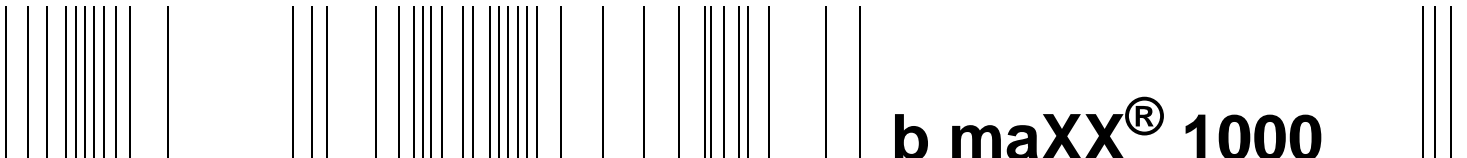


be in motion be in motion



b maXX[®] 1000

Parameter manual

E

5.07004.03



Title	Parameter manual
Product	b maXX® 1000
Version	5.07004.03
Part No.	410408
Status	08.02.2008
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1

INTRODUCTION

In this manual information is to be found referring to the parameters for the devices b maXX[®] 1000.

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 comprehensive description of the parameters sorted by parameter numbers you will find in chapter [▶Parameter◀](#) from page 17.

A brief survey of all the parameters is shown in [▶Parameter list◀](#) from page 155.

1.1 Copyright and trade mark

b maXX[®] is a registered trade mark of Baumüller Nürnberg GmbH

FUNDAMENTAL SAFETY INSTRUCTIONS

In this chapter we describe the possible dangers which may occur when you parameterize a Baumüller b maXX[®] 1000 controller part and we explain the meaning of the information sign.

2.1 Safety notes and instructions



WARNING

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

- serious personal injury
- death



The danger is: **mechanical and electrical cause**. *The change of parameters affects the behavior of the Baumüller-unit and consequently the behavior of the construction and its components. If you change the adjustments of the parameters, you may cause a dangerous behavior of the construction and/or of its components.*



Please carry out a starting after every change of the parameter settings with consideration to all safety instructions and safety regulations.

2.2 Information signs



NOTE

This note is a very important information.

3

DRIVE MANAGEMENT

The device manager administrates the significant system resources of the drive. Amongst others these include the complete device control in the different operating modes, the mode switch, troubleshooting, the administration of all communication interfaces, and so on.

The control of the drive operates via a status machine, which is operated via the control word [▶P0300◀](#) and via hardware control inputs. Thereby a control is only to be operated via the hardware inputs, i. e. without the control word.

The status machine for the device control (see [▶Figure 2◀](#) on page 12) and the commands in the control word thereby accord to the Drivecom/CANopen standard. The control word [▶P0300◀](#) and the accordant commands are described in the parameter description in detail.

- **Device control status**

- NOT READY TO START

- The electronics are voltage-supplied
- Initialization is running
- Drive operation is inhibited
- Drive is not ready to run

- INHIBIT START

- Software/hardware initialization is completed
- Application can be reparameterized
- Drive function is inhibited
- Switch-on is inhibited
- Drive is ready to operate

- READY TO SWITCH ON

- Application can be reparameterized
- Drive function is inhibited
- Operation is enabled
- Drive is ready to operate

- SWITCHED ON

- Application can be reparameterized
- Drive function is inhibited
- At automatic operation holding brake the drive is carrying current before transition in OPERATION ENABLED.
- Power unit is ready for use, there is supply voltage
- Drive is ready to operate

- OPERATION ENABLED

- Application can be reparameterized
- Drive operation is enabled
- Drive is ready to operate

- QUICKSTOP ACTIVE

- Application can be reparameterized
- Quickstop function is active
- Drive operation is enabled
- Drive is ready to operate

- ERROR REACTION ACTIVE
 - Application can be reparameterized
 - An error-dependent action is carried out
 - Drive operation can be enabled

- ERROR
 - Application can be reparameterized
 - Drive function is inhibited
 - Drive is not ready to run

Introduction of the device control display

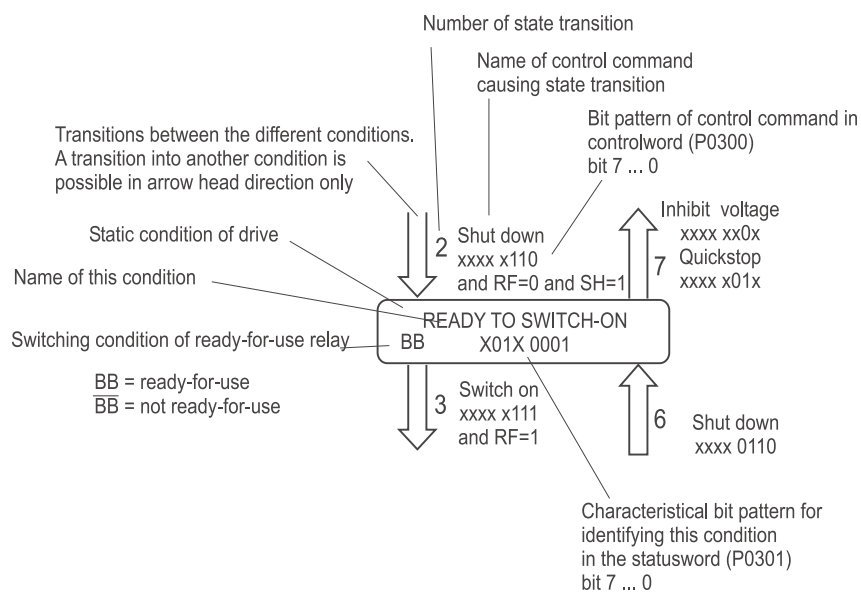


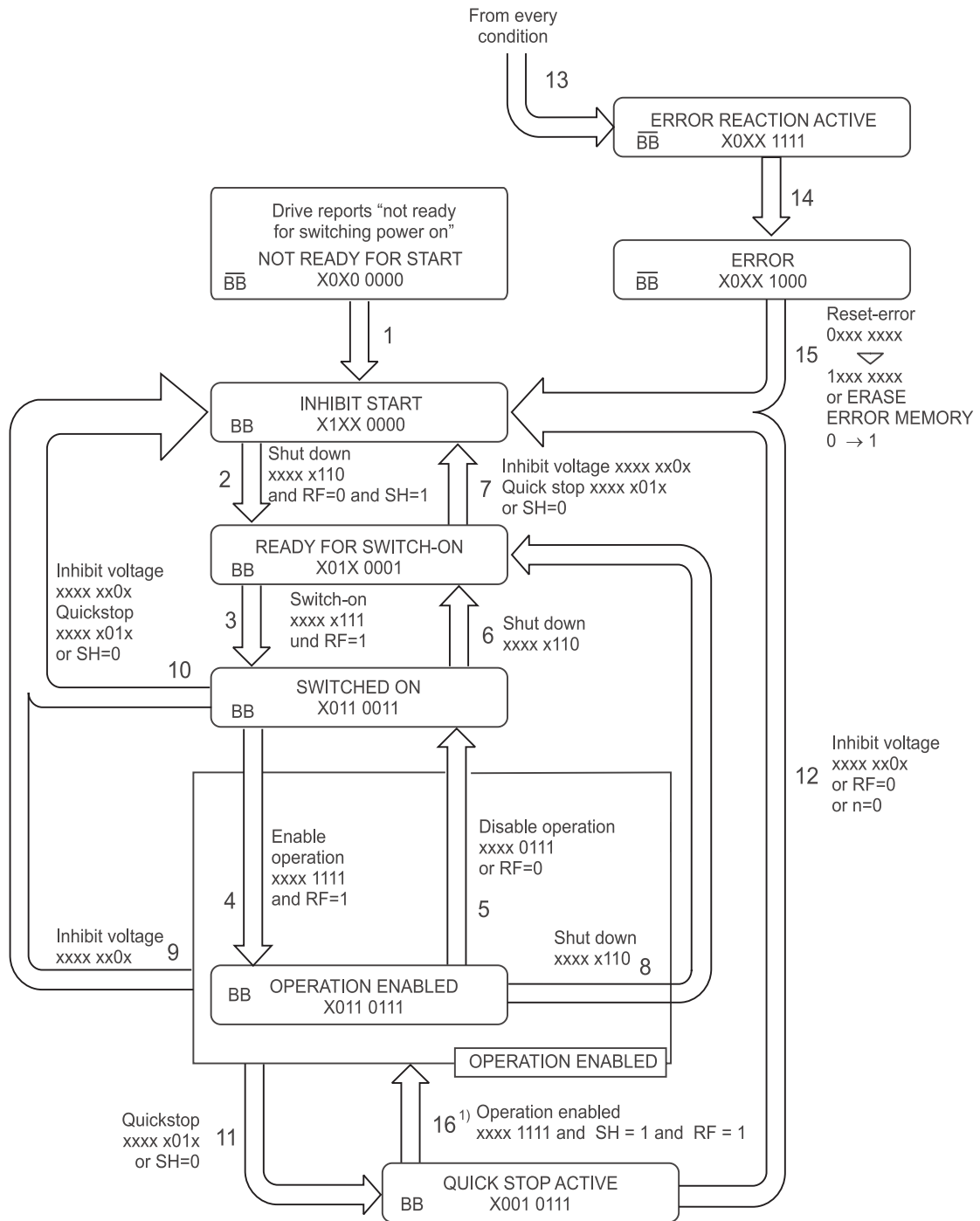
Figure 1: Introduction of the device control

Within the status (see >Figure 1< the bits 7 ... 0 of the status word >P0301< in binary form are shown as XXXX XXXX.

At the transition states (arrows, see >Figure 1< above) the bits 7 0 of the control word >P0300< are shown in binary form as xxxx xxxx.

All digits, which are marked with X (that means the bits of the status word) or x (that means the bits of the control word) are without a meaning for the control of the status machine and the representation of the current status.

• Device control status machine



RF = 1: Controller enable at level 1 (1 = high)
 RF = 0: Controller enable at level 0 (0 = low)

SH = 1: Quickstop at level 1 (inactive) (1 = high)
 SH = 0: Quickstop at level 0 (active) (0 = low)

BB = ready-for-use

1): Only if quickstop reaction (P1004) is set to 5 up to 7 (remaining in status quickstop)

Figure 2: Device control status machine

- **State transitions of device control**

0 Input of the status machine → NOT READY-TO-START

- Event:
 - Switch on electronic power supply
 - Hardware reset or
 - Software reset
- Action:
 - Initialization and self-test are started

1 NOT READY-TO-START → SWITCH-ON INHIBIT

- Event:
 - Initialization and self-test are completed error-free
- Action:
 - none

2 INHIBIT START → READY-TO-START

- Event:
 - Command 'Shut down'
- Condition:
 - Quickstop input = High
- Action:
 - none

3 READY-TO-START → SWITCHED ON

- Event:
 - Command 'switch on'
- Condition:
 - Pulse enable = High
 - Supply voltage is present
- Action:
 - none

4 SWITCHED ON → OPERATION ENABLED

- Event:
 - Command 'operation enabled'
- Condition:
 - Pulse enable input MI6 = High
- Action:
 - Drive operation is enabled

5 OPERATION ENABLED → SWITCHED ON

- Event:
 - Command 'inhibit operation' or
 - Pulse enable input MI6 = Low
- Condition:
 - Zero speed is reached or for „inhibit operation“ an immediate pulse inhibit has been set
- Action:
 - Drive inhibit is commenced (according to settings: braking or coasting to a standstill)

6 SWITCHED ON → READY-TO-START

- Event:
 - Command 'shut down' or
 - Pulse enable input MI6 = Low
- Action:
 - Feed unit 'ready for use'-signal monitoring will be deactivated

7 READY-TO-START → INHIBIT READY TO START

- Event:
 - Command 'quickstop' or
 - Command 'inhibit voltage' or
 - Quickstop input = Low (default quickstop input MI5 = 23)
- Action:
 - none

8 ENABLE OPERATION → SHUT DOWN DRIVE ACTIVE

- Event:
 - Command 'Shut down'
- Action:
 - Shut down of drive is commenced (according to settings: braking or coasting to a standstill)

9 OPERATION ENABLED → SWITCH-ON INHIBIT

- Event:
 - Command 'inhibit voltage'
- Action:
 - Drive operation is inhibited

10 SWITCH ON → INHIBIT READY TO START

- Event:
 - Command 'inhibit voltage' or
 - Command 'quickstop' or
 - Quickstop input = Low (default quickstop input MI5 = 23)
- Action:
 - none

11 OPERATION ENABLED → QUICKSTOP ACTIVE

- Event:
 - Command 'quickstop' or
 - Quickstop input = Low (default quickstop input MI5 = 23)
- Action:
 - Quickstop function is activated

12 QUICKSTOP ACTIVE → INHIBIT START

- Event:
 - Command 'inhibit voltage' or
 - Quickstop is stopped (speed 0 has been reached)
 - Pulse enable input MI6 = Low
- Action:
 - Drive operation is inhibited

13 All conditions → ERROR REACTION ACTIVE

- Event:
 - Drive error is recognized
- Action:
 - Error-dependable error reactions are activated
 - Ready-to-operate relay is switched off (multi function relay)

14 ERROR REACTION ACTIVE → ERROR


- Event:
 - Error reaction is completed
- Action:
 - Drive operation is inhibited

15 ERROR → INHIBIT READY TO START

- Event:
 - Command 'reset error' or
 - RESET ERROR input = Low → High (multi function digital input)
- Condition:
 - Error doesn't exist anymore
- Action:
 - Reset error is carried out

16 QUICKSTOP ACTIVE → OPERATION ENABLED

- Event:
 - Command 'operation enabled'
- Condition:
 - Quickstop reaction ([▶P1004◀](#) or [▶P1009◀](#)) Quickstop reaction (or is set to 'Remain in quickstop" (values 4 to 7) or
 - Quickstop-input = High (default quickstop input MI5 = 23)
 - Pulse enable input MI6 = High
- Action:
 - Drive function is enabled again



The status change only operates, if the actions have completely been carried out. The sequence of the actions is the same as their execution during condition change. The next condition will be reached and new commands will be accepted, only if the actions have been completely executed.

4

PARAMETER

For the controller b maXX[®] 1000 there are more than 1000 parameters, which are described in this chapter.

4.1 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.

4.1 Structure of controller parameter range

4.1.1 Attributes

Every parameter can have one or more attributes - see detailed 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' and can be saved in EEPROM. This parameter will be automatically loaded from the controller's internal EEPROM when the controller is started.
ON	Changes take effect instantly
STOP	Changes possible only in inhibit or ready for switch-on status
-	The parameter will not be saved (effective for e.g. actual values)

4.1.2 Reserved bits

In the description of the parameters, especially of the mode parameters and status parameters several bits are marked as reserved. The bits can obtain an importance with future extensions. For these bits the following is valid:

- In setting parameters the bits are to be set to 0.
- In status parameters these bits are not to be evaluated.

4.2 Structure of the parameter description

All parameter descriptions are based on the following scheme:

P1172	Hochlaufgeber Hochlaufzeit 1	0.1 to 600.0 s or 0.01 to 60.00 s
EE	RFG acceleration time 1	10.0 s
ON	BM_u_RFGRampUpTime1	10:1 or 100:1

The different branches of the scheme are described below:

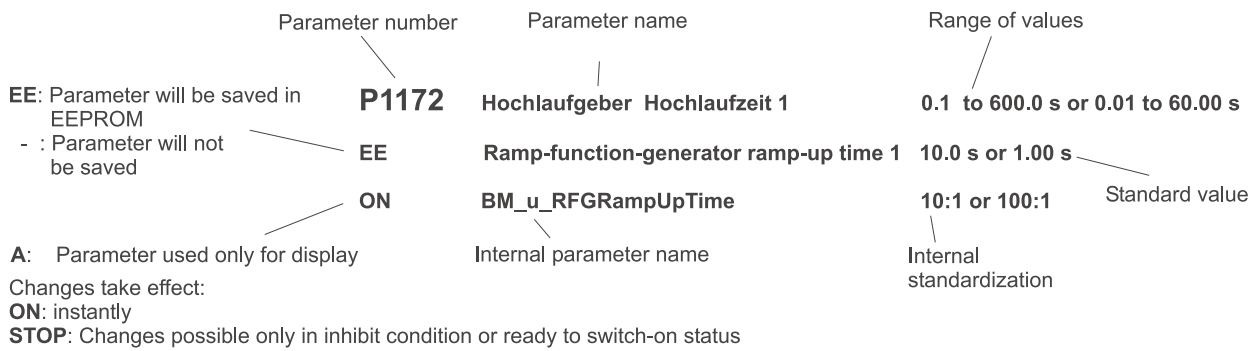


Figure 3: Parameter description scheme

The construction of the internal parameter name is shown below:

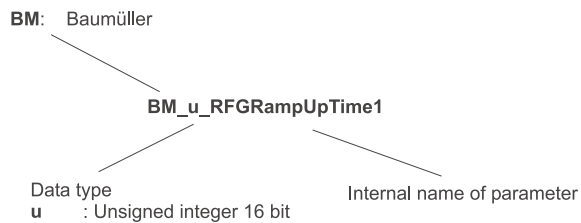


Figure 4: Construction of internal parameter name

4.3 Parameter description

P0001	Regler Typ	1000	
-	Controller type	1	
A	BM_u_ControllerType	1:1	-

Identification of controller type.

Value	Meaning
1000	b maXX® 1000

P0002	Controller Firmware Typ	0 to 65535	
-	Controller firmware type	0	
A	BM_u_SoftwareType	1:1	-

Differentiation between standard firmware and customized firmware.

Value	Meaning
0	Standard software
1 to 65535	Customized software

P0003	Controller Firmware ID	0 to 65535	
-	Controller firmware ID	0	
A	BM_u_SoftwareID	1:1	-

Identification no. of the controller firmware.

Value	Meaning
1459	Controller firmware identified for b maXX® 1000
0	Not defined controller firmware

P0004	Controller Firmware ID	2.000 to 5.999	
-	Controller firmware ID	2.000	
A	BM_u_SoftwareVersionID	1000:1	-

Software version, which is used.

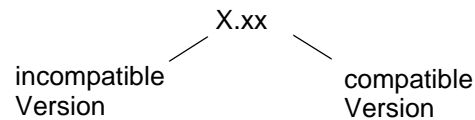


Figure 5: Controller software version

P0005	Parametertabellen-Version	0 to 65535	
-	Parameter table version	1	
A	BM_u_ParamTableVersion	1:1	-

Version of parameter table used. A new table version is created for parameter description when a parameter are changed or added.

Value	Meaning
0	Not defined table version
1 to 65535	Table version

P0006	Typenschlüssel 1	0 to 1999	
-	Identity code 1	1xxx	
A	BM_u_IdentCode1	1:1	-

This parameter displays the identity code of the b maXX[®] 1000. 0 means unknown identity.

Value	Meaning
0	Not defined identity code
1 to 1999	Type code see ▶Figure 6◀ on page 22

4.3 Parameter description

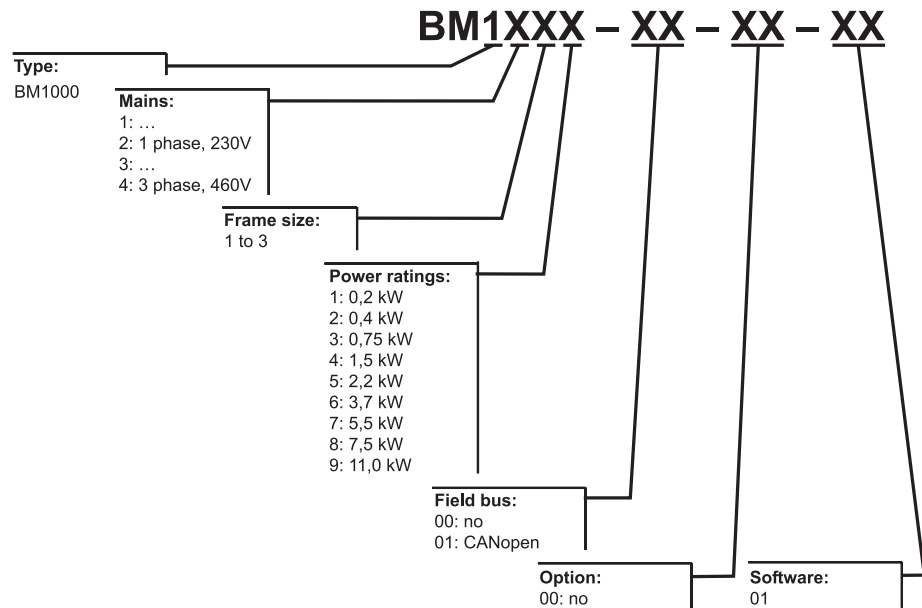


Figure 6: Type code

P0007	Leistungsteil Seriennummer	0 to 9999
-	Power unit serial number	0
A	BM_u_AmpSerialNr	1:1 -

Display of power unit serial number. 0 means unknown serial number.

Value	Meaning
0	Not defined serial number
1 to 9999	Code including place of manufacture and production year

P0009	Leistungsteil Software-Version	1.00 to 5.99
-	Power unit software version	1.00
A	BM_u_AmpSW_Version	100:1 -

Version of power unit software, which is used.

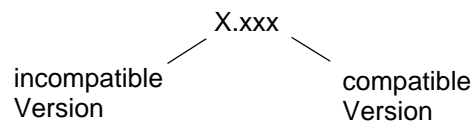


Figure 7: Software version of power unit

P0010	Leistungsteil Nennstrom	0.0 to 99.9 A	
-	Power unit rate current	0.0 A	
A	BM_u_AmpNomCurrent	10:1	-

Display of power unit rate current.

P0024	Lüfterregelung	0 to 3	
EE	Fan control	0	
ON	BM_u_FanControl	1:1	-

This parameter determines the operation mode of the cooling fan.

Value	Meaning
0	Always fan on
1	Fan off after 1 min drive stop
2	Fan on when drive run Fan off when drive stop
3	Fan on when preliminary temperature attained

P0032	50 Hz Spannungsauswahl	0 to 1	
EE	50 Hz base volt selection	0	
STOP	BM_u_BaseVoltSelect	1:1	-

This parameter determines the base voltage for 50 Hz power supply.

Value	Meaning
0	230V / 400V
1	220V / 380V

P0033	Maximale Ausgangsfrequenz	50.00 to 600.00 Hz	
EE	Maximum output frequency	50.00 Hz	
STOP	BM_u_MaxOutputFreq	100:1	-

This parameter determines the b maXX[®] 1000 maximum output frequency. All the drive command sources (analog inputs 0 to +10 V and 4 to 20 mA) are scaled to correspond to this output frequency range.

Also see [▶Figure 8◀](#) on page 26.

P0036	Mittelfrequenz Fmid	0.10 to 600.0 Hz	
EE	Mid-point frequency (Fmid)	1.50 Hz	
STOP	BM_u_MidPointFreq	100:1 Hz	-

This parameter sets the mid-point frequency of the V/f curve if $\triangleright P0800 \triangleleft = 0$.

With this setting, the V/f ratio between minimum frequency and mid-point frequency can be determined. This parameter must be equal to or greater than minimum output frequency $\triangleright P0038 \triangleleft$ and equal to or less than maximum voltage frequency $\triangleright P0061 \triangleleft$. This setting is invalid in vector control mode $\triangleright P0800 \triangleleft = 1$.

The settings have to meet the condition of $\triangleright P0038 \triangleleft \leq \triangleright P0036 \triangleleft \leq \triangleright P0061 \triangleleft$.

Also see [Figure 8](#) on page 26.

P0037	Mittelspannung Vmid	0.1 to 255.0 V or 0.1 to 510.0 V	
EE	Mid-point voltage (Vmid)	10.0 V or 20.0 V	
STOP	BM_u_MidPointVolt	10:1 V	-

This parameter sets the mid-point voltage of any V/f curve if $\triangleright P0800 \triangleleft = 0$.

The maximum value depends on the b maXX[®] used, up to 255.0 V for single-phase devices and up to 510.0 V for three-phase devices.

With this setting, the V/f ratio between minimum frequency and mid point frequency can be determined. This parameter must be equal to or greater than minimum output voltage $\triangleright P0039 \triangleleft$ and equal to or less than maximum output voltage $\triangleright P0053 \triangleleft$. This setting is invalid in vector control mode $\triangleright P0800 \triangleleft = 1$.

The settings have to meet the condition of $\triangleright P0039 \triangleleft \leq \triangleright P0037 \triangleleft \leq \triangleright P0053 \triangleleft$.

Also see [Figure 8](#) on page 26.

P0038	Minimale Ausgangsfrequenz Fmin	0.10 to 600.0 Hz	
EE	Minimum output frequency (Fmin)	1.50 Hz	
STOP	BM_u_MinOutFreq	100:1	-

This parameter sets the minimum output frequency of the drive if $\triangleright P0800 \triangleleft = 0$.

This parameter must be equal or less than mid-point frequency $\triangleright P0036 \triangleleft$. This setting is invalid in vector control mode $\triangleright P0800 \triangleleft = 1$.

The settings have to meet the condition of $\triangleright P0038 \triangleleft \leq \triangleright P0036 \triangleleft \leq \triangleright P0061 \triangleleft$.

Also see [Figure 8](#) on page 26.

P0039	Minimale Ausgangsspannung Vmin	0.1 to 255.0 V or 0.1 to 510.0 V
EE	Minimum output voltage (Vmin)	10.0 V or 20.0 V
STOP	BM_u_MinOutVolt	10:1 V -

This parameter sets the minimum output voltage of any V/f curve if [P0800](#) = 0.

The maximum value depends on the b maXX[®] used, up to 255.0 V for single-phase devices and up to 510.0 V for three-phase devices.

This parameter must be equal to or less than mid-point voltage [P0037](#). This setting is invalid in vector control mode [P0800](#) = 1.

The settings have to meet the condition of $\text{P0039} \leq \text{P0037} \leq \text{P0053}$.

Also see [Figure 8](#) on page 26.

P0040	Ausgangsfrequenz: obere Grenze	0.1 to 120.0 %
EE	Output frequency: upper limit	110.0 %
STOP	BM_u_OutFreqUpperLimit	10:1 -

This parameter must be equal to or greater than the output frequency lower limit [P0041](#).

The maximum output frequency [P0033](#) is regarded to 100 %.

$$\text{Output frequency upper limit value} = (\text{P0033} \cdot \text{P0040}) / 100$$

Also see [Figure 8](#) on page 26.

4.3 Parameter description

P0041	Ausgangsfrequenz: untere Grenze	0.0 to 100.0 %
EE	Output frequency: lower limit	0.0 %
STOP	BM_u_OutFreqlowerLimit	10:1 -

The upper lower limits are to prevent operation errors and machine damage. If the output frequency upper limit is 50 Hz and the maximum output frequency is 60 Hz, the output frequency will be limited to 50 Hz. If the output frequency lower limit is 10 Hz, and the minimum output frequency \blacktriangleright P0038 \blacktriangleleft is set to 1.0 Hz, then any command frequency between 1.0 to 10 Hz will generate a 10 Hz output from the drive.

The maximum output frequency \blacktriangleright P0033 \blacktriangleleft is regarded to 100 %.

This parameter must be equal to or less than the output frequency upper limit \blacktriangleright P0040 \blacktriangleleft .

$$\text{Output frequency lower limit value} = (\blacktriangleright\text{P0033}\blacktriangleleft \cdot \blacktriangleright\text{P0041}\blacktriangleleft) / 100$$

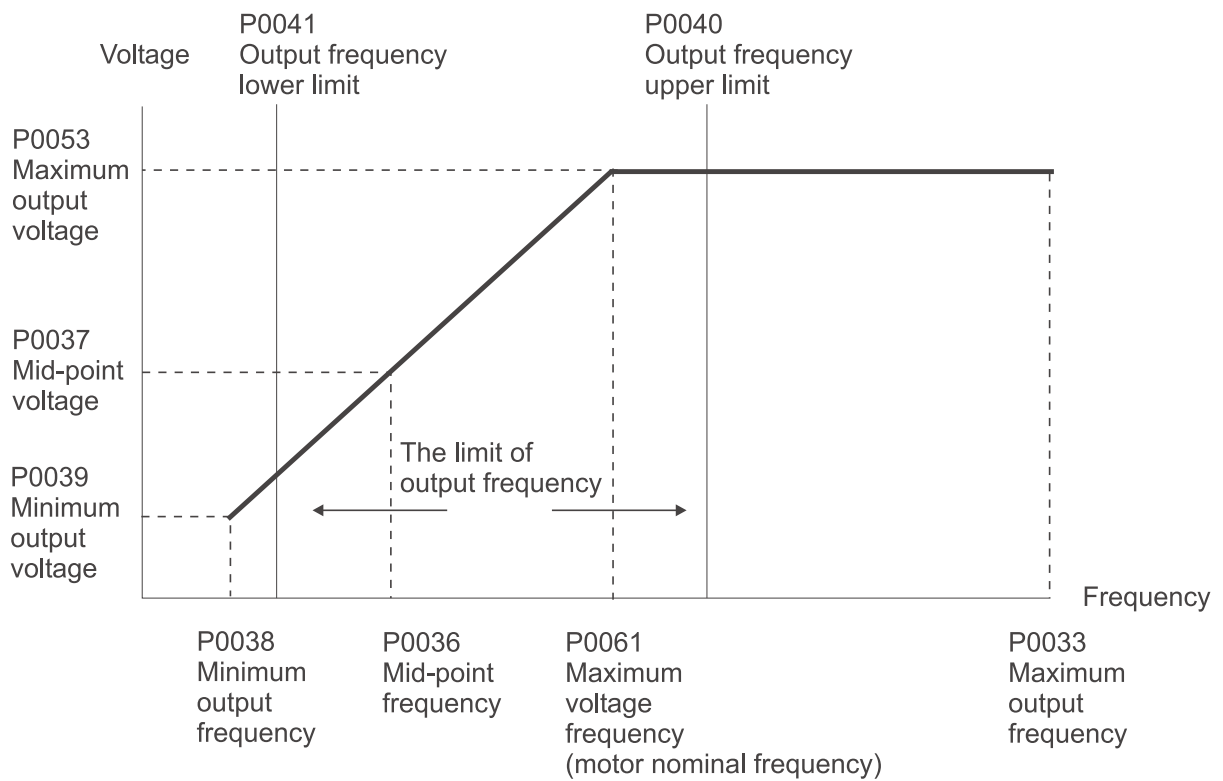


Figure 8: V/f curve

P0050	Motor Typenschlüssel	0_{hex} to FFFF_{hex}	
EE	Motor type code	-	
STOP	BM_u_MotorType	1:1	-
	Not implemented.		
P0051	Motor Seriennummer	0 to 65535	
EE	Motor serial number	0	
STOP	BM_ud_MotorSerialNr	1:1	-
	Not implemented.		
P0053	Motor Nennspannung	0.1 to 255.0 V or 0.1 to 510.0 V	
EE	Motor rated voltage	220.0 V or 440.0 V	
STOP	BM_u_MotorNomVolt	10:1 V	-

This parameter determines the maximum output voltage of the drive. The maximum output voltage setting must be smaller than or equal to the rated voltage of the motor as indicated on the motor nameplate. This parameter value must be equal to or greater than the mid-point voltage [▶P0037◀](#).

The maximum value depends on the b maXX[®] used, up to 255.0 V for single-phase devices and up to 510.0 V for three-phase devices.

Also see [▶Figure 8◀](#) on page 26.

P0054	Motor Nennstrom	$0.3 \cdot \text{▶P0010◀}$ to $1.2 \cdot \text{▶P0010◀}$	
EE	Motor rated current	▶P0010◀	
ON	BM_u_MotorNomCurrent	10:1	-

Parameters [▶P0054◀](#) and [▶P0110◀](#) must be set if the drive is programmed to operate in vector control mode ([▶P0800◀](#) = 1). They also must be set if the „electronic thermal overload relay“ [▶P1216◀](#) or „slip compensation“ [▶P0114◀](#) functions are selected.

Motor current: motor rated current in [A] on the motor.

b maXX[®] 1000: rated current of used b maXX[®] 1000 in [A], see parameter [▶P0010◀](#)

4.3 Parameter description

P0056	Motor Nennleistung	0.00 to 99.99 kW
EE	Motor nominal power	0.00 kW
STOP	BM_u_MotorNomPower	100:1 -

Not implemented.

P0057	Motor Nenndrehzahl	1 to 65535 rpm
EE	Motor rated speed	1 rpm
STOP	BM_u_MotorNomSpeed	1:1 rpm -

Nominal speed of motor on motor type plate. You must set the rated speed before starting „autotuning“. [▶P0057◀](#) can be calculated with [▶P0124◀](#) if only the rated slip frequency of the motor is known. [▶P0057◀](#) can be changed only if [▶P0124◀](#) = 0.

P0058	Motor Leistungsfaktor	0.6 to 1.0
EE	Motor power factor	0.9
ON	BM_u_MotorPowerFactor	10:1 -

Power factor (cos φ) of the motor.

P0061	Motor Nennfrequenz	0.10 to 600.00 Hz
EE	Motor nominal frequency	50.00 Hz (▶P0310◀ = 9) or 60.00 Hz (▶P0310◀ = 10)
STOP	BM_u_MotorNomFreq	100:1 -

This value should be set according to the rated frequency of the motor as indicated on the motor type plate. Maximum voltage frequency determines the V/f curve ratio. For example, if the drive is rated for 460 V_{AC} output and the maximum voltage frequency is set to 60 Hz, the drive will maintain a constant ratio of 7.66 V/Hz (460 V/60 Hz = 7.66 V/Hz).

This parameter value must be equal to or greater than the mid-point frequency [▶P0036◀](#).

The settings have to meet the condition of [▶P0039◀](#) ≤ [▶P0037◀](#) ≤ [▶P0053◀](#) and [▶P0038◀](#) ≤ [▶P0036◀](#) ≤ [▶P0061◀](#).

Also see [▶Figure 8◀](#) on page 26.

[▶P0061◀](#) can be changed only if [▶P0124◀](#) = 0.

P0065	Motor Polpaarzahl	1 to 10
EE	Motor number of pole pairs	2
STOP	BM_u_MotorPolePairs	1:1 -

Number of motor pole pairs (1 pole pair = 2 poles).

[▶P0065◀](#) can be changed only if [▶P0124◀](#) = 0.

P0077	Motor Ständerwiderstand	0 to 65535 mΩ
EE	Motor line-to-line resistance	0 mΩ
STOP	BM_u_MotorStatorResist	1:1 -
<p>The motor auto tuning procedure will set this parameter. The user may also set this parameter without using the auto tuning procedure, see ▶P0850◀.</p>		
P0110	Motor Leerlauf-Strom	0.0 to 99.0 % ▶P0054◀
EE	Motor no-load current	40.0 % ▶P0054◀
ON	BM_u_MotorNoLoadCurrent	10:1 -
<p>The rated current of the drive ▶P0054◀ is regarded as 100 %. The setting of the motor no-load current will affect the slip compensation.</p> <p>The setting value must be less than ▶P0054◀.</p>		
P0111	Motor Nennschlupf	0.00 to 20.00 Hz
EE	Motor rated slip (Motor nominal slip)	3.00 Hz
STOP	BM_u_MotorRatedSlip	100:1 -
<p>Refer to the rated rpm and the number of polepairs on the type plate of the motor and use the following equation to calculate the rated slip:</p> $\text{Rated slip (Hz)} = F_{\text{Motor nominal frequ.}} (\text{▶P0061◀}) - (\text{rated rpm} \cdot \text{motor pole pairs} \cdot 120)/60$ <p>This parameter is valid only in vector mode.</p> <p>▶P0111◀ can be calculated via ▶P0124◀ automatically if unknown. ▶P0111◀ can be changed only if ▶P0124◀ = 0.</p>		
P0112	Drehmomentanpassung	0.0 to 10.0 Hz
EE	Torque compensation	0.0 Hz
ON	BM_u_TorqueComp	10:1 -
<p>This parameter may be set so that the drive will increase its voltage output to obtain a higher torque. Only to be used for V/f control mode.</p>		

NOTE

Too high torque compensation can overheat the motor.



4.3 Parameter description

P0113	Drehmomentanpassung Zeitkonstante	0.01 to 10.00 s
EE	Torque compensation time constant	0.10 s
STOP	BM_u_TorqueCompTimeConst	100:1 -

Setting this parameter changes the response time for the torque compensation [▶P0112◀](#).

NOTE



Too long time constants give slow response, too short values can give unstable operation.

P0114	Motor Schlupfanpassung	0.00 to 10.00 %
EE	Motor slip compensation	0.00 %
ON	BM_u_MotorSlipComp	1:1 -

While driving an asynchronous motor, increasing the load on the drive will cause an increase in slip and decrease in speed. This parameter may be used to compensate the slip by increasing the output frequency. When the output current of the drive is bigger than the motor no-load current [▶P0110◀](#), the drive will adjust its output frequency according to this parameter.

P0115	Motor Schlupfanpassung Grenze	0 to 250 %
EE	Motor slip compensation limit	200 %
STOP	BM_u_MotorSlipCompLimit	1:1 -

This parameter sets the upper limit of the compensation frequency (the percentage of [▶P0111◀](#)).

Example:

when [▶P0111◀](#) = 5 Hz and [▶P0115◀](#) = 150 %, the upper limit of the compensation frequency is 5 Hz · 150 % = 7.5 Hz. Therefore, for a 50 Hz motor, the max. output is 57.5 Hz.

P0116	Schlupfanpassung Zeitkonstante	0.05 to 10.00 s	
EE	Motor slip compensation time constant	0.20 s	
STOP	BM_u_MotorSlipCompTimeConst	100:1 s	-

Setting this parameter changes the response time for the slip compensation >P0114<.

NOTE

Too long time constants give slow response, too short values can give unstable operation.



P0117	Motor Kaltleiter Überhitzungsschutz Überwachung	0 to 1	
EE	Motor PTC overheat protection	0	
STOP	BM_u_PTCOverheatProt	1:1	-

This parameter enables the overheat protection of the motor.

Value	Meaning
0	Disable
1	Enable overheat protection by AVI terminal

P0118	Eingangfilterzeitkonstante Kaltleiterschutz	0 to 9999	
EE	Input filter time constant of the PTC protection	100 (200 ms)	
STOP	BM_u_InputFilterTimeConstantPTC	1:2	-

This parameter is to delay the signals on PTC analog input terminals. 1 unit is 2 ms, 2 units are 4 ms, etc.

P0119	Motor Kaltleiter Überhitzung Fehlergrenze	0.1 to 10.0 V	
EE	Motor PTC overheat fault level	2.4 V	
ON	BM_u_PTCTOverheatFaultLevel	10:1	-

When the motor is running at low frequency for a long time, the cooling function of the motor fan will be lower. To prevent overheating, it needs to have a PTC resistor on the motor and connect its output signal to the drive's corresponding control terminals.

When the source of first/second frequency command is set to AVI ([▶P0801◀](#)= 2/ [▶P0809◀](#)= 2), it will disable the function of motor PTC overheat protection (i.e. [▶P0117◀](#) cannot be set to 1).

If temperature exceeds the setting level, motor will be coast to stop and error code 0063_{hex} is displayed. When the temperature decreases below the level of ([▶P0120◀](#), [▶P0121◀](#)) and error code 0063_{hex} stops blinking, you can press RESET key to clear the fault.

[▶P0119◀](#) (overheat protection level) must exceed [▶P0120◀](#) (overheat warning level).

The PTC uses the AVI-input and is connected via resistor-divider as shown below.

- 1 The voltage between +10V to ACM: lies within 10.4 V to 11.2 V.
- 2 The impedance for AVI is around 47 kΩ.
- 3 Recommended value for resistor-divider R1 is 1 to 20 kΩ.
- 4 Please contact your motor dealer for the curve of temperature and resistance value for PTC.

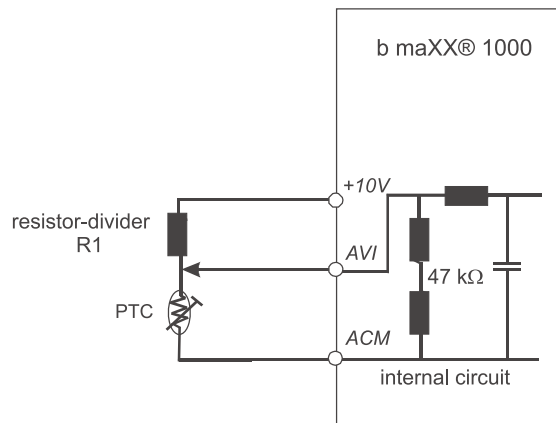


Figure 9: Motor PTC overheat protection

Refer to following calculation for protection level and warning level.

1 Protection level (error level)

$$\triangleright P0119 \triangleleft = V_{+10} * (R_{PTC1} // 47k) / [R1 + (R_{PTC1} // 47k)]$$

2 Warning level

$$\triangleright P0120 \triangleleft = V_{+10} * (R_{PTC2} // 47k) / [R1 + (R_{PTC2} // 47k)]$$

3 Definition:

V_{+10} : voltage between +10V-ACM, range 10.4 to 11.2 V_{DC}

R_{PTC1} : motor PTC overhear protection level.

Corresponding voltage level set in [▷P0119◁](#)

R_{PTC2} : motor PTC overhear warning level.

Corresponding voltage level set in [▷P0120◁](#)

47k: is AVI input impedance

R1: resistor-divider (recommended value: 1 to 20 k Ω)

Take the standard PTC resistor as example:

If protection level is 1330 Ω , the voltage between +10V-ACM is 10.5V and resistor-divider R1 is 4.4k Ω . Refer to following calculation for [▷P0119◁](#) setting.

$$1330 // 47000 = (1330 * 47000) / (1330 + 47000) = 1293.4$$

$$10.5 * 1293.4 / (4400 + 1293.4) = 2.38(V) \approx 2.4(V)$$

Therefore, [▷P0119◁](#) should be set to 2.4.

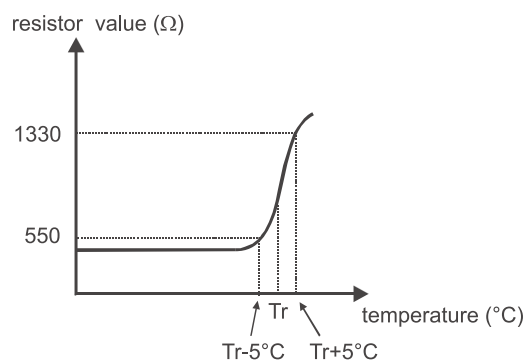


Figure 10: PTC resistor curve

P0120	Motor Kaltleiter Überhitzung Warnungsgrenze	0.1 to 10.0 V	
EE	Motor PTC overhear warning level	1.2 V	
ON	BM_u_PTCOverheatWarningLevel	10:1	-

Warning level PTC overhear, refer to [▷P0119◁](#).

P0121	Motor Kaltleiter Überhitzung	0.1 to 5.0 V	
EE	Motor PTC overhear reset delta level	0.6 V	
ON	BM_u_PTCOverheatResetLevel	10:1	-

Reset level PTC overhear, refer to [▷P0119◁](#).

4.3 Parameter description

P0122 Motorüberhitzung Warnung 0 to 2

EE **Motor PTC overheat warning protection** 0

STOP BM_u_PTCTOverheatWarning 1:1 -

If temperature exceeds the motor PTC overheat warning level [▶P0120◀](#), the drive will act according to [▶P0122◀](#) and display error code 0512_{hex}. If the temperature decreases below the result ([▶P0120◀](#) minus [▶P0121◀](#)), the warning display will disappear.

