxParaNr	0	1:1	394
P1370	SpeedSetFcenter	0 to 4000 Hz	0 Hz	1:1 Hz	394
P1371	SpeedSetBandwidth	10 to 2000 Hz	100 Hz	1:1 Hz	394
P1372	SpeedActFcenter	0 to 4000 Hz	0 Hz	1:1 Hz	394
P1373	SpeedActBandwidth	10 to 2000 Hz	100 Hz	1:1 Hz	394
P1374	IqSetFcenter	0 to 8000 Hz	0 Hz	1:1 Hz	394
P1375	IqSetBandwidth	20 to 4000 Hz	100 Hz	1:1 Hz	395
P1380	TLC_In	0 to MaxParaId	0	1:1	395
P1381	TLC_InRel	0 to MaxParaId	0	1:1	395
P1382	TLC_AbsLowerThreshold	-32768 to 32767	0	1:1	395
P1383	TLC_AbsUpperThreshold	-32768 to 32767	0	1:1	396
P1384	TLC_Mode	0 to 0xFFFF	0	1:1	396
P1385	TLC_RelLowerThreshold	-32768 to 32767	0	1:1	397
P1386	TLC_RelUpperThreshold	-32768 to 32767	0	1:1	397
P1387	TLC_TargetPxxx	0 to MaxParaNr	0	1:1	397
P1388	TLC_BitSelection	0 to 0xFFFF	0	1:1	397
P1389	TLC_LowPattern	0 to 0xFFFF	0	1:1	398
P1390	TLC_HighPattern	0 to 0xFFFF	0	1:1	398
P1400	MotBrakeMode	0x0000 to 0xFFFF	0x0000	1:1	398
P1401	MotBrakeAutoMode	0x0000 to 0xFFFF	0x0000	1:1	399
P1402	MotBrakeTorque	-100.00 to 100.00 %	100.00 %	0x4000: 100 %	399
P1403	MotBrakeSpeedLim	0.50 to 100.00 %	1.00 %	0x4000: 100 %	400
P1404	MotBrakeInTimeout	100 to 1000 ms	1000 ms	1:1 ms	400
P1405	MotBrakeCloseDelay	0 to 1000 ms	500 ms	1:1 ms	400
P1406	MotBrakeOpenDelay	0 to 1000 ms	500 ms	1:1 ms	401
P1407	MotBrakeOpenCmdDelay	0 to 1000 ms	5 ms	1:1 ms	401
P1415	TLC2_In	0 to MaxParaNr	0	1:1	402
P1416	TLC2_LowerThreshold	-32768 to 32767	0	1:1	402
P1417	TLC2_UpperThreshold	-32768 to 32767	0	1:1	402
P1418	TLC2_Mode	0 to 0xFFFF	0	1:1	403
P1419	TLC2_TargetPxxx	0 to MaxParaNr	0	1:1	404
P1420	TLC2_BitSelection	0 to 0xFFFF	0	1:1	404
P1421	TLC2_LowPattern	0 to 0xFFFF	0	1:1	404

Parameter	Range of values	Default value	Internal scaling	Page	
P1422	TLC2_HighPattern	0 to 0xFFFF	0	1:1	404
P1425	SPosMode	0x0000 to 0xFFFF	0x0000	1:1	405
P1426	SPosTargetAngle	0x00000000 to 0xFFFFFFFF Inc	0x0 Inc	1:1 Inc	406
P1427	SPosSpeed	0.01 to 100.00 %	1.00 %	0x4000: 100 %	406
P1428	SPosDeceleration	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	406
P1429	SPosTimeoutTrigger	0 to 65535 ms	0 ms	1:1 ms	406
P1430	SPosRelativOffset	0x00000000 to 0xFFFFFFFF	0x0	1:1	407
P1431	SPosSmooth	0 to 8191 ms	0 ms	1:1 ms	407
P1503	FU_Uoffset	0 to 199.99 %	0 %	0x4000: 100 %	408
P1504	FU_V_bei_nmax	0 to 199.99 %	0 %	0x4000: 100 %	409
P2000	Transient_Source1Pxxx	0 to MaxParaNr	0	1:1	409
P2001	Transient_Source2Pxxx	0 to MaxParaNr	0	1:1	410
P2002	Transient_Source3Pxxx	0 to MaxParaNr	0	1:1	410
P2003	Transient_Source4Pxxx	0 to MaxParaNr	0	1:1	410
P2004	Transient_Source5Pxxx	0 to MaxParaNr	0	1:1	410
P2005	Transient_Source6Pxxx	0 to MaxParaNr	0	1:1	410
P2006	Transient_Source7Pxxx	0 to MaxParaNr	0	1:1	410
P2007	Transient_Source8Pxxx	0 to MaxParaNr	0	1:1	410
P2008	Transient_TriggerSrc1Pxxx	0 to MaxParaNr	0	1:1	411
P2009	Transient_TriggerSrc2Pxxx	0 to MaxParaNr	0	1:1	411
P2010	Transient_TriggerMask1	0 to 0xFFFFFFFF	0xFFFFFFFF	1:1	411
P2011	Transient_TriggerMask2	0 to 0xFFFFFFFF	0xFFFFFFFF	1:1	411
P2012	Transient_TriggerOp1	0 to 3	0	1:1	412
P2013	Transient_TriggerOp2	0 to 3	0	1:1	412
P2014	Transient_TriggerCmpVal1	0 to 0xFFFFFFFF	0	1:1	412
P2015	Transient_TriggerCmpVal2	0 to 0xFFFFFFFF	0	1:1	412
P2016	Transient_TriggerCombi	1 to 4	1	1:1	413
P2017	Transient_TriggerDelay	0 to 100	0	1:1	413
P2018	Transient_TriggerStatus	0 to 0xFFFF	0	1:1	413
P2019	Transient_TriggerCommand	1 to 11	1	1:1	414
P2020	Transient_Samples	0 to 0xFFFFFFFF	0	1:1	414
P2021	Transient_SampleTime	0.0625 to 4095 ms	0.0625 ms	1: 0.0625 ms	414
P2022	Transient_Duration	0 to 0xFFFFFFFF ms	0 ms	1:1 ms	415
P2023	Transient_Memory	1 to 128	16	1024:1	415
P2024	Transient_MemoryStartAdr	0 to 0xFFFFFFFF	0	1:1	415

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Parameter	Range of values	Default value	Internal scaling	Page	
P2025	Transient_ErrorCode	0 to 0xFFFF	0x0000	1:1	415
P2030	Password	0 to 65535	0	1:1	416
P2031	SystemCommand	0 to 65535	0	1:1	416
P2032	SystemTime	0 to 0xFFFFFFFF s	0 s	1:1 s	416
P2033	SystemTimeLow	0 to 999 ms	0 ms	1:1 ms	416
P2034	UpTime	0 to 0xFFFFFFFF s	0 s	1:1 s	416
P2035	UpTimeSum	0 to 0xFFFFFFFF s	0 s	1:1 s	417
P2036	LtOnTime	0 to 0xFFFFFFFF s	0 s	1:1 s	417
P2040	ParaFilter1SourcePxxx	0 to MaxParaNr	0	1:1	417
P2041	ParaFilter2SourcePxxx	0 to MaxParaNr	0	1:1	417
P2045	ParaFilterTime1	0.000 to 32.767 s	2.000 s	1000:1 s	417
P2046	ParaFilterTime2	0.000 to 32.767 s	2.000 s	1000:1 s	417
P2050	RetMotionMode	0 to 0xFFFF	0	1:1	418
P2051	RetMotionStatus	0 to 0xFFFF	0	1:1	418
P2052	RetMotionDest	0 to 0xFFFFFFFF Inc	0 Inc	1:1 Inc	418
P2053	RetMotionSpeed	1 to 13200 Inc/ms	1000 Inc/ms	1:1 Inc/ms	418
P2054	RetMotionAcc	0.25 to 450.00 Inc/ms ²	2.00 Inc/ms ²	100:1 Inc/ms ²	418
P2056	MainsMonitorMode	0x0000 to 0xFFFF	0x0000	1:1	418
P2057	MainsMonitorStatus	0 to 0xFFFFFFFF	0	1:1	420
P2058	MaMoVoltageWarnLLim	65.4 to 104.8 %	96.9 %	0x4000: 100 %	420
P2059	MaMoVoltageWarnULim	104.8 to 144.0 %	115.2 %	0x4000: 100 %	421
P2060	MaMoFreqWarnLLim	40.0 to 60.0 Hz	47.0 Hz	10:1 Hz	421
P2061	MaMoFreqWarnULim	45.0 to 70.0 Hz	52.0 Hz	10:1 Hz	421
P2062	MaMoWarningMask	0x0000 to 0xFFFF	0xFFFF	1:1	421
P2063	MaMoNetFailReactDelay	0.000 to 6.000 s	0.000 s	1000:1 s	422
P2064	MaMoActMainsVoltage	0.0 to 200.0 %	0.0 %	0x4000: 100 %	422
P2065	MaMoActMainFreq	0.1 to 312.5 Hz	Hz	10:1 Hz	422
P2066	MaMoMaxActMainsVolt	0.0 to 200.0 %	0.0 %	0x4000: 100 %	422
P2067	MaMoMinActMainsVolt	0.0 to 200.0 %	200.0 %	0x4000: 100 %	422
P2068	MaMoMaxActMainFreq	0.1 to 312.5 Hz	0.1 Hz	10:1 Hz	422
P2069	MaMoMinActMainFreq	0.1 to 312.5 Hz	312.5 Hz	10:1 Hz	423
P2070	ParkingAxisControl	0 to 0xFFFF	0	1:1	423
P2071	ParkingAxisStatus	0 to 0xFFFF	0	1:1	423
P2072	ParkingAxisRestStat	0 to 0xFFFF	0	1:1	423
P2080	CamMaxIndex	1 to 1024	512	1:1	423
P2081	CamActIndex	0 to 1023	0	1:1	423
P2082	CamInParam	0 to MaxParaNr	0	1:1	424