Value	Meaning
0	Warn and RAMP to stop
1	Warn and COAST to stop
2	Warn and keep running

P0123 Motor Nenndrehzahl/Nennfrequenz Auswahl 0 to 1

EE **Motor rated speed/nominal slip master selection** 1

STOP BM_u_MotorRatedSpeedSlipSelection 1:1 -

Value	Meaning
0	Motor rated speed is existing, motor rated Slip can automatic calculation with ▶P0124◀
1	Motor rated slip is existing, motor rated speed can automatic calculation with ▶P0124◀

P0124 Motor Nenndrehzahl/Nennfrequenz Bestätigung 0 to 2

EE **Motor rated speed/nominal slip master selection confirm** 0

STOP BM_u_MotorRatedSpeedSlipSelectionConfirm 1:1 -

Value	Meaning
0	Motor nominal slip frequency or motor rated speed can be changed
1	Start calculation
2	Calculated motor nominal slip frequency or motor rated speed OK

Parameters [▶P0057◀](#), [▶P0061◀](#), [▶P0065◀](#) and [▶P0111◀](#) can only be changed if [▶P0124◀](#) = 0.

P0240	Aktueller Fehlerspeicher	0 to 052F _{hex}
-	Present fault record	0
A	BM_u_PresentFaultRecord	1:1 -

Procedures for troubleshooting and for additional information see chapter 'Troubleshooting' in the manual b maXX[®] 1000.

Here are the five most recent faults that occurred, are stored. After removing the cause of the fault, use the reset command to reset the drive.

Fault list:

Error code	Description (from b maXX [®] 1000 controller)	Display	b maXX [®] 1000 Error reaction	CANopen Error code
0000 _{hex}	Reserve			--
0003 _{hex}	NMI interrupt has occurred - incorrect bus access	oc	PWM Inhibit	7400 _{hex}
0021 _{hex}	CAN error	cPtE, cc04 to cc08, cc02	▶P0296◀	8200 _{hex}
0030 _{hex}	Error in analog option card	AnCd		7300 _{hex}
0035 _{hex}	Error ADDA card break off	Aoff	PWM Inhibit	
0050 _{hex}	Communications error USB CARD (CME-USB01) or IO COM1 communication time out	UbCd; PE10	▶P0868◀	7500 _{hex}
0052 _{hex}	UIC overvoltage (U _{DC})	ov	PWM Inhibit	3210 _{hex}
0054 _{hex}	Ground current	GFF	PWM Inhibit	2240 _{hex}
0062 _{hex}	Motor temperature fault - switch-off threshold exceeded	PtC1	▶P0119◀	7120 _{hex}
0063 _{hex}	Fault I2t > 100%	oL1	PWM Inhibit	7120 _{hex}
0070 _{hex}	Communication error PG card (option card)	PG_ERR	▶P1077◀	7300 _{hex}
00A0 _{hex}	1= Modbus communication time monitoring	cE10	▶P0862◀	Warning
00A1 _{hex}	1= control board/power board communication time monitoring	cP10	PWM Inhibit	7500 _{hex}
00B0 _{hex}	EEPROM error	cF10; cF11; cF20; cF21	▶P1007◀	5530 _{hex}
00B2 _{hex}	Checksum error in EEPROM	Ecnt	PWM Inhibit	5530 _{hex}
0500 _{hex}	IGBT inside temperature exceed	oH1	PWM Inhibit	4310 _{hex}
0501 _{hex}	Lower than standard voltage	Lv	▶P0297◀	3220 _{hex}
0502 _{hex}	Phase loss	PHL	PWM Inhibit	3130 _{hex}
0503 _{hex}	Password don't match	codeE	PWM Inhibit	6320 _{hex}
0505 _{hex}	Temperature sensor fault detect	cF34	PWM Inhibit	4310 _{hex}
0506 _{hex}	Control board ACI loss	AErr	▶P0806◀	FF00 _{hex}
0507 _{hex}	b maXX [®] driver loading exceed	oL	PWM Inhibit	2310 _{hex}
0509 _{hex}	Motor loading exceed	oL2	▶P1213◀	2310 _{hex}
050A _{hex}	CC current clamp	HPF1	PWM Inhibit	5000 _{hex}
050B _{hex}	OV hardware error	HPF2	PWM Inhibit	5000 _{hex}
050C _{hex}	GFF ground hardware error	HPF3	PWM Inhibit	5000 _{hex}
050D _{hex}	OC hardware error	HPF4	PWM Inhibit	5000 _{hex}

4.3 Parameter description

Error code	Description (from b maXX [®] 1000 controller)	Display	b maXX [®] 1000 Error reaction	CANopen Error code
050E _{hex}	DC BUS checking error	cF33	PWM Inhibit	3210 _{hex}
0512 _{hex}	Motor PTC temperature warning	PtC2	▶P0122◀	Warning
0513 _{hex}	IO PID feedback error	FbE	▶P1368◀ , ▶P1368◀	Warning
0515 _{hex}	U-phase error	cF30	PWM Inhibit	2300 _{hex}
0516 _{hex}	V-phase error	cF31	PWM Inhibit	2300 _{hex}
0517 _{hex}	W-phase error	cF32	PWM Inhibit	2300 _{hex}
0518 _{hex}	Current exceed at acceleration process	ocA	PWM Inhibit	2310 _{hex}
0519 _{hex}	Current exceed at deceleration process	ocd	PWM Inhibit	2310 _{hex}
051A _{hex}	Current exceed at steady state	ocn	PWM Inhibit	2310 _{hex}
051B _{hex}	Power BD over heat	oH2	PWM Inhibit	4310 _{hex}
051C _{hex}	External fault	EF	▶P0803◀	9000 _{hex}

P0241	Zweiter aktueller Fehlerspeicher	0 to 052F _{hex}
-	Second most recent fault record	0
A	BM_u_SecondFaultRecord	1:1

Procedures for troubleshooting and for additional information see chapter 'Troubleshooting' in the manual b maXX[®] 1000.

Here are the next five most recent faults that occurred, are stored. After removing the cause of the fault, use the reset command to reset the drive, fault list see [▶P0240◀](#) on page 35.

P0242	Dritter aktueller Fehlerspeicher	0 to 052F _{hex}	
-	Third most recent fault record	0	
A	BM_u_ThirdFaultRecord	1:1	-

Procedures for troubleshooting and for additional information see chapter 'Troubleshooting' in the manual b maXX[®]1000.

Here are the next five most recent faults that occurred, are stored. After removing the cause of the fault, use the reset command to reset the drive, fault list see [▶P0240◀](#) on page 35.

P0243	Vierter aktueller Fehlerspeicher	0 to 052F _{hex}	
-	Fourth most recent fault record	0	
A	BM_u_FourthFaultRecord	1:1	-

Procedures for troubleshooting and for additional information see chapter 'Troubleshooting' in the manual b maXX[®]1000.

Here are the next five most recent faults that occurred, are stored. After removing the cause of the fault, use the reset command to reset the drive, fault list see [▶P0240◀](#) on page 35.

P0244	Fünfter aktueller Fehlerspeicher	0 to 052F _{hex}	
-	Fifth most recent fault record	0	
A	BM_u_FifthFaultRecord	1:1	-

Procedures for troubleshooting and for additional information see chapter 'Troubleshooting' in the manual b maXX[®]1000.

Here are the next five most recent faults that occurred, are stored. After removing the cause of the fault, use the reset command to reset the drive, fault list see [▶P0240◀](#) on page 35.

4.3 Parameter description

P0296	Fehlerreaktion CAN-Bus Signalausfall	0 to 255	
EE	Reaction CAN-bus drop-out	0	
STOP	BM_u_ReactionCANBusDropOut	1:1	-

This parameter determines the reaction after a CAN-bus drop-out.

Value	Meaning
255	No Reaction
0	Reaction according to P1007 (error reaction code)
1	Pulse inhibit
2	Braking operation at the deceleration time
3	Braking operation at the quickstop time
4	Braking operation at the deceleration automatic time

CANopen Index 6007_{hex} for Node Guarding Error

6007 _{hex}	Meaning
0 _{hex}	No Reaction
2 _{hex}	Pulse inhibit, default value
3 _{hex}	Quickstop
FFFF _{hex}	Reaction according to P0296

P0297	Fehlerreaktion Spannungsausfall	0 to 255	
EE	Error reaction power lost	0	
STOP	BM_u_ErrorReactionPowerLost	1:1	-

This parameter determines the reaction after a power lost.

Value	Meaning
-1	No Reaction
0	Pulse inhibit
1	Braking operation at the deceleration time
2	Braking operation at quickstop ramp
3	Braking operation at the deceleration automatic time

P0300	Steuerwort	0 _{hex} to FFFF _{hex}
EE	Controlword	0
ON	BM_u_ControlWord	1:1

This parameter is the input word used in the status machine of the device control.

Bit	Meaning
0	1: Command 'switch on' 0: Command 'shut down'
1 ¹⁾	1: Command ' Inhibit no voltage' (operating status) 0: Command 'inhibit voltage'
2 ¹⁾	1: Command ' no quickstop' (operating status) 0: Command 'quickstop'
3	1: Command 'operation enabled' 0: Command 'inhibit operation'
4	Ramp-function-generator inhibit: output frequency fixed to 0
5	Ramp-function-generator stop: freeze output frequency
6	Ramp-function-generator zero: set output frequency by ramp to 0
7	0 -> 1 reset error
10 ... 8	Reserved
11	Jog forwards
12	Jog backwards
15 ... 13	reserved

¹⁾ These bits are low active.

Description of bits

- Bit 0 to 3 Control of drive status machine.
The device control commands are defined with the following bit combinations:

Command	Bit 7 Reset- error	Bit 3 Operation enabled	Bit 2 Quickstop ¹⁾	Bit 1 = 1: Inhibit voltage ¹⁾	Bit 0 Switch on
Shut down	X	X	1	1	0
Switch on	X	X	1	1	1
Inhibit voltage	X	X	X	0	X
Quickstop	X	X	0	1	X
Inhibit operation	X	0	1	1	1
Operation enabled	X	1	1	1	1
Reset error	0 → 1	X	X	X	X

The bits which are marked with X are of no significance for the accordant command.

¹⁾ These bits are low active.

4.3 Parameter description

- Bit 4: Ramp function generator inhibit
1: enable ramp function generator
0: inhibit ramp function generator (output set to 0)
(a quickstop is executed if ramp function generator status is not STOP)
- Bit 5: Ramp function generator stop
1: enable ramp function generator
0: inhibit ramp-up/ramp-down ramp function generator
(output frequency is frozen if ramp function generator is in ramp-up or ramp-down phase)
- Bit 6: Ramp function generator zero
1: enable ramp function generator
2: ramp function input is set to 0
(set output frequency by ramp to 0)
- Bit 7: Drive manager command „Quit error“
This command is executed when bit 7 changes from 0 \Rightarrow 1.

P0301

	Statuswort	0 to 65535
-	Statusword	0
A	BM_u_Status word	1:1 -

This parameter is the output word used in the status machine of the device control.

Bit	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 quickstop requirements are available)
6 ²⁾	1: Inhibit 0: No inhibit
7	1: Warning 0: No warning
8	Ramp function generator in status STOP
9	Reserved
10	1: Setpoint reached 0: Setpoint not reached
11	1: Internal limit active (current, speed) 0: No internal limit active
15 ... 12	Reserved

¹⁾ These bits are low active.

²⁾ Display operational status of device manager

Description of bits

- Bit 0 to bit 6
These bits show the status of the drive status machine.

Status of unit control	Bit in status word					
	Bit 6 Inhibit start	Bit 5 ¹⁾ Quick stop	Bit 3 Error	Bit 2 Operation enabled	Bit 1 Switched on	Bit 0 Ready-to-start
NOT READY-TO-START	0	X	0	0	0	0
INHIBIT START	1	X	0	0	0	0
READY TO SWITCH ON	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.

- Bit 3: Error
The b maXX[®] 1000 sets the bit as soon as an error ([▶P0240◀](#)) occurs which is followed by an error reaction. The bit is enabled while error reaction and in error state. It is only be reset if the error is acknowledged successfully.
- Bit 4: Mains voltage / DC link voltage available
This bit is set when the mains voltage is available at the power unit and the DC link is loaded.
- Bit 5: Quick stop or Quick stop request active
This bit is low active. It is set to 0 if a quick stop reaction is enabled with the control word command „QUICK STOP“ or with the hardware input „QUICK STOP“ (multi function input MI5 = 23).
The bit is enabled when changing to state „READY TO SWITCH ON“. The bis is set to 0 as long as the drive's state is „Quick stop“. The bit is enabled when the drive's state is enabled again or the state „READY TO SWITCH ON“ is reached because of commands.
- Bit 7: Warning
The bit displays a warning generated by the controller.

4.3 Parameter description

P0304	Ist-Betriebsart	0 to 249	
-	Operation mode actual	249	
A	BM_i_OperationModeAct	1:1	-

This parameter displays the active drive operation mode.

Value	Meaning
249	Motor parameters auto-tuning
2	Speed setting 1 (ramp function generator)
5	Jog operation
6	Operation mode (function for motion control)

P0305	Antriebs-Status	0 to 15	
-	Drive status	0	
A	BM_u_DriveStatus	1:1	-

This parameter shows the current status of the drive.

Value	Meaning
0	Not ready-to-start
1	Inhibit start
2	Ready to switch on
3	Switched on
4	Operation enabled
7	Quickstop active
14	Error reaction active
15	Error

P0310	Parameter Reset	0 to 11	
EE	Parameter reset	0	
STOP	BM_u_ParameterReset	1:1	-

This parameter allows the user to reset all parameters to the factory settings except the fault records (▶P0240◀ to ▶P0244◀).

50 Hz:

▶P0033◀ and ▶P0061◀ are set to 50 Hz and ▶P0053◀ will be set by ▶P0032◀

60 Hz:

▶P0033◀ and ▶P0061◀ are set to 60 Hz and ▶P0053◀ will be set to 230 V or 460 V

When ▶P0310◀= 11, all parameters are read-only.

To write all parameter, set ▶P0310◀= 0

Value	Meaning
0	Parameter can be set and read
3 to 8	Reserved
9	Reset parameter to factory setting for 50 Hz motor
10	Reset parameter to factory setting for 60 Hz motor
11	Parameter are read only

P0311	Datensatzverwaltung Status	0 to 2	
-	Data set status	0	
A	BM_w_RecordStatus	1:1	-

This parameter displays the status of the last data set management command.

Status	Meaning
0	No error
1	Write/read cycle in process
2	Error

P0317	Anzahl Schreibvorgänge EEPROM	1 to 65535	
-	EEPROM write count	0	
A	BM_u_EepromWriteCount	1:1	-

Number of write counts in EEPROM. This counter will be incremented at write access for parameters (▶P0077◀, ▶P0110◀, ▶P0811◀, ▶P0812◀, ▶P0850◀, ▶P1172◀, ▶P1173◀, ▶P1176◀, ▶P1177◀, ▶P1180◀, ▶P1181◀, ▶P1182◀, ▶P1183◀, ▶P1184◀, ▶P1359◀, ▶P1361◀, ▶P1362◀, ▶P1363◀, internal parameter 1, internal parameter 2) to EEPROM by Power OFF.

4.3 Parameter description

P0558 Controller Hardware-Version 0 to 65535

- **Controller hardware version** 1

A BM_u_ControllerHardwareVersion 1:1 -

This parameter defines in addition to [▶P0001◀](#) the hardware version of the b maXX[®] 1000 if the hardware was changed. 0 is an unknown hardware version.

P0800 Regelungsart 0 to 1

EE **Control method** 0

STOP BM_u_ControlMethod 1:1 -

This parameter determines the control method of the b maXX[®] 1000.

Value	Meaning
0	V/f control
1	Vector control

P0801 Quelle der ersten Hauptfrequenzvorgabe 1 to 225

EE **Source of first master frequency command** 5

STOP BM_u_SourceFirstMasterFrequComm 1:1 -

This parameter set the master frequency command source of the b maXX[®] 1000.

The factory setting for master frequency command is 5 (digital keypad is optional).

Setting 2:

use the ACI/AVI switch on the AC motor drive to select ACI or AVI2. When setting to AVI, AVI2 is indicated.

When the b maXX[®] 1000 is controlled by external terminal, please refer to [▶P0805◀](#) for details.

The first/second frequency/operation command is enabled/disabled by multi function input terminals. Please refer to [▶P1091◀](#) to [▶P1094◀](#).

Value	Meaning
255	Digital terminal 15 fixed set value
0	Digital keypad UP/DOWN keys or multi-function inputs UP/DOWN. Last used frequency saved (digital keypad is optional).
1	0 to +10V from AVI
2	4 to 20mA from ACI or 0 to +10V from AVI2
3	ProDrive communication interface
4	Digital keypad potentiometer
5	CANopen

P0802	Quelle des ersten Betriebskommandos	1 to 5	
EE	Source of first operation command	5	
STOP	BM_u_SourceFirstOperComm	1:1	-

The factory setting for source or first operation command is 2.

When the b maXX[®] 1000 is controlled by an external terminal, please refer to [▶P0805◀](#) / [▶P1090◀](#) for details.

Value	Meaning
0	by digital keypad *
1	by external terminals, keypad STOP enabled *
2	by external terminals, keypad STOP disabled *
3	by ProDrive communication interface, keypad STOP enabled *
4	by ProDrive communication interface, keypad STOP disabled *
5	by CANopen

* digital keypad is optional

NOTE

Value 0, 1 and 2 needs the digital input PULSE ENABLE (input MI6).

Value 3, 4 and 5 needs the digital input PULSE ENABLE (input MI6) and QUICKSTOP (default multi function input MI5).



4.3 Parameter description

P0803	Stop Methode	0 to 3
EE	Stop method	1
STOP	BM_u_StopMethod	1:1 -

The parameter determines how the motor is stopped when the b maXX[®] 1000 receives a valid stop command or detects an external fault.

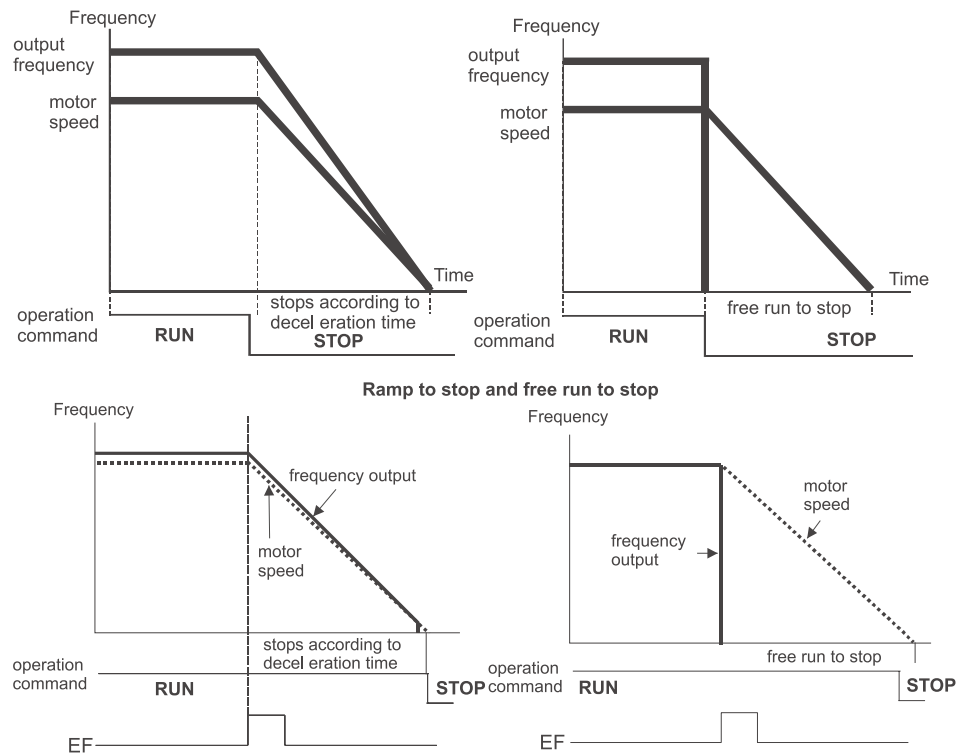
Ramp: the b maXX[®] 1000 decelerates to minimum output frequency ([▶P0038◀](#)) according to the deceleration time and then stops.

Coast: the b maXX[®] 1000 stops the output instantly upon command, and the motor free runs until it comes to a complete standstill.

The motor stop method is usually determined by the characteristics of the motor load and how frequently it is stopped.

- 1 It is recommended to use „ramp to stop“ for safety of personnel or to prevent material from being wasted in applications where the motor has to stop after the drive is stopped. The deceleration time has to be set accordingly.
- 2 If motor free running is allowed or the load inertia is large, it is recommended to select „coast to stop“. For example: blowers, punching machines, centrifuges and pumps.

Value	Meaning
0	STOP: ramp stop, external fault: coast stop
1	STOP: coast stop, external fault: coast stop
2	STOP: ramp stop, external fault: ramp stop
3	STOP: coast stop, external fault: ramp stop



When **P0803** is set to 2 or 3

When **P0803** is set to 0 or 1

Figure 11: Stop method

4.3 Parameter description

P0805	Anlaufsperr	0 to 3	
EE	Line start lockout	1	
STOP	BM_u_LineStartLockout	1:1	-

This parameter determines the response of the drive upon power on and operation command source is changed.

Value	Meaning
0	Disable. Operation status is not changed even if operation command source ▶P0802◀ is changed.
1	Enable. Operation status is not changed even if operation command source ▶P0802◀ is changed.
2	Disable. Operation status will change if operation command source ▶P0802◀ is changed.
3	Enable. Operation status will change if operation command source ▶P0802◀ is changed.

▶P0805◀	Start lockout (Run when power is ON)	Operation status when operation command source is changed
0	Disable (b maXX [®] 1000 will run)	Keep previous status
1	Enable (b maXX [®] 1000 doesn't run)	Keep previous status
2	Disable (b maXX [®] 1000 will run)	Change according to the new operation command source
3	Enable (b maXX [®] 1000 doesn't run)	Change according to the new operation command source

When the operation command source is from external terminal and operation command is ON (FWD/REV DCM=closed), the b maXX[®] 1000 will operate according to [▶P0805◀](#) after power is applied.

<For terminals FWD and REV only>

- 1 When **▷P0805◁** is set to 0 or 2, the b maXX[®] 1000 will run immediately.
- 2 When **▷P0805◁** is set to 1 or 3, the b maXX[®] 1000 will remain stopped until operation command is received after previous operation command is cancelled.

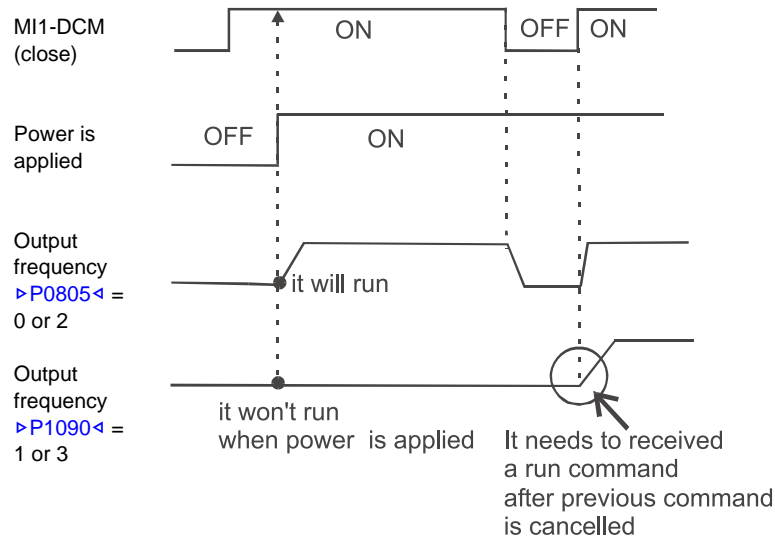


Figure 12: P0805 Line start lockout

When the operation command source isn't from the external terminals, independently from whether the b maXX[®] 1000 runs or stops, the b maXX[®] 1000 will operate according to **▷P0805◁** if the two conditions below are both met.

- 1 When operation command source is changed to external terminal (**▷P0802◁** = 1 or 2)
- 2 The status of terminal and b maXX[®] 1000 is different.

And the operation of the AC motor drive will be:

- 1 When setting 0 or 1, the status of the b maXX[®] 1000 is not changed by the terminal status.
- 2 When setting 2 or 3, the status of the b maXX[®] 1000 is changed by the terminal status.

4.3 Parameter description

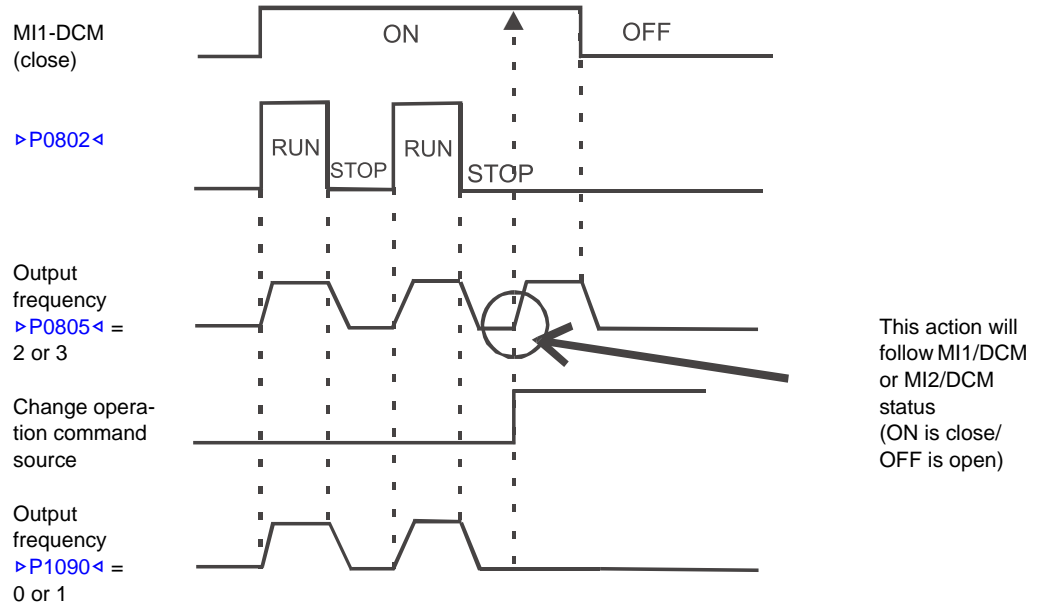


Figure 13: P0805 Line start lockout with external terminals



WARNING

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

- personal injury

The line start lockout feature does not guarantee that the motor will never start under this condition. It is possible the motor may be set in motion by a malfunctioning switch.

P0806

ACI Signal fehlt

0 to 2

EE

Loss of ACI Signal

1

STOP

BM_u_LossACISignal

1:1

-

This parameter determines the behavior when analog current input ACI is lost.

When set to 1, it will display warning message „AErr“ on the keypad in case of loss of ACI signal and execute the setting. When ACI signal is recovered, the warning message will stop blinking. Please press „RESET“ key to clear it.

Value	Meaning
0	Decelerate to 0 Hz
1	Coast to stop and display „AErr“
2	Continue operation by the last frequency command

P0807	Hochlauf/Rücklauf Mode	0 to 3	
EE	Up/Down Mode	0	
STOP	BM_u_UpDownMode	1:1	-

This parameter sets the up/down mode only for external terminals.

Value	Meaning
0	By digital keypad up/down keys mode
1	Based on acceleration/deceleration time according to ▶P1172◀ , ▶P1173◀ , ▶P1180◀ , ▶P1181◀
2	Constant speed (according to ▶P0908◀)
3	By pulse input unit (according to ▶P0908◀)

This parameter determines the increase/decrease of the motor frequency when operated via the multi function inputs ([▶P1091◀](#) to [▶P1094◀](#) are set to 10 (up command) or 11 (down command)).

P0809	Quelle der zweiten Hauptfrequenzvorgabe	1 to 255	
EE	Source of second master frequency command	0	
ON	BM_u_SourceSecondMasterFrequComm	1:1	-

This parameter set the master frequency command source of the b maXX[®] 1000.

The factory setting for master frequency command is 1 (digital keypad is optional).

Setting 2:

use the ACI/AVI switch on the b maXX[®] 1000 to select ACI or AVI2. When setting to AVI, AVI2 is indicated.

When the b maXX[®] 1000 is controlled by external terminal, please refer to [▶P0805◀](#) for details.

The first/second frequency/operation command is enabled/disabled by multi function input terminals. Please refer to [▶P1091◀](#) to [▶P1094◀](#).

Value	Meaning
255	Digital terminal 15 fixed set value
0	Digital keypad UP/DOWN keys or multi-function inputs UP/DOWN. Last used frequency saved (digital keypad is optional).
1	0 to +10V from AVI
2	4 to 20mA from ACI or 0 to +10V from AVI2
3	ProDrive communication interface
4	Digital keypad potentiometer
5	CANopen

4.3 Parameter description

P0810	Kombination von erster und zweiter Hauptfrequenz- vorgabe	0 to 2	
EE	Combination of first and second master fre- quency command	0	
ON	BM_u_CombFirstSecondMasterFrequComm	1:1	-

This parameter sets a combination of first and second master frequency command.

Value	Meaning
0	First master frequency command ▶P0801◀ only
1	First master frequency ▶P0801◀+ second master frequency ▶P0809◀
2	First master frequency ▶P0801◀- second master frequency ▶P0809◀

P0811	Keypad Frequenzvorgabe	0.00 to 600.00 Hz	
EE	Keypad frequency command	50.00 Hz (▶P0310◀ = 9) or 60.00 Hz (▶P0310◀ = 10)	
ON	BM_u_KeypadFrequComm	100:1 Hz	-

This parameter can be used to set frequency command by power on or read keypad frequency command.

P0812	Kommunikation Frequenzvorgabe	0.00 to 600.00 Hz	
EE	Communication frequency command	50.00 Hz (▶P0310◀ = 9) or 60.00 Hz (▶P0310◀ = 10)	
ON	BM_u_RS485FrequComm	100:1	-

This parameter can be used to set frequency command or read communication frequency command.

P0813	Auswahl zur Speicherung von Keypad- oder Kom- munikationsfrequenz	1 to 2	
EE	Selections for saving keypad or communication frequency	0	
STOP	BM_u_SelectSaveFrequency	1:1	-

This parameter is used to save keypad or RS485 frequency command.

Value	Meaning
0	Save keypad Up/Down and ProDrive communication initial frequency
1	Save keypad Up/Down frequency only
2	Save ProDrive communication frequency only

P0814	Auswahl der Frequenzvorgabe	0 to 2	
EE	Initial frequency selection	0	
STOP	BM_u_InitialFreqSelection	1:1	-

This parameter is used to select the frequency command at drive stop for keypad and RS485 communication.

Value	Meaning
0	By current frequency command
1	By zero frequency command
2	By frequency display at ▶P0815◀

P0815	Anfangsfrequenz Keypad und RS485 Sollwert	0.00 to 600.00 Hz	
EE	Keypad and RS485 initial frequency setpoint	60.00	
STOP	BM_u_KeypadRS485InitialFrequSet	100:1	-

This parameter sets the initial frequency setpoint for keypad and RS485 communication.

P0816	Anzeige der Quelle der Masterfrequenzvorgabe	0 to 7	
-	Display the master frequency command source	1	
A	BM_u_DisplayMasterFrequCommandSource	1:1	-

You can read the master frequency command source by this parameter.

Display value	Bit	Meaning
1	Bit 0	1: Master frequency command source by first frequency source (▶P0801◀)
2	Bit 1	1: Master frequency command source by second frequency source (▶P0809◀)
4	Bit 2	1: Master frequency command source by multi-input function

4.3 Parameter description

P0817	Anzeige der Sollwertquelle	0 to 63	
-	Display the operation command source	32	
A	BM_u_DisplayOpCommandSource	1:1	-

You can read the operation source by this parameter.

Display value	Bit	Meaning
1	Bit 0	1: Operation command source by digital keypad
2	Bit 1	1: Operation command source by ProDrive communication
4	Bit 2	1: Operation command source by external terminal 2/ 3 wire mode
8	Bit 3	1: Operation command source by multi-function input
16	Bit 4	Reserved
32	Bit 5	1: Operation command source by CANopen

P0818	Wiederanlauf bei Fehler	0 to 10	
EE	Auto restart after (OC or OV) fault numbers	0	
STOP	BM_u_AutoOCOVRestart	1:1	-

Only after an over-current OC or over-voltage OV fault occurs, the b maXX[®] 1000 can be reset/restarted automatically up to 10 times.

Setting this parameter to 0 will disable automatic reset/restart operation after any fault has occurred.

When enabled, the b maXX[®] 1000 will restart with speed search, which starts at the frequency before the fault. To set the waiting time before restart after a fault, please set base block time for speed search [▶P0897◀](#).

P0819	Zeit bis zum Zurücksetzen der Anzahl nach Wiederanlauf bei Fehler	0.1 to 6000.0 s	
EE	Auto reset time at restart after fault	60.0 s	
STOP	BM_u_AutoResetTime	10:1	-

This parameter should be used in conjunction with [▶P0818◀](#).

For example:

If [▶P0818◀](#) is set to 10 and [▶P0819◀](#) is set to 600 s (10 min), and if there is no fault for over 600 seconds from the restart for the previous fault, the auto reset times for restart after fault will be reset to 10.

P0820	Automatische Energieeinsparung	0 to 1	
EE	Auto energy saving	0	
STOP	BM_u_AutoEnergySaving	1:1	-

This parameter enabled/disables the energy-saving operation. The auto energy saving function is not adapted for full load and changing load operation.

Value	Meaning
0	Energy-saving operation disabled
1	Energy-saving operation enabled

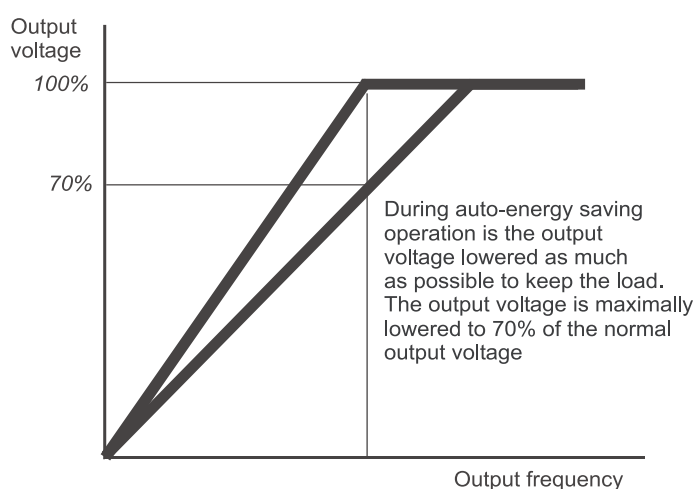


Figure 14: Auto energy saving

P0821	Automatische Spannungsregelung	0 to 3	
EE	Automatic voltage regulation function	0	
STOP	BM_u_AutoVoltReg	1:1	-

The rated voltage of the motor is usually 230V/200V_{AC} 50Hz/60Hz and the input voltage of the b maXX[®] 1000 may vary between 180V to 264 V_{AC} 50Hz/60Hz. Therefore, when the b maXX[®] 1000 is used without AVR (automatic voltage regulation) function, the output voltage will be the same as the input voltage. When the motor runs at voltages exceeding the rated voltage with 12 % to 20 %, its lifetime will be shorter and it can be damaged due to higher temperature, failing insulation and unstable torque output.

AVR function automatically regulates the b maXX[®] 1000 output voltage to the maximum output voltage [▶P0053◀](#). For instance, if [▶P0053◀](#) is set at 200 V_{AC} and the input voltage is at 200 V_{AC} to 264 V_{AC}, then the maximum output voltage will automatically be reduced to a maximum of 200 V_{AC}.

4.3 Parameter description

When the motor ramps to stop, the deceleration time is longer. When setting this parameter to 2 with auto acceleration/deceleration, the deceleration will be quicker.

Value	Meaning
0	AVR function enabled
1	AVR function disabled
2	AVR function disabled for deceleration
3	AVR function disabled for stop

P0822	Bremsschwelle Zwischenkreis	370.0 to 430.0 V _{DC} or 740.0 to 860.0 V _{DC}
EE	Software braking level	380.0 V _{DC} or 760.0 V _{DC}
STOP	BM_u_SoftBrakLevel	10:1 -

This parameter sets the DC link voltage at which the brake chopper is activated.

The maximum value depends on the b maXX[®] used, up to 430.0 V_{DC} for single-phase devices and up to 860.0 V_{DC} for three-phase devices.

This parameter is invalid for b maXX[®] BM1x1x models without brake chopper.

P0823	Kompensationsfaktor der Motorinstabilität	0.0 to 5.0
EE	Compensation coefficient for motor instability	0.0
ON	BM_u_CompCoeffMotorInstab	10:1 -

The drift current will occur in a specific zone of the motor and it will make motor instable. By using this parameter, it will improve this situation greatly.

The drift current zone of the high-power motors is usually in the low frequency area.

It is recommended to set to more than 2.0.

Value	Meaning
0.0	Disabled
0.1 to 5.0	Recommended 2.0

P0850	Selbstoptimierung Motorparameter	0 to 2	
EE	Motor auto parameters auto tuning	0	
STOP	BM_u_MotorAutoParaAutoTuning	1:1	-

The operation mode [▶P1000◀](#) must be set to 249 using auto tuning.

Start Auto Tuning by pressing RUN key after this parameter is set to 1 or 2.

Value	Meaning
0	Disable
1	Auto tuning R1 (motor doesn't run)
2	Auto tuning R1 and no load test (with running motor)

When set to 1, it will only auto detect R1 value and [▶P0110◀](#) must be input manually. When set to 2, the b maXX[®] 1000 should be unloaded and the values of [▶P0110◀](#) and [▶P0077◀](#) will be set automatically.

The steps for AUTO-Tuning are:

- 1 Make sure that all the parameters are set to factory settings and the motor wiring is correct.
- 2 Make sure the motor has no-load before executing auto-tuning and the shaft is not connected to any belt or gear motor.
- 3 Fill in [▶P0061◀](#), [▶P0053◀](#), [▶P0054◀](#), [▶P0850◀](#), [▶P0111◀](#) and [▶P1000◀](#) with correct values.
- 4 After [▶P1000◀](#) is set to 249 and [▶P0850◀](#) is set to 2, the b maXX[®] 1000 will execute auto-tuning immediately after receiving a „RUN“ command. (Note: The motor will run!). The total auto tune time will be 15 seconds + [▶P1172◀](#) + [▶P1173◀](#). Higher power drives need longer accel/decel time (factory setting is recommended). After executing Auto-tune, [▶P0850◀](#) is set to 0.
- 5 After executing, please check if there are values filled in [▶P0110◀](#) and [▶P0077◀](#). If not, please press RUN key after setting [▶P0850◀](#) again.
- 6 Then you can set [▶P0800◀](#) to 1 (vector control) and set other parameters according to your application requirement.

NOTE

- 1 In vector control mode it is not recommended to have motors run in parallel.
- 2 It is not recommended to use vector control mode if motor rated power exceeds the rated power of the b maXX[®] 1000.



4.3 Parameter description

P0860	Kommunikationsadresse RS485	1 to 254	
EE	Communication address RS485	1	
STOP	BM_u_CommRS485Address	1:1	-

If the b maXX[®] 1000 is controlled by RS-485 serial communication, the communication address for this drive must be set via this parameter. The communication address for each b maXX[®] 1000 must be different and unique.

P0861	Übertragungsgeschwindigkeit RS485	0 to 3	
EE	Transmission speed RS485	3	
STOP	BM_u_TransmissionRS485Speed	1:1	-

This parameter is used to set the transmission speed between the RS485 master (PLC, PC, etc.) and b maXX[®] 1000.

Value	Meaning
0	Baud rate 4800 bps
1	Baud rate 9600 bps
2	Baud rate 19200 bps
3	Baud rate 38400 bps

bps = bits per second

P0862	RS485 Übertragungsfehler	0 to 3	
EE	RS485 Transmission fault treatment	3	
ON	BM_u_RS485TransFaultTreat	1:1	-

This parameter is set to how to react if transmission errors occur.

Value	Meaning
0	Warn and keep operating
1	Warn and RAMP to stop
2	Warn and COAST to stop
3	No warning and keep operating

P0863	RS485Time-out Erkennung	0.0 to 120.0 s
EE	RS485Time-out detection	0.0 s
ON	BM_u_RS485TimeOutDetect	10:1 -

If **P0863** is not equal to 0.0, **P0862** = 0 to 2, and there is no communication on the bus during the time out detection period, „cE10“ will be shown on the keypad.

Value	Meaning
0.0	Disable
0.1 to 120.0 s	Time-out detection enabled

P0864	RS485Kommunikationsprotokoll	0 to 5
EE	RS485 Communication protocol	3
STOP	BM_u_RS485CommProtocol	1:1 -

Value	Meaning
0	7, N, 2 (Modbus, ASCII)
1	7, E, 1 (Modbus, ASCII)
2	7, O, 1 (Modbus, ASCII)
3	8, N, 2 (Modbus, RTU)
4	8, E, 1 (Modbus, RTU)
5	8, O, 1 (Modbus, RTU)

P0865	RS485 Antwortverzögerungszeit	0 to 200
EE	RS485 Response delay time	1 [2 ms]
ON	BM_u_RS485ResponseDelayTime	1:1 -

This parameter is the response delay time after b maXX[®] 1000 receives communication command as shown in the following. 1 unit = 2 ms.

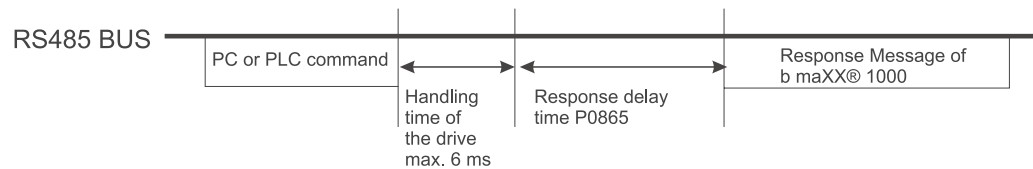


Figure 15: Response delay time

4.3 Parameter description

P0866	USB Kommunikationskarte Übertragungsgeschwindigkeit	0 to 4
EE	USB Communication card transmission speed	3
STOP	BM_u_USBCommCardTransSpeed	1:1 -

This parameter is used to set the transmission speed between the communication card and b maXX[®] 1000.

Value	Meaning
0	Baud rate 4800 bps (bits / second)
1	Baud rate 9600 bps
2	Baud rate 19200 bps
3	Baud rate 38400 bps
4	Baud rate 57600 bps

P0867	USB Kommunikationskarte Protokoll	0 to 5
EE	USB Communication card protocol	3
STOP	BM_u_USBCommCardProtocol	1:1 -

This parameter defines the communication card protocol.

Value	Meaning
0	7, N, 2 (Modbus, ASCII)
1	7, E, 1 (Modbus, ASCII)
2	7, O, 1 (Modbus, ASCII)
3	8, N, 2 (Modbus, RTU)
4	8, E, 1 (Modbus, RTU)
5	8, O, 1 (Modbus, RTU)

P0868	USB Kommunikationskarte Übertragungsfehler	0 to 3
EE	USB Communication card transmission fault treatment	0
ON	BM_u_USBCommCardTransFaultTreat	1:1 -

This parameter is set to how to react if transmission errors occur.

Value	Meaning
0	Warn and keep operating
1	Warn and RAMP to stop
2	Warn and COAST to stop
3	No warning and keep operating

P0869	USB Kommunikationskarte Zeitfehler	0.0 to 120.0 s	
EE	USB Communication card over time detection	0.0 s	
ON	BM_u_USBCommCardOverTimeDetect	10:1	-

This parameter sets the over time detection of the communication card.

Value	Meaning
0.0	Disable
0.1 to 120.0 s	Over time detection enabled

P0870	CANopen Adresse	1 to 127	
EE	CANopen address	1	
STOP	BM_u_CANopenAddress	1:1	-

If the b maXX[®] 1000 is controlled by CANopen communication, the communication address for this drive must be set via this parameter. The communication address for each b maXX[®] 1000 must be different and unique.