Parameter	Range of values	Default value	Internal scaling	Page	
P2083	CamOutParam	0 to MaxParaNr	0	1:1	424
P2084	CamRelParam	0 to MaxParaNr	0	1:1	424
P2085	CamIdxBaseValue	0x80000000 to 0x7FFFFFFF	0	1:1	424
P2086	CamIdxShiftFactor	0 to 32	23	1:1	425
P2087	CamMode	0 to 0xFFFF	0	1:1	425
P2088	CamState	0 to 0xFFFF	0	1:1	427
P2089	CamPosVirtualMaster	0 to 130944	0	1:1	427
P2090	CamOffset	0 to 0xFFFFFFFF	0	1:1	427
P2100	PlcControl	0 to 0xFFFF	0	1:1	428
P2101	PlcTaskControl	0 to 0xFFFF	0x8000	1:1	428
P2102	PlcTaskStatus	0 to 0xFFFF	0	1:1	428
P2103	PlcEventWrUint	0 to 0xFFFF	0	1:1	428
P2104	PlcEventWrUdint	0 to 0xFFFFFFFF	0	1:1	428
P2105	PlcErrModulNo	-1 to 32767	-1	1:1	428
P2106	PlcErrLineNo	-1 to 32767	-1	1:1	428
P2107	PlcErrInfo	0 to 65535	0	1:1	429
P2108	PlcErrorCode	-32768 to 32767	0	1:1	429
P2109	PlcCycleTimeDefault	0 to 32767 ms	0 ms	1:1 ms	429
P2110	PlcRunModeDefault	0 to 0xFFFF	0	1:1	429
P2111	PlcPcDefault	0 to 65535	0	1:1	429
P2120	NotchFreqModulation1	125.000 to 1562.500 Hz	906.250 Hz	100:3125 Hz	429
P2121	NotchFreqModulation2	31.250 to 1000.000 Hz	250.000 Hz	GUI = (2 ^{Para})*3125/100 Hz	430
P2122	NotchVoltModulation1	0.00 to 100.00 %	0.00 %	0xFFFF: 100 %	430
P2123	NotchVoltModulation2	0.00 to 100.00 %	0.00 %	0xFFFF: 100 %	430
P2124	NotchVp	0x00000000 to 0x00040000	0x00002710	1:1	430
P2125	MinOS2	0x00000000 to 0x00400000	0x00040000	1:1	431
P2126	PGainNotchPosM0	0.00 to 100.00 %	20.00 %	0xFFFF: 100 %	431
P2127	NotchSlowDownTime	0 to 2000 ms	100 ms	1: 2 ms	431
P2128	NotchDeltaPhiMechM1	0 to 15 °	0.5 °	0x10000: 360 °	431
P2130	Enc1PitchPosMeas	0.001 to 200000.000 μm	20.000 μm	1000:1 μm	431
P2135	Enc2PitchPosMeas	0.001 to 200000.000 μm	20.000 μm	1000:1 μm	432
P3000	ScalingKtFactor	0.00 to 100.00 %	100.00 %	0x4000: 100 %	432
P3001	Iu_AD	-100.00 to 100.00 %	0.00 %	0x8000: 100 %	432
P3002	Iv_AD	-100.00 to 100.00 %	0.00 %	0x8000: 100 %	432