Value	Meaning
0	Disable CANopen
1 to 127	CANopen communication address

b maXX[®] 1000 CANopen address is set by parameter [P0870](#) only if CANopen hardware address is set to 0 (switch 1 = off, switch 2 = off, switch 3 = off). Otherwise the hardware setting is valid.

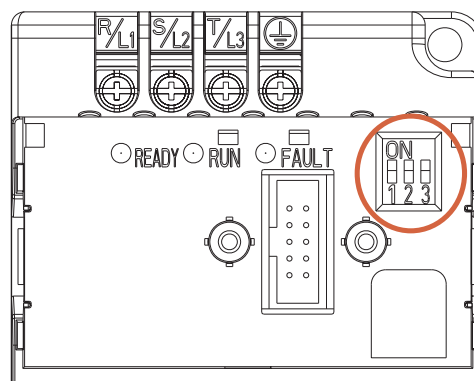


Figure 16: DIP switch CANopen address

4.3 Parameter description

P0871	CANopen rate	0 to 5	
EE	CAN rate	0	
STOP	BM_u_CANRate	1:1	-

This parameter sets the CANopen transmission rate of the b maXX[®] 1000.

Value	Meaning
00	1 Mbaud
01	500 kbaud
02	250 kbaud
03	125 kbaud
04	100 kbaud
05	50 kbaud

b maXX[®] 1000 CANopen baudrate is set by parameter [▶P0870◀](#) only if CANopen hardware address is set to 0 (switch 1 = off, switch 2 = off, switch 3 = off). Otherwise the hardware setting is valid.

P0890	DC Bremsstromhöhe	0 to 100 %	
EE	DC braking current level	0 %	
STOP	BM_u_DCBrakingCurrentLevel	1:1	-

This parameter sets the level of DC braking current output to the motor during start-up and stopping. When setting DC braking current, the rated current [▶P0010◀](#) is regarded as 100 %. It is recommended to start with a low DC braking current level and then increase until proper holding torque has been achieved. See also [▶Figure 17◀](#) on page 63.

P0891	DC Bremszeit während der Startphase	0.0 to 60.0 s	
EE	DC braking time during start-up	0.0 s	
STOP	BM_u_DCBrakingDuringStart	10:1	-

This parameter determines the duration of the DC braking current after a RUN command. When the time has elapsed, the b maXX[®] 1000 will start accelerating from the minimum Frequency [▶P0038◀](#). See also [▶Figure 17◀](#) on page 63.

P0892	DC Bremszeit während der Stopphase	0.0 to 60.0 s	
EE	DC braking time during stopping	0.0 s	
STOP	BM_u_DCBrakingDuringStop	10:1	-

This parameter determines the duration of the DC braking current during stopping. If stopping with DC braking is desired, [▶P0803◀](#) stop method must be set to 0 or 2 for ramp to stop. See also [▶Figure 17◀](#) on page 63.

P0893	DC Bremsen Startfrequenz	0.00 to 600.00 Hz
EE	Start point for DC braking	0.00 Hz
STOP	BM_u_StartPointDCBraking	100:1 -

This parameter determines the frequency when DC braking will begin during deceleration.

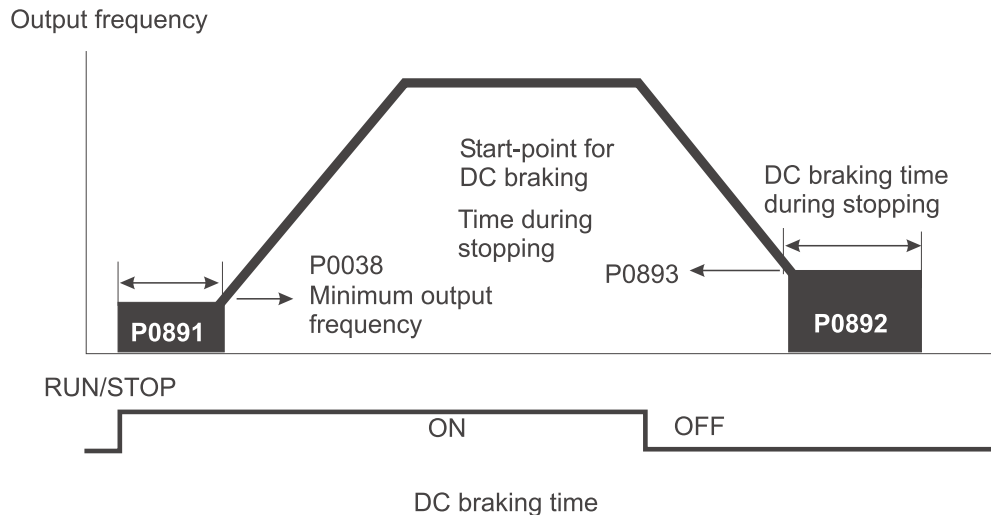


Figure 17: DC braking

DC Braking during start-up is used for loads that may move before the b maXX[®] 1000 starts, such as fans and pumps. Under such circumstances, DC braking can be used to hold the load in position before setting it in motion.

DC Braking during stopping is used to shorten the stopping time and also to hold a stopped load in position. For high inertia loads, a brake resistor for dynamic braking may also be needed for fast decelerations.

P0894	Antriebsreaktion bei kurzzeitigem Spannungsabfall	0 to 2
EE	Momentary power loss operation selection	0
STOP	BM_u_PowerLossOpSelect	1:1 -

This parameter determines the operation mode when the b maXX[®] 1000 restarts from a momentary power loss.

Value	Meaning
0	Operation stops (coast to stop) after momentary power loss.
1	Operation continues after momentary power loss, speed search starts with the master frequency reference value.
2	Operation continues after momentary power loss, speed search starts with the minimum frequency.

4.3 Parameter description

P0895	Maximal erlaubte Spannungsausfallzeit	0.1 to 5.0 s
EE	Maximum allowable power loss time	2.0 s
STOP	BM_u_DCBrakingDuringStop	10:1 -

If the duration of a power loss is less than this parameter setting, the b maXX[®] 1000 will resume operation. If it exceeds the maximum allowable power loss time, the b maXX[®] 1000 output is then turned off (coast stop).

The selected operation after power loss in [▶P0894◀](#) is only executed when the maximum allowable power loss time is 5 seconds and the b maXX[®] 1000 displays „Lu“.

But if the b maXX[®] 1000 is powered off due to overload, even if the maximum allowable power loss time is 5 seconds, the operation mode as set in [▶P0894◀](#) is not executed. In that case it starts up normally.

P0896	Basis Drehzahlsuche	0 to 2
EE	Base-block speed search	1
STOP	BM_u_BaseBlockSpeedSearch	1:1 -

This parameter determines the b maXX[®] 1000 restart method after external base block is enabled.

Value	Meaning
0	Disable speed search
1	Speed search starts with last frequency command
2	Speed search starts with minimum output frequency ▶P0038◀

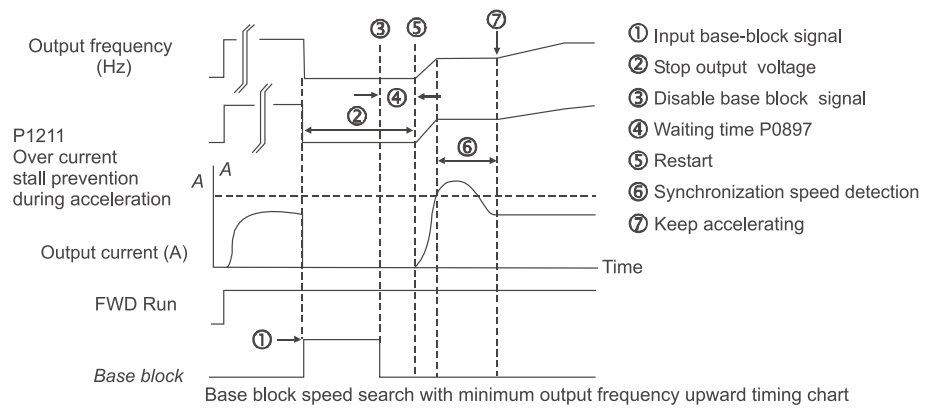
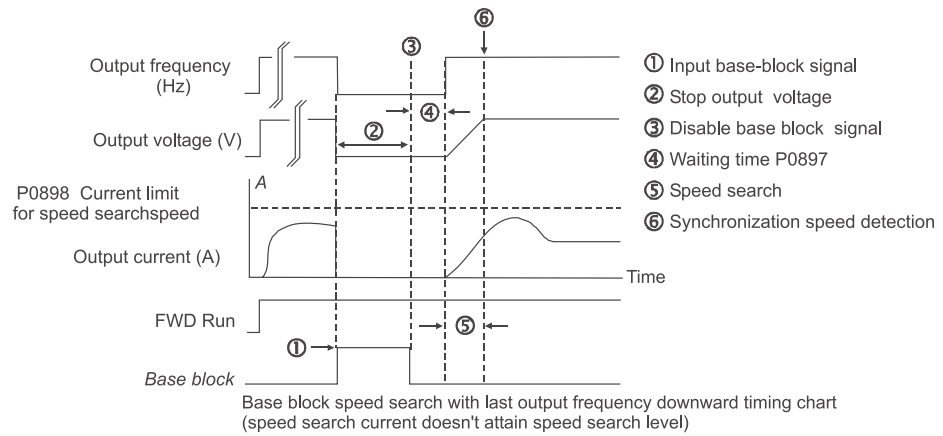
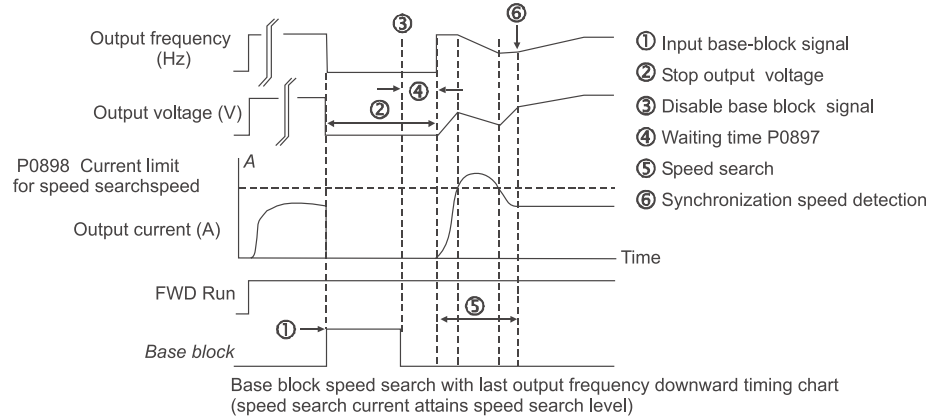


Figure 18: Base block speed search

4.3 Parameter description

P0897	Basiszeit für Geschwindigkeitssuche (BB)	0.1 to 5.0 s	
EE	Baseblock time for speed search (BB)	0.5 s	
STOP	BM_u_BaseBlockTimeSpeedSearch	10:1	-

When momentary power loss is detected, the b maXX[®] 1000 will block its output and then wait for a specified period of time (determined by [P0897](#), called base-block time) before resuming operation. This parameter should be set at a value to ensure that any residual regeneration voltage from the motor on the output has disappeared before the drive is activated again.

This parameter also determines the waiting time before resuming operation after external baseblock and auto restart after fault [P0818](#).

When using a PG card with PG (encoder), speed search will begin at the actual PG (encoder) feedback speed.

P0898	Stromgrenze für Geschwindigkeitssuche	30 to 200 %	
EE	Current limit for speed search	150 %	
STOP	BM_u_CurrentLimitForSpeedSearch	1:1	-

Following a momentary power loss, the b maXX[®] 1000 will start its speed search operation only if the output current is greater than the value set by [P0898](#). When the output current is less than the value of [P0898](#), the b maXX[®] 1000 output frequency is at „speed synchronization point“. The drive will start to accelerate or decelerate back to the operating frequency at which it was running prior to the power loss.

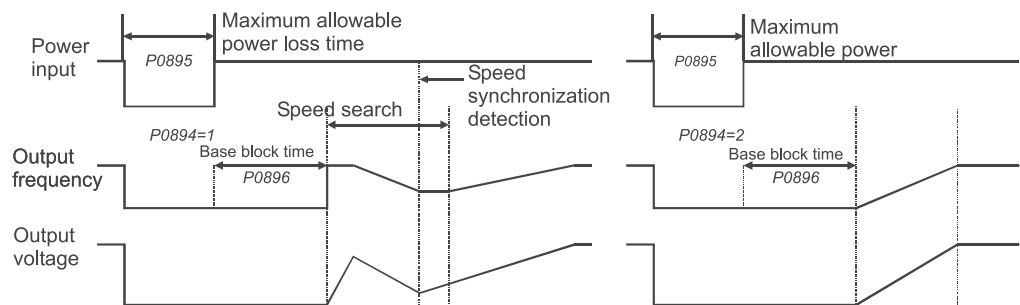


Figure 19: Momentary power loss operation

P0908 Beschleunigung-/Verzögerungsfaktor für Up/Down Betrieb mit konst. Geschwindigkeit 0.01 to 10.00 Hz/2 ms

EE **Accel/decel rate of change of UP/DOWN operation with constant speed** 0.01 Hz / 2 ms

STOP BM_u_AccelDecelRateUpDown 100:1 -

This parameters determine the increase/decrease of the master frequency when operated via the multi-function inputs when [▶P1091◀](#) to [▶P1093◀](#) are set to 10 (up command) or 11 (down command).

Value	Meaning
▶P0807◀ = 0	Increase/decrease the frequency by using UP/DOWN key. Only enabled, if the b maXX [®] 1000 is in state operation.
▶P0807◀ = 1	Increase/decrease the frequency by acceleration/deceleration setting. Only enabled, if the b maXX [®] 1000 is in state operation.
▶P0807◀ = 2	Increase/decrease the frequency by ▶P0908◀ (constant speed).
▶P0807◀ = 3	Increase/decrease the frequency by ▶P0908◀ (pulse input).

P0909 Quellfrequenz der RS485 (Modbus) Kommunikationsschnittstelle (U/min) -32768 to 32767 rpm

- **Source frequency for RS485 (Modbus) communication interface (rpm)** 0 rpm

ON BM_u_SourceFrequencyRS485 1:1 -

The following parameter sets the source frequency for RS485 communication (first or second frequency).

P0910 Quellfrequenz der CANopen Kommunikationschnittstelle (U/min) 0 to 36000 rpm

- **Source frequency for CANopen communication interface (rpm)** 0 rpm

A BM_u_SourceFrequencyCANopen 1:1 -

The following parameter sets the source frequency for CANopen communication (first or second frequency).

4.3 Parameter description

P0911	Geschwindigkeit Multiplikator CANopen/Modbus	0 to
EE	Speed multiplier CANopen/Modbus	1.00
ON	BM_u_Speed MultiplierCANModbus	100:1

Speed can be scaled by the user with this parameter.

Example:

Speed set value = 18000 rpm

▶P0911◀ = 2.00

⇒ Speed set value = 36000 rpm

P1000	Soll-Betriebsart	1 to 249
EE	Operation mode set value	6
STOP	BM_u_OperationModeSetValue	1:1

With this parameter you determine the operation mode of the drive.

Value	Meaning
249	Motor parameter auto tuning
2	Speed setting for ramp function generator
5	Jog operation
6	Operation mode only for motion control

Switching between operation modes is possible with drive inhibited (offline mode) and also drive enabled (online mode).

P1004	Schnellhalt Reaktion (Hardware)	0 to 7	
EE	QUICKSTOP reaction code (Hardware)	0	
STOP	BM_u_QuickstopCodeHardware	1:1	-

Also see [▶Device management◀](#) from page 70.

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. Default digital input is multi function input MI5.

For the command 'Quickstop' a separate reaction can be set via parameter [▶P1009◀](#) or the setting „Same reaction for command and digital input“ can be selected. If another reaction as that for the digital input is selected for the command Quickstop, then the digital input has higher priority. The value = 0 (inhibit pulses) has a higher priority to other values.

The speed controller must be sufficiently parameterized for a correct functioning of the braking operations at the quickstop- or deceleration ramp.

Value	Meaning
0	Inhibit pulse
1	Braking operation at the deceleration time
2	Braking operation at the quickstop time
3	Braking operation at the deceleration automatic time
4	Inhibit pulses and remaining in status QUICKSTOP ACTIVE
5	Braking operation at the deceleration ramp and remaining in status QUICKSTOP ACTIVE
6	Braking operation at the quickstop time and remaining in status QUICKSTOP ACTIVE
7	Braking operation at the voltage limit and remaining in status QUICKSTOP ACTIVE

At the settings 5 to 7 after the braking operation the drive remains in the status QUICKSTOP ACTIVE and again can be enabled.

P1005	STILLSETZEN-Reaktion	0 to 3	
EE	SHUTDOWN reaction code	0	
STOP	BM_u_ShutdownCode	1:1	-

Also see [▶Device management◀](#) from page 70.

This parameter determines the drive reaction at transition of status OPERATION ENABLED towards READY FOR SWITCH ON (in the status machine of unit control).

The speed controller must be sufficiently parameterized for a correct functioning of the brake operations at the quickstop- or deceleration ramp.

Reaction code	Meaning
0	Inhibit drive function
1	Braking operation at the deceleration time by ramp function generator
2	Braking operation at the quickstop time by ▶P1174◀
3	Braking operation at the deceleration automatic time

P1007	Antrieb Fehler-Reaktion	0 to 3	
EE	Drive error reaction code	0	
STOP	BM_u_DriveErrorReactionCode	1:1	-

With this parameter the general error reaction is set. It is valid for errors, which do not require a pulse inhibit (e. g. position deviation) and which also is not set to "No reaction". At errors with separately settable error reaction the reaction, which was set there is valid.

Reaction code	Meaning
0	Pulse inhibit
1	Braking operation at the deceleration time
2	Braking operation at the quickstop time
3	Braking operation at the deceleration automatic time

With this parameter the general error reaction is set.

The following is valid for errors, whose error reaction is settable: Either you permanently define the error reaction or you reference it indirectly to this parameter.

P1009	Schnellhalt-Kommando Reaktion (Software)	0 to 255	
EE	Reaction quickstop command (software)	0	
STOP	BM_u_QuickstopCmdCode	1:1	-

Also see [►Device management◄](#) from page 70.

This parameter determines the drive reaction to the command 'QUICKSTOP'. At setting 'Same reaction as hardware input' the setting according to parameter '[►P1004◄ QUICKSTOP REACTION](#)' takes effect.

If here a separated reaction is set than for the digital input, then the digital input is of higher priority. That means, if during the reaction to the quickstop command the hardware quickstop is enabled, that the drive changes to the reaction, which was set in „[►P1004◄ QUICKSTOP REACTION](#)“. The value = 0 (pulse inhibit) has higher priority.

The speed controller must be sufficiently parameterized for a correct functioning of the braking operations at the quickstop- or deceleration ramp.

Value	Meaning
255	same reaction as at hardware quickstop, setting operates via ►P1004◄
0	Pulse inhibit
1	Braking operation at the deceleration time by ramp function generator
2	Braking operation at the quickstop time (►P1174◄)
3	Braking operation at the deceleration automatic time
4	Reserved
5	Braking operation at the deceleration ramp and remaining in status QUICKSTOP ACTIVE
6	Braking operation at the current limit and remaining in status QUICKSTOP ACTIVE
7	Braking operation at the current limit and remaining in status QUICKSTOP ACTIVE
8	Reserved

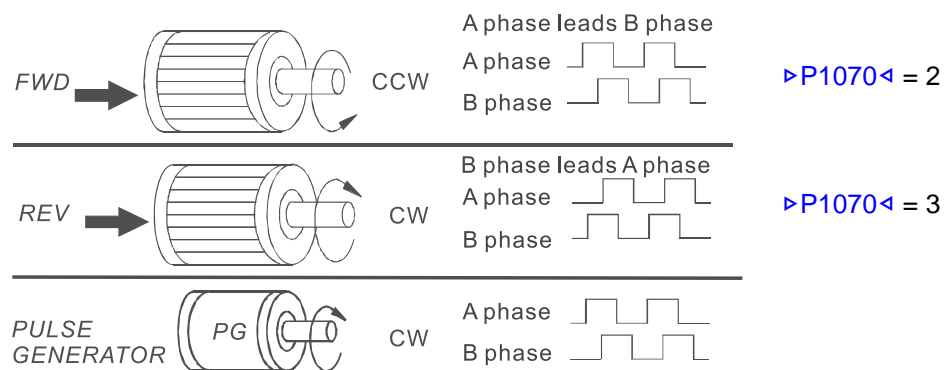
P1010	Datensatz Identifikations-Nummer	0 to 65535
EE	Data set ID	0
STOP	BM_u_RecordId	1:1

Free selectable identification number of saved parameter set. For customer to identify the version of the parameter setting for different data sets.

P1070	PG Funktionsauswahl	0 to 3
EE	PG function selection (enable card)	0
STOP	BM_PGFunctionSelection	1:1 -

Value	Meaning
0	Disable Pulse generator PG
1	Single phase
2	Forward/counter clockwise rotation
3	Reverse/clockwise rotation

The relationship between the motor rotation and PG input is illustrated below:



P1071	PG Strichzahl Bereich	0 to 20000 Inc
EE	PG pulse range	600 Inc
STOP	BM_u_PGPulseRange	1:1 -

A pulse generator PG is used as a sensor that provides a feedback signal of the motor speed. This parameter defines the number of pulses for each cycle of the PG control (1 pole pair max. 20000 Inc.)

4.3 Parameter description

P1072	PG Verstärkung P	0.0 to 10.0
EE	PG proportional gain (P)	1.0
ON	BM_u_PGProportionalGainP	1:1

This parameter specifies proportional control and associated gain (P), and is used for speed control with PG feedback.

P1073	PG Integrierzeit I	0.00 to 100.00 s
EE	PG integral time	1.00 s
ON	BM_u_PGIntegralTime	100:1

This parameter specifies integral control and associated gain (I), and is used for speed control with PG feedback.

P1074	PG Grenzfrequenz der Geschwindigkeitsregelung	0.00 to 100.00 Hz
EE	PG speed control output frequency limit	10.00 Hz
ON	BM_u_PGSpeedControlOutputFrequLimit	100:1

This parameter limits the amount of correction by the PI control on the output frequency when controlling speed via PG feedback. It can limit the maximum output frequency.

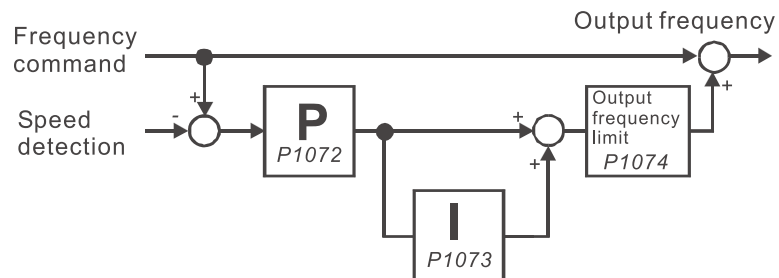


Figure 20: Speed control output frequency limit

P1075	PG Anzeigefilter Geschwindigkeitsrückführung	0 to 9999
EE	PG speed feedback signal display filter	500
ON	BM_u_SpeedFeedbackSignal	1:1

When [▶P2061◀](#) is set to 14, its display will be updated regularly. This update time is set by [▶P1075◀](#). The set value is multiplied by 2 ms.

P1076	Ansprechzeit PG Geschwindigkeitsrückführung Signalfehler	0.0 to 10.0 s
EE	Detection time PG speed feedback signal fault	1.0 s
STOP	BM_u_DetectTimePGFault	10:1 s

This parameter defines the time during which the PID feedback must be abnormal before a warning (see [▶P1077◀](#)) is given. It also can be modified according to the system feedback signal time.

If this parameter is set to 0.0, the system would not detect any abnormality signal.

Value	Meaning
0.0	Disable pulse generator (encoder card) PG
0.1 to 10.0 s	Detection time enabled

P1077	Fehlerbehandlung Geschwindigkeitsrückführung Signalfehler	0 to 2
EE	Feedback speed signal fault treatment	1
ON	BM_u_FeedbackSignalFaultTreatment	1:1

Reaction when the feedback signals (analog PID feedback or PG (encoder) feedback) are faulty.

Value	Meaning
0	Fault and RAMP stop
1	Fault and COAST stop
2	Warn and continue operation

P1078	PG Geschwindigkeitsbewertung Filter	0 to 9999
EE	PG speed estimate filter	1
ON	BM_u_SpeedEstimateFilter	1:2

This parameter sets the filter time from the speed feedback to the PG card (pulse generator, incremental encoder).

4.3 Parameter description

P1079	Warnung Code	0 to 65535
-	Warning code	0
A	BM_u_WarningCode	1:1

This parameter displays the warning code.

Value	Meaning
7	Communication error Modbus (cE10)
8	Motor loading exceed (oL2)
9	Warning, waveform by H2100hi byte (AUE)
10	Under current (Uc)
11	Warning, PU Keypad Copy parameter operation error (SE1)
12	Warning, PU Keypad Copy parameter save error (SE2)
13	Warning, Motor PTC temperature warning (PtC2)
14	PG loss warn (PG_WARN)
15	Warning, IO PID feedback error (FbE)
16	Warning, IO PU keypad copying (SAvE)
23	IO COM1 comm time out (PE10)
24	ADDA card break off (AoFF)
25	Lower than standard voltage (Lv)
26	Control board ACI (current) loss (Aerr)
27	Base-block (bb)
33	CANopen SDO Time out (CSdo)
34	CANopen SDO buffer overflow (CSbF)
36	Can Boot up fault (CbtU)
50	Error count for CAN detect (cc01)
51	SYNC fault(cc03)
52	Communication error USB card (UbCd)
53	Error protocol of CANOPEN (cPt2)

P1090	Multi-Funktions-Eingang (MI1, MI2)	0 to 2	
EE	Multi function input terminal (MI1, MI2)	0	
STOP	BM_u_MultiFunktioInputMI1MI2	1:1	-

There are three different types of control modes:

Value	Meaning
0	2-wire: FWD/STOP, REV/STOP
1	2-wire: FWD/REV, RUN/STOP
2	3-wire operation

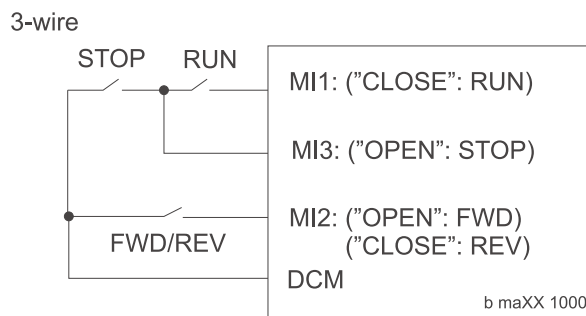
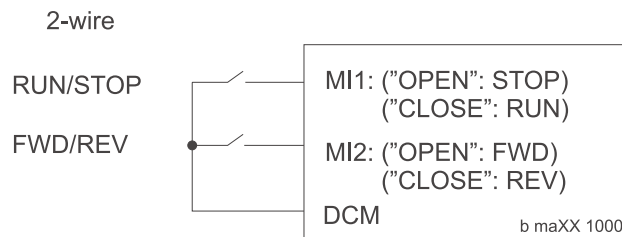
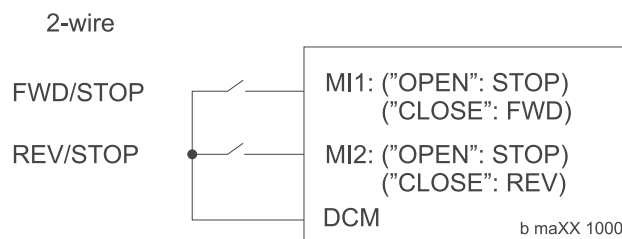


Figure 21: Multi function input 2/3-wire

4.3 Parameter description

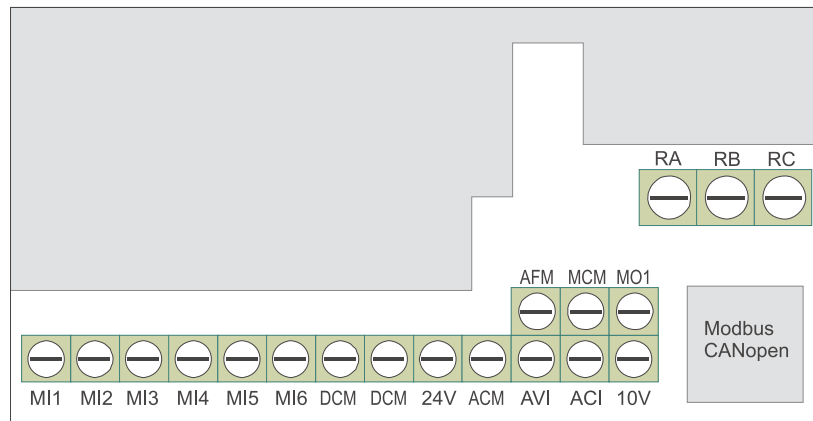


Figure 22: Position of the control terminals

P1091	Multi-Funktions-Eingang (MI3)	0 to 24
EE	Multi function input terminal (MI3)	1
STOP	BM_u_MultiFunctionInputTerminalMI3	1:1 -

Settings for the multi function input terminals.

Value	Function	Description
0	No function	Any unused terminals should be programmed to 0 to insure they have no effect on operation.
1	Multi step speed command 1	These four inputs select the multi speed defined via ▶P1189◀ to ▶P1203◀ as shown in ▶Figure 23◀ on page 78. NOTE: There are 17 step speed frequencies (including master frequency and jog frequency) to select for application.
2	Multi step speed command 2	
3	Multi step speed command 3	
4	Multi step speed command 4	
5	External reset	The external reset has the same function as the reset key on the digital keypad. After faults such as 0003 _{hex} , 0500 _{hex} and 051B _{hex} are cleared this input can be used to reset the drive.
6	Accel/decel inhibit	When the command is active, acceleration and deceleration is stopped and the b maXX @ 1000 maintains a constant speed.
7	Accel/decel time selection command	Used to select the one of 2 Accel/Decel times (▶P1172◀ , ▶P1173◀ and ▶P1180◀ , ▶P1181◀). See explanation at the end of this table.
8	Jog operation control	Parameter value 8 programs one of the multi function input terminals MI3 to MI5 (▶P1091◀ to ▶P1093◀) for jog control. NOTE: Programming for jog operation by 8 can only be done while the motor is stopped. (Refer to parameter ▶P1182◀ to ▶P1184◀)
9	External base block (▶P0896◀)	Parameter value 9 programs a multi function input terminals for external base block control. NOTE: When a base-block signal is received, the b maXX @ 1000 will block all output and the motor will free run. When base block control is deactivated, the b maXX @ 1000 will start its speed search function and synchronize with the motor speed, and then accelerate to master frequency.

Value	Function	Description
10	UP: Increase master frequency	Increase/decrease the master frequency each time an input is received or continuously when the input stays active. When both inputs are active at the same time, the master frequency increase/decrease is halted. Please refer to ▶P0807◀ . This function is also called „motor potentiometer“.
11	DOWN: Decrease master frequency	
12	Counter trigger	Parameter value 12 programs one of the multi function input terminals MI3 to MI5 (▶P1091◀ to ▶P1093◀) to increment the b maXX ® 1000 internal counter. When an input is received, the counter is incremented by 1.
13	Counter reset	When active, the counter is reset and inhibited. To enable counting the input should be OFF. Refer to ▶P1118◀ and ▶P1119◀ .
14	External fault	Parameter value 14 programs one of the multi function input terminals MI3 to MI5 (▶P1091◀ to ▶P1093◀) or MI7 to MI11 (▶P1095◀ to ▶P1100◀) to be external fault (E.F.) inputs.
15	PID function disabled	When an input ON with this setting is ON, the PID function will be disabled.
16	Output shutoff stop	b maXX ® 1000 will stop output and the motor free run if one of these settings is enabled. If the status of terminal is changed, b maXX ® 1000 will restart from 0 Hz.
17	Parameter lock enable	When this setting is enabled, all parameters will be locked and write parameters is disabled.
18	Operation command selection (▶P0802◀ setting/external terminals)	ON: Operation command via ext. terminals OFF: Operation command via ▶P0802◀ setting ▶P0802◀ is disabled if this parameter value 18 is set. See the explanation below this table.
19	Operation command selection (▶P0802◀ setting/digital keypad)	ON: Operation command via digital keypad OFF: Operation command via ▶P0802◀ setting ▶P0802◀ is disabled if this parameter value 19 is set. See the explanation below this table.
20	Operation command selection (▶P0802◀ setting/communication)	ON: Operation command via communication OFF: Operation command via ▶P0802◀ setting ▶P0802◀ is disabled if this parameter value 20 is set. See the explanation below this table.
21	Forward/reverse	This function has top priority to set the direction for running (if ▶P0805◀ = 0).
22	Source of second frequency command enabled	Used to select the first/second frequency command source. Refer to ▶P0801◀ and ▶P0809◀ . ON: 2nd Frequency command source OFF: 1st Frequency command source
23	Quickstop motor control (SH)	CAN open motor control (SH)
24	Pulse inhibit (disable) (RF)	Pulse inhibit (RF)

4.3 Parameter description

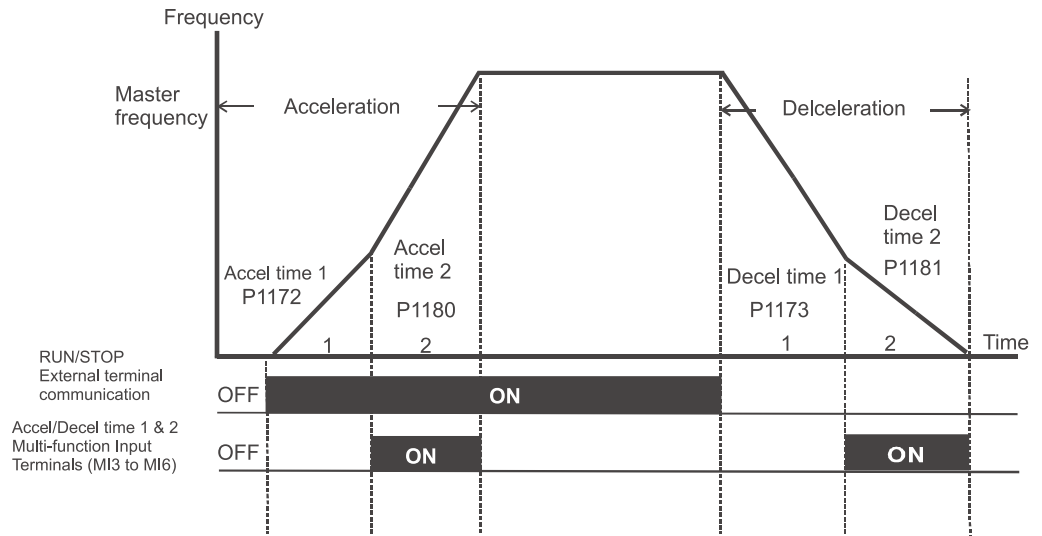


Figure 23: Acceleration/deceleration time selection

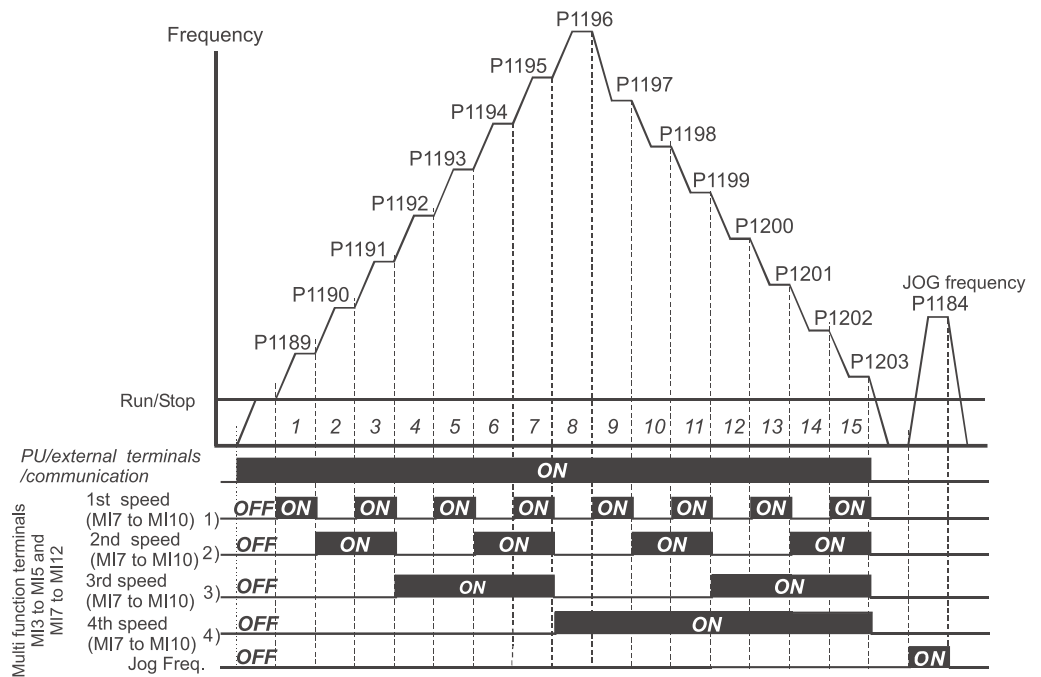


Figure 24: Multi step speed

	MI6=4	MI5=3	MI4=2	MI3=1
Master frequency	OFF	OFF	OFF	OFF
1 st speed	OFF	OFF	OFF	ON
2 nd speed	OFF	OFF	ON	OFF
3 rd speed	OFF	OFF	ON	ON
4 th speed	OFF	ON	OFF	OFF
5 th speed	OFF	ON	OFF	ON
6 th speed	OFF	ON	ON	OFF
7 th speed	OFF	ON	ON	ON
8 th speed	ON	OFF	OFF	OFF
9 th speed	ON	OFF	OFF	ON
10 th speed	ON	OFF	ON	OFF
11 th speed	ON	OFF	ON	ON
12 th speed	ON	ON	OFF	OFF
13 th speed	ON	ON	OFF	ON
14 th speed	ON	ON	ON	OFF
15 th speed	ON	ON	ON	ON

- P1092** Multi-Funktions-Eingang (MI4) 0 to 24
 EE **Multi function input terminal (MI4)** 2
 STOP BM_u_MultiFunctionInputTerminalMI4 1:1 -
 Description see [▶P1091◀](#) from page 76.
- P1093** Multi-Funktions-Eingang (MI5) 0 to 24
 EE **Multi function input terminal (MI5)** 23
 STOP BM_u_MultiFunctionInputTerminalMI5 1:1 -
 Description see [▶P1091◀](#) from page 76. Default value is Quickstop function.
- P1094** Multi-Funktions-Eingang (MI6) 0 to 24
 - **Multi function input terminal (MI6)** 24
 A BM_u_MultiFunctionInputTerminalMI6 1:1 -
 Description see [▶P1091◀](#) from page 76. Fixed input for pulse inhibit (disable).

4.3 Parameter description

P1095	Multi-Funktions-Eingang (MI7)	0 to 24	
EE	Multi function input terminal (MI7)	0	
STOP	BM_u_MultiFunctionInputTerminalMI7	1:1	-
	Description see ▶P1091◀ from page 76.		
P1096	Multi-Funktions-Eingang (MI8)	0 to 24	
EE	Multi function input terminal (MI8)	0	
STOP	BM_u_MultiFunctionInputTerminalMI8	1:1	-
	Description see ▶P1091◀ from page 76.		
P1097	Multi-Funktions-Eingang (MI9)	0 to 24	
EE	Multi function input terminal (MI9)	0	
STOP	BM_u_MultiFunctionInputTerminalMI9	1:1	-
	Description see ▶P1091◀ from page 76.		
P1098	Multi-Funktions-Eingang (MI10)	0 to 24	
EE	Multi function input terminal (MI10)	0	
STOP	BM_u_MultiFunctionInputTerminalMI10	1:1	-
	Description see ▶P1091◀ from page 76.		
P1099	Multi-Funktions-Eingang (MI11)	0 to 24	
EE	Multi function input terminal (MI11)	0	
STOP	BM_u_MultiFunctionInputTerminalMI10	1:1	-
	Description see ▶P1091◀ from page 76.		
P1100	Multi-Funktions-Eingang (MI12)	0 to 24	
EE	Multi function input terminal (MI12)	0	
STOP	BM_u_MultiFunctionInputTerminalMI11	1:1	-
	Description see ▶P1091◀ from page 76.		

P1101	Interner/externer Multi-Funktions-Eingang Auswahl	0 to 4095
EE	Internal/external multi function input terminals selection	0
STOP	BM_u_IntExtMultiFunctionInputTerminals	1:1 -

This parameter is used to select the terminals to be internal terminal or external terminal. You can activate internal terminals by [P1102](#). A terminal cannot be both internal terminal and external terminal at the same time.

For standard b maXX[®] 1000 (without extension card), the multi-function input terminals are MI1 to MI6 as shown in the following.

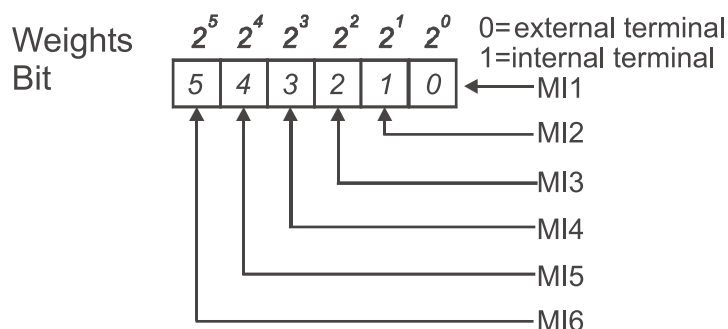


Figure 25: Multi function input terminals (internal/external)

The Setting method is convert binary number to decimal number for input.

For example:

If setting MI3, MI5, MI6 to be internal terminals and MI1, MI2, MI4 to be external terminals. The setting value should be

$\text{bit5} \times 2^5 + \text{bit4} \times 2^4 + \text{bit2} \times 2^2 = 1 \times 2^5 + 1 \times 2^4 + 1 \times 2^2 = 32 + 16 + 4 = 52$ as shown in the following.

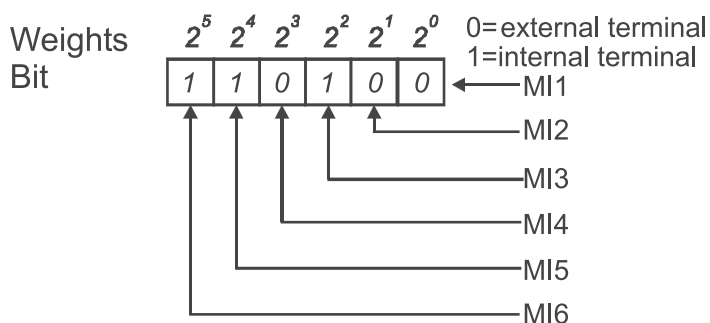


Figure 26: Multi function input terminals (internal/external)

4.3 Parameter description

When extension card is installed, the number of the multi-function input terminals will increase according to the extension card. The maximum number of the multi-function input terminals is 12.

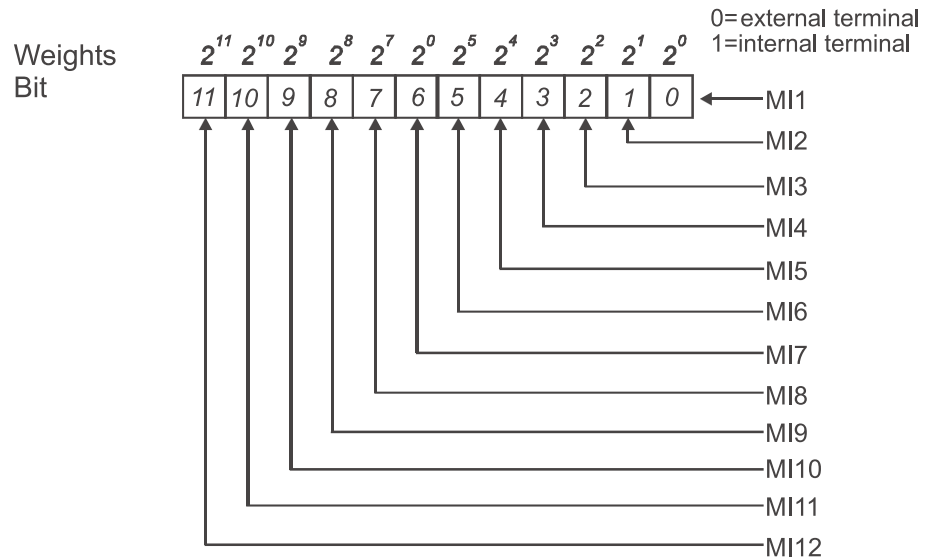


Figure 27: Extension card terminals

P1102

Interner Multi-Funktions-Eingang

0 to 4095

EE

Internal multi function terminal

0

ON

BM_u_InternalMultiFunctionTerminal

1:1

This parameter is used to set the internal terminal action via keypad or communication.

For standard b maXX[®] 1000 (without extension card), the multi function input terminals are MI1 to MI6 as shown in the following.

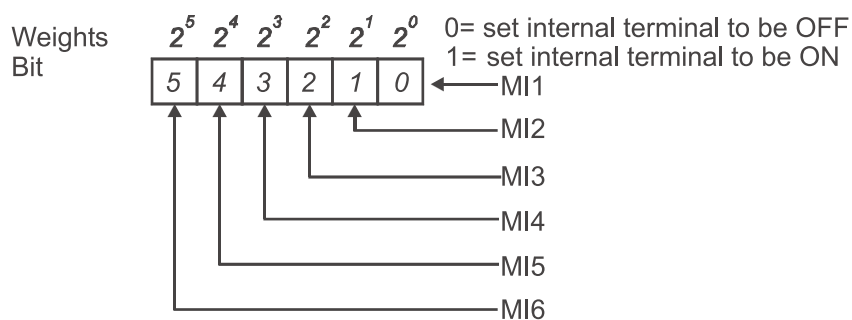


Figure 28: Internal terminal 1

For example:

If setting MI3, MI5 and MI6 to be ON, **>P1102<** should be set to

$\text{bit5} \times 2^5 + \text{bit4} \times 2^4 + \text{bit2} \times 2^2 = 1 \times 2^5 + 1 \times 2^4 + 1 \times 2^2 = 32 + 16 + 4 = 52$ as shown in the following.

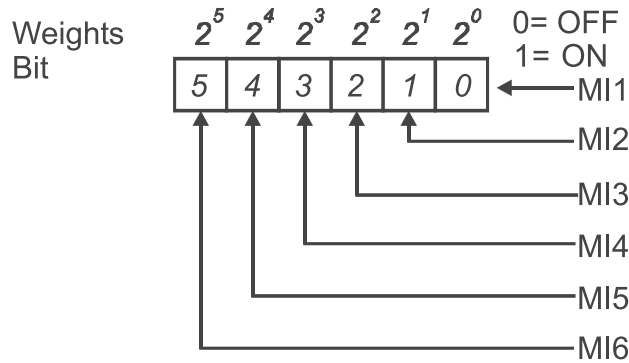


Figure 29: Internal terminal status 2

When extension card is installed, the number of the multi-function input terminals will increase according to the extension card. The maximum number of the multi-function input terminals is 12.

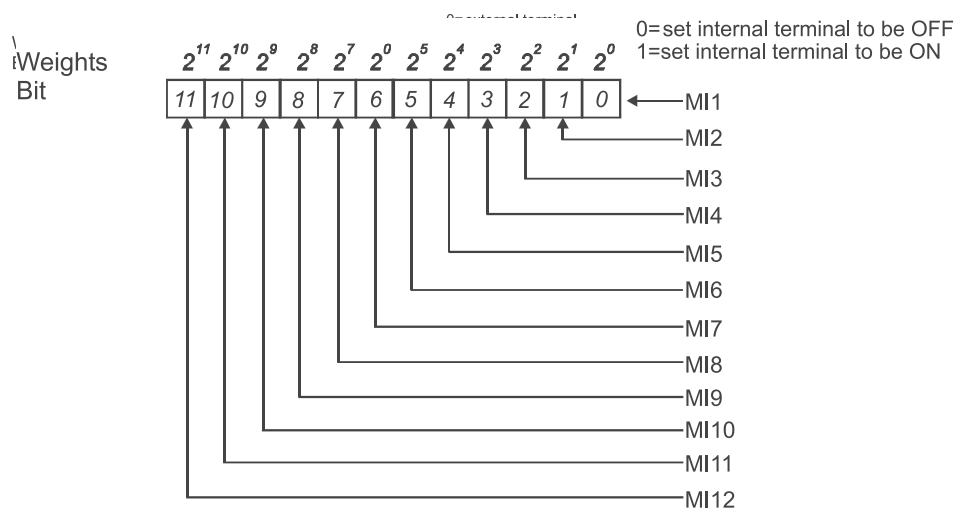


Figure 30: Extension card 2

4.3 Parameter description

P1103	Externer Multi-Funktions-Eingang	0 to 4095
EE	External multi function input contact selection	0
STOP	BM_u_ExtMultiFunctionInputContactSel	1:1

This parameter can be used to set the status of multi-function terminals (MI1 to MI6 (N.O./N.C.) for standard b maXX® 1000).

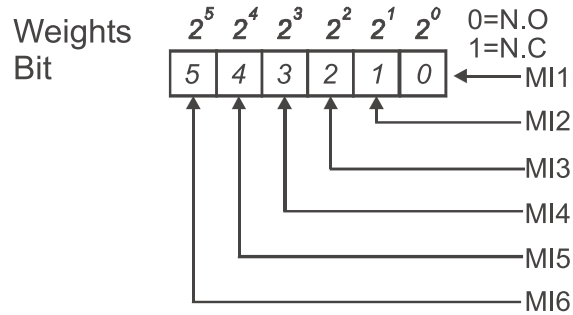


Figure 31: Multi function input contact selection 1

The MI1 to MI3 setting will be invalid when the operation command source is external terminal (2/3wire).

The setting method: It needs to convert binary number (6-bit) to decimal number for input.

For example:

If setting MI3, MI5, MI6 to be N.C. and MI1, MI2, MI4 to be N.O. The setting value **>P1103<** should be

$\text{bit5} \times 2^5 + \text{bit4} \times 2^4 + \text{bit2} \times 2^2 = 1 \times 2^5 + 1 \times 2^4 + 1 \times 2^2 = 32 + 16 + 4 = 52$
as shown in the following.

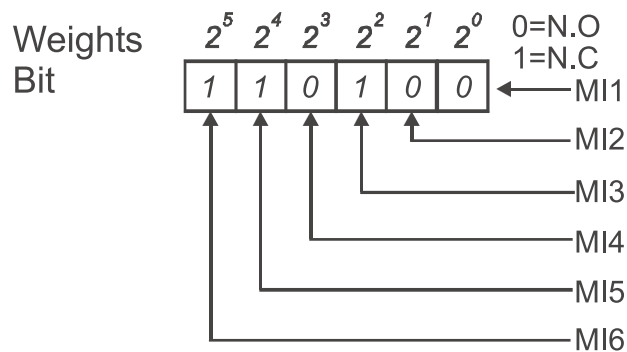
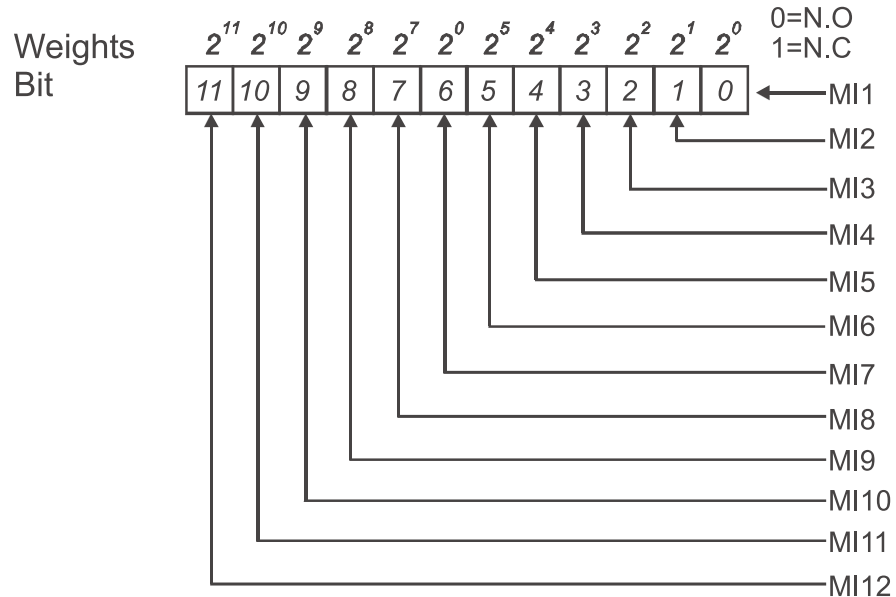


Figure 32: Multi function input contact selection 2

When extension card is installed, the number of the multi function input terminals will increase according to the extension card. The maximum number of the multi-function input terminals is 12.



3-wire control cannot be selected.

P1104	Digitaleingang Verzögerungszeit	0 to 20
EE	Digital terminal input delay time	1
STOP	BM_u_DigitalTerminalInputDelayTime	1:1

This parameter is to delay the signals on digital input terminals. 1 unit is 2 ms, 2 units are 4 ms, etc. The delay time is to debounce noisy signals that could cause the digital terminals to malfunction.

4.3 Parameter description

P1105	Statusanzeige externe Multi-Funktions-Eingänge	0 to 4095
-	Display the status of external multi function input terminals	0
A	BM_u_StatusExtMultFunctionInputTerminals	1:1

The external multi-function input terminals are falling-edge triggered. For standard b maXX[®] 1000 (without extension card), there are MI1 to MI6 and **P1105** will display 63 (111111) for no action.

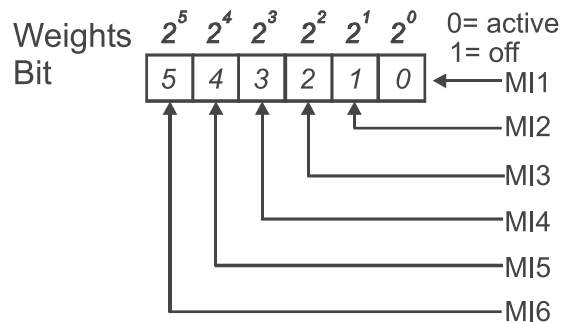


Figure 33: Display status multi function input terminal 1

For Example:

If **P1105** displays 52, it means MI1, MI2 and MI4 are active.

The display value

$$52 = 32 + 16 + 4 = 1 \times 2^5 + 1 \times 2^4 + 1 \times 2^2 = \text{bit } 6 \times 2^5 + \text{bit } 5 \times 2^4 + \text{bit } 3 \times 2^2$$

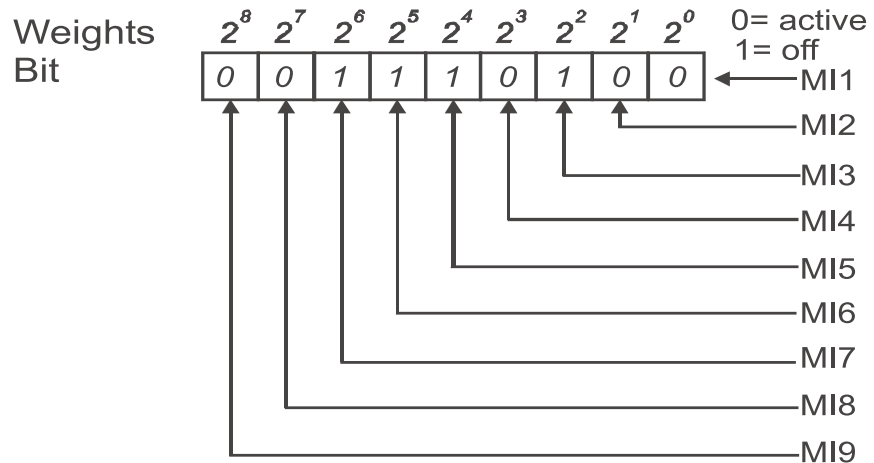


Figure 34: Display status external multi function input terminal 2

When extension card is installed, the number of the multi function input terminals will increase according to the extension card. The maximum number of the multi-function input terminals is 12.

Figure 35: Display status external multi function input

P1106	Statusanzeige Multi-Funktions-Eingänge	0 to 4095
-	Display the status of multi function input terminals	0
A	BM_u_StatusMultFunctionInputTerminals	1:1

The multi-function input terminals are falling-edge triggered. For standard b maXX[®] 1000 (without extension card), there are MI1 to MI6 and [▶P1106◀](#) will display 63 (111111) for no action.

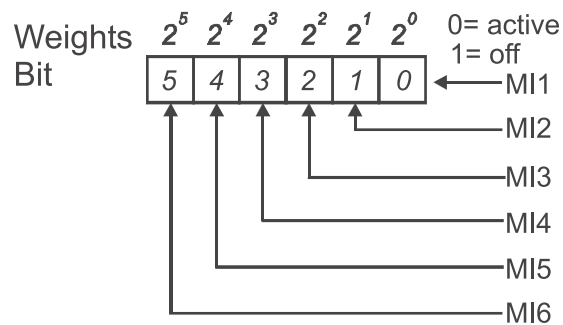


Figure 36: Display status multi function input terminal 1

4.3 Parameter description

For Example:

If **>P1106<** displays 52, it means MI1, MI2 and MI4 are active.

The display value

$$52 = 32 + 16 + 4 = 1 \times 2^5 + 1 \times 2^4 + 1 \times 2^2 = \text{bit } 6 \times 2^5 + \text{bit } 5 \times 2^4 + \text{bit } 3 \times 2^2$$

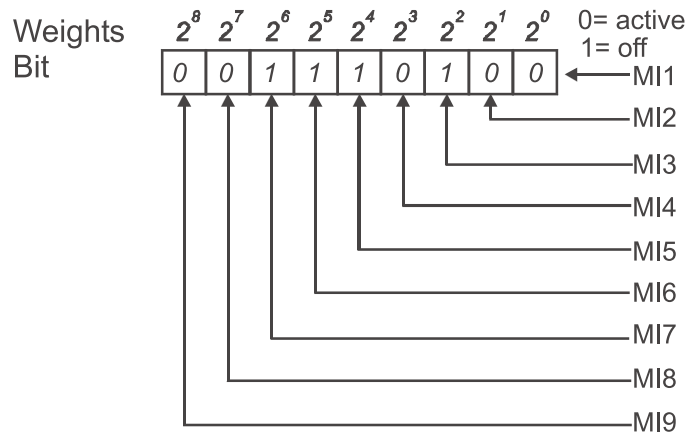


Figure 37: Display status multi function input terminal 2

When extension card is installed, the number of the multi function input terminals will increase according to the extension card. The maximum number of the multi-function input terminals is 12.

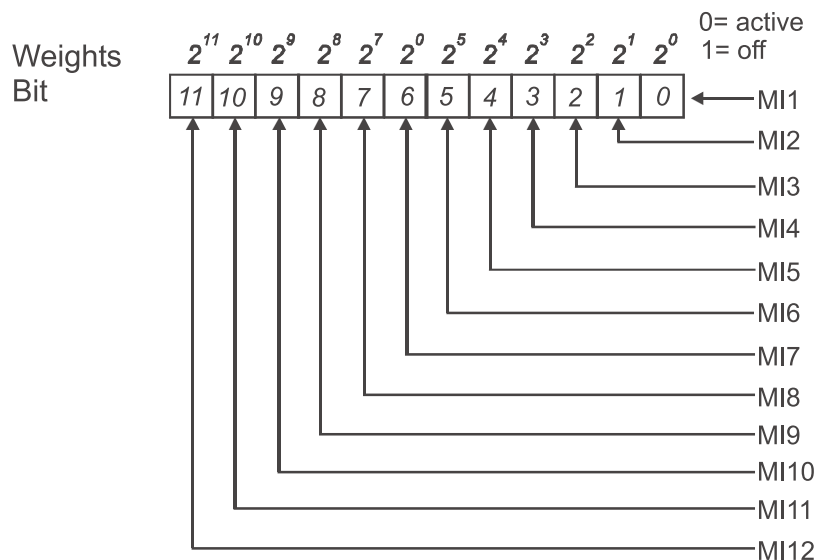


Figure 38: Display status multi function input terminal

P1110 Multi-Funktions-Ausgang Relais (RA1, RB1, RC1) 0 to 21

EE **Multi function output relay (RA1, RB1, RC1)** 8

STOP BM_u_MultiFunctionOutputRelayRA1 1:1 -

Assignment of the multi function outputs:

Value	Function	Description
0	No function	
1	b maXX® 1000 operational	Active when the b maXX® 1000 is ready or RUN command is „ON“
2	Master frequency attained	Active when the b maXX® 1000 reaches the output frequency setting.
3	Zero speed	Active when command frequency is lower than the minimum output frequency.
4	Over-torque detection	Active as long as over-torque is detected. (Refer to ▶P1213◀ to ▶P1215◀)
5	Baseblock (B.B.) indication	Active when the output of the b maXX® 1000 is shut off during base block. Base block error code 051D _{hex} can be forced by multi-function input (setting 9).
6	Low-voltage indication	Active when low voltage (Lv) is detected
7	Operation mode indication	Active when operation command is controlled by external terminal.
8	Fault indication	Active when a fault occurs, see error list ▶P0240◀ .
9	Desired frequency attained	Active when the desired frequency ▶P1118◀ is attained.
10	Terminal count value attained	Active when the counter reaches terminal count value
11	Preliminary count value attained	Active when the counter reaches preliminary count value
12	Over voltage stall supervision	Active when the over voltage stall function operating
13	Over current stall supervision	Active when the over current stall function operating
14	Heat sink overheat warning	When heatsink overheats, it will signal to prevent OH turn off the b maXX® 1000. When it is higher than 85°C (185°F), it will be ON.
15	Over voltage supervision	Active when the DC link voltage exceeds level
16	PID supervision	Active when the PID function operating
17	Forward command	Active when the direction command is FWD
18	Reverse command	Active when the direction command is REV
19	Zero speed output signal	Active when the drive is standby or STOP
20	Communication warning (FbE, Cexx, AoL2, AUE, SAvE)	Active when there is a communication warning, e.g. warning codes: 00A0 _{hex} , 050E _{hex} , 050F _{hex} , 0513 _{hex} , 0514 _{hex} , 0525 _{hex}
21	Brake control (desired frequency attained)	Active when output frequency \geq ▶P1121◀ . Deactivated when output frequency \leq ▶P1122◀ after STOP command
22	Inverter ready	Drive is ready.

4.3 Parameter description

P1111	Multi-Funktions-Ausgang (Optokoppler MO1)	0 to 21	
EE	Multi function output (photocoupler output MO1)	1	
STOP	BM_u_MultiFunctionOutputMO1	1:1	-
	Assignment of the multi function outputs see ▶P1110◀ from page 89.		
P1112	Multi-Funktions-Ausgang (MO2/RA2)	0 to 21	
EE	Multi function output terminal (MO2/RA2)	0	
STOP	BM_u_MultiFunctionOutputMO2RA2	1:1	-
	Assignment of the multi function outputs see ▶P1110◀ from page 89.		
P1113	Multi-Funktions-Ausgang (MO3/RA3)	0 to 21	
EE	Multi function output terminal (MO3/RA3)	0	
STOP	BM_u_MultiFunctionOutputMO3RA3	1:1	-
	Assignment of the multi function outputs see ▶P1110◀ from page 89.		
P1114	Multi-Funktions-Ausgang (MO4/RA4)	0 to 65535	
EE	Multi function output terminal (MO4/RA4)	0	
STOP	BM_u_MultiFunctionOutputMO4RA4	1:1	-
	Assignment of the multi function outputs see ▶P1110◀ from page 89.		
P1115	Multi-Funktions-Ausgang (MO5/RA5)	0 to 21	
EE	Multi function output terminal (MO5/RA5)	0	
STOP	BM_u_MultiFunctionOutputMO5RA5	1:1	-
	Assignment of the multi function outputs see ▶P1110◀ from page 89.		
P1116	Multi-Funktions-Ausgang (MO6/RA6)	0 to 21	
EE	Multi function output terminal (MO6/RA6)	0	
STOP	BM_u_MultiFunctionOutputMO6RA6	1:1	-
	Assignment of the multi function outputs see ▶P1110◀ from page 89.		
P1117	Multi-Funktions-Ausgang (MO7/RA7)	0 to 21	
EE	Multi function output terminal (MO7/RA7)	0	
STOP	BM_u_MultiFunctionOutputMO7RA7	1:1	-
	Assignment of the multi function outputs see ▶P1110◀ from page 89.		

P1118	Eingang Zählerwert	0 to 9999
EE	Terminal count value	0
STOP	BM_u_TerminalCountValue	1:1 -

This parameter sets the count value of the internal counter. To increase the internal counter, one of [▶P1091◀](#) to [▶P1093◀](#) and [▶P1095◀](#) to [▶P1100◀](#) should be set to 12. Upon completion of counting, the specified output terminal will be activated. ([▶P1110◀](#) to [▶P1117◀](#) set to 10).

When the display shows c555, the drive has counted 555 times. If display shows „c555“, it means that real counter value is between 5,550 and 5,559.

P1119	Vorabzug-Zählerwert	0 to 9999
EE	Preliminary count value	0
STOP	BM_u_PreliminaryCountValue	1:1 -

When the counter value reaches this value, the corresponding multi-function output terminal will be activated, provided one of [▶P1110◀](#) to [▶P1117◀](#) set to 11 (preliminary count value setting). This multi-function output terminal will be deactivated upon completion of terminal count value attained.

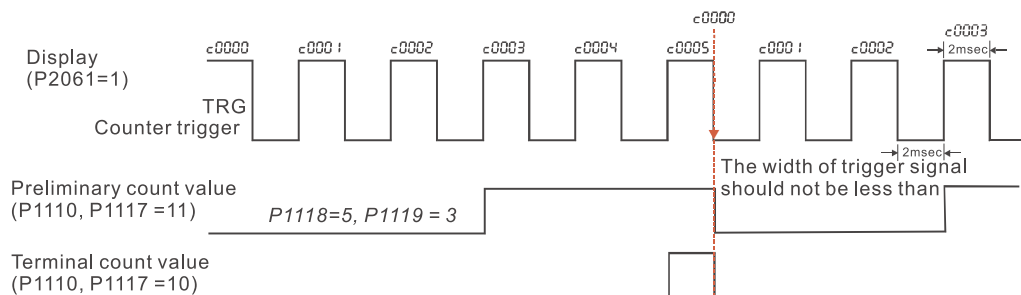


Figure 39: Timing diagram preliminary count value

4.3 Parameter description

P1120	EF, wenn Eingang Zählerwert erreicht	0 to 1
EE	EF active when terminal count value attained	0
STOP	BM_u_EFActiveCountValueAttained	1:1

If this parameter is set to 1 and the desired value of counter is attained, the AC drive will treat it as a fault. The drive will stop and show the error code 051C_{hex}, „EF“ message on the display.

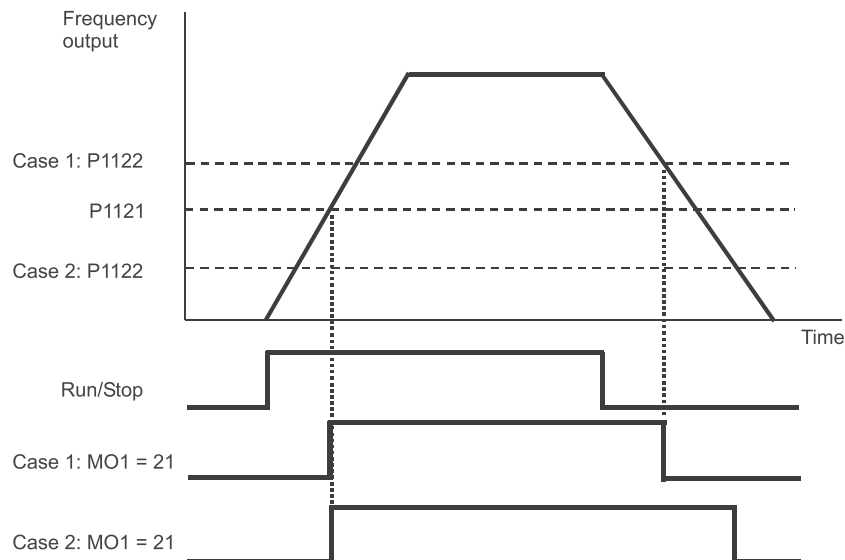
Value	Meaning
0	Continue operation
1	Stop immediately and display (EF), error code 051C _{hex}

P1121	Frequenz Bremse lösen	0.00 to 20.00 Hz
EE	Brake release frequency	0.00 Hz
STOP	BM_u_BrakeReleaseFrequency	100:1

This parameter is used to set control of mechanical brake via the output terminals (relay or MO1) when $\triangleright P1110 \triangleleft$ to $\triangleright P1117 \triangleleft$ is set to 21. Refer to the following example for details.

Example:

1. Case 1: $\triangleright P1122 \triangleleft \geq \triangleright P1121 \triangleleft$
2. Case 2: $\triangleright P1122 \triangleleft \leq \triangleright P1121 \triangleleft$



Note: MO1: setting value of P1111 = 21 (brake control engage)

Figure 40: Brake release frequency

P1122	Frequenz Bremse einrasten	0.00 to 20.00 Hz
EE	Brake engage frequency	0.00 Hz
STOP	BM_u_BrakeEngageFrequency	100:1

These parameter is used to set control of mechanical brake via the output terminals, see [▶P1121◀](#) for details.

P1123	Statusanzeige Multi-Funktions-Ausgänge	0 to 255
-	Display the status of multi function output terminals	0
A	BM_u_StatusMultiFunctionOutputs	1:1 -

For standard b maXX® 1000 (without extension card), the multi-function output terminals are falling-edge triggered and [▶P1123◀](#) will display 3 (bit 0 = 1, bit 1 = 1) for no action.

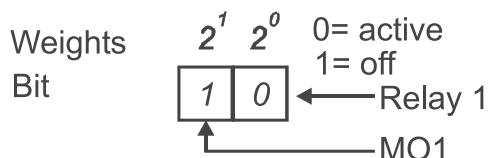


Figure 41: Display the status of multi function output terminals 1

For Example:

If [▶P1123◀](#) displays 2, it means Relay 1 is active.

The display value 2 = bit 1 x 2^1

When extension card is installed, the number of the multi-function output terminals will increase according to the extension card. The maximum number of the multi-function output terminals is shown as follows.

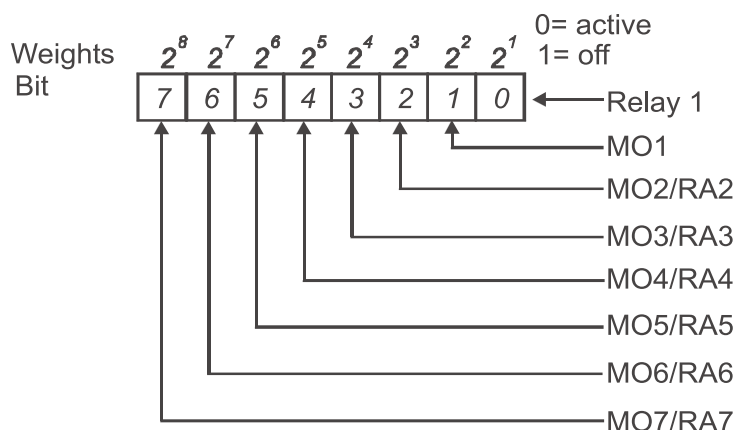


Figure 42: Display the status of multi function output terminals 2

4.3 Parameter description

Bit	Meaning
0	RLY status
1	MO1 status
2	MO2/RA2 status
3	MO3/RA3 status
4	MO4/RA4 status
5	MO5/RA5 status
6	MO6/RA6 status
7	MO7/RA7 status

P1124

Sollgeschwindigkeit erreicht 0.00 to 600.00 Hz

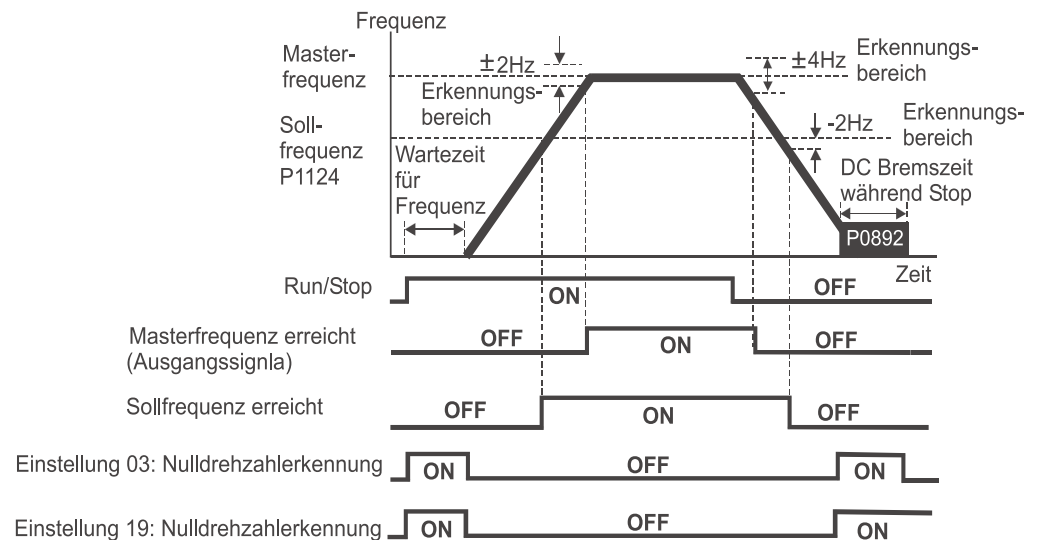
EE

Desired frequency attained 0.00 Hz

STOP

BM_u_DesiredFrequencyAttained 100:1

If a multi-function output terminal is set to function as desired frequency attained (>P1110< to >P1117< = 9), then the output will be activated when the programmed frequency is attained.



Ausgangszeitdiagramm der Multi-Funktions-Anschlüsse bei Einstellung auf Sollfrequenz erreicht oder Nulldrehzahlerkennung

Figure 43: Output timing chart of multi function terminals

P1125	Minimale AVI Spannung	0.0 to 10.0 V
EE	Minimum AVI voltage	0.1 V
STOP	BM_u_MinimumAVIVoltage	10:1 V

The parameter are used to set the analog input reference values. The min and max frequencies are based on \triangleright P0033 \triangleleft (during open-loop control) as shown in the following.

- \triangleright P0033 \triangleleft = 50.00 Hz when \triangleright P0310 \triangleleft = 9
- \triangleright P0033 \triangleleft = 60.00 Hz when \triangleright P0310 \triangleleft = 10

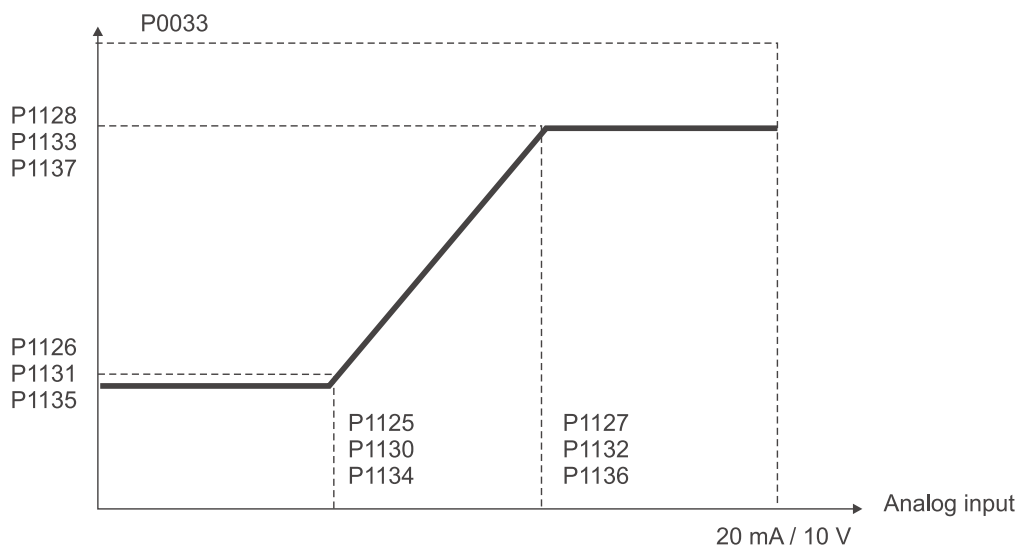


Figure 44: Analog input reference values 1

- \triangleright P0033 \triangleleft = 50.00 Hz when \triangleright P0310 \triangleleft = 9
- \triangleright P0033 \triangleleft = 60.00 Hz when \triangleright P0310 \triangleleft = 10

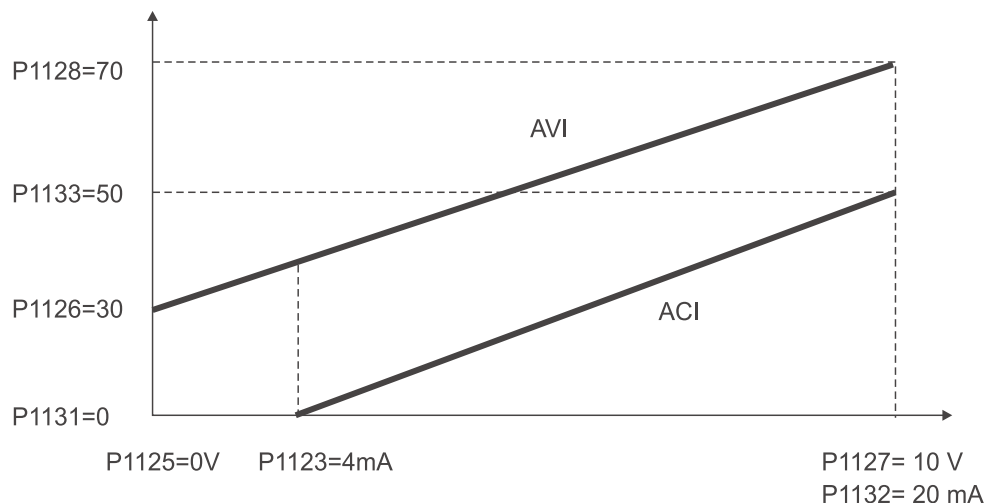


Figure 45: Analog input reference values 2

4.3 Parameter description

P1126	Minimale AVI Frequenz	0.0 to 100.0 %
EE	Minimum AVI frequency	0.0 %
STOP	BM_u_MinimumAVIFrequency	10:1

The parameter are used to set the analog input reference values and is based on percentage of [P0033](#)). For further information see [Figure 44](#) and [Figure 45](#) on page 95.

P1127	Maximale AVI Spannung	0.0 to 10.0 V
EE	Maximum AVI voltage	0.1 V
STOP	BM_u_MaximumAVIVoltage	10:1

Please note the ACI/AVI switch on the b maXX[®] 1000.

For further information see [Figure 44](#) and [Figure 45](#) on page 95.

P1128	Maximale AVI Frequenz	0.0 to 100.0 %
EE	Maximum AVI frequency	0.0 %
STOP	BM_u_MaximumAVIFrequency	10:1

The parameter are used to set the analog input reference values and is based on percentage of [P0033](#)). For further information see [Figure 44](#) and [Figure 45](#) on page 95.

P1129	ACI/AVI2 Auswahl	0 to 65535
EE	ACI/AVI2 selection	0
STOP	BM_u_ACI/AVI2Selection	1:1

Please note the ACI/AVI2 switch on the b maXX[®] 1000. Switch to ACI for 4 to 20 mA analog current signal (ACI) ([P1129](#) should be set to 0) and AVI2 for analog voltage signal (AVI2) ([P1129](#) should be set to 1).

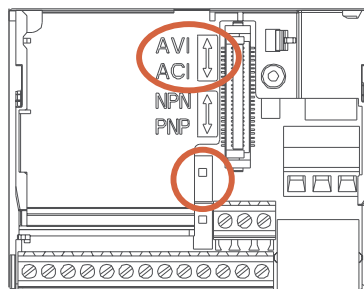


Figure 46: ACI/AVI2 selection

This parameter selects between ACI and AVI2.

Value	Meaning
0	ACI
1	AVI2

P1130	Minimaler ACI Strom	0.0 to 20.0 mA
EE	Minimum ACI current	4.0 mA
STOP	BM_u_MinimumACICurrent	10:1

Please note the ACI/AVI switch on the b maXX[®] 1000, see [▶P1129◀](#) from page 96.
For further information see [▶Figure 44◀](#) and [▶Figure 45◀](#) on page 95.

P1131	Minimale ACI Frequenz	0.0 to 100.0 %
EE	Minimum ACI frequency	0.0 %
STOP	BM_u_MinimumACIFrequency	10:1

Please note the ACI/AVI switch on the b maXX[®] 1000, see [▶P1129◀](#) from page 96.
The parameter are used to set the analog input reference values and is based on percentage of [▶P0033◀](#)). For further information see [▶Figure 44◀](#) and [▶Figure 45◀](#) on page 95.

P1132	Maximaler ACI Strom	0.0 to 20.0 mA
EE	Maximum ACI current	4.0 mA
STOP	BM_u_MaximumACICurrent	10:1

Please note the ACI/AVI switch on the b maXX[®] 1000, see [▶P1129◀](#) from page 96.
For further information see [▶Figure 44◀](#) and [▶Figure 45◀](#) on page 95.

P1133	Maximale ACI Frequenz	0.0 to 100.0 %
EE	Maximum ACI frequency	0.0 %
STOP	BM_u_MaximumACIFrequency	10:1

Please note the ACI/AVI switch on the b maXX[®] 1000, see [▶P1129◀](#) from page 96.
The parameter are used to set the analog input reference values and is based on percentage of [▶P0033◀](#)). For further information see [▶Figure 44◀](#) and [▶Figure 45◀](#) on page 95.

P1134	Minimale AVI2 Spannung	0.0 to 10.0 V
EE	Minimum AVI2 voltage	0.1 V
STOP	BM_u_MinimumAVI2Voltage	10:1

Please note the ACI/AVI switch on the b maXX[®] 1000, see [▶P1129◀](#) from page 96.
For further information see [▶Figure 44◀](#) and [▶Figure 45◀](#) on page 95.

4.3 Parameter description

P1135	Minimale AVI2 Frequenz	0.0 to 100.0 %
EE	Minimum AVI2 frequency	0.0 %
STOP	BM_u_MinimumAVI2Frequency	10:1

Please note the ACI/AVI switch on the b maXX[®] 1000, see [▶P1129◀](#) from page 96.
For further information see [▶Figure 44◀](#) and [▶Figure 45◀](#) on page 95.

P1136	Maximale AVI2 Spannung	0.0 to 10.0 V
EE	Maximum AVI2 voltage	0.1 V
STOP	BM_u_MaximumAVI2Voltage	10:1

Please note the ACI/AVI switch on the b maXX[®] 1000, see [▶P1129◀](#) from page 96.
For further information see [▶Figure 44◀](#) and [▶Figure 45◀](#) on page 95.

P1137	Maximale AVI2 Frequenz	0.0 to 100.0 %
EE	Maximum AVI2 frequency	0.0 %
STOP	BM_u_MaximumAVI2Frequency	10:1

Please note the ACI/AVI switch on the b maXX[®] 1000, see [▶P1129◀](#) from page 96.
For further information see [▶Figure 44◀](#) and [▶Figure 45◀](#) on page 95.

P1138	AI1 Funktionsauswahl	0 to 5
EE	AI1 function selection	0
STOP	BM_u_AI1FunctionSelection	1:1

This parameter selects the target of the analog input function.

Value	Meaning
0	Disable
1	First frequency source
2	Second frequency source
3	PID set point (PID enable)
4	PID positive feedback
5	PID negative feedback

P1139	ACI2/AVI3 Auswahl für AI1	0 to 1
EE	ACI2/AVI3 selection for AI1 terminal mode	0
STOP	BM_u_AI1modeACI2AVI3Selection	1:1

Please note the ACI/AVI switch on the option card.

This parameter selects between ACI2 and AVI3.

Value	Meaning
0	ACI2: Current mode (0.0 to 20.0 mA)
1	AVI3: Voltage mode (0.0 to 10.0 V)

Please note the ACI2/AVI3 switch on the option card.

Switch to ACI for 4 to 20 mA analog current signal (ACI) ([▶P1139◀](#) should be set to 0) and AVI for analog voltage signal (AVI2) ([▶P1139◀](#) should be set to 1).

Besides parameter settings, the voltage/current mode should be used with the switch.

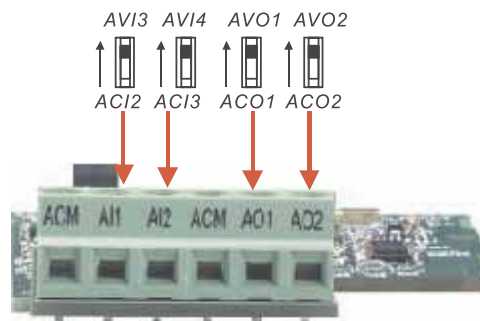


Figure 47: Voltage/current mode setting

For further information see [▶Figure 48◀](#) on page 100.

4.3 Parameter description

P1140	Minimale AVI3 Spannung	0.0 to 10.0 V
EE	Minimum AVI3 voltage	0.1 V
STOP	BM_u_MinimumAVI3Voltage	10:1

The parameter are used to set the analog input reference values. The min and max frequencies are based on [P0033](#) (during open-loop control) as shown in the following.

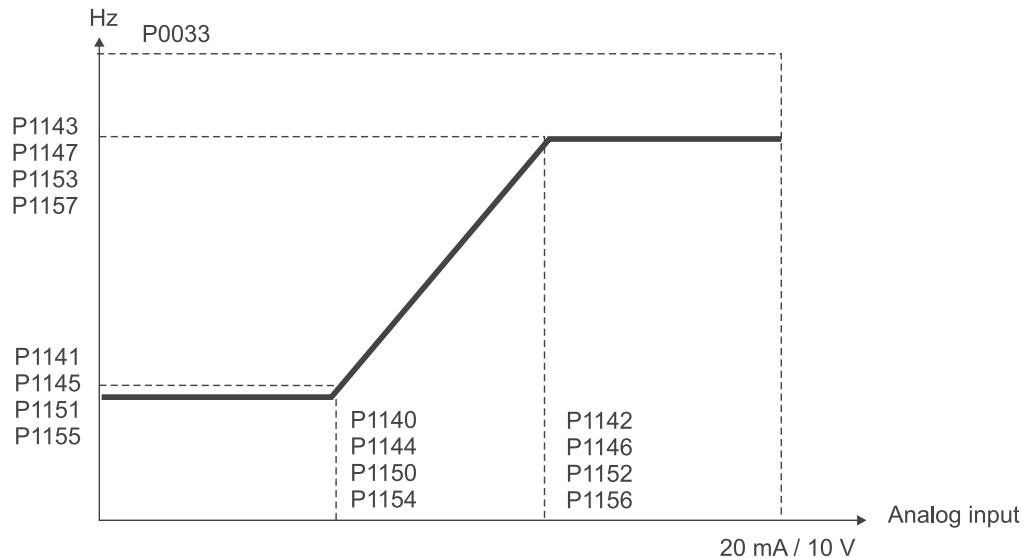


Figure 48: Analog input reference values 3

Example see [Figure 44](#) and [Figure 45](#) on page 95.