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Parameter	Range of values	Default value	Internal scaling	Page	
P3003	Offset_IuAD	-200.00 to 200.00 %	0.00 %	0x4000: 100 %	432
P3004	Offset_IvAD	-200.00 to 200.00 %	0.00 %	0x4000: 100 %	433
P3005	CosRho	-100.00 to 100.00 %	0.00 %	0x8000: 100 %	433
P3006	SinRho	-100.00 to 100.00 %	0.00 %	0x8000: 100 %	433
P3007	Int_isq_D	-200.00 to 200.00 %	0.00 %	0x40000000: 100 %	433
P3008	Int_isd_D	-200.00 to 200.00 %	0.00 %	0x40000000: 100 %	433
P3009	IqSetUnlim	-200.00 to +200.00 %	0.00 %	0x4000: 100 %	433
P3010	IdSetUnlim	-100.00 to 100.00 %	0.00 %	0x4000: 100 %	434
P3011	Usalpha_ref	-200.00 to 200.00 %	0.00 %	0x4000: 100 %	434
P3012	Usbeta_ref	-200.00 to 200.00 %	0.00 %	0x4000: 100 %	434
P3013	SystemCapacity	0 to 65535	0	1:1	434
P3014	IqULimit	0.00 to +200.00 %	+100.00 %	0x4000: 100 %	434
P3015	IqLLimit	-200.00 to 0.00 %	-100.00 %	0x4000: 100 %	434
P3016	G2deltaphi_D	-2147483648 to 2147483647	0	1:1	434
P3017	Int_n_HD	-100.00 to 100.00 %	0 %	0x40000000: 100 %	435
P3018	Int_n_L	to		1:1	435
P3019	Delta_phi_ref_D	0x80000000 to 0x7FFFFFFF	0x00000000	1:1	435
P3020	Rho	0.0 to 360.0 °	0.0 °	65536: 360 °	435
P3021	CurrentDiffPST	3.0 to 152.6 %/s	15.3 %/s	0x4000: 50000 %/s	435
P3022	RhoDiffPST	2.7 to 137.3 °/s	13.7 °/s	0x10000: 180000 °/s	435
P3023	G1cntlt	0x0000 to 0xFFFF	0x0000	1:1	436
P3024	Enc1TrackA	0x8000 to 0x7FFF	0x0000	1:1	436
P3025	Enc1TrackB	0x8000 to 0x7FFF	0x0000	1:1	436
P3026	G1pos_D	0x00000000 to 0xFFFFFFFF	0x00000000	1:1	436
P3027	G1deltaphi_D	0x80000000 to 0x7FFFFFFF	0x00000000	1:1	436
P3028	Enc2TrackA	0x8000 to 0x7FFF		1:1	436
P3029	Enc2TrackB	0x8000 to 0x7FFF		1:1	437
P3030	ADCorrection	0 to 200.00 %	100.00 %	0x4000: 100 %	437
P3031	PosIpCalcAngle	0x80000000 to 0x7FFFFFFF	0x00000000	1:1	437
P3032	IqActmA	-2147483647 to 2147483647 A	0 A	1:1 A	437
P3033	SignalSelect	0 to 0xFFFF	0x0100	1:1	437
P3035	Reg_ctrl	0x0000 to 0xFFFF	0x0000	1:1	438
P3037	Geb_mode	0x0000 to 0xFFFF	0x0000	1:1	439
P3039	G2cntlt	0x0000 to 0xFFFF	0x0000	1:1	439
P3040	AOF1_DirectMemAddr	0 to 0xFFFFFFFF	0	1:1	439