P1141	Minimale AVI3 Frequenz	0.0 to 100.0 %
EE	Minimum AVI3 frequency	0.0 %
STOP	BM_u_MinimumAVI3Frequency	10:1

The parameter are used to set the analog input reference values and is based on percentage of [P0033](#)). For further information see [P1139](#) and [Figure 48](#) on page 100.

P1142	Maximale AVI3 Spannung	0.0 to 10.0 V
EE	Maximum AVI3 voltage	0.1 V
STOP	BM_u_MaximumAVI3Voltage	10:1

For further information see [P1139](#) and [Figure 48](#) on page 100.

P1143	Maximale AVI3 Frequenz	0.0 to 100.0 %
EE	Maximum AVI3 frequency	0.0 %
STOP	BM_u_MaximumAVI3Frequency	10:1

For further information see [P1139](#) and [Figure 48](#) on page 100.

P1144	Minimaler ACI2 Strom	0.0 to 20.0 mA
EE	Minimum ACI2 current	4.0 mA
STOP	BM_u_MinimumACI2Current	10:1

For further information see [▶P1139◀](#) and [▶Figure 48◀](#) on page 100.

P1145	Minimale ACI2 Frequenz	0.0 to 100.0 %
EE	Minimum ACI2 frequency	0.0 %
STOP	BM_u_MinimumACI2Frequency	10:1

For further information see [▶P1139◀](#) and [▶Figure 48◀](#) on page 100.

P1146	Maximaler ACI2 Strom	0.0 to 20.0 mA
EE	Maximum ACI2 current	4.0 mA
STOP	BM_u_MaximumACI2Current	10:1

For further information see [▶P1139◀](#) and [▶Figure 48◀](#) on page 100.

P1147	Maximale ACI2 Frequenz	0.0 to 100.0 %
EE	Maximum ACI2 frequency	0.0 %
STOP	BM_u_MaximumACI2Frequency	10:1

For further information see [▶P1139◀](#) and [▶Figure 48◀](#) on page 100.

P1148	AI2 Funktionsauswahl	0 to 5
EE	AI2 function selection	0
STOP	BM_u_AI2FunctionSelection	1:1

This parameter selects the target of the analog input function.

Value	Meaning
0	Disable
1	First frequency source
2	Second frequency source
3	PID set point (PID enable)
4	PID positive feedback
5	PID negative feedback

4.3 Parameter description

P1149	ACI3/AVI4 Auswahl für AI2	0 to 1
EE	ACI3/AVI4 selection for AI2 terminal mode	0
STOP	BM_u_AI2ModeACI3AVI4Selection	1:1

Please note the ACI3/AVI4 switch on the option card.

This parameter selects between ACI3 and AVI4.

Value	Meaning
0	ACI3: analog current (0.0 to 20.0 mA)
1	AVI4: analog voltage (0.0 to 10.0 V)

For further information see [▶P1139◀](#) and [▶Figure 48◀](#) on page 100.

P1150	Minimale AVI4 Spannung	0.0 to 10.0 V
EE	Minimum AVI4 voltage	0.1 V
STOP	BM_u_MinimumAVI4Voltage	10:1

For further information see [▶P1139◀](#) or [▶P1149◀](#) and [▶Figure 48◀](#) on page 100.

P1151	Minimale AVI4 Frequenz	0.0 to 100.0 %
EE	Minimum AVI4 frequency	0.0 %
STOP	BM_u_MinimumAVI4Frequency	10:1

The parameter are used to set the analog input reference values and is based on percentage of [▶P0033◀](#)).

For further information see [▶P1139◀](#) or [▶P1149◀](#) and [▶Figure 48◀](#) on page 100.

P1152	Maximale AVI4 Spannung	0.0 to 10.0 V
EE	Maximum AVI4 voltage	0.1 V
STOP	BM_u_MaximumAVI4Voltage	10:1

For further information see [▶P1139◀](#) or [▶P1149◀](#) and [▶Figure 48◀](#) on page 100.

P1153	Maximale AVI4 Frequenz	0.0 to 100.0 %
EE	Maximum AVI4 frequency	0.0 %
STOP	BM_u_MaximumAVI4Frequency	10:1

The parameter are used to set the analog input reference values and is based on percentage of [▶P0033◀](#)).

For further information see [▶P1139◀](#) or [▶P1149◀](#) and [▶Figure 48◀](#) on page 100.

P1154	Minimaler ACI3 Strom	0.0 to 20.0 mA
EE	Minimum ACI3 current	4.0 mA
STOP	BM_u_MinimumACI3Current	10:1

For further information see [▶P1139◀](#) or [▶P1149◀](#) and [▶Figure 48◀](#) on page 100.

P1155	Minimale ACI3 Frequenz	0.0 to 100.0 %
EE	Minimum ACI3 frequency	0.0 %
STOP	BM_u_MinimumACI3Frequency	10:1

The parameter are used to set the analog input reference values and is based on percentage of [▶P0033◀](#)).

For further information see [▶P1139◀](#) or [▶P1149◀](#) and [▶Figure 48◀](#) on page 100.

P1156	Maximaler ACI3 Strom	0.0 to 20.0 mA
EE	Maximum ACI3 current	4.0 mA
STOP	BM_u_MaximumACI3Current	10:1

For further information see [▶P1139◀](#) or [▶P1149◀](#) and [▶Figure 48◀](#) on page 100.

P1157	Maximale ACI3 Frequenz	0.0 to 100.0 %
EE	Maximum ACI3 frequency	0.0 %
STOP	BM_u_MaximumACI3Frequency	10:1

The parameter are used to set the analog input reference values and is based on percentage of [▶P0033◀](#)).

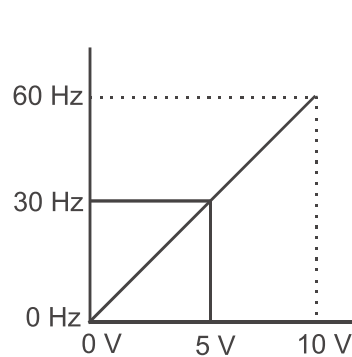
For further information see [▶P1139◀](#) or [▶P1149◀](#) and [▶Figure 48◀](#) on page 100.

P1158	Bedienfeld Potentiometer Offset	0.0 to 100.0 %
EE	Keypad potentiometer bias	0.0 %
ON	BM_u_KeypadPotentiometerBias	10:1

Example 1: Standard application

4.3 Parameter description

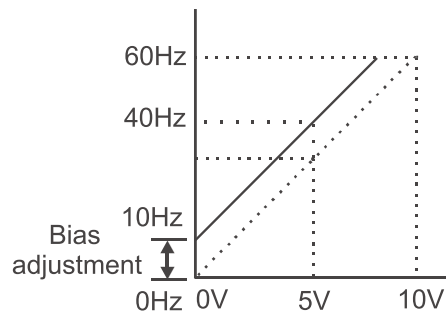
This is the most used setting. The user must set $\triangleright P0801 \triangleleft$ to 04 and $\triangleright P0802 \triangleleft$ to 0, 1, 2, only. The frequency command comes from keypad potentiometer on AVI.



- $\triangleright P0033 \triangleleft = 60 \text{ Hz}$
(max. output frequency potentiometer)
- $\triangleright P1158 \triangleleft = 0 \%$ (bias adjustment)
- $\triangleright P1159 \triangleleft = 0$ (positive bias)
- $\triangleright P1160 \triangleleft = 100 \%$ (input gain)
- $\triangleright P1161 \triangleleft = 0$ (no negative bias command)

Example 2: Use of bias

This example shows the influence of changing the bias. When the input is 0 V the output frequency is 10 Hz. At mid-point a potentiometer will give 40 Hz. Once the maximum output frequency is reached, any further increase of the potentiometer or signal will not increase the output frequency. (To use the full potentiometer range, please refer to Example 3.) The value of external input voltage/current 0 to 8.33 V corresponds to the setting frequency 10 to 60 Hz.



- $\triangleright P0033 \triangleleft = 60 \text{ Hz}$
- $\triangleright P1158 \triangleleft = 16.7 \%$
- $\triangleright P1159 \triangleleft = 0$
- $\triangleright P1160 \triangleleft = 100 \%$
- $\triangleright P1161 \triangleleft = 0$

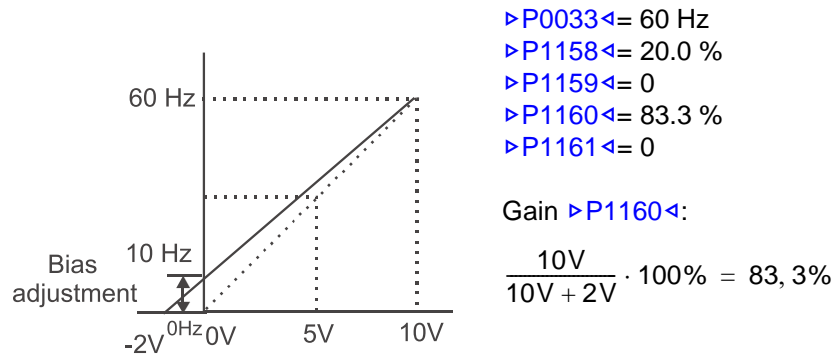
Gain: 100 %

Bias adjustment $\triangleright P1158 \triangleleft$:

$$\frac{10 \text{ Hz}}{60 \text{ Hz}} \cdot \frac{100\%}{100\%} = 16,7\%$$

Example 3: Use of bias and gain for use of full range

This example also shows a popular method. The whole scale of the potentiometer can be used as desired. In addition to signals of 0 to 10 V, the popular voltage signals also include signals of 0 to 5 V, or any value under 10 V. Regarding the setting, please refer to the following examples.

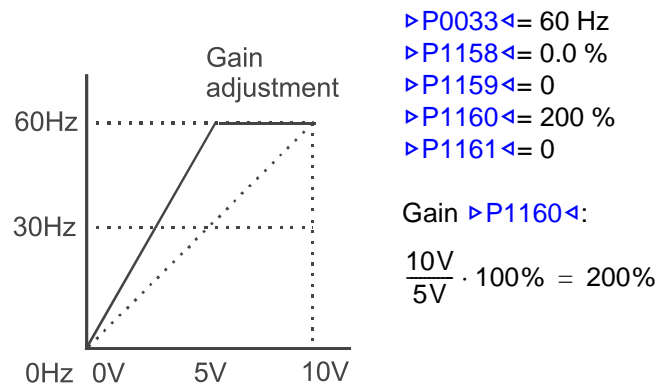


Bias adjustment ▷P1158◀:

$$\frac{10\text{Hz}}{\frac{60\text{Hz}}{\text{Gain}} \cdot 100\%} = 20\%$$

Example 4: Use of 0 to 5 V potentiometer range via gain adjustment

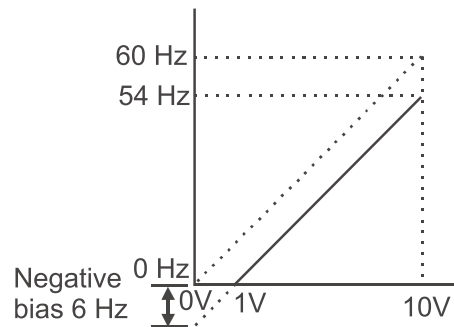
This example shows a potentiometer range of 0 to 5 Volts. Instead of adjusting gain as example below, you can set ▷P0033◀ to 120 Hz to achieve the same results.



4.3 Parameter description

Example 5: Use of negative bias in noisy environment

In this example, a 1 V negative bias is used. In noisy environments it is advantageous to use negative bias to provide a noise margin (1 V in this example).



- ▷P0033◁= 60 Hz
- ▷P1158◁= 10.0 %
- ▷P1159◁= 1
- ▷P1160◁= 100 %
- ▷P1161◁= 0

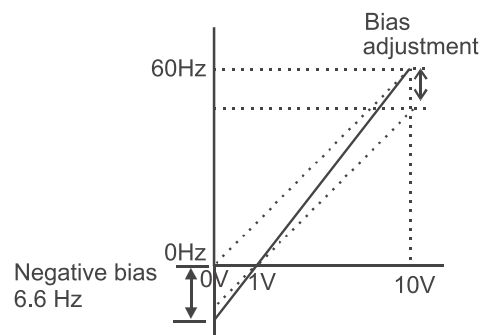
Gain ▷P1160◁: 100 %

Bias adjustment ▷P1158◁:

$$\frac{6\text{ Hz}}{\frac{60\text{ Hz}}{\text{Gain}}} \cdot 100\% = 10\%$$

Example 6: Use of negative bias in noisy environment and gain adjustment to use full potentiometer range

In this example, a negative bias is used to provide a noise margin. Also a potentiometer frequency gain is used to allow the maximum output frequency to be reached.



- ▷P0033◁= 60 Hz
- ▷P1158◁= 10.0 %
- ▷P1159◁= 1
- ▷P1160◁= 111 %
- ▷P1161◁= 0

Gain ▷P1160◁:

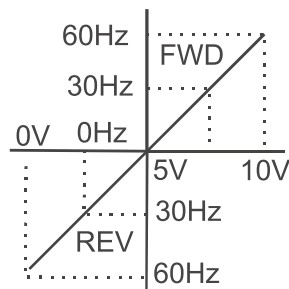
$$\frac{10\text{ V}}{9\text{ V}} \cdot 100\% = 111\%$$

Bias adjustment ▷P1158◁:

$$\frac{6,6\text{ Hz}}{\frac{60\text{ Hz}}{\text{Gain}}} \cdot 100\% = 10\%$$

Example 7: Use of 0 to 10 V potentiometer signal to run motor in FWD and REV direction

In this example, the input is programmed to run a motor in both forward and reverse direction. The motor will be idle when the potentiometer position is at mid-point of its scale. Using the settings in this example disables the external FWD and REV controls.



- ▷P0033◁= 60 Hz
- ▷P1158◁= 50.0 %
- ▷P1159◁= 1
- ▷P1160◁= 200 %
- ▷P1161◁= 1

Gain ▷P1160◁:

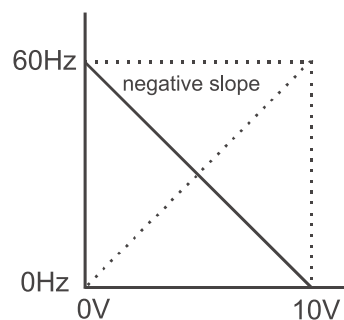
$$\frac{10\text{V}}{5\text{V}} \cdot 100\% = 200\%$$

Bias adjustment ▷P1158◁:

$$\frac{60\text{Hz}}{\frac{60\text{Hz}}{\text{Gain}} \cdot 100\%} = 50\%$$

Example 8: Use negative slope

In this example, the use of negative slope is shown. Negative slopes are used in applications for control of pressure, temperature or flow. The sensor that is connected to the input generates a large signal (10 V) at high pressure or flow. With negative slope settings, the b maXX[®] 1000 will slow stop the motor. With these settings the b maXX[®] 1000 will always run in only one direction (reverse). This can only be changed by exchanging 2 wires to the motor.



- ▷P0033◁= 60 Hz
- ▷P1158◁= 100.0 %
- ▷P1159◁= 1
- ▷P1160◁= 100 %
- ▷P1161◁= 1

Gain ▷P1160◁:

$$\frac{10\text{V}}{10\text{V}} \cdot 100\% = 100\%$$

Bias adjustment ▷P1158◁:

$$\frac{60\text{Hz}}{\frac{60\text{Hz}}{\text{Gain}} \cdot 100\%} = 100\%$$

4.3 Parameter description

P1159 Bedienfeld Potentiometer Offset Polarität 0 to 1

EE **Keypad potentiometer bias polarity** 0

ON BM_u_KeypadPotentiometerBiasPolarity 1:1

Setting the bias polarity of the keypad potentiometer. For further information see [▶P1158◀](#) from page 103.

Value	Meaning
0	Positive bias
1	Negative bias

P1160 Bedienfeld Potentiometer Verstärkung 0.1 to 100.0 %

EE **Keypad potentiometer gain** 100.0 %

ON BM_u_KeypadPotentiometerGain 1:1

Setting the gain of the keypad potentiometer. For further information see [▶P1158◀](#) from page 103.

P1161 Bedienfeld Potentiometer negativ AN/AUS 0 to 1

EE **Keypad potentiometer negative enable/disable** 0

STOP BM_u_KeypadPotentiometerEnable/Disable 1:1

For further information see [▶P1158◀](#) from page 103.

Value	Meaning
0	No negative bias command
1	Negative bias: REV motion enabled

P1162 Analoges Ausgangssignal 0 to 1

EE **Analog output signal (AFM)** 0

ON BM_u_AnalogOutputSignal 1:1

This parameter sets the function of the AFM output 0 to +10 V_{DC} (ACM is common), see also [▶P1163◀](#) from page 109.

Value	Meaning
0	Analog frequency meter (0 to maximum output frequency)
1	Analog current meter (0 to 250 % of rated current)

P1163	Analoges Ausgangssignal Verstärkung	1 to 200 %
EE	Analog output gain	100 %
ON	BM_u_AnalogOutputGain	1:1

This parameter sets the voltage range of the analog output signal AFM.

When **▶P1162◀** is set to 0, the analog output voltage is directly proportional to the output frequency of the b maXX[®] 1000. With **▶P1163◀** set to 100 %, the maximum output frequency **▶P0033◀** of the b maXX[®] 1000 corresponds to +10 V_{DC} on the AFM output.

Similarly, if **▶P1162◀** is set to 1, the analog output voltage is directly proportional to the output current of the b maXX[®] 1000. With **▶P1163◀** set to 100 %, then 2.5 times the rated current corresponds to +10 V_{DC} on the AFM output.

NOTE



Any type of voltmeter can be used. If the meter reads full scale at a voltage less than 10 V, **▶P1163◀** should be set using the following formula:

$$\mathbf{▶P1163◀} = ((\text{meter full scale voltage})/10) \times 100\%$$

For Example: When using the meter with full scale of 5 Volts, adjust **▶P1163◀** to 50 %. If **▶P1162◀** is set to 0, then 5 V_{DC} will correspond to maximum output frequency.

P1164	AO1 Auswahl Ausgang Mode	0 to 2
EE	AO1 terminal mode selection	0
STOP	BM_u_TerminalModeSelectionAO1	1:1

This parameter selects the mode of the analog voltage output or analog current output.

Value	Meaning
0	AVO1 (analog voltage output)
1	ACO1 by 0 to 20 mA (analog current output)
2	ACO1 by 4 to 20 mA (analog current output)

Besides parameter settings, the voltage/current mode should be used with the switch.

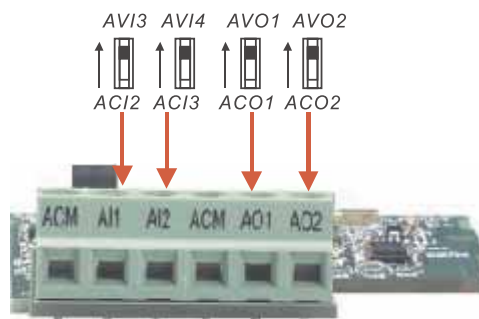


Figure 49: Voltage/current mode setting

4.3 Parameter description

P1165	Analoges Ausgangssignal AO1	0 to 1
EE	Analog output signal AO1	0
STOP	BM_u_AnalogOutputSignal1	1:1

This parameter sets the function of the AO1 output 0 to +10 V_{DC} (ACM is signal ground), see also [▶P1166◀](#) from page 110.

Value	Meaning
0	Analog frequency meter (0 to maximum output frequency)
1	Analog current meter (0 to 250 % of rated current)

P1166	Analoges Ausgangssignal Verstärkung AO1	0 to 200 %
EE	Analog output gain AO1	100 %
STOP	BM_u_AnalogOutputGain AO1	1:1

This parameter sets the voltage range of the analog output signal AO1.

When [▶P1165◀](#) is set to 0, the analog output voltage is directly proportional to the output frequency of the b maXX[®] 1000. With [▶P1166◀](#) set to 100 %, the maximum output frequency [▶P0033◀](#) of the b maXX[®] 1000 corresponds to +10 V_{DC} on the AO1 output.

Similarly, if [▶P1165◀](#) is set to 1, the analog output voltage is directly proportional to the output current of the b maXX[®] 1000. With [▶P1166◀](#) set to 100%, then 2.5 times the rated current corresponds to +10 V_{DC} on the AO1 output.

NOTE



Any type of voltmeter can be used. If the meter reads full scale at a voltage less than 10 V, [▶P1166◀](#) should be set using the following formula:

$$\text{▶P1166◀} = ((\text{meter full scale voltage})/10) \times 100\%$$

For Example: When using the meter with full scale of 5 volts, adjust [▶P1166◀](#) to 50 %. If [▶P1165◀](#) is set to 0, then 5 V_{DC} will correspond to maximum output frequency.

P1167	AO2 Auswahl Ausgang Mode	0 to 2
EE	AO2 terminal mode selection	0
STOP	BM_u_TerminalModeSelectionAO2	1:1

This parameter selects the mode of the analog voltage output or analog current output.

Value	Meaning
0	AVO2 (analog voltage output)
1	ACO2 by 0 to 20 mA (analog current output)
2	ACO2 by 4 to 20 mA (analog current output)

For further information see [▶Voltage/current mode setting◀](#) on page 109.

P1168	Analoges Ausgangssignal AO2	0 to 1
EE	Analog output signal AO2	0
STOP	BM_u_AnalogOutputSignal2	1:1

This parameter sets the function of the AO2 output 0 to +10 V_{DC} (ACM is signal ground), see also [▶P1169◀](#) from page 111.

Value	Meaning
0	Analog frequency meter (0 to maximum output frequency)
1	Analog current meter (0 to 250 % of rated current)

P1169	Analoges Ausgangssignal Verstärkung AO2	0 to 200 %
EE	Analog output gain AO2	100 %
STOP	BM_u_AnalogOutputGain AO2	1:1

This parameter sets the voltage range of the analog output signal AO2.

When [▶P1168◀](#) is set to 0, the analog output voltage is directly proportional to the output frequency of the b maXX[®] 1000. With [▶P1169◀](#) set to 100 %, the maximum output frequency [▶P0033◀](#) of the b maXX[®] 1000 corresponds to +10 V_{DC} on the AO2 output.

Similarly, if [▶P1168◀](#) is set to 1, the analog output voltage is directly proportional to the output current of the b maXX[®] 1000. With [▶P1169◀](#) set to 100%, then 2.5 times the rated current corresponds to +10 V_{DC} on the AO2 output.

NOTE



Any type of voltmeter can be used. If the meter reads full scale at a voltage less than 10 V, [▶P1169◀](#) should be set using the following formula:

$$\text{▶P1169◀} = ((\text{meter full scale voltage})/10) \times 100\%$$

For Example: When using the meter with full scale of 5 volts, adjust [▶P1169◀](#) to 50 %. If [▶P1168◀](#) is set to 0, then 5 V_{DC} will correspond to maximum output frequency.

P1170	Hochlaufgeber Modus	0 to 120
EE	Ramp function generator mode	0
ON	BM_u_RFGMode	1:1

Settings for ramp function generator.

Bit	Meaning
0 to 2	reserved
3	1: Negative set values inhibited
4	1: Positive set values are inhibited
5	1: Polarity reversal of the actual set value
6	0: Trapezoidal speed profile with ramp function generator smoothing 1: S-curve with square speed profile
7 ... 15	reserved

- If the S-curve profile ([▶P1170◀](#) ramp function generator mode bit 6 = 1) is set and [▶P1176◀](#) ≥ [▶P1172◀](#) or [▶P1180◀](#), [▶P1177◀](#) ≥ [▶P1173◀](#) or [▶P1181◀](#), then the ramp function generator accelerates and decelerates only with trapezoidal speed profile.

P1171	Anzeige Hochlaufgeber Eingang	0.0 to 600.00 Hz
-	Display ramp function generator input	0.00 Hz
A	BM_u_RFGDisplayInput	100:1

This parameter displays the set point first and second frequency.

Scaling before the PID control.

P1172	HLG Hochlaufzeit 1	0.1 to 600.0 s or 0.01 to 60.00 s
EE	RFG acceleration time 1	10.0 s
ON	BM_u_RFG1RampUpTime1	10:1 or 100:1

The acceleration time is used to determine the time required for the b maXX[®] 1000 to ramp from 0 Hz to maximum output frequency [▶P0033◀](#). The rate is linear unless S-curve is „Enabled“; see [▶P1176◀](#).

Acceleration/deceleration time 1 or 2 can be switched by setting the external terminals (MI3 to MI5 or MI7 to MI12) [▶P1091◀](#) to [▶P1093◀](#) or [▶P1095◀](#) to [▶P1100◀](#) to 7.

Standardization see [▶P1186◀](#).

P1173	HLG Rücklaufzeit 1	0.1 to 600.0 s or 0.01 to 60.00 s
EE	RFG deceleration time 1	10.0 s
ON	BM_u_RFG1RampDownTime1	10:1 or 100:1

The deceleration time is used to determine the time required for the b maXX[®] 1000 to decelerate from the maximum output frequency [▶P0033◀](#) down to 0 Hz. The rate is linear unless S-curve is „Enabled.“, see [▶P1177◀](#).

Acceleration/deceleration time 1 or 2 can be switched by setting the external terminals (MI3 to MI5 or MI7 to MI12) [▶P1091◀](#) to [▶P1093◀](#) or [▶P1095◀](#) to [▶P1100◀](#) to 7.

Standardization see [▶P1186◀](#).

P1174	HLG Schnellhalt-Zeit	0.1 to 600.0 s or 0.01 to 60.00 s
EE	RFG quickstop time	10.0 s
ON	BM_u_RFG1StopTime	10:1 or 100:1

The quickstop ramp is effective in all quickstop procedures, not only in the speed-controlled operation modes.

The quickstop time is used to determine the time required for the b maXX[®] 1000 to ramp from maximum output frequency [▶P0033◀](#) to 0 Hz.

For a correct functioning of brake operations at the quickstop- or deceleration the speed controller must be sufficiently parameterized.

Standardization see [▶P1186◀](#).

P1176	HLG S-Kurve Hochlaufzeit	0.1 to 600.0 s or 0.01 to 60.00 s
EE	RFG S-curve accel time	10.0 s
STOP	BM_u_RFG1SCurveAccelTime	10:1 or 100:1

This parameter is used to ensure smooth acceleration and deceleration via S-curve. For further information see [▶P1177◀](#).

Standardization see [▶P1186◀](#).

P1177	HLG S-Kurve Rücklaufzeit	0.1 to 600.0 s or 0.01 to 60.00 s
EE	RFG S-curve decel time	10.0 s
STOP	BM_u_RFG1SCurveDecelTime	10:1 or 100:1

This parameter is used to ensure smooth acceleration and deceleration via S-curve.

The S-curve is disabled when set to 0.0 and enabled when set to 0.1 to 10.0/0.01 to 10.00.

Setting 0.1/0.01 gives the quickest and setting 10.0/10.00 the longest and smoothest S-curve.

The b maXX[®] 1000 will not follow the accel/decel times in [▶P1172◀](#), [▶P1173◀](#), [▶P1180◀](#), [▶P1185◀](#).

Standardization see [▶P1186◀](#).

The diagram below shows that the original setting of the accel/decel time is only for reference when the S-curve is enabled. The actual accel/decel time depends on the selected S-curve (0.1 to 10.0).

The total accel. time = [▶P1172◀](#) + [▶P1177◀](#) or [▶P1180◀](#) + [▶P1177◀](#)

The total decel. time = [▶P1173◀](#) + [▶P1177◀](#) or [▶P1185◀](#) + [▶P1177◀](#)

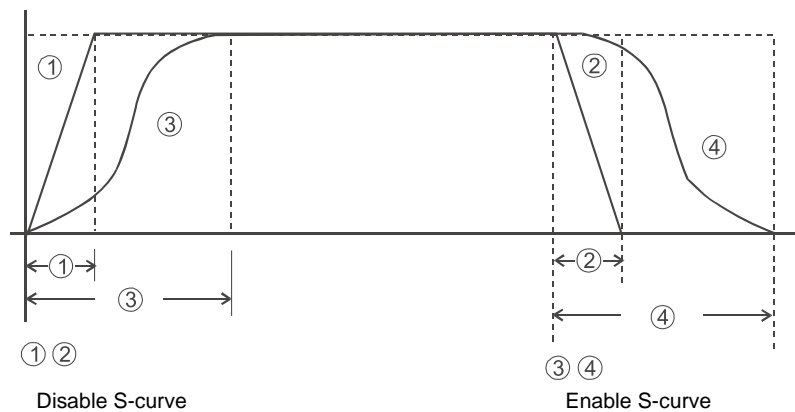


Figure 50: Acceleration/deceleration S-curve

P1180	HLG Hochlaufzeit 2	0.1 to 600.0 s or 0.01 to 60.00 s
EE	RFG ramp-up time 2	10.0 s
ON	BM_u_RFG1RampUpTime2	10:1 or 100:1

The ramp-up time is used to determine the time required for the b maXX[®] 1000 to ramp from 0 Hz to maximum output frequency [▶P0033◀](#). The rate is linear unless S-curve is „Enabled“; see [▶P1177◀](#).

Acceleration/deceleration time 1 or 2 can be switched by setting the external terminals (MI3 to MI5 or MI7 to MI12) [▶P1091◀](#) to [▶P1093◀](#) or [▶P1095◀](#) to [▶P1100◀](#) to 7.

Standardization see [▶P1186◀](#).

P1181	HLG Rücklaufzeit 2	0.1 to 600.0 s or 0.01 to 60.00 s
EE	RFG ramp-down time 2	10.0 s
ON	BM_u_RFG1RampDownTime 2	10:1 or 100:1

The ramp-down time is used to determine the time required for the b maXX[®] 1000 to decelerate from the maximum output frequency [▶P0033◀](#) down to 0 Hz. The rate is linear unless S-curve is „Enabled.“, see [▶P1177◀](#).

Acceleration/deceleration time 1 or 2 can be switched by setting the external terminals (MI3 to MI5 or MI7 to MI12) [▶P1091◀](#) to [▶P1093◀](#) or [▶P1095◀](#) to [▶P1100◀](#) to 7.

Standardization see [▶P1186◀](#).

P1182	HLG Tippbetrieb Hochlaufzeit	0.1 to 600.0 s or 0.01 to 60.00 s
EE	RFG jog ramp-up time	10.0 s
ON	BM_u_RFGJogRampUpTime	10:1 or 100:1

The jog ramp-up time is used to determine the time required for the b maXX[®] 1000 to ramp from 0 Hz to maximum output frequency [▶P0033◀](#). Standardization see [▶P1186◀](#) for further information refer to [▶P1184◀](#).

P1183	HLG Tippbetrieb Rücklaufzeit	0.1 to 600.0 s or 0.01 to 60.00 s
EE	RFG jog ramp-down time	10.0 s
ON	BM_u_RFGJogRampDownTime	10:1 or 100:1

The jog ramp-down time is used to determine the time required for the b maXX[®] 1000 to decelerate from the maximum output frequency [▶P0033◀](#) down to 0 Hz. Standardization see [▶P1186◀](#) for further information refer to [▶P1184◀](#).

P1184	HLG Tippbetrieb Frequenz	0.10 to 600.00 Hz
EE	RFG jog frequency	6.00 Hz
ON	BM_u_RFGJogFrequency	100:1 s

Only external terminal JOG (MI3 to MI5 or MI7 to MI12) [▶P1091◀](#) to [▶P1093◀](#) or [▶P1095◀](#) to [▶P1100◀](#) can be used.

When the operation mode [▶P1000◀](#) = 5 (jog mode) and the jog command is „ON“, the b maXX[®] 1000 will accelerate from minimum output frequency [▶P0038◀](#) to jog frequency [▶P1184◀](#). When the jog command is „OFF“, the b maXX[®] 1000 will decelerate from jog frequency to zero. The used accel/decel time is set by the jog ramp-up/ramp-down time ([▶P1182◀](#), [▶P1183◀](#)).

Before using the JOG command, the drive must be stopped first and operation mode [▶P1000◀](#) must be set to 5. During Jog operation, other operation commands are not accepted, except commands via the FORWARD, REVERSE and STOP keys on the digital keypad.

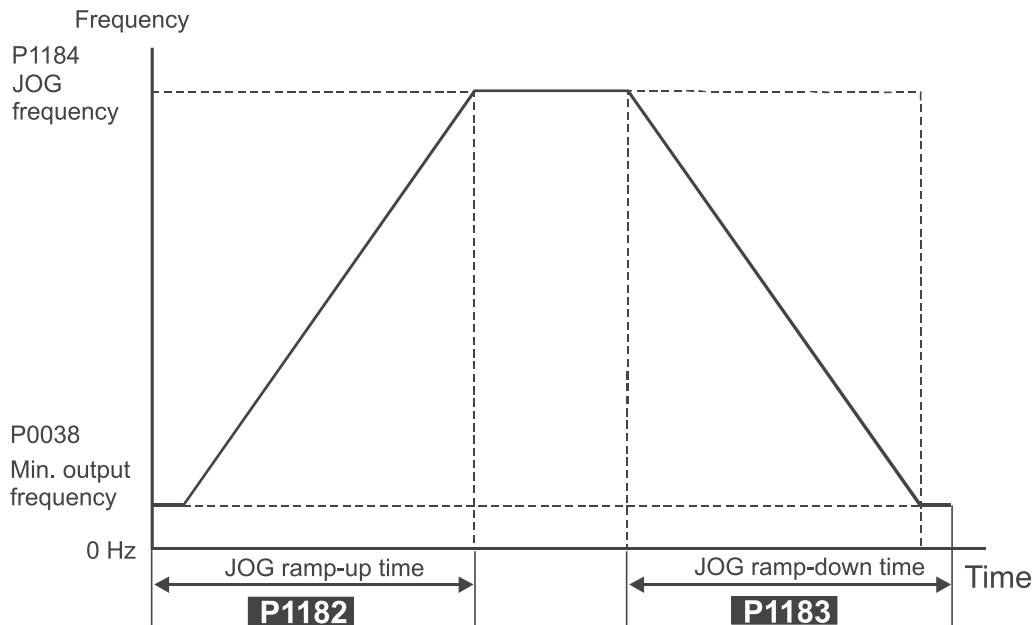


Figure 51: Jog ramp-up/ramp-down time

P1185	RFG Auto Hochlauf/Rücklauf	0 to 4
EE	RFG Auto acceleration/deceleration	0
STOP	BM_u_AutoAccelDecel	1:1

Settings for ramp function generator.

Value	Meaning
0	Linear acceleration / deceleration
1	Auto acceleration, linear deceleration
2	Linear acceleration, auto deceleration
3	Auto acceleration / deceleration (set by load)
4	Auto acceleration / deceleration (set by accel/decel time setting)

With auto acceleration / deceleration it is possible to reduce vibration and shocks during starting/stopping the load.

During auto acceleration the torque is automatically measured and the drive will accelerate to the set frequency with the fastest acceleration time and the smoothest starting current.

During auto deceleration, regenerative energy is measured and the motor is smoothly stopped with the fastest deceleration time.

But when this parameter is set to 04, the actual accel/decel time will be equal to or more than parameter [▶P1172◀](#), [▶P1173◀](#), [▶P1180◀](#), [▶P1185◀](#).

Auto acceleration/deceleration makes the complicated processes of tuning unnecessary. It makes operation efficient and saves energy by acceleration without stall and deceleration without brake resistor.

In applications with brake resistor or brake unit, Auto deceleration shall not be used.

P1186	RFG Hochlauf/Rücklauf Zeiteinheit	0 to 1
EE	RFG accel/decel time unit	0
STOP	BM_u_AccelDecelTimeUnit	1:1

Set for all RFG accel/decel times the time unit.

Value	Meaning
0	Unit: 0.1 s
1	Unit: 0.01 s

The ramp are selected according to the multi-function input terminals settings. See [▶P1091◀](#) to [▶P1094◀](#) for more details.

In the diagram shown below, the acceleration/deceleration time of the b maXX[®] 1000 is the time between 0 Hz to maximum output frequency [▶P0033◀](#). Suppose the maximum output frequency is 60 Hz, minimum output frequency [▶P0038◀](#) is 1.0 Hz, and acceleration/deceleration time is 10 seconds. The actual time for the b maXX[®] 1000 to accelerate from start-up to 60 Hz and to decelerate from 60 Hz to 1.0 Hz is in this case 9.83 s $((60-1) * 10/60=9.83 \text{ s})$.

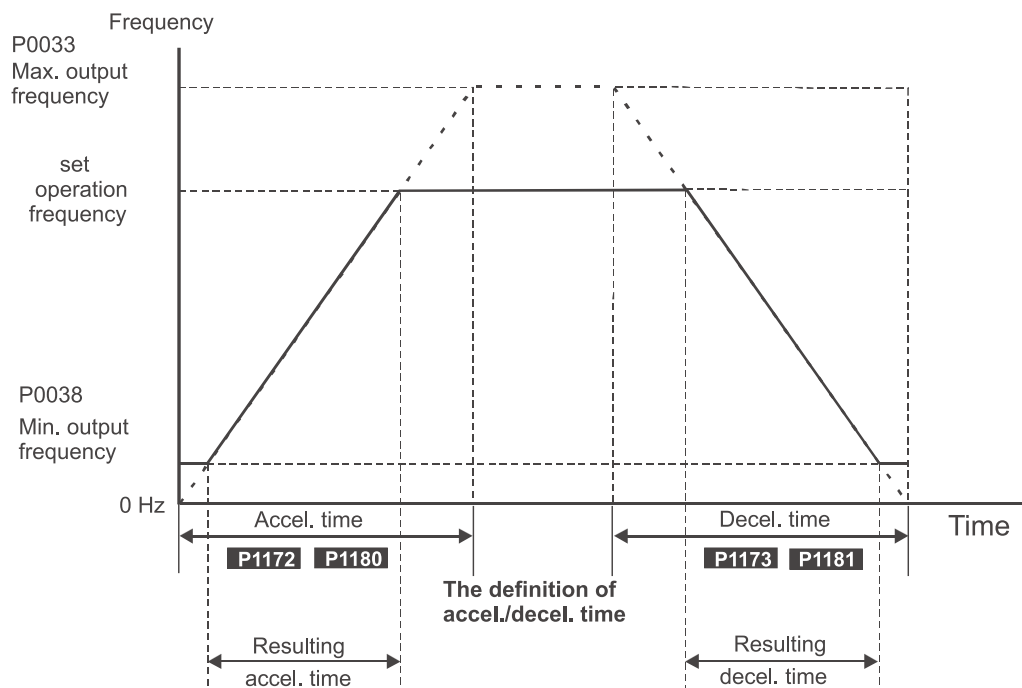


Figure 52: Resulting accel/decel time

P1187	Hochlaufgeber Status	0 to 65535
-	Ramp function generator status	0
A	BM_u_RFGStatus	1:1

Status for ramp function generator.

Bit	Meaning
0 to 3	reserved
4	1: RFG output is internally set to 0 (RFG inhibit)
5	1: RFG is stopped on the ramp (RFG stop)
6	1: RFG input is internally set to 0 (RFG zero)
7	1: Quickstop ramp is active (RFG quickstop)
8	1: Ramp-up is active
9	1: Ramp-down is active
11 ... 10	reserved
12	1: RFG output = RFG input (set value reached)

P1188	HLG Ausgang	0.00 to 600.00 Hz
-	RFG output	0.00 Hz
A	BM_u_RFGOutput	100:1

This parameter displays the frequency output of the ramp function generator.

P1189	1. Stufengeschwindigkeit	0.00 to 600.00 Hz
EE	1st step speed frequency	0.00 Hz
ON	BM_u_1StepSpeedFrequency	100:1 -

The multi-function input terminals MI3 to MI5 or MI7 to MI12 (refer to [▶P1091◀](#) to [▶P1093◀](#) and [▶P1095◀](#) to [▶P1100◀](#)) are used to select one of the b maXX[®] 1000 multi-step speeds. The speeds (frequencies) are determined by [▶P1189◀](#) to [▶P1203◀](#), for further information see [▶Figure 24◀](#) on page 78.

P1190	2. Stufengeschwindigkeit	0.00 to 600.00 Hz
EE	2nd step speed frequency	0.00 Hz
ON	BM_u_2StepSpeedFrequency	100:1 -

The multi-function input terminals MI3 to MI5 or MI7 to MI12 (refer to [▶P1091◀](#) to [▶P1093◀](#) and [▶P1095◀](#) to [▶P1100◀](#)) are used to select one of the b maXX[®] 1000 multi-step speeds. The speeds (frequencies) are determined by [▶P1189◀](#) to [▶P1203◀](#), for further information see [▶Figure 24◀](#) on page 78.

P1191	3. Stufengeschwindigkeit	0.00 to 600.00 Hz
EE	3rd step speed frequency	0.00 Hz
ON	BM_u_3StepSpeedFrequency	100:1 -
<p>The multi-function input terminals MI3 to MI5 or MI7 to MI12 (refer to ▶P1091◀ to ▶P1093◀ and ▶P1095◀ to ▶P1100◀) are used to select one of the b maXX[®] 1000 multi-step speeds. The speeds (frequencies) are determined by ▶P1189◀ to ▶P1203◀, for further information see ▶Figure 24◀ on page 78.</p>		
P1192	4. Stufengeschwindigkeit	0.00 to 600.00 Hz
EE	4th step speed frequency	0.00 Hz
ON	BM_u_4StepSpeedFrequency	100:1 -
<p>The multi-function input terminals MI3 to MI5 or MI7 to MI12 (refer to ▶P1091◀ to ▶P1093◀ and ▶P1095◀ to ▶P1100◀) are used to select one of the b maXX[®] 1000 multi-step speeds. The speeds (frequencies) are determined by ▶P1189◀ to ▶P1203◀, for further information see ▶Figure 24◀ on page 78.</p>		
P1193	5. Stufengeschwindigkeit	0.00 to 600.00 Hz
EE	5th step speed frequency	0.00 Hz
ON	BM_u_5StepSpeedFrequency	100:1 -
<p>The multi-function input terminals MI3 to MI5 or MI7 to MI12 (refer to ▶P1091◀ to ▶P1093◀ and ▶P1095◀ to ▶P1100◀) are used to select one of the b maXX[®] 1000 multi-step speeds. The speeds (frequencies) are determined by ▶P1189◀ to ▶P1203◀, for further information see ▶Figure 24◀ on page 78.</p>		
P1194	6. Stufengeschwindigkeit	0.00 to 600.00 Hz
EE	6th step speed frequency	0.00 Hz
ON	BM_u_6StepSpeedFrequency	100:1 -
<p>The multi-function input terminals MI3 to MI5 or MI7 to MI12 (refer to ▶P1091◀ to ▶P1093◀ and ▶P1095◀ to ▶P1100◀) are used to select one of the b maXX[®] 1000 multi-step speeds. The speeds (frequencies) are determined by ▶P1189◀ to ▶P1203◀, for further information see ▶Figure 24◀ on page 78.</p>		
P1195	7. Stufengeschwindigkeit	0.00 to 600.00 Hz
EE	7th step speed frequency	0.00 Hz
ON	BM_u_7StepSpeedFrequency	100:1 -
<p>The multi-function input terminals MI3 to MI5 or MI7 to MI12 (refer to ▶P1091◀ to ▶P1093◀ and ▶P1095◀ to ▶P1100◀) are used to select one of the b maXX[®] 1000 multi-step speeds. The speeds (frequencies) are determined by ▶P1189◀ to ▶P1203◀, for further information see ▶Figure 24◀ on page 78.</p>		

P1196	8. Stufengeschwindigkeit	0.00 to 600.00 Hz
EE	8th step speed frequency	0.00 Hz
ON	BM_u_8StepSpeedFrequency	100:1 -

The multi-function input terminals MI3 to MI5 or MI7 to MI12 (refer to [▶P1091◀](#) to [▶P1093◀](#) and [▶P1095◀](#) to [▶P1100◀](#)) are used to select one of the b maXX[®] 1000 multi-step speeds. The speeds (frequencies) are determined by [▶P1189◀](#) to [▶P1203◀](#), for further information see [▶Figure 24◀](#) on page 78.