Parameter	Range of values	Default value	Internal scaling	Page	
P3041	AOF2_DirectMemAddr	0 to 0xFFFFFFFF	0	1:1	439
P3042	Lt_StatusReg	0x0000 to 0xFFFF	0x0000	1:1	440
P3043	Lt_ModeReg	0x0000 to 0xFFFF	0x0000	1:1	440
P3044	Lt_WarningsReg	0x0000 to 0xFFFF	0x0000	1:1	441
P3045	Lt_ErrorReg	0x0000 to 0xFFFF	0x0000	1:1	441
P3046	Reg_Ctrl2	0x0000 to 0xFFFF	0x0000	1:1	442
P3048	InternalLimitStatus	0x0000 to 0xFFFF	0x0000	1:1	442
P3050	PosScalingUserUnit	1 to 16777215	65536	1:1	443
P3051	PosScalingRevolution	1 to 255	1	1:1	443
P3052	PPosAccelerSetVal	0x8000 to 0x7FFF	0	1:1	443
P3060	PsiAlpha	0x80000000 to 0x7FFFFFFF	0x00000000	1:1	443
P3061	PsiBeta	0x80000000 to 0x7FFFFFFF	0x00000000S	1:1	443
P3062	OL_StartUpStatus	0x0000 to 0xFFFF	0x0000	1:1	443
P3064	DeltaUsAlpha	0xC000 to 0x4000	0x0000	1:1	443
P3065	DeltaUsBeta	0xC000 to 0x4000	0x0000	1:1	444
P3066	TrqCurrent	-2147483.647 to 2147483.647 A	0 A	1000:1 A	444
P3067	TrqCurrentMax	-2147483.647 to 2147483.647 A	0 A	1000:1 A	444
P3100	Is_beta	-120 to 120 %	%	0x4000: 100 %	444
P3101	G2pos_D	0 to 0xFFFFFFFF		1:1	444
P3106	Norm_dls	0 to 32767	0	1:1	444
P3107	Norm_rs	0x0000 to 0x7FFF	0x0000	1:1	444
P3109	Norm_tab_dls	0 to 0x7FFF	0	1:1	445
P3110	G1mask	0 to 0xFFFF	0x3FFF	1:1	445
P3111	G2mask	0x0000 to 0xFFFF	0x3FFF	1:1	445
P3120	IKGN_Test_Transmit	0x00000000 to 0xFFFFFFFF	0x00000000	1:1	445
P3121	IKGN_Test_Receive	0x00000000 to 0xFFFFFFFF	0x00000000	1:1	445
P3122	EncEmuIKGN_Kfac	1 to 8191	781	1:1	446
P3123	EncEmuIKGN_Ctrl	0x00000000 to 0xFFFFFFFF	0x00000000	1:1	446
P3124	EncEmuIKGN_Status	0x00000000 to 0xFFFFFFFF	0x00000000	1:1	446
P3130	PhaseOffsetAngle	0 to 0xFFFFFFFF Inc	0 Inc	1:1 Inc	446
P3131	PhaseSumAngle	0 to 0xFFFFFFFF Inc	0 Inc	1:1 Inc	446
P3141	WarningMask1	0 to 0xFFFF	0xFFFF	1:1	446
P3142	WarningMask2	0 to 0xFFFF	0xFFFF	1:1	447

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P3143	WarningMask3	0 to 0xFFFF	0xFFFF	1:1	447
P3144	WarningMask4	0 to 0xFFFF	0xFFFF	1:1	447
P3145	SetError	0 to 0xFFFF	0	1:1	447
P3150	MCP_Address	0 to 0xFFFFFFFF	0	1:1	447
P3151	MCP_Count	0 to 0xFFFFFFFF	0	1:1	447
P3152	MCP_Control	0 to 0xFFFF	0	1:1	448
P3153	MCP_Status	0 to 0xFFFF	0x0000	1:1	448
P3154	MCP_Data1	to	0	1:1	448
P3155	MCP_Data2	to	0	1:1	448
P3156	MCP_Data3	to	0	1:1	448
P3157	MCP_Data4	to	0	1:1	448
P3158	MCP_Data5	to	0	1:1	448
P3159	MCP_Data6	to	0	1:1	449
P3160	MCP_Data7	to	0	1:1	449
P3161	MCP_Data8	to	0	1:1	449
P3162	MCP_Data9	to	0	1:1	449
P3163	MCP_Data10	to	0	1:1	449
P3164	MCP_Data11	to	0	1:1	449
P3165	MCP_Data12	to	0	1:1	449
P3166	MCP_Data13	to	0	1:1	450
P3167	MCP_Data14	to	0	1:1	450
P3168	MCP_Data15	to	0	1:1	450
P3169	MCP_Data16	to	0	1:1	450
P3170	MCP_Data17	to	0	1:1	450
P3171	MCP_Data18	to	0	1:1	450
P3172	MCP_Data19	to	0	1:1	450
P3173	MCP_Data20	to	0	1:1	451
P3174	MCP_Data21	to	0	1:1	451
P3175	MCP_Data22	to	0	1:1	451
P3176	MCP_Data23	to	0	1:1	451
P3177	MCP_Data24	to	0	1:1	451
P3200	PSU_Ualpha_AD	0.0 to 100.0 V	0.0 V	10:1 V	451
P3201	PSU_Ubeta_AD	0.0 to 100.0 V	0.0 V	10:1 V	451
P3205	PSU_PLL_Counter	0x0000 to 0xFFFF	0x0000	1:1	452
P3209	PSU_Offset_UalphaAD	-200.00 to 200.00 %	0.00 %	0x4000: 100 %	452
P3210	PSU_Offset_UbetaAD	-200.00 to 200.00 %	0.00 %	0x4000: 100 %	452
P3211	PSU_FreqCounter	0x0000 to 0xFFFF	0x0000	1:1	452
P3240	CAN_Zk0	0 to MaxParaNr	0	1:1	452

Parameter	Range of values	Default value	Internal scaling	Page	
P3241	CAN_Zk1	0 to MaxParaNr	0	1:1	452
P3242	CAN_Zk4	0x0000 to 0xFFFF	0	1:1	452
P3243	CAN_Zk5	0x0000 to 0xFFFF	0	1:1	454
P3244	CAN_Zk16	0 to MaxParaNr	0	1:1	454
P3245	CAN_Zk17	0 to MaxParaNr	0	1:1	454
P3246	CAN_Zk20	0x0000 to 0xFFFF	0	1:1	455
P3247	CAN_Zk21	0x0000 to 0xFFFF	0	1:1	455
P3248	CAN_Zk25	0x0000 to 0xFFFF	0	1:1	456
P3249	CAN_Zk26	0 to 65535	0	1:1	456
P3250	IPMDataBuffer	0 to 0xFFFFFFFF	0	1:1	456
P3251	IPMState	0 to 0xFFFF	0	1:1	457
P3300	ControlerSWBuild	to	0	1:1	457
P3304	ISRTIME	0.00 to 1310.70 μ s	0 μ s	1000: 20 μ s	457
P3305	ISRTIMEMax	0 to 1310.70 μ s	0 μ s	1000: 20 μ s	457
P3306	ISRTIMEErrorCnt	0 to 65535	0	1:1	457
P3309	TrqDirectULim	-100.00 to 100.00 %	100.00 %	0x4000: 100 %	457
P3310	TrqDirectLLim	-100.00 to 100.00 %	-100.00 %	0x4000: 100 %	458
P3311	MeasureTimeSlice	0 to 8	0	1:1	458
P3312	MeasureTSFct	0 to 10	0	1:1	458
P3313	LEDStatus	0 to 0xFFFF	0x0000	1:1	458
P3314	ApplicationParam1	-2147483648 to 2147483647	0	1:1	459
P3315	ApplicationParam2	-2147483648 to 2147483647	0	1:1	459
P3316	ApplicationParam3	-2147483648 to 2147483647	0	1:1	459
P3317	ApplicationParam4	-2147483648 to 2147483647	0	1:1	459
P3318	ApplicationParam5	-2147483648 to 2147483647	0	1:1	459
P3319	ApplicationParam6	-2147483648 to 2147483647	0	1:1	460
P3320	ApplicationParam7	-2147483648 to 2147483647	0	1:1	460
P3321	ApplicationParam8	-2147483648 to 2147483647	0	1:1	460
P3322	ApplicationParam9	-2147483648 to 2147483647	0	1:1	460
P3323	ApplicationParam10	-2147483648 to 2147483647	0	1:1	460
P3324	ApplicationParam11	-2147483648 to 2147483647	0	1:1	460