P1197	9. Stufengeschwindigkeit	0.00 to 600.00 Hz
EE	9th step speed frequency	0.00 Hz
ON	BM_u_9StepSpeedFrequency	100:1 -

The multi-function input terminals MI3 to MI5 or MI7 to MI12 (refer to [▶P1091◀](#) to [▶P1093◀](#) and [▶P1095◀](#) to [▶P1100◀](#)) are used to select one of the b maXX[®] 1000 multi-step speeds. The speeds (frequencies) are determined by [▶P1189◀](#) to [▶P1203◀](#), for further information see [▶Figure 24◀](#) on page 78.

P1198	10. Stufengeschwindigkeit	0.00 to 600.00 Hz
EE	10th step speed frequency	0.00 Hz
ON	BM_u_10StepSpeedFrequency	100:1 -

The multi-function input terminals MI3 to MI5 or MI7 to MI12 (refer to [▶P1091◀](#) to [▶P1093◀](#) and [▶P1095◀](#) to [▶P1100◀](#)) are used to select one of the b maXX[®] 1000 multi-step speeds. The speeds (frequencies) are determined by [▶P1189◀](#) to [▶P1203◀](#), for further information see [▶Figure 24◀](#) on page 78.

P1199	11. Stufengeschwindigkeit	0.00 to 600.00 Hz
EE	11th step speed frequency	0.00 Hz
ON	BM_u_11StepSpeedFrequency	100:1 -

The multi-function input terminals MI3 to MI5 or MI7 to MI12 (refer to [▶P1091◀](#) to [▶P1093◀](#) and [▶P1095◀](#) to [▶P1100◀](#)) are used to select one of the b maXX[®] 1000 multi-step speeds. The speeds (frequencies) are determined by [▶P1189◀](#) to [▶P1203◀](#), for further information see [▶Figure 24◀](#) on page 78.

P1200	12. Stufengeschwindigkeit	0.00 to 600.00 Hz
EE	12th step speed frequency	0.00 Hz
ON	BM_u_12StepSpeedFrequency	100:1 -

The multi-function input terminals MI3 to MI5 or MI7 to MI12 (refer to [▶P1091◀](#) to [▶P1093◀](#) and [▶P1095◀](#) to [▶P1100◀](#)) are used to select one of the b maXX[®] 1000 multi-step speeds. The speeds (frequencies) are determined by [▶P1189◀](#) to [▶P1203◀](#), for further information see [▶Figure 24◀](#) on page 78.

4.3 Parameter description

P1201	13. Stufengeschwindigkeit	0.00 to 600.00 Hz
EE	13th step speed frequency	0.00 Hz
ON	BM_u_13StepSpeedFrequency	100:1 -
<p>The multi-function input terminals (refer to ▶P1091◀ to ▶P1094◀ are used to select one of the b maXX[®] 1000 multi-step speeds. The speeds (frequencies) are determined by ▶P1210◀ to ▶P1203◀ as shown above.</p>		
P1202	14. Stufengeschwindigkeit	0.00 to 600.00 Hz
EE	14th step speed frequency	0.00 Hz
ON	BM_u_14StepSpeedFrequency	100:1 -
<p>The multi-function input terminals (refer to ▶P1091◀ to ▶P1094◀ are used to select one of the b maXX[®] 1000 multi-step speeds. The speeds (frequencies) are determined by ▶P1210◀ to ▶P1203◀ as shown above.</p>		
P1203	15. Stufengeschwindigkeit	0.00 to 600.00 Hz
EE	15th step speed frequency	0.00 Hz
ON	BM_u_15StepSpeedFrequency	100:1 -
<p>The multi-function input terminals MI3 to MI5 or MI7 to MI12 (refer to ▶P1091◀ to ▶P1093◀ and ▶P1095◀ to ▶P1100◀) are used to select one of the b maXX[®] 1000 multi-step speeds. The speeds (frequencies) are determined by ▶P1189◀ to ▶P1203◀, for further information see ▶Figure 24◀ on page 78.</p>		
P1204	Anzeige Hochlaufgebereingang nach PID Regelung	0.00 to 600.00 Hz
-	Display RFG input after PID control	0.00 Hz
A	BM_u_DisplayRFGInputPIDControl	100:1 -
<p>This parameter displays the ramp function generator input after PID control.</p>		

P1210	Überspannung Abschaltenschutz	330.0 to 410.0 V _{DC} or 660.0 to 820.0 V _{DC}
EE	Over-voltage stall prevention	390.0 V or 780.0 V
STOP	BM_u_OverVoltageStallPrevention	10:1

The maximum value depends on the b maXX[®] used, up to 410.0 V for single-phase devices and up to 820.0 V for three-phase devices.

During deceleration, the DC bus voltage may exceed its maximum allowable value due to motor regeneration. When this function is enabled, the b maXX[®] 1000 will not decelerate further and keep the output frequency constant until the voltage drops below the pre-set value again.

Over-voltage stall prevention must be disabled (\triangleright P1210 \triangleleft = 0) when a brake unit or brake resistor is used.

NOTE



With moderate inertia load, over-voltage stall prevention will not occur and the real deceleration time will be equal to the setting of deceleration time. The b maXX[®] 1000 will automatically extend the deceleration time with high inertia loads. If the deceleration time is critical for the application, a brake resistor or brake unit should be used.

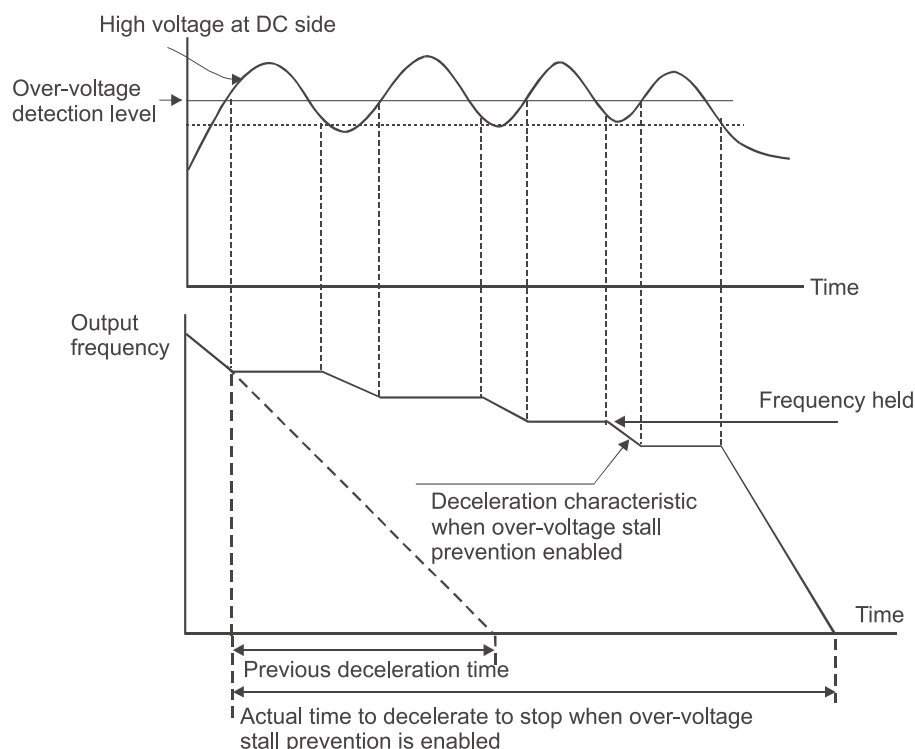


Figure 53: Over-voltage stall prevention

4.3 Parameter description

Value	Meaning
0.0	Disabled: over-voltage stall prevention with brake unit or brake resistor
330.0 to 410.0 V _{DC}	230 V device for 230 V mains voltage
660.0 to 820.0 V _{DC}	460 V device for 460 V mains voltage

P1211	Überstrom Abschaltenschutz während Hochlauf	0 to 250 %
EE	Over-current stall prevention level during acceleration	170 %
STOP	BM_u_OverCurrentStallPreventionLevelAccel	1:1

A setting of 100% is equal to the rated output current of the drive.

During acceleration, the b maXX[®] 1000 output current may increase abruptly and exceed the value specified by >P1212< due to rapid acceleration or excessive load on the motor. When this function is enabled, the b maXX[®] 1000 will stop accelerating and keep the output frequency constant until the current drops below the maximum value.

Value	Meaning
0	Disabled
20 to 250 %	Enabled

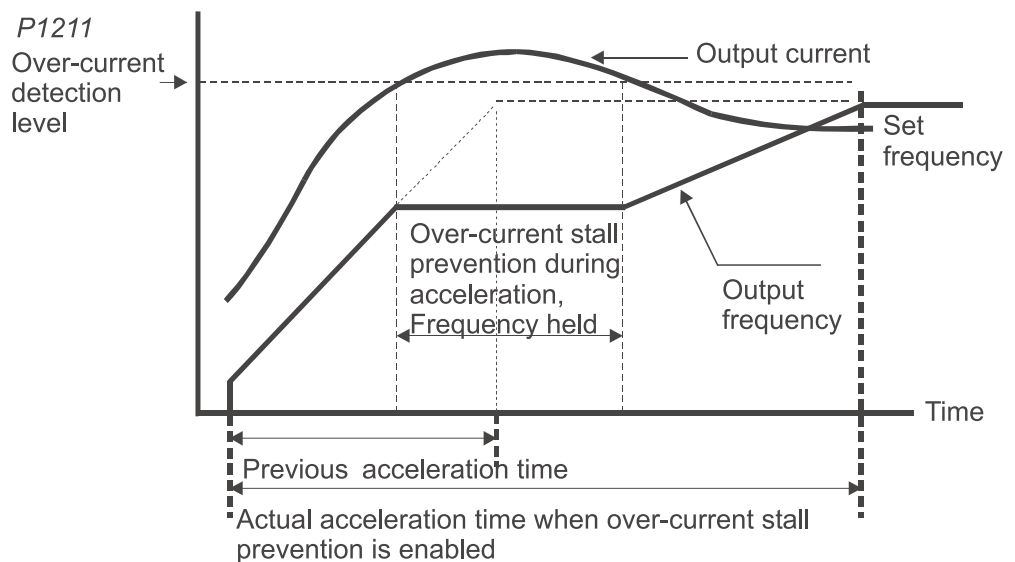


Figure 54: Over-current stall prevention during acceleration

P1212	Überstrom Abschaltenschutz während Betrieb	0 to 250 %
EE	Over-current stall prevention level during operation	170 %
STOP	BM_u_OverCurrentStallPreventionLevelOper	1:1

If the output current exceeds the setting specified in **▶P1212◀** when the drive is operating, the drive will decrease its output frequency to prevent the motor stall. If the output current is lower than the setting specified in **▶P1212◀**, the drive will accelerate again to catch up with the set frequency command value.

Value	Meaning
0	Disabled
20 to 250 %	Enabled

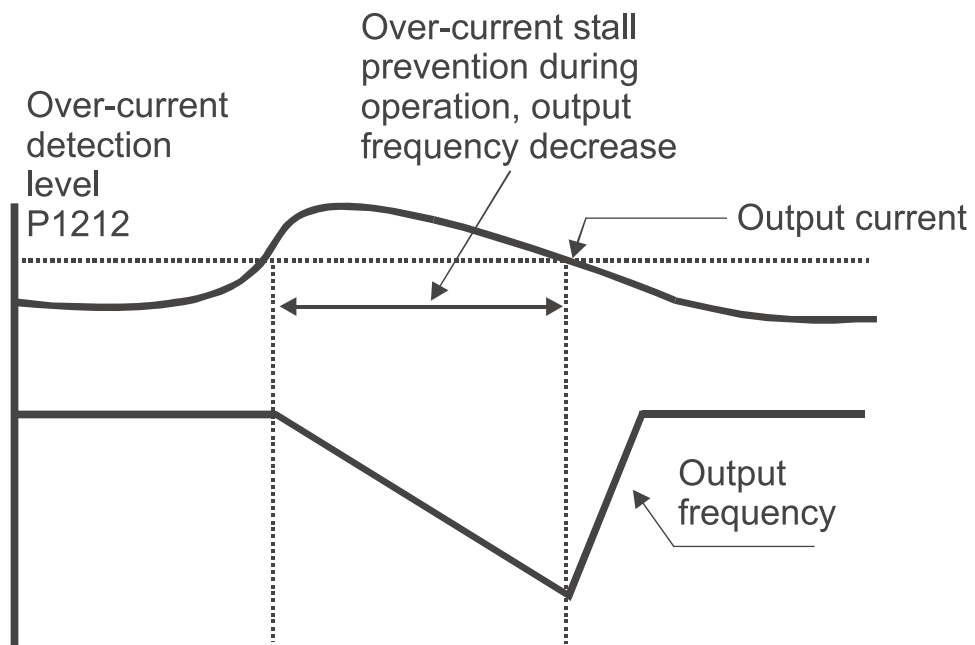


Figure 55: Over-current stall prevention during operation

4.3 Parameter description

P1213	Momenten-Überlast Erkennung	0 to 4
EE	Over-torque detection mode	0
STOP	BM_u_OverTorqueDetectMode	1:1 -

This parameter determines the operation mode of the drive after the over-torque (OL2) error code 0509_{hex} is detected via the following method: if the output current exceeds the over-torque detection level [▶P1214◀](#) longer than the setting of [▶P1215◀](#) over-torque detection time, the warning message „OL2“ is displayed. If a multi-functional output terminal is set to over-torque detection ([▶P1110◀](#) to [▶P1117◀](#) = 04), the output is on. Please refer to [▶P1110◀](#) to [▶P1117◀](#) for details.

Value	Meaning
0	Over-torque detection disabled
1	Over-Torque detection enabled during constant speed operation. After over-torque is detected, keep running until I _t ▶P1216◀ or OL (overload) occurs.
2	Over-Torque detection enabled during constant speed operation. After over-torque is detected, stop running.
3	Over-Torque detection enabled during acceleration. After over-torque is detected, keep running until I _t ▶P1216◀ or OL (overload) occurs.
4	Over-Torque detection enabled during acceleration. After over-torque is detected, stop running.

P1214	Momenten-Überlast Erkennung Grenze	10 to 200 %
EE	Over-torque detection mode level	150
ON	BM_u_OverTorqueDetectModeLevel	1:1 -

This setting is proportional to the rated output current of the drive.

P1215	Momenten-Überlast Erkennung Zeit	0.1 to 60.0 s
EE	Over-torque detection mode time	0.1 s
STOP	BM_u_OverTorqueDetectModeTime	10:1 -

This parameter sets the time for how long over-torque must be detected before „OL2“ is displayed.

P1216	Elektron. thermische Überlast Relais Auswahl	0 to 2
EE	Electronic thermal overload relay selection	2
STOP	BM_u_ElectronicThermalOverloadRelaySelection	1:1 -

This function is used to protect the motor from overloading or overheating. $I^2t > 100\%$ (OL) error code 0063_{hex}.

Value	Meaning
0	Operate with standard motor (self-cooled by fan)
1	Operate with a special motor (forced external cooling)
2	Operation disabled

This parameter sets the time the overtorque must be detected before (OL2) error code 0509_{hex} for [P1213](#).

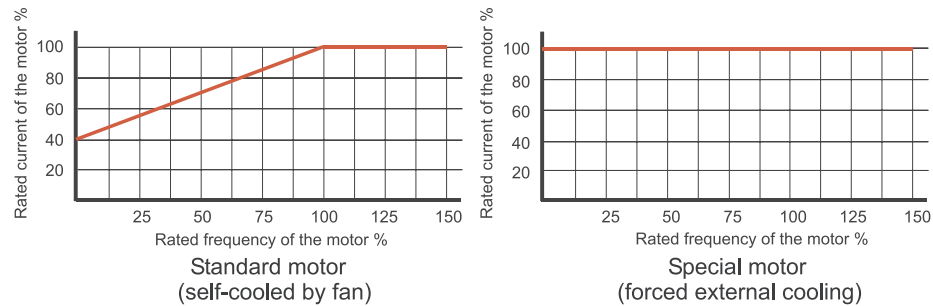


Figure 56: Electronic thermal overload relay

4.3 Parameter description

P1217	Elektron. thermische Kennlinie	30 to 600 s
EE	Electronic thermal characteristic	60 s
STOP	BM_u_ElectronicThermalCharacteristic	1:1 -

The parameter determines the time required for activating the I2t electronic thermal protection function. The graph below shows I2t curves for 150 % output power for 1 minute.

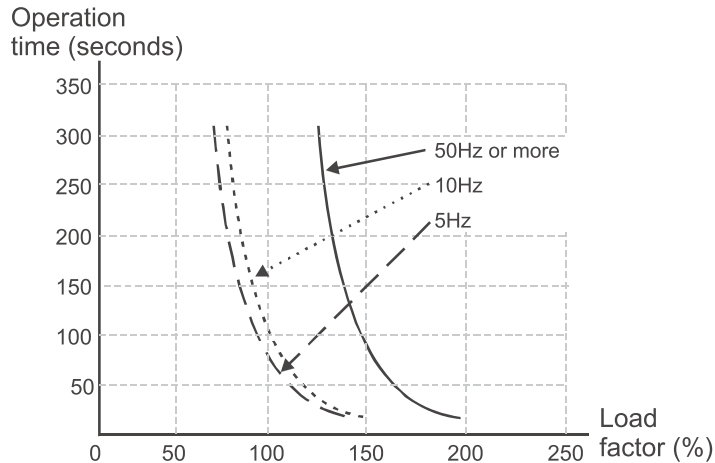


Figure 57: Electronic thermal characteristic

P1240	PWM Frequenz Auswahl	1 to 15 kHz
EE	PWM carrier frequency selections	8 kHz
STOP	BM_u_PWMCarrierFrequencySelections	1:1 -

This parameter determines the PWM carrier frequency of the b maXX[®] 1000.

Power	0.2 kW to 11 kW
Setting Range	1 to 15 kHz
Factory Setting	8 kHz

Carrier frequency	Acoustic noise	Electromagnetic noise or leakage current	Heat dissipation	Current wave
1kHz	Significant	Minimal	Minimal	Minimal
8kHz				
15kHz	Minimal	Significant	Significant	Significant

Figure 58: PWM carrier frequency selection

From the table, we see that the PWM carrier frequency has a significant influence on the electromagnetic noise, b maXX[®] 1000 heat dissipation, and motor acoustic noise.

The PWM carrier frequency will be decreased automatically by heat sink temperature and output current of the b maXX[®] 1000. It is used as a necessary precaution to prevent the b maXX[®] 1000 from overheating and thus extends IGBT's life. Example for 460V models: Assume the carrier frequency to be 15 kHz, the ambient temperature is 50 °C with a single b maXX[®] 1000 (mounting method A). If the output current exceeds 80% * rated current, the b maXX[®] 1000 will decrease the carrier frequency automatically according to the following chart. If output current is 100 % * rated current, the carrier frequency will decrease from 15 kHz to 12 kHz.

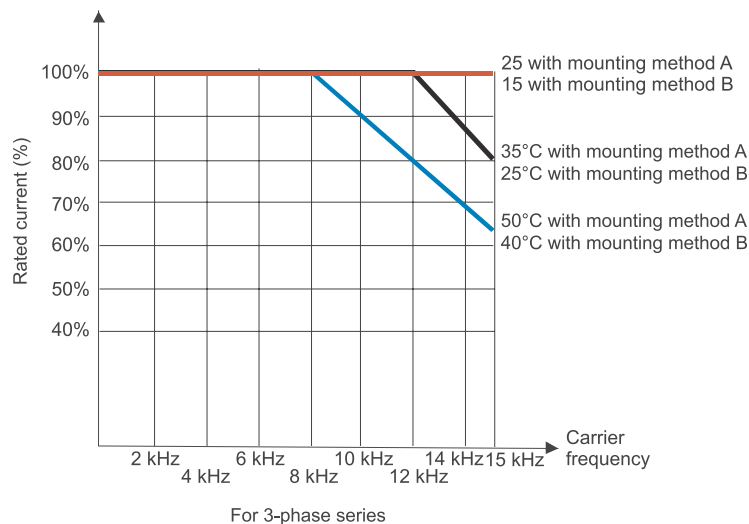
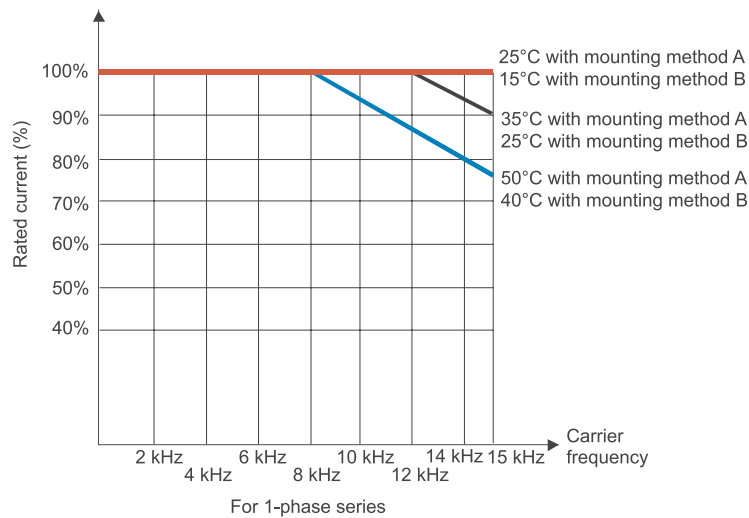


Figure 59: PWM carrier frequency

4.3 Parameter description

P1359	PID Sollwert Auswahl	0 to 5
EE	PID set point selection	0
STOP	BM_u_SetPointSelection	1:1 -

This parameter selects the set point source of the PID controller of b maXX[®] 1000.

Value	Meaning
0	Disable
1	Digital keypad UP/DOWN keys ▶P0801◀ = 0
2	AVI 0 to +10 V _{DC}
3	ACI 4 to 20 mA / AVI2 0 to +10V _{DC}
4	PID set point (▶P1380◀)
5	First to second frequency command ▶P0810◀

P1360	Eingang für PID Rückführung	0 to 3
EE	Input terminal for PID feedback	0
STOP	BM_u_InputPIDFeedback	1:1 -

Mode parameter for the freely programmable PID controller.

Value	Meaning
0	Positive feedback 0 to +10 V _{DC} AVI
1	Negative feedback 0 to +10 V _{DC} AVI
2	Positive feedback 4 to 20 mA ACI or Positive feedback 0 to +10 V _{DC} AVI2
3	Negative feedback 4 to 20 mA ACI or Negative feedback 0 to +10 V _{DC} AVI2

Note that the measured variable (feedback) controls the output frequency (Hz). Select input terminal accordingly. Make sure this parameter setting does not conflict with the setting for [▶P1359◀](#) (master frequency).

When [▶P1359◀](#) is set to 2 or 3, the set point (master frequency) for PID control is obtained from the AVI or ACI/AVI2 external terminal (0 to +10 V_{DC} or 4 to 20 mA) or from multi-step speed. When [▶P1359◀](#) is set to 1, the set point is obtained from the keypad.

Negative feedback means: +target value - feedback

Positive feedback means: -target value + feedback.

Complete PID diagram see [▶P1369◀](#).

P1361	Verstärkung (P)	0.0 to 10.0
EE	Proportional gain (P)	1.0
ON	BM_u_PGain	10:1 -

This parameter specifies proportional control and associated gain (P). If the other two gains (I and D) are set to zero, proportional control is the only one effective. With 10 % deviation (error) and $P = 1$, the output will be $P \times 10 \% \times$ master frequency.

NOTE

The parameter can be set during operation for easy tuning.



Complete PID diagram see [▶P1369◀](#).

P1362	Integrierzeit (I)	0.00 to 100.00 s
EE	Integral time (I)	1.00 s
ON	BM_u_IntegralTime	100:1 s -

This parameter specifies integral control (continual sum of the deviation) and associated gain (I). When the integral gain is set to 1 and the deviation is fixed, the output is equal to the input (deviation) once the integral time setting is attained.

NOTE

The parameter can be set during operation for easy tuning.



Complete PID diagram see [▶P1369◀](#).

P1363	Differenzierende Regelung (D)	0.00 to 1.00 s
EE	Derivative control (D)	0.00 s
ON	BM_u_IntegralTime	100:1 -

This parameter specifies derivative control (rate of change of the input) and associated gain (D). With this parameter set to 1, the PID output is equal to differential time \times (present deviation - previous deviation). It increases the response speed but it may cause over-compensation.

NOTE

The parameter can be set during operation for easy tuning.



Complete PID diagram see [▶P1369◀](#).

P1364	Obere Grenze Integralverstärkung	0 to 100 %
EE	Upper bound for integral control	100 %
STOP	BM_u_UpperBoundIntegralControl	1:1 -

This parameter defines an upper bound or limit for the integral gain (I) and therefore limits the master frequency.

The formula is:

Integral upper bound = maximum output frequency [▶P0033◀](#) x [▶P1364◀](#).

This parameter can limit the maximum output frequency.

Complete PID diagram see [▶P1369◀](#).

P1365	Hauptfilter Verzögerungszeit	0.0 to 2.5 s
EE	Primary delay filter time	0.0 s
STOP	BM_u_PrimaryDelayFilterTime	10:1 -

To avoid amplification of measurement noise in the controller output, a derivative digital filter is inserted. This filter helps to dampen oscillations.

Complete PID diagram see [▶P1369◀](#).

P1366	Ausgangsfrequenz Grenze	0 to 110 %
EE	Output frequency limit	100 %
STOP	BM_u_OutputFrequencyLimit	1:1 -

This parameter defines the percentage of output frequency limit during the PID control. The formula is:

Output frequency limit = maximum output frequency [▶P0033◀](#) x [▶P1366◀](#).

This parameter will limit the maximum output frequency. An overall limit for the output frequency can be set in [▶P0040◀](#).

Complete PID diagram see [▶P1369◀](#).

P1368	Antriebsreaktion auf PID Rückführung Fehler	0 to 2
EE	Treatment of PID feedback signal error	0
STOP	BM_u_PIDFeedbackSignalDetectionTime	1:1 -

b maXX[®] 1000 reaction when the feedback signals (analog PID feedback or PG (encoder) feedback) are abnormal according to [▶P1385◀](#).

Value	Meaning
0	Warn and RAMP to stop
1	Warn and COAST to stop
2	Warn and continue operation

Complete PID diagram see [▶P1369◀](#).

P1369	Verstärkung des PID Wertes	0.0 to 10.0
EE	Gain over the PID detection value	1.0
STOP	BM_u_GainPIDDetectionValue	10:1 -

This is the gain adjustment over the feedback detection value.

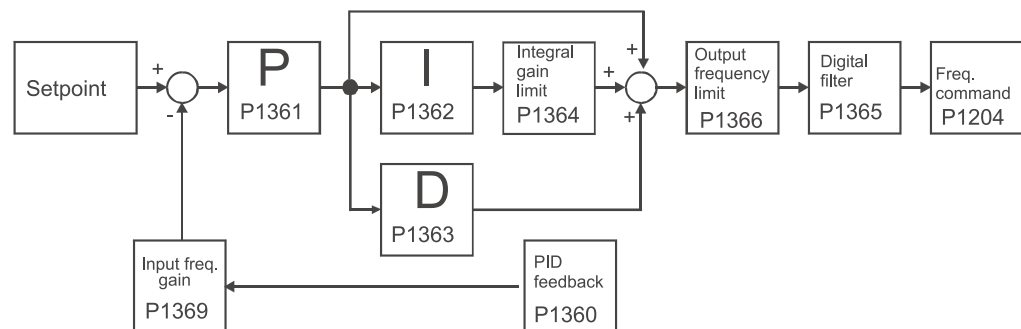


Figure 60: Complete PID diagram

P1370	Ausblendfrequenz 1 obere Grenze	0.00 to 600.00 Hz
EE	Skip frequency 1 upper bound	0.00
STOP	BM_u_SkipFrequency1UpperBound	100:1 -

This parameter sets one of the skip frequencies. For further information see [▶P1375◀](#).

P1371	Ausblendfrequenz 1 untere Grenze	0.00 to 600.00 Hz
EE	Skip frequency 1 lower bound	0.00
STOP	BM_u_SkipFrequency1LowerBound	100:1 -

This parameter sets one of the skip frequencies. For further information see [▶P1375◀](#).

4.3 Parameter description

P1372	Ausblendfrequenz 2 obere Grenze	0.00 to 600.00 Hz
EE	Skip frequency 2 upper bound	0.00
STOP	BM_u_SkipFrequency2UpperBound	100:1 -

This parameter sets one of the skip frequencies. For further information see [▶P1375◀](#).

P1373	Ausblendfrequenz 2 untere Grenze	0.00 to 600.00 Hz
EE	Skip frequency 2 lower bound	0.00
STOP	BM_u_SkipFrequency2LowerBound	100:1 -

This parameter sets one of the skip frequencies. For further information see [▶P1375◀](#).

P1374	Ausblendfrequenz 3 obere Grenze	0.00 to 600.00 Hz
EE	Skip frequency 3 upper bound	0.00
STOP	BM_u_SkipFrequency3UpperBound	100:1 -

This parameter sets one of the skip frequencies. For further information see [▶P1375◀](#).

P1375	Ausblendfrequenz 4 untere Grenze	0.00 to 600.00 Hz
EE	Skip frequency 4 lower bound	0.00
STOP	BM_u_SkipFrequency4LowerBound	100:1 -

This parameter sets one of the skip frequencies. It will cause the b maXX[®] 1000 never to remain within these frequency ranges with continuous frequency output.

These six parameters should be set as follows

[▶P1370◀](#) ≥ [▶P1371◀](#) ≥ [▶P1372◀](#) ≥ [▶P1373◀](#) ≥ [▶P1374◀](#) ≥ [▶P1375◀](#).

The frequency ranges may be overlapping.

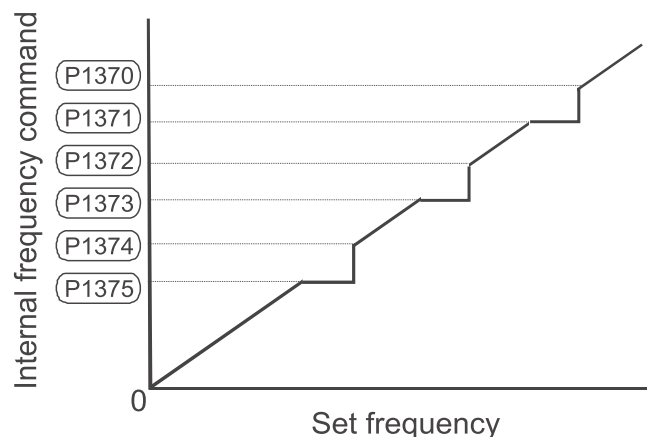


Figure 61: Skip frequencies

P1380	Quelle PID Sollwert	0.00 to 600.00 Hz
EE	Source of PID set point	0.00
ON	BM_u_SourcePIDSetPoint	100:1 Hz -

This parameter is used in conjunction with [▶P1359◀](#) set 4 to input a set point in Hz.

P1381	PID Offset	1.0 to 50.0 %
EE	PID offset level	10.0 %
STOP	BM_u_PIDOffsetLevel	10:1 -

This parameter is used to set detection of the offset between set point and feedback.

When the offset is higher than the setting of [▶P1381◀](#) for a time exceeding the setting of [▶P1382◀](#), the b maXX[®] 1000 will output a signal when [▶P1110◀](#) and [▶P1117◀](#) is set to 16.

P1382	Ansprechzeit PID Offset	0.1 to 300.0 s
EE	Detection time of PID offset level	5.0 s
STOP	BM_u_DetectionTimePIDOffsetLevel	10:1 -

This parameter defines the time during which the PID feedback must be abnormal before a warning (see [▶P1368◀](#)) is given. It also can be modified according to the system feedback signal time.

P1383	Ansprechzeit Stand-by	0.0 to 6550.0 s
EE	Sleep/wake up detection time	0.0 s
STOP	BM_u_SleepWakeUpDetectionTime	10:1 -

When the actual output frequency \leq [▶P1384◀](#) and the time exceeds the setting of [▶P1383◀](#), the b maXX[®] 1000 will be in sleep mode.

When the actual frequency command $>$ [▶P1385◀](#) and the time exceeds the setting of [▶P1383◀](#), the b maXX[®] 1000 will restart.

When the b maXX[®] 1000 is in sleep mode, frequency command is still calculated by PID. When frequency reaches wake up frequency, b maXX[®] 1000 will accelerate from [▶P0038◀](#) minimum frequency following the V/f curve.

The wake up frequency must be higher than sleep frequency.

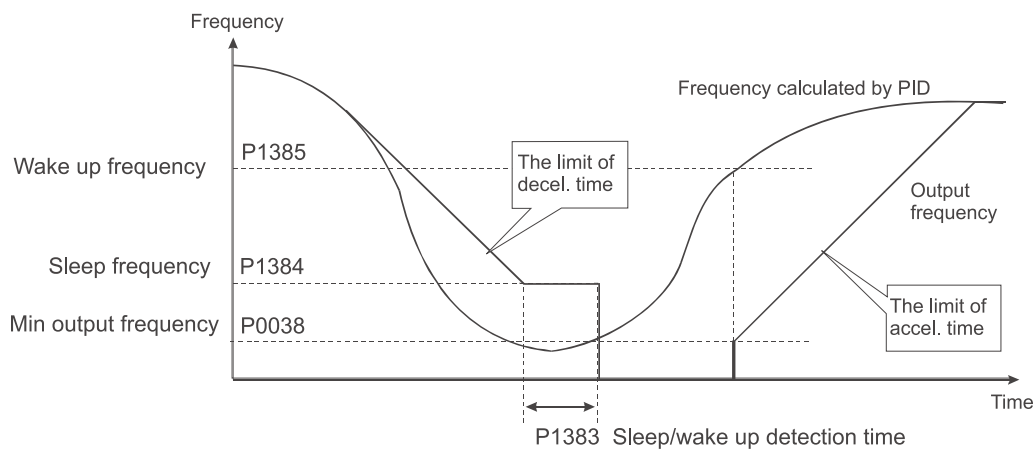
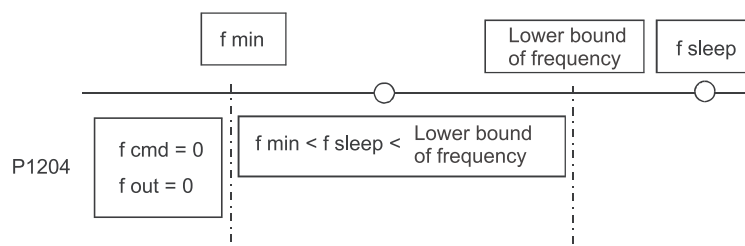


Figure 62: Wake up/ sleep frequency



When output frequency \leq sleep frequency \triangleright P1384 \triangleleft (f_{sleep}) and time $>$ detection time \triangleright P1383 \triangleleft , it will go in sleep mode.

When min. output frequency \leq PID frequency \leq lower bound of frequency and sleep function is enabled (output frequency \leq sleep frequency and time $>$ detection time), frequency will be 0 (in sleep mode). If sleep function is disabled, frequency command = lower bound frequency.

When PID frequency $<$ min. output frequency and sleep function is enabled (output frequency \leq sleep frequency and time $>$ detection time), output frequency = 0 (in sleep mode).

If output frequency \leq sleep frequency but time $<$ detection time, frequency command = lower frequency. If sleep function is disabled, output frequency = 0.

P1384

	PID Stand-by Abschalt-Frequenz	0.00 to 600.00 Hz
EE	PID sleep frequency	0.00
STOP	BM_u_SleepFrequency	100:1 Hz -

This parameter sets the sleep frequency, for further information see \triangleright P1383 \triangleleft .

P1385	PID Stand-by Einschalt-Frequenz	0.00 to 600.00 Hz
EE	PID wake up frequency	0.00
STOP	BM_u_WakeUpFrequency	100:1 Hz -

This parameter sets the wake up frequency, for further information see [▶P1383◀](#)

P1386	Minimale PID Ausgangsfrequenz mode	0 to 1
EE	Minimum PID output frequency selection	0
STOP	BM_u_PIDFeedbackSignalDetectionTime	1:1 -

This is the source selection of minimum output frequency when control is by PID.

Value	Meaning
0	By PID control
1	By minimum output frequency (▶P0038◀)

Complete PID diagram see [▶P1369◀](#).

P2030	Passwortschutz Eingabe	0 to 9999
EE	Password protect input	0
STOP	BM_u_PasswordProtectInput	1:1 -

The function of this parameter is to input the password that is set in [▶P2031◀](#). Input the correct password here to enable changing parameters. You are limited to a maximum of 3 attempts. After 3 consecutive failed attempts, a blinking „error code 0503_{hex}“ will show up to force the user to restart the b maXX[®] 1000 in order to try again to input the correct password.

Value	Meaning
0 - 2	Display: times of wrong password
0 to 9999	Password input settings

4.3 Parameter description

P2031	Passwortschutz	0 to 9999	
EE	Password protect set	0	
STOP	BM_u_PasswordProtectSet	1:1	-

To set a password to protect your parameter settings.

If the display shows 0, no password is set or password has been correctly entered in [▶P2030◀](#). All parameters can then be changed, including [▶P2031◀](#).

The first time you can set a password directly. After successful setting of password the display will show 1.

Be sure to record the password for later use.

To cancel the parameter lock, set the parameter to 0 after inputting correct password into [▶P2030◀](#).

The password consists of min. 1 digits and max. 4 digits.

How to make the password valid again after decoding by [▶P2030◀](#):

Method 1: Re-input original password into [▶P2031◀](#) (or you can enter a new password if you want to use a changed or new one).

Method 2: After rebooting, password function will be recovered.

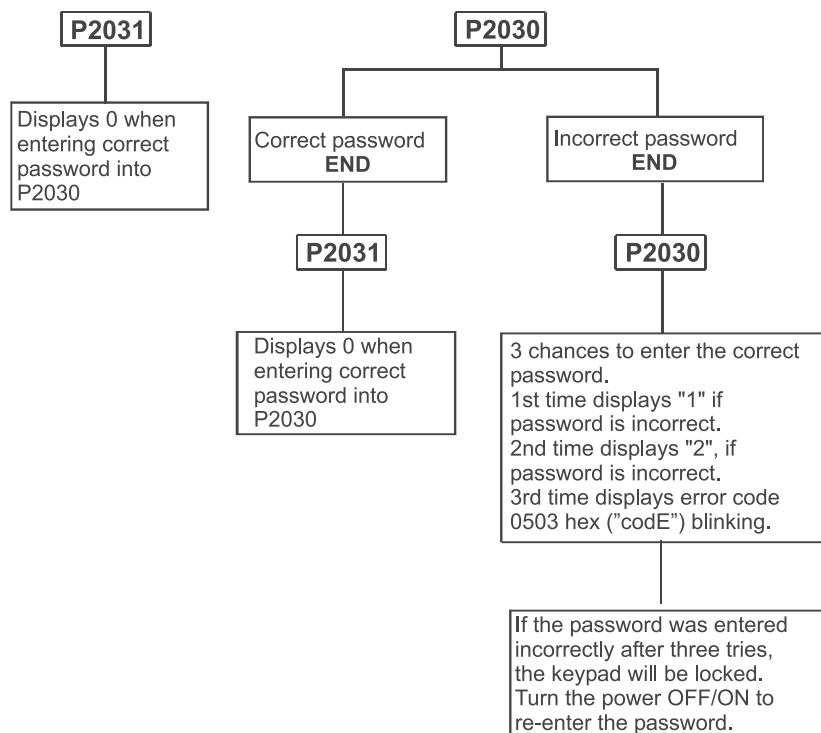







Figure 63: Password protect set

Value	Meaning
0	Display: No password set or successful input in ▶P2030◀
1	Display: Password has been set
0 to 9999	Password settings





P2060	Start Anzeige	0 to 4
EE	Start-up display selection	0
ON	BM_u_StartUpDisplaySelection	1:1

This parameter determines the start-up display page after power is applied to the drive.











Value	Meaning	
0	Display the frequency command value (Fxxx)	
1	Display the actual output frequency (Hxxx)	
2	Display the output current in A supplied to the motor (Axxx)	
3	Display the content of user-defined unit (Uxxx)	
4	FWD/REV command	

P2061	Inhalt Multi-Funktions-Anzeige	0 to 14
EE	Content of multi function display	0
ON	BM_u_MultiFunctionDisplay	1:1

This parameter determines the content of the multi function display.

Value	Meaning	
0	Display the content of user-defined unit (Uxxx)	
1	Display the counter value which counts the number of pulses on TRG terminal	
2	reserved	
3	Display the actual DC bus voltage in V_{DC} of the b maXX [®] 1000	
4	Display the output voltage in V_{AC} of terminals 1U2, 1V2, 1W2 to the motor	

4.3 Parameter description

Value	Meaning	
5	Display PID analog feedback signal value in %	
6	Display the power factor angle in ° of terminals 1U2, 1V2, 1W2 to the motor	
7	Display the output power in kW of terminals 1U2, 1V2, 1W2 to the motor	
8	Display the estimated value of torque in Nm as it relates to current	
9	Display the signal of AVI analog input terminal (V)	
10	Display the signal of ACI analog input terminal (mA) or display the signal of AVI2 analog input terminal (V)	
11	Display the temperature of IGBT (h) in °C	
12	Display the signal of ACI2 analog input terminal (mA) or display the signal of AVI3 analog input terminal (V)	
13	Display the signal of ACI3 analog input terminal (mA) or display the signal of AVI4 analog input terminal (V)	
14	Display PG speed RPM	

P2062	Anzeige Stromsollwert	0.0 to 99.9	
-	Display the current set value	0	
A	BM_u_DisplayCurrentSetValue	1:1	-
	Display of the current set value [A].		
P2063	Anzeige AVI analoges Eingangssignal	0 to 1023	
-	Display of AVI analog input terminal	0	
A	BM_u_DisplayAVI	1:1	-
	Display the signal of the AVI analog input terminal [increment].		
	1023 Inc \Leftrightarrow 10.0 V		
	0 - 1023 Inc \Leftrightarrow 0.0 - 10.0 V		
P2064	Anzeige ACI oder AVI2 analoger Eingang	0 to 1023	
-	Display of ACI or AVI2 analog input terminal	0	
A	BM_u_DisplayACIAVI2	1:1	-
	Display the signal of the ACI or AVI2 analog input terminal [mA or V].		
	1023 Inc \Leftrightarrow 20.0 mA or 10.0 V		
	0 - 1023 Inc \Leftrightarrow 0.0 - 20.0 mA or 0.0 - 10.0 V		
P2065	Anzeige ACI2 oder AVI3 analoger Eingang	0 to 4095	
-	Display of ACI2 or AVI3 analog input terminal	0	
A	BM_u_DisplayACI2AVI3	1:1	-
	Display the signal of the ACI2 or AVI3 analog input terminal [mA or V].		
	4095 Inc \Leftrightarrow 20.0 mA or 10.0 V		
	0 - 4095 Inc \Leftrightarrow 0.0 - 20.0 mA or 0.0 - 10.0 V		
P2066	Anzeige ACI3 oder AVI4 analoger Eingang	0 to 4095	
-	Display of ACI3 or AVI4 analog input terminal	0	
A	BM_u_DisplayACI3AVI4	1:1	-
	Display the signal of the ACI3 or AVI4 analog input terminal [mA or V].		
	4095 Inc \Leftrightarrow 20.0 mA or 10.0 V		
	0 - 4095 Inc \Leftrightarrow 0.0 - 20.0 mA or 0.0 - 10.0 V		

4.3 Parameter description

P2067	Anzeige Geber PG Eingang	0 to 65535 Inc	
-	Display of encoder PG input terminal	0	
A	BM_u_EncoderPGInputTerminal	1:1	-
	Display the signal of the encoder PG input terminal [Inc].		
P2068	Anzeige Geber PG A/O Ausgang	0 to 65535 Inc	
-	Display of encoder PG A/O output terminal	0	
A	BM_u_EncoderPGAOutputTerminal	1:1	-
	Display the signal of the encoder PG A/O output terminal [V]. 65535 Inc \Leftrightarrow 24.00 V 0 - 65535 Inc \Leftrightarrow 0.00 - 24.00 V 1 revolution \Leftrightarrow 65535 Inc		
P2069	Anzeige Geber PG B/O FWD, REV Ausgang	0 to 1	
-	Display of encoder PG B/O FWD, REV output terminal	0	
A	BM_u_EncoderPGBOFwdDRevOutputTerminal	1:1	-
	Display the signal of the encoder PG B/O output terminal [V]. 0 \Leftrightarrow FWD, 1 \Leftrightarrow REV 0 - 1 \Leftrightarrow 0.00 - 24.00 V		
P2070	Anzeige AFM analoger Ausgang	0 to 1023	
-	Display of AFM analog output	0	
A	BM_u_AFMAAnalogOutput	1:1	-
	Display the signal of AFM analog output [V]. 1023 Inc \Leftrightarrow 10.00 V 0 - 1023 Inc \Leftrightarrow 0.00 - 10.00 V		
P2071	Anzeige AO1 analoger Ausgang	0 to 4095	
-	Display of AO1 analog output	0	
A	BM_u_AO1AnalogOutput	1:1	-
	Display the signal of AO1 analog output [mA or V]. 4095 Inc \Leftrightarrow 20.0 mA or 10.0 V 0 - 4095 Inc \Leftrightarrow 0.0 - 20.0 mA or 0.0 - 10.0 V		

P2072	Anzeige AO2 analoger Ausgang	0 to 65535	
-	Display of AO2 analog output	0	
A	BM_u_AO2AnalogOutput	1:1	-
	Display the signal of AO2 analog output [mA or V]. 4095 Inc \leftrightarrow 20.0 mA or 10.0 V 0 - 4095 Inc \leftrightarrow 0.0 - 20.0 mA or 0.0 - 10.0 V		
P2073	Anzeige Geschwindigkeits-Istwert in U/min	0 to 36000 rpm	
-	Display speed actual value in rpm	0 rpm	
A	BM_u_DisplaySpeedActValue	1:1	-
	Display the speed actual value in rpm.		
P2080	Benutzerdefinierter Faktor K	0.1 to 160.0	
EE	User defined coefficient K	1.0	
ON	BM_u_UserDefinedCoeffK	10:1	
	The coefficient K determines the multiplying factor for the user-defined unit. The display value is calculated as follows: U (User-defined unit) = Actual output frequency * K ▶P2080◀		
	Example: A conveyor belt runs at 13.6 m/s at motor speed 60 Hz. K = 13.6/60 = 0.22 (0.226667 rounded to 1 decimal), therefore ▶P2080◀ = 0.2 With Frequency command 35 Hz, display shows U and 35 · 0.2 = 7.0 m/s. (To increase accuracy, use K = 2.2 or K = 22.7 and disregard decimal point)		
P2081	Motorbetriebszeit (Minuten)	0 to 1439	
-	Accumulative motor operation time (min)	0	
A	BM_u_AccumulMotorOperationTimeMin	1:1	
	▶P2081◀ and ▶P2082◀ are used to record the motor operation time. They can be cleared by setting to 0 and time is less than 1 minute is not recorded.		

4.3 Parameter description

P2082	Motorbetriebszeit (Tag)	0 to 1439
-	Accumulative motor operation time (day)	0
A	BM_u_AccumulMotorOperationTimeDay	1:1

▶P2081◀ and ▶P2082◀ are used to record the motor operation time. They can be cleared by setting to 0 and time is less than 1 minute is not recorded.

P2100	Typenschlüssel (word 1)	1111 to 1999
-	Identity code (word 1)	1xxx
A	BM_u_IdentCodeWord1	1:1

This parameter displays the identity code (word 1) of the b maXX® 1000. Identity code (word 2) is displayed via parameter ▶P2101◀.

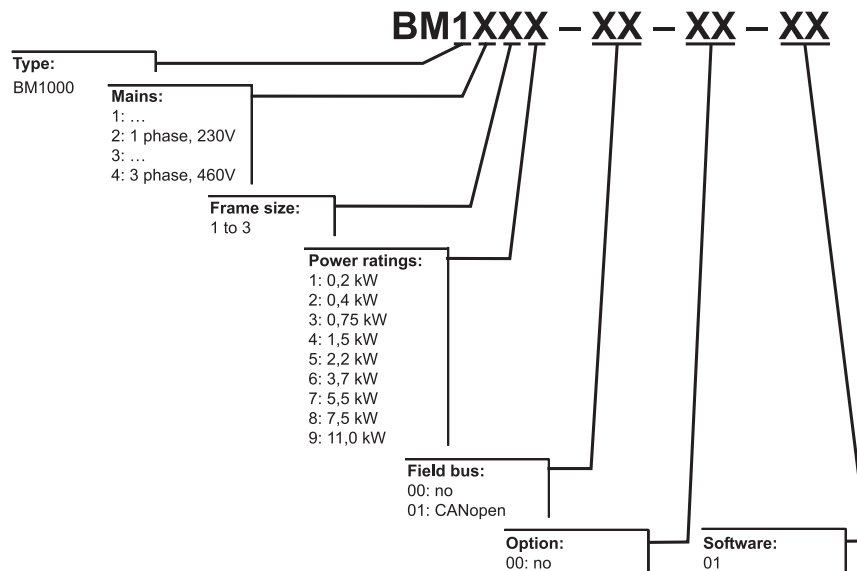


Figure 64: Type code

P2101	Typenschlüssel (word 2)	1111 to 1999
-	Identity code (word 2)	1xxx
A	BM_u_IdentCodeWord2	1:1

This parameter displays the identity code (word 2) of the b maXX[®] 1000.

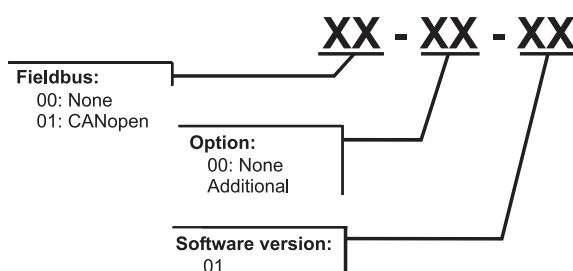


Figure 65: Type code field bus and software

P2102	Leistungsteil Seriennummer (word 1)	0 to 9999
-	Power unit serial number (word 1)	0
A	BM_u_AmpSerialNrWord1	1:1 -

Display of power unit serial number. In word 1 the production place and date is coded.

Value	Meaning
0	Not defined serial number
1 to 9999	Code including place of manufacture and production year

P2103	Leistungsteil Seriennummer (word 2)	0 to 99
-	Power unit serial number (word 2)	0
A	BM_u_AmpSerialNrWord2	1:1 -

Display of power unit serial number (word 2). This parameter displays the number of b maXX[®] 1000 built per year.

99 ⇔ 990000

P2104	Leistungsteil Seriennummer (word 3)	0 to 9999
-	Power unit serial number (word 3)	0
A	BM_u_AmpSerialNrWord3	1:1 -

Display of power unit serial number (word 3). This parameter displays the number of b maXX[®] 1000 built per year.

99 ⇔ 990000

4.3 Parameter description

P2105	Benutzerdefinierte Einheit	0 to 60000	
-	User-defined unit	0	
A	BM_u_UserDefinedUnit	1:1	-
	This parameter displays the user-defined unit (Uxxx).		
P2106	Zähler Triggerimpulse	0 to 65535	
-	Trigger count value	0	
A	BM_u_TriggerCountValue	1:1	-
	This parameter displays the number of pulses on TRG terminal.		
P2108	Zwischenkreis Spannung	0.0 to 1000.0 V	
-	DC link voltage	0.0 V	
A	BM_u_DCLinkVoltage	10:1	-
	This parameter displays the DC link voltage in V_{DC} .		
P2109	Ausgangsspannung	0.0 to 1000.0 V	
-	Output voltage	0.0 V	
A	BM_u_OutputVoltage	10:1	-
	This parameter displays the output voltage of the terminals U/T1, V/T2, W/T3 to the motor in V_{AC} .		
P2110	PID Rückführung	0.00 to 327.67 %	
-	PID feedback	0.00 %	
A	BM_u_PIDFeedback	100:1	-
	Here the PID analog feedback signal value in % is displayed (after the multiplication by gain), complete PID diagram see ▶P1369◀ .		
P2111	Leistungsfaktor Winkel	0.0 to 99.9 °	
-	Power factor angle	0.0 °	
A	BM_u_PowerFactorAngle	10:1	-
	This parameter displays the power factor angle in ° of the terminals U/T1, V/T2, W/T3 to the motor.		

P2112	Ausgangsleistung	0.00 to 99.99 kW
-	Output power	0.00 kW
A	BM_u_OutputPower	100:1 -
	This parameter displays the output power in kW of the terminals U/T1, V/T2, W/T3 to the motor.	
P2113	Ausgangsmoment	0.00 to 655.35 Nm
-	Output torque	0.00 Nm
A	BM_u_OutputTorque	100:1 -
	This parameter displays the estimated value of torque in Nm as it relates to the current.	
P2114	Frequenzsollwert	0.00 to 600.00 Hz
-	Set point frequency	0.00 Hz
A	BM_u_SetPointFrequency	100:1 -
	The frequency command value is displayed here.	
P2115	Frequenzistwert	0.00 to 600.00 Hz
-	Actual output frequency	0.00 Hz
A	BM_u_ActualFrequency	100:1 -
	The actual value of frequency is displayed here.	
P2116	IGBT Temperatur	0.0 to 999.9 °C
-	IGBT temperature	0.0 °C
A	BM_u_IGBTTemperature	10:1 -
	This parameter displays the temperature of the IGBT in °C.	
P2117	Ausgangsstrom	0.0 to 99.9 A
-	Output current	0.0 A
A	BM_u_OutputCurrent	10:1 A -
	This parameter displays the output current in A supplied to the motor.	

4.3 Parameter description

P2118	Drehrichtung vor/zurück	0 to 1	
-	FWD/REV	0	
A	BM_u_FWD_REV	1:1	-

This parameter displays whether the motor command have set forward or reverse rotation of the motor.

Value	Meaning
0	FWD rotation
1	REV rotation

P2119	Geber Geschwindigkeit U/min (optional)	0 to 65535 rpm	
-	PG speed RPM (option)	0 rpm	
A	BM_u_SpeedRPM	1:1	-

This parameter displays the PG (encoder card, only incremental encoder) speed in rpm.

P2120	Benutzerdatensatz 1	0 to 65535	
EE	Data set for use 1	0	
ON	BM_u_DataSet1	1:1	-

P2121	Benutzerdatensatz 2	0 to 65535	
EE	Data set for use 2	0	
ON	BM_u_DataSet2	1:1	-

P2122	Benutzerdatensatz 3	0 to 65535	
EE	Data set for use 3	0	
ON	BM_u_DataSet3	1:1	-

P2123	Benutzerdatensatz 4	0 to 65535	
EE	Data set for use 4	0	
ON	BM_u_DataSet4	1:1	-

P2124	Benutzerdatensatz 5	0 to 65535	
EE	Data set for use 5	0	
ON	BM_u_DataSet5	1:1	-
P2125	Benutzerdatensatz 6	0 to 65535	
EE	Data set for use 6	0	
ON	BM_u_DataSet6	1:1	-
P2126	Benutzerdatensatz 7	0 to 65535	
EE	Data set for use 7	0	
ON	BM_u_DataSet7	1:1	-
P2127	Benutzerdatensatz 8	0 to 65535	
EE	Data set for use 8	0	
ON	BM_u_DataSet8	1:1	-
P2128	Benutzerdatensatz 9	0 to 65535	
EE	Data set for use 9	0	
ON	BM_u_DataSet9	1:1	-
P2129	Benutzerdatensatz 10	0 to 65535	
EE	Data set for use 10	0	
ON	BM_u_DataSet10	1:1	-
P2130	Benutzerdatensatz 11	0 to 65535	
EE	Data set for use 11	0	
ON	BM_u_DataSet11	1:1	-

4.3 Parameter description

P2131	Benutzerdatensatz 12	0 to 65535	
EE	Data set for use 12	0	
ON	BM_u_DataSet12	1:1	-
P2120	Benutzerdatensatz 13	0 to 65535	
EE	Data set for use 13	0	
ON	BM_u_DataSet13	1:1	-
P2120	Benutzerdatensatz 14	0 to 65535	
EE	Data set for use 14	0	
ON	BM_u_DataSet14	1:1	-
P2134	Benutzerdatensatz 15	0 to 65535	
EE	Data set for use 15	0	
ON	BM_u_DataSet15	1:1	-
P2135	Benutzerdatensatz 16	0 to 65535	
EE	Data set for use 16	0	
ON	BM_u_DataSet16	1:1	-
P2136	Benutzerdatensatz 17	0 to 65535	
EE	Data set for use 17	0	
ON	BM_u_DataSet17	1:1	-
P2137	Benutzerdatensatz 18	0 to 65535	
EE	Data set for use 18	0	
ON	BM_u_DataSet18	1:1	-

P2138	Benutzerdatensatz 19	0 to 65535	
EE	Data set for use 19	0	
ON	BM_u_DataSet19	1:1	-
P2139	Benutzerdatensatz 20	0 to 65535	
EE	Data set for use 20	0	
ON	BM_u_DataSet20	1:1	-
P2140	CAN baudrate	0 to 5	
EE	CAN baudrate for CAN with switch on	2	
STOP	BM_u_CANBaudrateWithSwitchOn	1:1	-

This parameter value is used as CAN baudrate if one of the b maXX[®] 1000 hardware DIP switches is ON (see [▶P0870◀](#)). [▶P0871◀](#) is used as CAN baudrate if all DIP switches are OFF.

Value	Meaning
0	1000 kbaud
1	500 kbaud
2	250 kbaud
3	125 kbaud
4	100 kbaud
5	50 kbaud

4.3 Parameter description

P2141	Adresse-Einstellung für DIP-Schalter 1	0 to 127
EE	Address setting for DIP switch 1	21
STOP	BM_u_CANBaudrateWithSwitchOn1	1:1 -

This parameter together with [▶P2148◀](#) (DIP switch multiplier) determines the CAN address.

If [▶P2148◀](#) = 0, [▶P2141◀](#) default value is 21.

If [▶P2148◀](#) > 0, $\text{▶P2141◀} = \text{▶P2141◀} \cdot \text{▶P2148◀}$

[▶P0870◀](#) (b maXX[®] 1000 CAN address) is equal to the value of [▶P2141◀](#), if the DIP switch setting is 1.

[▶P2148◀](#) = 0

DIP switch			DIP switch value	CAN address setting	Default value
1	2	3			
1	0	0	1	▶P2141◀	21
0	1	0	2	▶P2142◀	22
1	1	0	3	▶P2143◀	23
0	0	1	4	▶P2144◀	24
1	0	1	5	▶P2145◀	25
0	1	1	6	▶P2146◀	26
1	1	1	7	▶P2147◀	27

[▶P2148◀](#) > 0

DIP switch			DIP switch value	CAN address setting	Default value
1	2	3			
1	0	0	1	▶P2141◀	$1 \cdot \text{▶P2148◀}$
0	1	0	2	▶P2142◀	$2 \cdot \text{▶P2148◀}$
1	1	0	3	▶P2143◀	$3 \cdot \text{▶P2148◀}$
0	0	1	4	▶P2144◀	$4 \cdot \text{▶P2148◀}$
1	0	1	5	▶P2145◀	$5 \cdot \text{▶P2148◀}$
0	1	1	6	▶P2146◀	$6 \cdot \text{▶P2148◀}$
1	1	1	7	▶P2147◀	$7 \cdot \text{▶P2148◀}$

P2142	Adresse-Einstellung für DIP-Schalter 2	0 to 127	
EE	Address setting for DIP switch 2	22	
STOP	BM_u_CANBaudrateWithSwitchOn2	1:1	-
	This parameter together with ▶P2148◀ (DIP switch multiplier) determines the CAN address.		
	If ▶P2148◀ = 0, ▶P2142◀ default value is 21.		
	If ▶P2148◀ > 0, $\text{▶P2142◀} = \text{▶P2142◀} \cdot \text{▶P2148◀}$		
	For further information see ▶P2141◀ on page 152.		
P2143	Adresse-Einstellung für DIP-Schalter 3	0 to 127	
EE	Address setting for DIP switch 3	23	
STOP	BM_u_CANBaudrateWithSwitchOn3	1:1	-
	This parameter together with ▶P2148◀ (DIP switch multiplier) determines the CAN address.		
	If ▶P2148◀ = 0, ▶P2143◀ default value is 21.		
	If ▶P2148◀ > 0, $\text{▶P2143◀} = \text{▶P2143◀} \cdot \text{▶P2148◀}$		
	For further information see ▶P2141◀ on page 152.		
P2144	Adresse-Einstellung für DIP-Schalter4	0 to 127	
EE	Address setting for DIP switch4	24	
STOP	BM_u_CANBaudrateWithSwitchOn4	1:1	-
	This parameter together with ▶P2148◀ (DIP switch multiplier) determines the CAN address.		
	If ▶P2148◀ = 0, ▶P2144◀ default value is 21.		
	If ▶P2148◀ > 0, $\text{▶P2144◀} = \text{▶P2144◀} \cdot \text{▶P2148◀}$		
	For further information see ▶P2141◀ on page 152.		
P2145	Adresse-Einstellung für DIP-Schalter 5	0 to 127	
EE	Address setting for DIP switch 5	25	
STOP	BM_u_CANBaudrateWithSwitchOn5	1:1	-
	This parameter together with ▶P2148◀ (DIP switch multiplier) determines the CAN address.		
	If ▶P2148◀ = 0, ▶P2145◀ default value is 21.		
	If ▶P2148◀ > 0, $\text{▶P2145◀} = \text{▶P2145◀} \cdot \text{▶P2148◀}$		
	For further information see ▶P2141◀ on page 152.		

4.3 Parameter description

P2146	Adresse-Einstellung für DIP-Schalter 6	0 to 127
EE	Address setting for DIP switch 6	26
STOP	BM_u_CANBaudrateWithSwitchOn6	1:1 -
<p>This parameter together with ▶P2148◀ (DIP switch multiplier) determines the CAN address.</p> <p>If ▶P2148◀ = 0, ▶P2146◀ default value is 21.</p> <p>If ▶P2148◀ > 0, $\text{▶P2146◀} = \text{▶P2146◀} \cdot \text{▶P2148◀}$</p> <p>For further information see ▶P2141◀ on page 152.</p>		
P2147	Adresse-Einstellung für DIP-Schalter 7	0 to 127
EE	Address setting for DIP switch 7	27
STOP	BM_u_CANBaudrateWithSwitchOn7	1:1 -
<p>This parameter together with ▶P2148◀ (DIP switch multiplier) determines the CAN address.</p> <p>If ▶P2148◀ = 0, ▶P2147◀ default value is 21.</p> <p>If ▶P2148◀ > 0, $\text{▶P2147◀} = \text{▶P2147◀} \cdot \text{▶P2148◀}$</p> <p>For further information see ▶P2141◀ on page 152.</p>		
P2148	DIP-Schalter Multiplikator	0 to 18
EE	DIP switch multiplier	8
STOP	BM_u_DIPSwitchMultiplier	1:1 -
<p>▶P2148◀ DIP switch multiplier is used together with parameters ▶P2141◀ to ▶P2147◀.</p> <p>If ▶P2148◀ = 0, ▶P2141◀ to ▶P2147◀ can be set by user to 1 to 127 as CAN address.</p> <p>If ▶P2148◀ > 0, the values of the DIP switches 1 to 7 are multiplied by ▶P2148◀ and stored at ▶P2141◀ to ▶P2147◀.</p> <p>If all DIP switches = OFF the CAN address is read from ▶P2141◀ to ▶P2147◀.</p> <p>For further information see ▶P2141◀ on page 152.</p>		



APPENDIX A - PARAMETER LIST

Parameter		Range	Standard value	Internal standardization	Page
P0001	Controller type	1000	1	1:1	20
P0002	Controller firmware type	0 to 65535	0	1:1	20
P0003	Controller firmware ID	0 to 65535	0	1:1	20
P0004	Controller firmware ID	2.000 to 5.999	2.000	1000:1	21
P0005	Parameter table version	0 to 65535	1	1:1	21
P0006	Identity code 1	0 to 1999	1xxx	1:1	21
P0007	Power unit serial number	0 to 9999	0	1:1	22
P0009	Power unit software version	1.00 to 5.99	1.00	100:1	22
P0010	Power unit rate current	0.0 to 99.9 A	0.0 A	10:1	23
P0024	Fan control	0 to 3	0	1:1	23
P0032	50 Hz base volt selection	0 to 1	0	1:1	23
P0033	Maximum output frequency	50.00 to 600.00 Hz	50.00 Hz	100:1	23
P0036	Mid-point frequency (Fmid)	0.10 to 600.0 Hz	1.50 Hz	100:1 Hz	24
P0037	Mid-point voltage (Vmid)	0.1 to 255.0 V or 0.1 to 510.0 V	10.0 V or 20.0 V	10:1 V	24
P0038	Minimum output frequency (Fmin)	0.10 to 600.0 Hz	1.50 Hz	100:1	24
P0039	Minimum output voltage (Vmin)	0.1 to 255.0 V or 0.1 to 510.0 V	10.0 V or 20.0 V	10:1 V	25
P0040	Output frequency: upper limit	0.1 to 120.0 %	110.0 %	10:1	25
P0041	Output frequency: lower limit	0.0 to 100.0 %	0.0 %	10:1	26
P0050	Motor type code	0 _{hex} to FFFF _{hex}	-	1:1	27
P0051	Motor serial number	0 to 65535	0	1:1	27
P0053	Motor rated voltage	0.1 to 255.0 V or 0.1 to 510.0 V	220.0 V or 440.0 V	10:1 V	27
P0054	Motor rated current	0,3* P0010 bis 1,2* P0010	P0010	10:1	27
P0056	Motor nominal power	0.00 to 99.99 kW	0.00 kW	100:1	28
P0057	Motor rated speed	1 to 65535 rpm	1 rpm	1:1 rpm	28
P0058	Motor power factor	0.6 to 1.0	0.9	10:1	28

Parameter		Range	Standard value	Internal standardization	Page
P0061	Motor nominal frequency	0.10 to 600.00 Hz	50.00 Hz (\triangleright P0310 \triangleleft = 9) or 60.00 Hz (\triangleright P0310 \triangleleft = 10)	100:1	28
P0065	Motor number of pole pairs	1 to 10	2	1:1	28
P0077	Motor line-to-line resistance	0 to 65535 m Ω	0 m Ω	1:1	29
P0110	Motor no-load current	0.0 to 99.0 % \triangleright P0054 \triangleleft	40.0 % \triangleright P0054 \triangleleft	10:1	29
P0111	Motor rated slip (Motor nominal slip)	0.00 to 20.00 Hz	3.00 Hz	100:1	29
P0112	Torque compensation	0.0 to 10.0 Hz	0.0 Hz	10:1	29
P0113	Torque compensation time constant	0.01 to 10.00 s	0.10 s	100:1	30
P0114	Motor slip compensation	0.00 to 10.00 %	0.00 %	1:1	30
P0115	Motor slip compensation limit	0 to 250 %	200 %	1:1	30
P0116	Motor slip compensation time constant	0.05 to 10.00 s	0.20 s	100:1 s	31
P0117	Motor PTC overheat protection	0 to 1	0	1:1	31
P0118	Input filter time constant of the PTC protection	0 to 9999	100 (200 ms)	1:2	31
P0119	Motor PTC overheat fault level	0.1 to 10.0 V	2.4 V	10:1	32
P0120	Motor PTC overheat warning level	0.1 to 10.0 V	1.2 V	10:1	33
P0121	Motor PTC overheat reset delta level	0.1 to 5.0 V	0.6 V	10:1	33
P0122	Motor PTC overheat warning protection	0 to 2	0	1:1	34
P0123	Motor rated speed/nominal slip master selection	0 to 1	1	1:1	34
P0124	Motor rated speed/nominal slip master selection confirm	0 to 2	0	1:1	34
P0240	Present fault record	0 to 052F _{hex}	0	1:1	35
P0241	Second most recent fault record	0 to 052F _{hex}	0	1:1	36
P0242	Third most recent fault record	0 to 052F _{hex}	0	1:1	37
P0243	Fourth most recent fault record	0 to 052F _{hex}	0	1:1	37
P0244	Fifth most recent fault record	0 to 052F _{hex}	0	1:1	37
P0296	Reaction CAN-bus drop-out	0 to 255	0	1:1	38
P0297	Error reaction power lost	0 to 255	0	1:1	38
P0300	Controlword	0 _{hex} to FFFF _{hex}	0	1:1	39
P0301	Statusword	0 to 65535	0	1:1	40
P0304	Operation mode actual	0 to 249	249	1:1	42
P0305	Drive status	0 to 15	0	1:1	42
P0310	Parameter reset	0 to 11	0	1:1	43
P0311	Data set status	0 to 2	0	1:1	43
P0317	EEPROM write count	1 to 65535	0	1:1	43
P0558	Controller hardware version	0 to 65535	1	1:1	44
P0800	Control method	0 to 1	0	1:1	44
P0801	Source of first master frequency command	1 to 225	5	1:1	44
P0802	Source of first operation command	1 to 5	5	1:1	45
P0803	Stop method	0 to 3	1	1:1	46
P0805	Line start lockout	0 to 3	1	1:1	48
P0806	Loss of ACI Signal	0 to 2	1	1:1	50
P0807	Up/Down Mode	0 to 3	0	1:1	51
P0809	Source of second master frequency command	1 to 255	0	1:1	51

Parameter		Range	Standard value	Internal standardization	Page
P0810	Combination of first and second master frequency command	0 to 2	0	1:1	52
P0811	Keypad frequency command	0.00 to 600.00 Hz	50.00 Hz (>P0310< = 9) or 60.00 Hz (>P0310< = 10)	100:1 Hz	52
P0812	Communication frequency command	0.00 to 600.00 Hz	50.00 Hz (>P0310< = 9) or 60.00 Hz (>P0310< = 10)	100:1	52
P0813	Selections for saving keypad or communication frequency	1 to 2	0	1:1	52
P0814	Initial frequency selection	0 to 2	0	1:1	53
P0815	Keypad and RS485 initial frequency setpoint	0.00 to 600.00 Hz	60.00	100:1	53
P0816	Display the master frequency command source	0 to 7	1	1:1	53
P0817	Display the operation command source	0 to 63	32	1:1	54
P0818	Auto restart after (OC or OV) fault numbers	0 to 10	0	1:1	54
P0819	Auto reset time at restart after fault	0.1 to 6000.0 s	60.0 s	10:1	54
P0820	Auto energy saving	0 to 1	0	1:1	55
P0821	Automatic voltage regulation function	0 to 3	0	1:1	55
P0822	Software braking level	370.0 to 430.0 V _{DC} or 740.0 to 860.0 V _{DC}	380.0 V _{DC} or 760.0 V _{DC}	10:1	56
P0823	Compensation coefficient for motor instability	0.0 to 5.0	0.0	10:1	56
P0850	Motor auto parameters auto tuning	0 to 2	0	1:1	57
P0860	Communication address RS485	1 to 254	1	1:1	58
P0861	Transmission speed RS485	0 to 3	3	1:1	58
P0862	RS485 Transmission fault treatment	0 to 3	3	1:1	58
P0863	RS485 Time-out detection	0.0 to 120.0 s	0.0 s	10:1	59
P0864	RS485 Communication protocol	0 to 5	3	1:1	59
P0865	RS485 Response delay time	0 to 200	1 [2 ms]	1:1	59
P0866	USB Communication card transmission speed	0 to 4	3	1:1	60
P0867	USB Communication card protocol	0 to 5	3	1:1	60
P0868	USB Communication card transmission fault treatment	0 to 3	0	1:1	60
P0869	USB Communication card over time detection	0.0 to 120.0 s	0.0 s	10:1	61
P0870	CANopen address	1 to 127	1	1:1	61
P0871	CAN rate	0 to 5	0	1:1	62
P0890	DC braking current level	0 to 100 %	0 %	1:1	62
P0891	DC braking time during start-up	0.0 to 60.0 s	0.0 s	10:1	62
P0892	DC braking time during stopping	0.0 to 60.0 s	0.0 s	10:1	62
P0893	Start point for DC braking	0.00 to 600.00 Hz	0.00 Hz	100:1	63
P0894	Momentary power loss operation selection	0 to 2	0	1:1	63
P0895	Maximum allowable power loss time	0.1 to 5.0 s	2.0 s	10:1	64
P0896	Base-block speed search	0 to 2	1	1:1	64
P0897	Baseblock time for speed search (BB)	0.1 to 5.0 s	0.5 s	10:1	66
P0898	Current limit for speed search	30 to 200 %	150 %	1:1	66
P0908	Accel/decel rate of change of UP/DOWN operation with constant speed	0.01 to 10.00 Hz/2 ms	0.01 Hz / 2 ms	100:1	67

Parameter		Range	Standard value	Internal standard-ization	Page
P0909	Source frequency for RS485 (Modbus) communication interface (rpm)	-32768 to 32767 rpm	0 rpm	1:1	67
P0910	Source frequency for CANopen communication interface (rpm)	0 to 36000 rpm	0 rpm	1:1	67
P0911	Speed multiplier CANopen/Modbus	0 to	1.00	100:1	68
P1000	Operation mode set value	1 to 249	6	1:1	68
P1004	QUICKSTOP reaction code (Hardware)	0 to 7	0	1:1	69
P1005	SHUTDOWN reaction code	0 to 3	0	1:1	69
P1007	Drive error reaction code	0 to 3	0	1:1	70
P1009	Reaction quickstop command (software)	0 to 255	0	1:1	70
P1010	Data set ID	0 to 65535	0	1:1	71
P1070	PG function selection (enable card)	0 to 3	0	1:1	71
P1071	PG pulse range	0 to 20000 Inc	600 Inc	1:1	71
P1072	PG proportional gain (P)	0.0 to 10.0	1.0	1:1	72
P1073	PG integral time	0.00 to 100.00 s	1.00 s	100:1	72
P1074	PG speed control output frequency limit	0.00 to 100.00 Hz	10.00 Hz	100:1	72
P1075	PG speed feedback signal display filter	0 to 9999	500	1:1	72
P1076	Detection time PG speed feedback signal fault	0.0 to 10.0 s	1.0 s	10:1 s	73
P1077	Feedback speed signal fault treatment	0 to 2	1	1:1	73
P1078	PG speed estimate filter	0 to 9999	1	1:2	73
P1079	Warning code	0 to 65535	0	1:1	74
P1090	Multi function input terminal (MI1, MI2)	0 to 2	0	1:1	75
P1091	Multi function input terminal (MI3)	0 to 24	1	1:1	76
P1092	Multi function input terminal (MI4)	0 to 24	2	1:1	79
P1093	Multi function input terminal (MI5)	0 to 24	23	1:1	79
P1094	Multi function input terminal (MI6)	0 to 24	24	1:1	79
P1095	Multi function input terminal (MI7)	0 to 24	0	1:1	80
P1096	Multi function input terminal (MI8)	0 to 24	0	1:1	80
P1097	Multi function input terminal (MI9)	0 to 24	0	1:1	80
P1098	Multi function input terminal (MI10)	0 to 24	0	1:1	80
P1099	Multi function input terminal (MI11)	0 to 24	0	1:1	80
P1100	Multi function input terminal (MI12)	0 to 24	0	1:1	80
P1101	Internal/external multi function input terminals selection	0 to 4095	0	1:1	81
P1102	Internal multi function terminal	0 to 4095	0	1:1	82
P1103	External multi function input contact selection	0 to 4095	0	1:1	84
P1104	Digital terminal input delay time	0 to 20	1	1:1	85
P1105	Display the status of external multi function input terminals	0 to 4095	0	1:1	86
P1106	Display the status of multi function input terminals	0 to 4095	0	1:1	87
P1110	Multi function output relay (RA1, RB1, RC1)	0 to 21	8	1:1	89
P1111	Multi function output (photocoupler output MO1)	0 to 21	1	1:1	90
P1112	Multi function output terminal (MO2/RA2)	0 to 21	0	1:1	90
P1113	Multi function output terminal (MO3/RA3)	0 to 21	0	1:1	90
P1114	Multi function output terminal (MO4/RA4)	0 to 65535	0	1:1	90
P1115	Multi function output terminal (MO5/RA5)	0 to 21	0	1:1	90

Parameter		Range	Standard value	Internal standard-ization	Page
P1116	Multi function output terminal (MO6/RA6)	0 to 21	0	1:1	90
P1117	Multi function output terminal (MO7/RA7)	0 to 21	0	1:1	90
P1118	Terminal count value	0 to 9999	0	1:1	91
P1119	Preliminary count value	0 to 9999	0	1:1	91
P1120	EF active when terminal count value attained	0 to 1	0	1:1	92
P1121	Brake release frequency	0.00 to 20.00 Hz	0.00 Hz	100:1	92
P1122	Brake engage frequency	0.00 to 20.00 Hz	0.00 Hz	100:1	93
P1123	Display the status of multi function output terminals	0 to 255	0	1:1	93
P1124	Desired frequency attained	0.00 to 600.00 Hz	0.00 Hz	100:1	94
P1125	Minimum AVI voltage	0.0 to 10.0 V	0.1 V	10:1 V	95
P1126	Minimum AVI frequency	0.0 to 100.0 %	0.0 %	10:1	96
P1127	Maximum AVI voltage	0.0 to 10.0 V	0.1 V	10:1	96
P1128	Maximum AVI frequency	0.0 to 100.0 %	0.0 %	10:1	96
P1129	ACI/AVI2 selection	0 to 65535	0	1:1	96
P1130	Minimum ACI current	0.0 to 20.0 mA	4.0 mA	10:1	97
P1131	Minimum ACI frequency	0.0 to 100.0 %	0.0 %	10:1	97
P1132	Maximum ACI current	0.0 to 20.0 mA	4.0 mA	10:1	97
P1133	Maximum ACI frequency	0.0 to 100.0 %	0.0 %	10:1	97
P1134	Minimum AVI2 voltage	0.0 to 10.0 V	0.1 V	10:1	97
P1135	Minimum AVI2 frequency	0.0 to 100.0 %	0.0 %	10:1	98
P1136	Maximum AVI2 voltage	0.0 to 10.0 V	0.1 V	10:1	98
P1137	Maximum AVI2 frequency	0.0 to 100.0 %	0.0 %	10:1	98
P1138	A11 function selection	0 to 5	0	1:1	98
P1139	ACI2/AVI3 selection for A11 terminal mode	0 to 1	0	1:1	99
P1140	Minimum AVI3 voltage	0.0 to 10.0 V	0.1 V	10:1	100
P1141	Minimum AVI3 frequency	0.0 to 100.0 %	0.0 %	10:1	100
P1142	Maximum AVI3 voltage	0.0 to 10.0 V	0.1 V	10:1	100
P1143	Maximum AVI3 frequency	0.0 to 100.0 %	0.0 %	10:1	100
P1144	Minimum ACI2 current	0.0 to 20.0 mA	4.0 mA	10:1	101
P1145	Minimum ACI2 frequency	0.0 to 100.0 %	0.0 %	10:1	101
P1146	Maximum ACI2 current	0.0 to 20.0 mA	4.0 mA	10:1	101
P1147	Maximum ACI2 frequency	0.0 to 100.0 %	0.0 %	10:1	101
P1148	A12 function selection	0 to 5	0	1:1	101
P1149	ACI3/AVI4 selection for A12 terminal mode	0 to 1	0	1:1	102
P1150	Minimum AVI4 voltage	0.0 to 10.0 V	0.1 V	10:1	102
P1151	Minimum AVI4 frequency	0.0 to 100.0 %	0.0 %	10:1	102
P1152	Maximum AVI4 voltage	0.0 to 10.0 V	0.1 V	10:1	102
P1153	Maximum AVI4 frequency	0.0 to 100.0 %	0.0 %	10:1	102
P1154	Minimum ACI3 current	0.0 to 20.0 mA	4.0 mA	10:1	103
P1155	Minimum ACI3 frequency	0.0 to 100.0 %	0.0 %	10:1	103
P1156	Maximum ACI3 current	0.0 to 20.0 mA	4.0 mA	10:1	103
P1157	Maximum ACI3 frequency	0.0 to 100.0 %	0.0 %	10:1	103
P1158	Keypad potentiometer bias	0.0 to 100.0 %	0.0 %	10:1	103
P1159	Keypad potentiometer bias polarity	0 to 1	0	1:1	108

	Parameter	Range	Standard value	Internal standard-ization	Page
P1160	Keypad potentiometer gain	0.1 to 100.0 %	100.0 %	1:1	108
P1161	Keypad potentiometer negative enable/disable	0 to 1	0	1:1	108
P1162	Analog output signal (AFM)	0 to 1	0	1:1	108
P1163	Analog output gain	1 to 200 %	100 %	1:1	109
P1164	AO1 terminal mode selection	0 to 2	0	1:1	109
P1165	Analog output signal AO1	0 to 1	0	1:1	110
P1166	Analog output gain AO1	0 to 200 %	100 %	1:1	110
P1167	AO2 terminal mode selection	0 to 2	0	1:1	110
P1168	Analog output signal AO2	0 to 1	0	1:1	111
P1169	Analog output gain AO2	0 to 200 %	100 %	1:1	111
P1170	Ramp function generator mode	0 to 120	0	1:1	112
P1171	Display ramp function generator input	0.0 to 600.00 Hz	0.00 Hz	100:1	112
P1172	RFG acceleration time 1	0.1 to 600.0 s or 0.01 to 60.00 s	10.0 s	10:1 or 100:1	112
P1173	RFG deceleration time 1	0.1 to 600.0 s or 0.01 to 60.00 s	10.0 s	10:1 or 100:1	113
P1174	RFG quickstop time	0.1 to 600.0 s or 0.01 to 60.00 s	10.0 s	10:1 or 100:1	113
P1176	RFG S-curve accel time	0.1 to 600.0 s or 0.01 to 60.00 s	10.0 s	10:1 or 100:1	113
P1177	RFG S-curve decel time	0.1 to 600.0 s or 0.01 to 60.00 s	10.0 s	10:1 or 100:1	114
P1180	RFG ramp-up time 2	0.1 to 600.0 s or 0.01 to 60.00 s	10.0 s	10:1 or 100:1	115
P1181	RFG ramp-down time 2	0.1 to 600.0 s or 0.01 to 60.00 s	10.0 s	10:1 or 100:1	115
P1182	RFG jog ramp-up time	0.1 to 600.0 s or 0.01 to 60.00 s	10.0 s	10:1 or 100:1	115
P1183	RFG jog ramp-down time	0.1 to 600.0 s or 0.01 to 60.00 s	10.0 s	10:1 or 100:1	115
P1184	RFG jog frequency	0.10 to 600.00 Hz	6.00 Hz	100:1 s	116
P1185	RFG Auto acceleration/deceleration	0 to 4	0	1:1	117
P1186	RFG accel/decel time unit	0 to 1	0	1:1	118
P1187	Ramp function generator status	0 to 65535	0	1:1	119
P1188	RFG output	0.00 to 600.00 Hz	0.00 Hz	100:1	119
P1189	1st step speed frequency	0.00 to 600.00 Hz	0.00 Hz	100:1	119
P1190	2nd step speed frequency	0.00 to 600.00 Hz	0.00 Hz	100:1	119
P1191	3rd step speed frequency	0.00 to 600.00 Hz	0.00 Hz	100:1	120
P1192	4th step speed frequency	0.00 to 600.00 Hz	0.00 Hz	100:1	120
P1193	5th step speed frequency	0.00 to 600.00 Hz	0.00 Hz	100:1	120
P1194	6th step speed frequency	0.00 to 600.00 Hz	0.00 Hz	100:1	120
P1195	7th step speed frequency	0.00 to 600.00 Hz	0.00 Hz	100:1	120
P1196	8th step speed frequency	0.00 to 600.00 Hz	0.00 Hz	100:1	121
P1197	9th step speed frequency	0.00 to 600.00 Hz	0.00 Hz	100:1	121
P1198	10th step speed frequency	0.00 to 600.00 Hz	0.00 Hz	100:1	121
P1199	11th step speed frequency	0.00 to 600.00 Hz	0.00 Hz	100:1	121

Parameter		Range	Standard value	Internal standardization	Page
P1200	12th step speed frequency	0.00 to 600.00 Hz	0.00 Hz	100:1	121
P1201	13th step speed frequency	0.00 to 600.00 Hz	0.00 Hz	100:1	122
P1202	14th step speed frequency	0.00 to 600.00 Hz	0.00 Hz	100:1	122
P1203	15th step speed frequency	0.00 to 600.00 Hz	0.00 Hz	100:1	122
P1204	Display RFG input after PID control	0.00 to 600.00 Hz	0.00 Hz	100:1	122
P1210	Over-voltage stall prevention	330.0 to 410.0 V _{DC} or 660.0 to 820.0 V _{DC}	390.0 V or 780.0 V	10:1	123
P1211	Over-current stall prevention level during acceleration	0 to 250 %	170 %	1:1	124
P1212	Over-current stall prevention level during operation	0 to 250 %	170 %	1:1	125
P1213	Over-torque detection mode	0 to 4	0	1:1	126
P1214	Over-torque detection mode level	10 to 200 %	150	1:1	126
P1215	Over-torque detection mode time	0.1 to 60.0 s	0.1 s	10:1	126
P1216	Electronic thermal overload relay selection	0 to 2	2	1:1	127
P1217	Electronic thermal characteristic	30 to 600 s	60 s	1:1	128
P1240	PWM carrier frequency selections	1 to 15 kHz	8 kHz	1:1	128
P1359	PID set point selection	0 to 5	0	1:1	130
P1360	Input terminal for PID feedback	0 to 3	0	1:1	130
P1361	Proportional gain (P)	0.0 to 10.0	1.0	10:1	131
P1362	Integral time (I)	0.00 to 100.00 s	1.00 s	100:1 s	131
P1363	Derivative control (D)	0.00 to 1.00 s	0.00 s	100:1	131
P1364	Upper bound for integral control	0 to 100 %	100 %	1:1	132
P1365	Primary delay filter time	0.0 to 2.5 s	0.0 s	10:1	132
P1366	Output frequency limit	0 to 110 %	100 %	1:1	132
P1368	Treatment of PID feedback signal error	0 to 2	0	1:1	133
P1369	Gain over the PID detection value	0.0 to 10.0	1.0	10:1	133
P1370	Skip frequency 1 upper bound	0.00 to 600.00 Hz	0.00	100:1	133
P1371	Skip frequency 1 lower bound	0.00 to 600.00 Hz	0.00	100:1	133
P1372	Skip frequency 2 upper bound	0.00 to 600.00 Hz	0.00	100:1	134
P1373	Skip frequency 2 lower bound	0.00 to 600.00 Hz	0.00	100:1	134
P1374	Skip frequency 3 upper bound	0.00 to 600.00 Hz	0.00	100:1	134
P1375	Skip frequency 4 lower bound	0.00 to 600.00 Hz	0.00	100:1	134
P1380	Source of PID set point	0.00 to 600.00 Hz	0.00	100:1 Hz	135
P1381	PID offset level	1.0 to 50.0 %	10.0 %	10:1	135
P1382	Detection time of PID offset level	0.1 to 300.0 s	5.0 s	10:1	135
P1383	Sleep/wake up detection time	0.0 to 6550.0 s	0.0 s	10:1	135
P1384	PID sleep frequency	0.00 to 600.00 Hz	0.00	100:1 Hz	136
P1385	PID wake up frequency	0.00 to 600.00 Hz	0.00	100:1 Hz	137
P1386	Minimum PID output frequency selection	0 to 1	0	1:1	137
P2030	Password protect input	0 to 9999	0	1:1	137
P2031	Password protect set	0 to 9999	0	1:1	138
P2060	Start-up display selection	0 to 4	0	1:1	139
P2061	Content of multi function display	0 to 14	0	1:1	139
P2062	Display the current set value	0.0 to 99.9	0	1:1	141

Parameter	Range	Standard value	Internal standardization	Page	
P2063	Display of AVI analog input terminal	0 to 1023	0	1:1	141
P2064	Display of ACI or AVI2 analog input terminal	0 to 1023	0	1:1	141
P2065	Display of ACI2 or AVI3 analog input terminal	0 to 4095	0	1:1	141
P2066	Display of ACI3 or AVI4 analog input terminal	0 to 4095	0	1:1	141
P2067	Display of encoder PG input terminal	0 to 65535 Inc	0	1:1	142
P2068	Display of encoder PG A/O output terminal	0 to 65535 Inc	0	1:1	142
P2069	Display of encoder PG B/O FWD, REV output terminal	0 to 1	0	1:1	142
P2070	Display of AFM analog output	0 to 1023	0	1:1	142
P2071	Display of AO1 analog output	0 to 4095	0	1:1	142
P2072	Display of AO2 analog output	0 to 65535	0	1:1	143
P2073	Display speed actual value in rpm	0 to 36000 rpm	0 rpm	1:1	143
P2080	User defined coefficient K	0.1 to 160.0	1.0	10:1	143
P2081	Accumulative motor operation time (min)	0 to 1439	0	1:1	143
P2082	Accumulative motor operation time (day)	0 to 1439	0	1:1	144
P2100	Identity code (word 1)	1111 to 1999	1xxx	1:1	144
P2101	Identity code (word 2)	1111 to 1999	1xxx	1:1	145
P2102	Power unit serial number (word 1)	0 to 9999	0	1:1	145
P2103	Power unit serial number (word 2)	0 to 99	0	1:1	145
P2104	Power unit serial number (word 3)	0 to 9999	0	1:1	145
P2105	User-defined unit	0 to 60000	0	1:1	146
P2106	Trigger count value	0 to 65535	0	1:1	146
P2108	DC link voltage	0.0 to 1000.0 V	0.0 V	10:1	146
P2109	Output voltage	0.0 to 1000.0 V	0.0 V	10:1	146
P2110	PID feedback	0.00 to 327.67 %	0.00 %	100:1	146
P2111	Power factor angle	0.0 to 99.9 °	0.0 °	10:1	146
P2112	Output power	0.00 to 99.99 kW	0.00 kW	100:1	147
P2113	Output torque	0.00 to 655.35 Nm	0.00 Nm	100:1	147
P2114	Set point frequency	0.00 to 600.00 Hz	0.00 Hz	100:1	147
P2115	Actual output frequency	0.00 to 600.00 Hz	0.00 Hz	100:1	147
P2116	IGBT temperature	0.0 to 999.9 °C	0.0 °C	10:1	147
P2117	Output current	0.0 to 99.9 A	0.0 A	10:1 A	147
P2118	FWD/REV	0 to 1	0	1:1	148
P2119	PG speed RPM (option)	0 to 65535 rpm	0 rpm	1:1	148
P2120	Data set for use 1	0 to 65535	0	1:1	148
P2121	Data set for use 2	0 to 65535	0	1:1	148
P2122	Data set for use 3	0 to 65535	0	1:1	148
P2123	Data set for use 4	0 to 65535	0	1:1	148
P2124	Data set for use 5	0 to 65535	0	1:1	149
P2125	Data set for use 6	0 to 65535	0	1:1	149
P2126	Data set for use 7	0 to 65535	0	1:1	149
P2127	Data set for use 8	0 to 65535	0	1:1	149
P2128	Data set for use 9	0 to 65535	0	1:1	149
P2129	Data set for use 10	0 to 65535	0	1:1	149
P2130	Data set for use 11	0 to 65535	0	1:1	149

Parameter		Range	Standard value	Internal standardization	Page
P2131	Data set for use 12	0 to 65535	0	1:1	150
P2120	Data set for use 13	0 to 65535	0	1:1	150
P2120	Data set for use 14	0 to 65535	0	1:1	150
P2134	Data set for use 15	0 to 65535	0	1:1	150
P2135	Data set for use 16	0 to 65535	0	1:1	150
P2136	Data set for use 17	0 to 65535	0	1:1	150
P2137	Data set for use 18	0 to 65535	0	1:1	150
P2138	Data set for use 19	0 to 65535	0	1:1	151
P2139	Data set for use 20	0 to 65535	0	1:1	151
P2140	CAN baudrate for CAN with switch on	0 to 5	2	1:1	151
P2141	Address setting for DIP switch 1	0 to 127	21	1:1	152
P2142	Address setting for DIP switch 2	0 to 127	22	1:1	153
P2143	Address setting for DIP switch 3	0 to 127	23	1:1	153
P2144	Address setting for DIP switch 4	0 to 127	24	1:1	153
P2145	Address setting for DIP switch 5	0 to 127	25	1:1	153
P2146	Address setting for DIP switch 6	0 to 127	26	1:1	154
P2147	Address setting for DIP switch 7	0 to 127	27	1:1	154
P2148	DIP switch multiplier	0 to 18	8	1:1	154



APPENDIX B - PLCOPEN MOTION CONTROL

B.1 Hardware

The Status LEDs of the CANopen-Slave for b maXX[®] 1000.