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Parameter	Range of values	Default value	Internal scaling	Page	
P3325	ApplicationParam12	-2147483648 to 2147483647	0	1:1	461
P3326	ApplicationParam13	-2147483648 to 2147483647	0	1:1	461
P3327	ApplicationParam14	-2147483648 to 2147483647	0	1:1	461
P3328	ApplicationParam15	-2147483648 to 2147483647	0	1:1	461
P3329	ApplicationParam16	0 to 4294967295	0	1:1	461
P3330	ApplicationParam17	0 to 4294967295	0	1:1	461
P3331	ApplicationParam18	0x00000000 to 0xFFFFFFFF	0	1:1	462
P3332	ApplicationParam19	0x00000000 to 0xFFFFFFFF	0	1:1	462
P3333	ApplicationParam20	-32768 to 32767	0	1:1	462
P3334	ApplicationParam21	-32768 to 32767	0	1:1	462
P3335	ApplicationParam22	-32768 to 32767	0	1:1	462
P3336	ApplicationParam23	0 to 65535	0	1:1	462
P3337	ApplicationParam24	0 to 65535	0	1:1	463
P3338	ApplicationParam25	0 to 65535	0	1:1	463
P3340	SyncCapture	0 to 65535	0	1:1	463
P3341	SyncTimer	0 to 65535	0	1:1	463
P3342	MeasureTSFctTime	0 to 65535 μ s	0 μ s	1:1 μ s	463
P3343	MeasureTSFctTimeMax	0 to 65535 μ s	0 μ s	1:1 μ s	463
P3344	BaciStatus	0x0000 to 0xFFFF	0	1:1	463
P3345	BaciCntrAccessErrG	0x0000 to 0xFFFF	0	1:1	464
P3346	BaciCntrAliveG	0x0000 to 0xFFFF	0	1:1	464
P3347	BaciCntrReconfigG	0x0000 to 0xFFFF	0	1:1	464
P3348	BaciCntrCyclSetValG	0 to 65535	0	1:1	464
P3349	BaciCntrCyclActValG	0 to 65535	0	1:1	464
P3350	BaciCntrCmdG	0x0000 to 0xFFFF	0	1:1	464
P3351	BaciCntrSrvDataG	0x0000 to 0xFFFF	0	1:1	464
P3352	DirectMemoryAddress	0x00000000 to 0xFFFFFFFF	0x00000000	1:1	465
P3353	DirectMemoryValue	0 to 0xFFFF	0x0000	1:1	465
P3354	RequestParaId1	0 to MaxParaNr	0	1:1	465
P3355	RequestParaArrayIdx1	0 to 65535	0	1:1	465
P3356	RequestParaBuf1	0 to 4294967295	0	1:1	465
P3357	RequestParaStatus1	0x0000 to 0xFFFF	0x0000	1:1	466
P3358	RequestParaId2	0 to MaxParaNr	0	1:1	466
P3359	RequestParaArrayIdx2	0 to 65535	0	1:1	466

Parameter	Range of values	Default value	Internal scaling	Page	
P3360	RequestParaBuf2	0 to 4294967295	0	1:1	467
P3361	RequestParaStatus2	0x0000 to 0xFFFF	0x0000	1:1	467
P3362	MeasureTSliceTotal	0 to 2	0	1:1	467
P3363	TSlice025_Time	0 to 1310.70 μ s	0 μ s	1000: 20 μ s	468
P3364	TSlice025_TimeMax	0 to 1310.70 μ s	0 μ s	1000: 20 μ s	468
P3365	TSlice05_Time	0 to 1310.70 μ s	0 μ s	1000: 20 μ s	468
P3366	TSlice05_TimeMax	0 to 1310.70 μ s	0 μ s	1000: 20 μ s	468
P3367	TSlice1_Time	0 to 1310.70 μ s	0 μ s	1000: 20 μ s	468
P3368	TSlice1_TimeMax	0 to 1310.70 μ s	0 μ s	1000: 20 μ s	468
P3369	TSlice2_Time	0 to 1310.70 μ s	0 μ s	1000: 20 μ s	469
P3370	TSlice2_TimeMax	0 to 1310.70 μ s	0 μ s	1000: 20 μ s	469
P3371	TSlice4_Time	0 to 1310.70 μ s	0 μ s	1000: 20 μ s	469
P3372	TSlice4_TimeMax	0 to 1310.70 μ s	0 μ s	1000: 20 μ s	469
P3373	TSlice8_Time	0 to 1310.70 μ s	0 μ s	1000: 20 μ s	469
P3374	TSlice8_TimeMax	0 to 1310.70 μ s	0 μ s	1000: 20 μ s	469
P3375	TSlice16_Time	0 to 1310.70 μ s	0 μ s	1000: 20 μ s	469
P3376	TSlice16_TimeMax	0 to 1310.70 μ s	0 μ s	1000: 20 μ s	470
P3377	AmpErrorMask	0 to 0xFFFF	0xFF40	1:1	470
P3378	AmpWarningMask	0 to 0xFFFF	0xFFFF	1:1	470
P3379	AmpPowerType	0 to 0xFFFF	0	1:1	471
P3380	SysSpecFunc	0 to 65535	0	1:1	471
P3381	ClientAliveCnt	0 to 0xFFFF	0	1:1	471
P3384	BaciErrMode	0 to 0xFFFF	0	1:1	471
P3392	MaxCyclicConflicts	0 to 65535	0	1:1	471
P3400	TSlice0125_Time	0 to 65535 μ s	0 μ s	1:1 μ s	471
P3401	TSlice0125_TimeMax	0 to 65535 μ s	0 μ s	1:1 μ s	472
P3402	NotchKorrWinkel1	0.0 to 360.0 °	0.5 °	65536: 360 °	472
P3403	NotchKorrWinkel2	0.0 to 360.0 °	90.5 °	65536: 360 °	472
P3404	NotchKorrDelta	-45.0 to 45.0 °	0 °	65536: 360 °	473
P3416	Iw_AD	-200.00 to 200.00 %	0.00 %	0x8000: 100 %	473
P3418	ENC_BREAK_LIM	0 to 100 %	30 %	0x4000: 100 * sqrt(2) %	473
P3419	FI_MODE	0 to 65535	0	1:1	473
P3420	APower	-200 to 200 %	0 %	0x10000000: 100 %	474
P3421	WriteSet	0 to 0xFFFF	0	1:1	474
P3422	WriteVal	0 to 0xFFFF	0	1:1	474
P3433	IGR_SignalOffset	-100 to 100	0	0x4000: 100	474
P3434	IGR_BREAK_LIM	0 to 100	20	0x4000: 100	474
P3435	Count_CAN_Receive	0 to 65535	0	1:1	475

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P3436	Count_CAN_Transmit	0 to 65535	0	1:1	475
P3438	Geberabgleich	0 to 9	0	1:1	475
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Appendix D - Revision history

Version	Date	Changes
5.08005.01	2008-12-12	First release of translated version

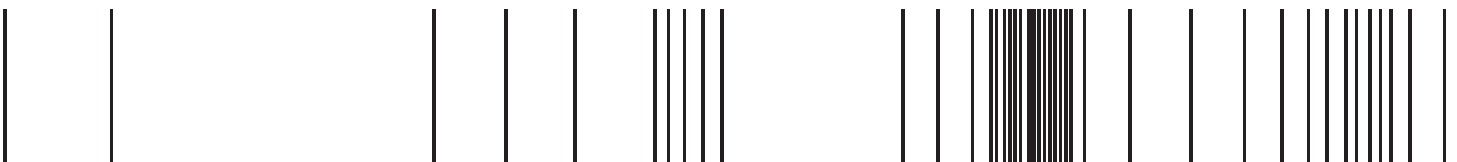


Appendix E - Abbreviations

A	Anzeigeparameter, siehe Attribute (S. 164)
ADC	Analog D igital C onverter
ASM	A Synchronous M achine
BACI	BA umüller C omponent I nterface
BB	B etriebs B ereit
CAN	C ontroller A rea N etwork, CAN-Bus
CD	C entral D ata
CS	C heck S umme
CW	C yclic W rite
DS	D ata S et
E	E rror
EE	Parametereigenschaft CD , siehe Attribute (S. 164)
EEPROM	E lectric E raseable P rogrammable R ead O nly M emory
FW	F irm W are-Version (P0004)
GUI	G raphical U ser I nterface
HLG	H och L auf G eber
Id	feldbildende Stromkomponente
IEE	I ncremental E ncoder E mulation

IF Pulses enable (**I**mpuls**F**reigabe)
IPM **I**nterpolated **P**osition **M**ode Betriebsart im CANopen Standard
Iq momentbildende Stromkomponente
LT **L**eistungs**T**eil
PSI **P**arameter **S**torage **I**nterface
PWM **P**uls**W**eiten**M**odulation
RAM RAM
RFG **R**amp **F**unction **G**enerator = **H**och**L**auf**G**eber (**H**LG)
SH Quickstop (**S**chnell**H**alt)
SM **S**ynchron**M**aschine
SR **S**icherheits**R**elais
SWG **S**oll**W**ert**G**enerator
UZK Zwischenkreisspannung
W **W**arnung

be in motion



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