Turning on and initializing the CANopen slave

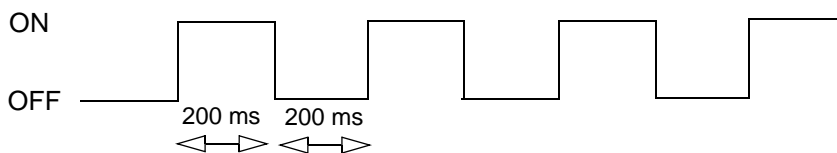
After the switch on, the H3 color in sequences red, green, light up, briefly on.

The CANopen slave is then initialized.

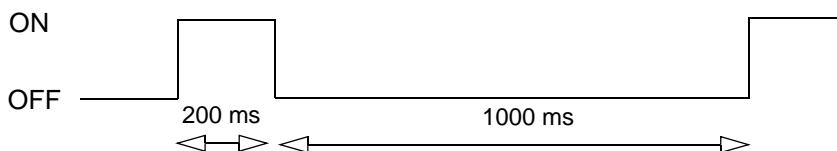
- Start Initialization: H3 blinking in orange color
- End Initialization: H3 single flash in orange color
- Initialization ready: H3 orange color off

In this way, the basic initialization of the option module CANopen slaves is completed, if a mistake occurred during initialization, the H3 flashes in red color.

- blinking



- single flash



Implementing of the CANopen slave

The H3 with the **green** color and the **red** color comply with the specification DR-303-3 indicator specification

H3 with **green** color for CANopen RUN

- **Single Flash:** (STOPPED)

The CANopen Slave is in STOPPED state.

(This single flash was introduced (instead of “off”) in order to avoid situations where all LEDs are off for a long period of time (especially on small devices that do not carry additional LEDs e.g. for power indication).

- **Blinking:** (PRE-OPERATIONAL)

The CANopen slave is in the PRE-OPERATIONAL state

- **On:** (OPERATIONAL)

The CANopen slave is in the OPERATIONAL state

While the device is executing a reset the CANopen RUN LED shall be off.

H3 with **red** color for ERROR

- **Off :** (no error)

The CANopen slave is in working condition

- **Single flash:** (warning limit reached)

At least one of the error counters of the CAN controller has reached or exceeded the warning level (too many error frames)

(This warning should be “OPTIONAL”, if there are CAN controllers available which do not indicate the warning level. Please report if you are aware of such CAN controller implementations.)

- **Double flash:** (error control event)

A “guard” event (NMT-master or NMT-slave) or a “heartbeat” event (heartbeat consumer) has occurred

- **Triple flash:** (SYNC error)

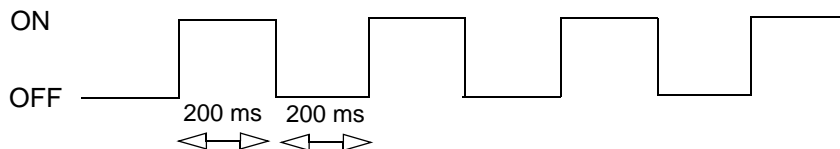
If Object 1006_{hex} is supported, and the SYNC-message is not received within the configured communication cycle period time out (see object dictionary entry 1006_{hex}).

(Object 1006_{hex} contains the SYNC cycle period in ms. The SYNC cycle period time out shall be the configured SYNC cycle multiplied by 1.5 (this is not specified in DS301, but shall be regarded as an application note)

- **On: (Bus Off)**

The CANopen-Slave doesn't communicate with the CANopen Master.

- blinking (green)



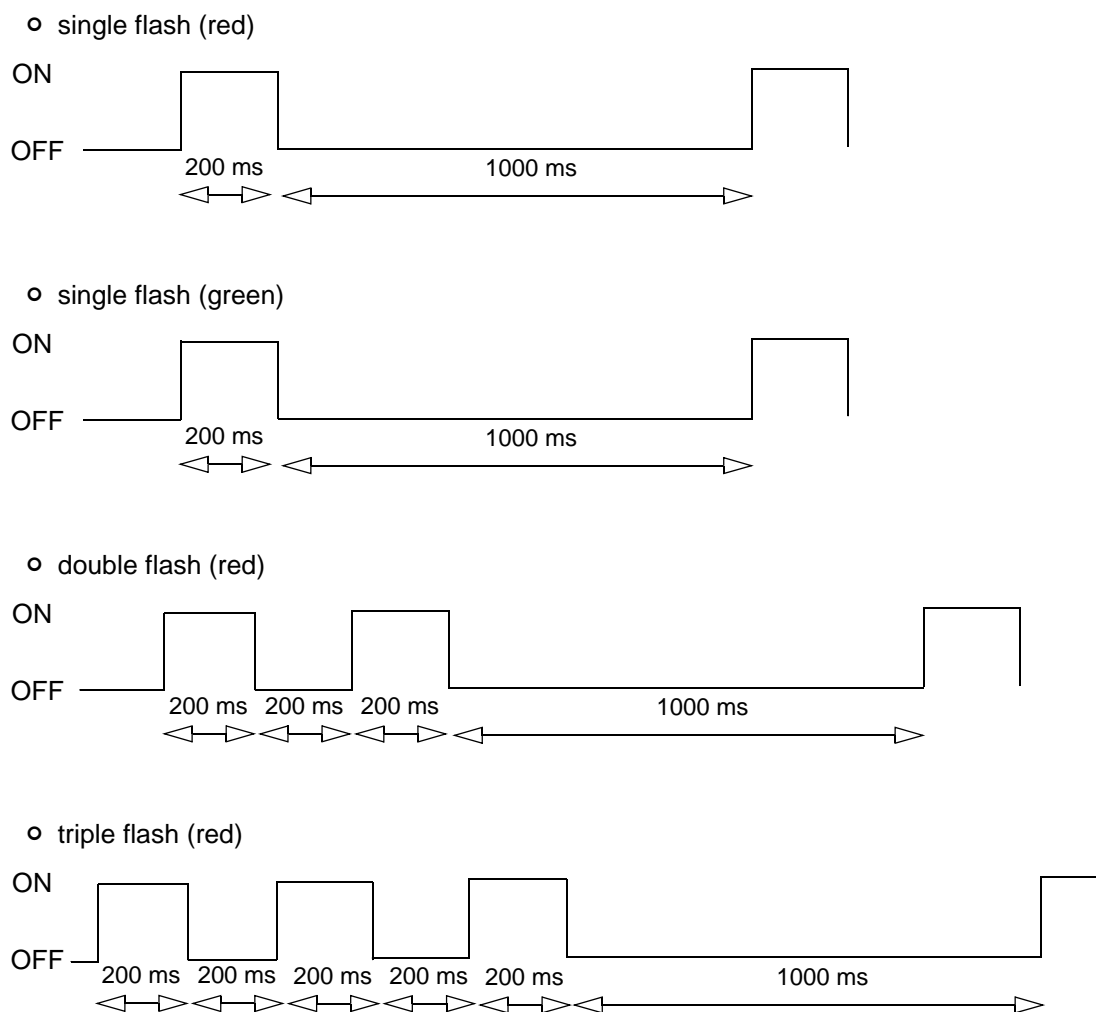


Figure 66: Indicator states and flash rates

CANopen error display via digital keypad

cc01	At least one of the error counters has reached warning level
cc02	„Guard“ (NMT master or NMT slave) or „Heartbeat“ event
cc03	Sync message hasn't received within the configured communication cycle
cc04	No communication between CAN interface and CANopen master
cc05	Hardware failure or no CANopen hardware available on processing unit
cc06	No CANopen software available on processing unit
cc07	A newer CANopen software is necessary
cc08	Hardware error

B.2 CANopen address (CANopen node ID)

Notice:

When switching on the b maXX device passes through three phases:

- 1 Boot up
- 2 Establish a communication
- 3 Hold up communication

Error detection is made using the H3 or digital Keypad.

Bootup

The CANopen signalizes an error condition during the booting over the lighting up with **red** and **orange** of the H3.

Establish a communication

After booting the CANopen-Slave tries to establish the communication with the CANopen network. If the slave cannot establish the communication that the H3 blinking with **red** color.

As soon as a few valid data frames have been send/received, the **red** color of H3 turns off.

Hold up communication

If the communication with the CANopen network is established, the CANopen-Slave tries to maintain the communication with the CANopen network. If the communication cancels, the H3 ('Fault LED') on with **red** color.

B.2 CANopen address (CANopen node ID)

The CANopen Address defined from 1 to 127.

b maXX[®] 1000 CANopen Switch Address Function:

Switch no.			Switch value	Parameter switch value multiplication	Switch address	Switch baud rate	b maxx [®] 1000 CAN address	b maxx [®] 1000 CAN baud rate
1	2	3						
0	0	0	0	--	--	--	P0870	P0871
1	0	0	1	P2148	P2141	P2140		
0	1	0	2		P2142			
1	1	0	3		P2143			
0	0	1	4		P2144			
1	0	1	5		P2145			
0	1	1	6		P2146			
1	1	1	7		P2147			

B.2.1 The CANopen address in case SWITCH VALUE > 0

P0870 (CANopen address) reads the value only from CAN with switch address parameter (P2141 ... P2147) x P2148, if P2148 = 0 then P0870 reads the value only from parameter (P2141 ... P2147) and P0871 (CANopen baud rate) reads the value from Parameter P2140.

- CAN with switch address if switch value multiplications parameter P2148 > 0

Switch value	Switch value multiplication P2148 default	CAN switch address		Switch address baud rate parameter P2140	
		Parameter	Value	Default	Value
1	8	P2141	1	2	0: 1000k
2	8	P2142	2		1: 500k
3	8	P2143	3		2: 250k
4	8	P2144	4		3: 125k
5	8	P2145	5		4: 100k
6	8	P2146	6		5: 50k
7	8	P2147	7		

- CAN with switch address if switch value multiplications parameter P2148 = 0

Switch value	Switch value multiplication P2148 default	CAN switch address		Switch address baud rate parameter P2140	
		Parameter	Value	Default	Value
1	0	P2141	21	2	0: 1000k
2	0	P2142	22		1: 500k
3	0	P2143	23		2: 250k
4	0	P2144	24		3: 125k
5	0	P2145	25		4: 100k
6	0	P2146	26		5: 50k
7	0	P2147	27		

B.2.2 The value for CANopen address in case SWITCH VALUE = 0

P0870 (CANopen address) and P0871 (CANopen baudrate) can be entered by the user directly.

b maXX® 1000 parameter no.	Default value	Value	
P0870 (CANopen address)	1	0 to 127	
P0871 (CANopen baudrate)	0	0	0: 1000k
		1	1: 500k
		2	2: 250k
		3	3: 125k
		4	4: 100k
		5	5: 50k

CANopen is deactivated, if the P0870 (CANopen address) is 0.

B.3 Basic of CAN

The CAN field bus is implemented using a line structure. A three-wire cable provides the physical basis of data transfer with the connections CAN_High, CAN_Low and CAN_Ground. CAN employs transmissions balanced to ground for the suppression of common mode interference. For this reason, the difference signals are evaluated.

Network

CAN is a multi-master network. Every participant can have access to and be active on the bus with equal priority. CAN uses object-oriented addressing, i. e. the transferred message is identified by an identifier defined network-wide. The identifier represents the encoded name of the message.

Bus access

Bus access takes place using the CSMA/CA method (Carrier Sense Multiple Access / Collision Avoidance). Because after detecting the necessary bus quiescence every participant has the right to begin transmitting a message, collisions can occur. This is avoided by means of bit-by-bit arbitration of the messages to be sent. During this, two bus levels are differentiated, a dominant level, logical bit value 0 and a recessive level, logical bit value 1. In the worst case, all participants wishing to transmit simultaneously begin sending their messages onto the bus. If a recessive bit of a participant is overwritten by a dominant bit of another, then the "recessive" node withdraws from the bus and, after detecting bus quiescence, attempts once more to transmit its message. Consequently, it is guaranteed that the most important and highest priority message (with the lowest identifier) will be transmitted in a collision-free manner and without delay. For this reason it is of course necessary that every identifier is permitted to be placed onto the CAN bus only once.

Identifier

In the CAN specification CAN 2.0A 2032 (CiA), different identifiers are available. Each participant can transmit in a requested manner (multi-master capability). A transmitter sends its message to all CAN nodes (broadcast) and each then decides on the basis of the identifier whether they will continue processing the message or not.

Error

Up to 8 bytes of user data can be transmitted within a CAN data message frame. For error or overload signaling, a CAN node can send error or overload message frames. This occurs on Layer 2 of the OSI/ISO reference model, the Data Link layer, therefore independently of the application. Due to high quality error detection and handling on Layer 2, a Hamming distance (a measure of error detection) of HD=6 is achieved, i. e. a maximum of 5 simultaneously-occurring bit errors within a message frame will be reliably detected as an error.

B.3.1 Basic Specification of CAN

• **OSI-Layer**

CANopen is an open and hence manufacturer-independent field bus system defining layers 1 and 2 of the CAN standard.

The layer 1 is according to ISO 11898

The layer 2 is according to CAN 2.0A (CiA)

• **CAL specification**

The CANopen protocol is based on the CAL specification (Layer 7 protocol). With CANopen, profiles are differentiated. The communication profile (DS 301) defines the method of data exchange and general definitions that are applicable for all devices.

• **Device profile**

Device profiles contain application- and device-specific definitions describing the contents-related meaning of data and device functionality. Device profiles exist for drives, etc. The CANopen slave for the b maXX[®] 1000 controller is implemented in accordance with the device profile **DSP402** (drives and motion control).

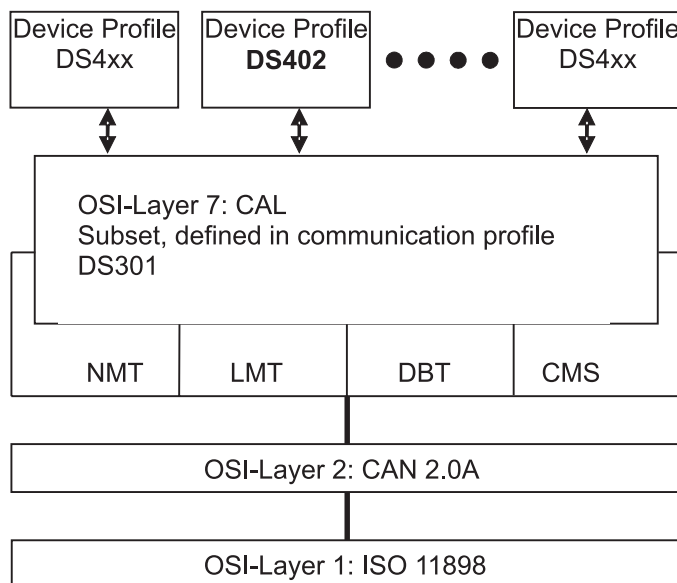


Figure 67: OSI: Open systems interconnection

Support CAN2.0A Protocol.

Support CANopen DS301 V4.02

Support DSP-402 V2.0

Object directory

The central element of every CANopen device is its object directory CANopen-device

Index (hex)	Object
0000 _{hex}	Not used
0001 _{hex} – 001F _{hex}	Static data types
0020 _{hex} – 003F _{hex}	Complex data types
0040 _{hex} – 005F _{hex}	Manufacturer-specific data types
0060 _{hex} – 007F _{hex}	Device profile-specific static data types
0080 _{hex} – 009F _{hex}	Device profile-specific dynamic data types
00A0 _{hex} – 0FFF _{hex}	Reserved
1000 _{hex} – 1FFF _{hex}	Range for the communication profile
2000 _{hex} – 5FFF _{hex}	Range for manufacturer-specific objects
6000 _{hex} – 9FFF _{hex}	Range for the device profile
A000 _{hex} – AFFF _{hex}	Reserved

CANopen differentiates between 4 types of messages

- Administrative messages (e.g. network-management NMT)
- Service data (SDO)
- Process data (PDO)
- Predefined messages (e.g. synchronization, emergency)

- NMT

The communication states of the device are controlled and monitored by means of the network management services.

- SDO

SDO are used for the transfer of greater volume of the service data (data with low priority) in addition, data volumes of 4 bytes maximum are transmitted with one SDO in the bmaxx1000. SDOs are used for device configuration, transmitted asynchronous and accepted by the receiver. All entries in the object directory can be accessed by means of SDOs:

- PDO

The function of PDOs is the exchange of process data (data with high priority). PDOs can be transmitted both synchronously and asynchronous. They have broadcast character and are not confirmed by the receiver.

Synchronous means that transmission depends on the synchronization object.

Predefined connection set

To be able to establish peer-to-peer communication between master and slave directly after boot-up, predefined identifier assignment is available. This identifier assignment can be reconfigured by the user.

Identifier structure

Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Function code				Node ID						

From the 7 bits for the module IDs, a maximum number of 127 nodes results per CANopen network.

Peer-to-peer objects in accordance with the predefined connection set

Object	Binary function code	Resultant COB ID	Object
NMT	0000	0	
SYNC	0001	128	1005 _{hex} , 1006 _{hex}
EMERGENCY	0001	129 – 255	1014 _{hex} , 1015 _{hex}
PDO1(TX)	0011	385 – 511	1800 _{hex}
PDO1(RX)	0100	513 – 639	1400 _{hex}
PDO2(TX)	0101	641 – 767	1801 _{hex}
PDO2(RX)	0110	769 – 895	1401 _{hex}
PDO3(TX)	0111	896 – 1023	1802 _{hex}
PDO3(RX)	1000	1025 – 1151	1402 _{hex}
PDO4(TX)	1001	1153 – 1279	1803 _{hex}
PDO4(RX)	1010	1281 – 1407	1403 _{hex}
SDO(TX)	1011	1409 – 1535	1200 _{hex}
SDO(RX)	1100	1537 – 1663	1200 _{hex}
Nodeguard	1110	1793 – 1919	100C _{hex} , 100D _{hex}

Objects supported by device profile DSP 402

- **Brief overview**

The following objects are supported via b maxx [®] 1000 CANopen slave		
Device control objects	6040 _{hex}	Control word
	6041 _{hex}	Status word
	6060 _{hex}	Modes of operation set value
	6061 _{hex}	Modes of operation actual value
speed objects	6042 _{hex}	Target speed
	604F _{hex}	Ramp function time
	6050 _{hex}	Slow down time
	6051 _{hex}	Quick stop time
	606C _{hex}	Speed actual value
Others objects	6064 _{hex}	Encoder value
	6067 _{hex}	Output torque actual value
	6078 _{hex}	Output current value

B.3.2 Data Exchange and Parameterization

- **CAN Configuration possibilities in bmaxx1000**

- Baumüller PC software Prodrive
- Digital Keypad
- DIP-Switch

- **Network management (NMT)**

Network management commands function primarily to control communication states in the CANopen network. Here the communication state diagram of the CANopen slaves is shown.

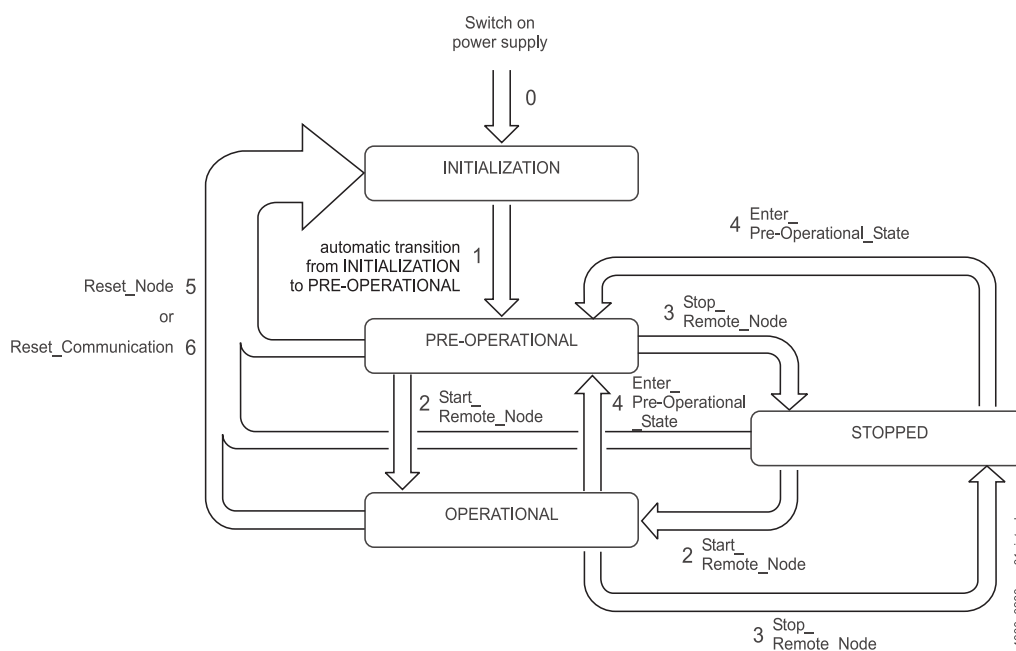


Figure 68: Communication state diagram

After INITIALIZATION (triggered by switching on the device), the PRE-OPERATIONAL state will automatically be reached. If a slave is in this state, it can be configured via SDOs: Data exchange via PDOs is not possible.

In the STOPPED state, only node guarding is activated. Neither SDOs nor PDOs can be transmitted or received.

In the OPERATIONAL state (normal operating state). PDO and SDO data exchange is possible. In addition, node guarding is also possible.

The individual state transitions are initiated by an NMT master. The bmaxx1000 CANopen slave can process the following NMT commands:

1 Automatic transition from INITIALIZATION to PRE-OPERATIONAL

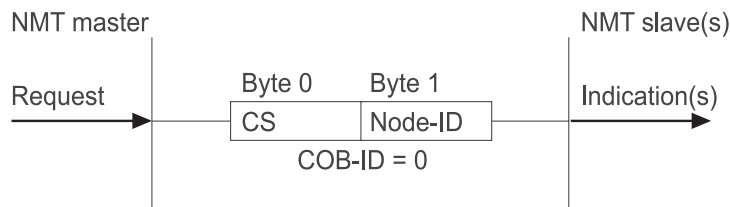
Note: At transition from PRE-OPERATIONAL to OPERATIONAL the parameter numbers are assigned to mapping. This assignment is time-consuming and can last several milliseconds, during this time no PDO is send and also no receive PDO is processed.

- 2 Start_Remote_Node
- 3 Stop_Remote_Node
- 4 Enter_Pre-Operational_State
- 5 Reset_Node
- 6 Reset_Communication

• State Control

Two data bytes are transmitted per message frame. Data byte 0 contains the command specifier CS, data byte 1 contains the device address. If the address 0 is entered, then all nodes will be addressed with the appropriate command (broadcast).

NMT message frame for controlling the communication states:



4000_0231_rev01_int.cdr

Figure 69: NMT message frame

Command specifiers and their effects on the slave:

CS	Identification	Effect
1	Start_Remote_Node	Starts normal operation
2	Stop_Remote_Node	Deactivates PDO and SDO communication
128	Enter_Pre-Operational_State	Transition to configuration mode
129	Reset_Node	Controlled reset of entire object directory to default values
130	Reset_Communication	Reset of the communication section of the object directory to default values

A message frame bringing node 16 into configuration mode has the following construction:

Enter_pre-operational_state message frame structure for node 16.

COB ID	DLC	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
00 _{hex}	02 _{hex}	80 _{hex}	10 _{hex}						

These message frames are unconfirmed, i.e. no NMT slave acknowledges the correctly received message to the NMT master

NOTE

If the CANopen address is not zero, after turning on supply voltage and a reset the bmaxx1000 CANopen slave signals a boot up telegram the entire reset sequence lasts a few seconds. Starting with the receipt of command reset node to the acknowledgement using boot up telegram.

- **Boot up**

Boot-up behavior is according to DS301 V4:

Boot-up frame with ID = 700 + node-ID, DLC = 1 byte 0 is filled with data = 0.

Boot up according with DS 301 V4,

Boot up telegram with ID = 700_{hex} + node ID, DLC = 1 byte 0 filled with the data = 0.

COB ID	DLC	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
701 _{hex}	01 _{hex}	00 _{hex}							

- **Node guarding**

Node guarding is the monitoring of the slave by the master. At the same time, the slave can monitor the master (life guarding).

The master interrogates the slaves at certain intervals by means of remote frames. Remote frames are special message frames with which it is possible to request data message frames. Remote frames have the same COB ID as the related data message frame, but present a data length of 0 bytes. The so-called RTR bit in the control field of the remote message frame serves to differentiate between remote and data message frames (message frame differentiation takes place normally by means of the COB ID). In the remote frame, the RTR bit is at "1", in the data message frame at "0".

The COB ID results from **700_{hex} + address**, according to the predefined connection set. This COB ID can also be modified. The object required for this is **100E_{hex}**.

The guarding time is set in Objects **100C_{hex}** and **100D_{hex}**. Within this time, the slave must have received a guarding request (remote message frame) from the master. Should this not be the case, the life guarding event occurs in the slave. Through this, the slave switches to the PRE-OPERATIONAL state and the reaction specified in **Object 6007_{hex}** is triggered in the controller (drives).

If there is no response from the slave within a certain time, the node guarding event will be triggered in the master. If no time is set, the slave will respond to every RTR, but without monitoring lifetime.

The current communication state of the slave can be recognized from the response of the slave to a node guarding request from the master. The response message frame consists of one data byte (see also Node Guarding Protocol). Field "s" differs according to the communication state. In addition, with two successive message frames, toggle bit "t" will be changed.

Communication phase	Identifier s	Resulting data with	
		t = 0	t = 1
PRE-OPERATIONAL	7F _{hex} (127)	7F _{hex} (127)	FF _{hex} (255)
OPERATIONAL	05 _{hex} (5)	05 _{hex}	85 _{hex} (133)
STOPPED	04 _{hex} (4)	04 _{hex}	84 _{hex} (132)

Node guarding is available in all communication phases. The toggle bit is only reset to its default value in the INITIALIZATION phase. This means that the toggle mechanism is continued also on changing state.

Node guarding is started in the slave after receipt of the first guarding request message frame. From this moment, the monitoring time parameterized in Objects **100C_{hex}** and **100D_{hex}** runs in the slave.

- **Heartbeat protocol**

The heartbeat protocol is responsible for the monitoring of the slave(s) by the master. The difference to node guarding is that there are no RTR-frames, rather the slave transmits cyclic heartbeat messages. One or several heartbeat consumers receive or monitor the heartbeat messages. If the heartbeat message is not transmitted within the set heartbeat time, the master (heartbeat consumer time in **Object 1016_{hex}**) triggers a heartbeat event. With the slave, the heartbeat producer time is set in **Object 1017_{hex}**.

The current communication state of the slave can be recognized from the slave heartbeat message. The heartbeat message frame consists of one data byte.

r: Reserved

s: Field "s" differs according to the communication state.

Communication phase	Identifier s
Boot up	00 _{hex}
PRE-OPERATIONAL	7F _{hex} (127)
OPERATIONAL	05 _{hex} (5)
STOPPED	04 _{hex} (4)

Either node guarding or heartbeat is supported each time. If the Heartbeat time is not equal to NULL, the Heartbeat protocol will be activated.

- **Service data (SDO)**

Segmented SDO transfer and **Block SDO transfer** are currently **not used** by b maxx[®] 1000.

The function of service data objects (SDOs) is to exchange messages without real time requests. Therefore low-priority COB IDs are provided for this in the predefined connection set. SDOs are used for parameterizing slaves and for setting the communication relationships for PDOs. Data access takes place exclusively via the object list. SDOs are always confirmed data, i.e. the transmitter receives an acknowledgement from the receiver. Data exchange via SDOs can only progress asynchronously.

SDOs follow the client-server model, the client initiates the communication and the sever responds. A server cannot begin an SDO communication. The b maxx[®] 1000 supports one server SDO and not client SDOs:

Message frame structure

The COB ID of the request SDO results from $600_{\text{hex}} + \text{address}$, from the response SDOs from $580_{\text{hex}} + \text{address}$. The data field of the CAN data message frame (byte 8) for an SDO is organized into three parts, a command specify CS (1 byte), a multiplexor M (3 bytes) and the actual user data area D0 - D3 (4 bytes).

SDO message frame:

COB ID	DLC	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
$600_{\text{hex}} + \text{address}$	08_{hex}	CS	M	M	M	D0	D1	D2	D3
$580_{\text{hex}} + \text{address}$	08_{hex}	CS	M	M	M	D0	D1	D2	D3

The multiplexor M consists of the 16-bit index of an object and the related 8-bit-wide Sub-index. With segmented message frames, the user data area is expanded by the 3 bytes of the multiplexor, whereby 7 bytes of user data per message frame can be transmitted. The command specified CS classifies the various SDO types.

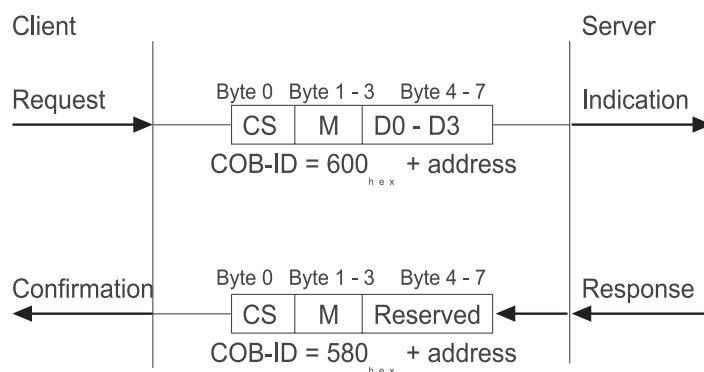
Expedited transfer

Objects can be written or read, with their data comprised of a maximum of 4 bytes. Only two message frames are required, a request and a response. All objects with the indices $1xxx_{\text{hex}}$, $2xxx_{\text{hex}}$ and $6xxx_{\text{hex}}$ can be addressed via expedited SDOs.

Writing objects

With the bmaxx1000 CANopen interface, expedited transfer is used to write objects. A client SDO (master) transmits a write request to the bmaxx1000 CANopen slave interface. This slave carries out the request and acknowledges this with the response.

Initiate SDO download:



4000_0233_rev01_int.cdr

Figure 70: Initiate SDO download protocol

The command specifier CS for the request will depend on the length of the user data. D0 is the LSB and D3 the MSB of the datum to be transmitted.

Data length in D0 - D3	Command specifier CS
1 byte	2F _{hex}
2 byte	2B _{hex}
4 byte	23 _{hex}

The command specifier CS for the response is 60_{hex}, the multiplexor is identical to that of the request, the data field without meaning (reserved).

Example:

The value '5'(05_{hex}) to be written to object 6060_{hex}, subindex 00_{hex}, of the b maXX[®] 1000 CANopen slave with the address 4. The data width of this object is 8 bits.

Request

		CS	Multiplexor				D0	D1	D2	D3
COB ID	DLC	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	
604 _{hex}	08 _{hex}	2F _{hex}	60 _{hex}	60 _{hex}	00 _{hex}	05 _{hex}	00 _{hex}	00 _{hex}	00 _{hex}	

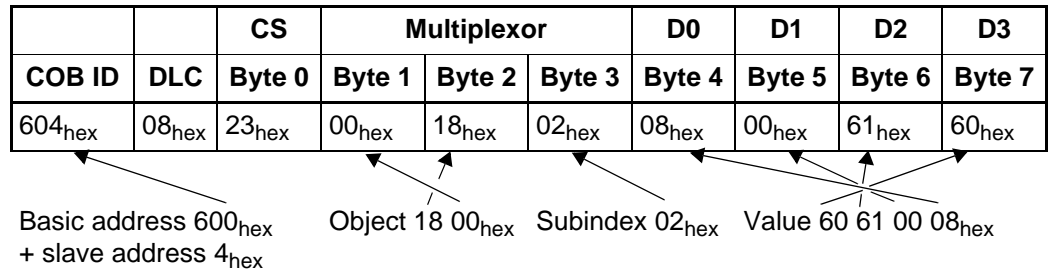
Basic address 600_{hex} + slave address 4_{hex} Object 60 60_{hex} Subindex 00_{hex} Value 05

Response

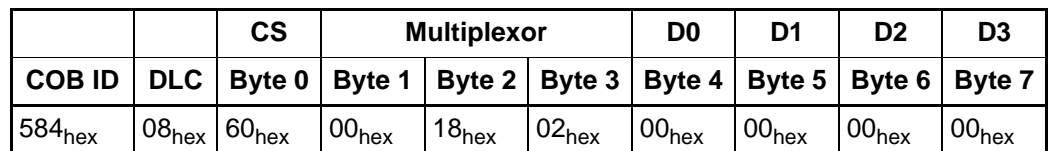
		CS	Multiplexor				D0	D1	D2	D3
COB ID	DLC	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	
584 _{hex}	08 _{hex}	60 _{hex}	60 _{hex}	60 _{hex}	00 _{hex}	00 _{hex}	00 _{hex}	00 _{hex}	00 _{hex}	

The value '60610008_{hex}' to be written to the object 1800_{hex}, subindex 02_{hex}, of the b maXX[®] 1000 CANopen slave with the address 4, the data width of this object is 32 bits

Request.



Response



o Reading object

A SCO client (master) transmits a read request to the b maXX[®] 1000 CANopen slave interface. This slave carries out the request and sends the required data in the response message.

Initiate SDO upload:

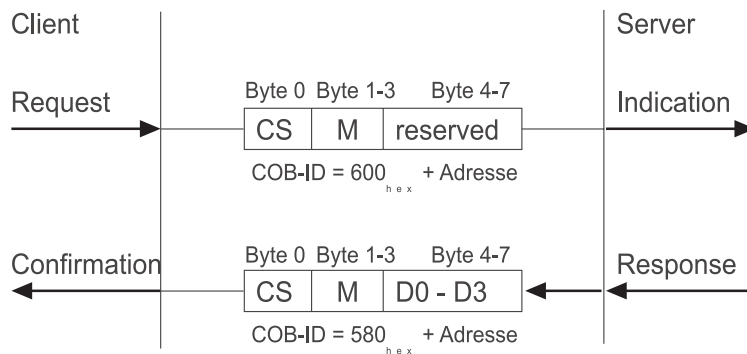


Figure 71: Initiate SDO upload expedited

The command specifier CS for the request is always 40_{hex}. The command specifier CS for the response will depend on the length of the user data. D0 is the LSB and D3 the MSB.

Data length in D0 - D3	Command specifier CS
1 byte	4F _{hex}
2 byte	4B _{hex}
4 byte	43 _{hex}

Example:

Object 0661_{hex}, subindex 00_{hex} of the b maXX[®] 1000 CANopen slave with the address 4 is to be read. The width of this object is 1 byte.

Request

		CS	Multiplexor				D0	D1	D2	D3
COB ID	DLC	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	
604 _{hex}	08 _{hex}	40 _{hex}	61 _{hex}	60 _{hex}	00 _{hex}	00 _{hex}	00 _{hex}	00 _{hex}	00 _{hex}	

Response

		CS	Multiplexor				D0	D1	D2	D3
COB ID	DLC	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	
584 _{hex}	08 _{hex}	4F _{hex}	61 _{hex}	60 _{hex}	00 _{hex}	D0 _{hex}	00 _{hex}	00 _{hex}	00 _{hex}	

Basic address 580_{hex}
+ slave address 4_{hex}

Object 60 61_{hex}

Subindex 00_{hex}

Value data

Object 1400_{hex}, subindex 01_{hex} of the b maXX[®] 1000 CANopen with the address 4 is to be read. The data width of this object is 4 byte.

Request

		CS	Multiplexor				D0	D1	D2	D3
COB ID	DLC	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	
604 _{hex}	08 _{hex}	40 _{hex}	00 _{hex}	14 _{hex}	01 _{hex}	00 _{hex}	00 _{hex}	00 _{hex}	00 _{hex}	

Response

		CS	Multiplexor				D0	D1	D2	D3
COB ID	DLC	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	
584 _{hex}	08 _{hex}	43 _{hex}	00 _{hex}	14 _{hex}	01 _{hex}	D0	D1	D2	D3	

Basic address 580_{hex}
+ slave address 4_{hex}

Object 14 00_{hex}

Subindex 00_{hex}

Value DB₃ DB₂ DB₁ DB₀

o Responses to errors

Invalid SDO access is refused with abort codes. The structure of these abort message frames is identical to the **SDO message frame**. The data field contains an abort code 4 bytes long.

With invalid accesses to communication-specific objects ($1xxx_{\text{hex}}$), the following messages are differentiated:

Abort code	Meaning
05 _{hex} 03 _{hex} 00 _{hex} 00 _{hex}	Inconsistent parameters (toggle bit has not changed)
06 _{hex} 01 _{hex} 00 _{hex} 02 _{hex}	Writing to write-protected object
06 _{hex} 02 _{hex} 00 _{hex} 00 _{hex}	Object does not exist
06 _{hex} 04 _{hex} 00 _{hex} 41 _{hex}	Data cannot be mapped (e. g. incorrect length indication)
06 _{hex} 06 _{hex} 00 _{hex} 00 _{hex}	Hardware access error (save/load from flash memory)
06 _{hex} 07 _{hex} 00 _{hex} 00 _{hex}	Access to flash memory concerning hardware fault failed
06 _{hex} 07 _{hex} 00 _{hex} 10 _{hex}	Incorrect length data value
06 _{hex} 09 _{hex} 00 _{hex} 11 _{hex}	Subindex does not exist
06 _{hex} 09 _{hex} 00 _{hex} 30 _{hex}	Value range exceeded (during write accesses)
06 _{hex} 09 _{hex} 00 _{hex} 31 _{hex}	Value too high (during write accesses)
08 _{hex} 00 _{hex} 00 _{hex} 20 _{hex}	Data cannot be transferred or saved to the application
08 _{hex} 00 _{hex} 00 _{hex} 22 _{hex}	Data cannot be mapped due to the current communication state (e. g. change mapping in the OPERATIONAL state).

Invalid accesses to all other objects ($2XXX_{\text{hex}}$ and $6XXX_{\text{hex}}$) are globally refused with the following codes:

Abort code	Meaning
06 _{hex} 01 _{hex} 00 _{hex} 00 _{hex}	Error in data format
06 _{hex} 01 _{hex} 00 _{hex} 02 _{hex}	Element cannot be changed
06 _{hex} 02 _{hex} 00 _{hex} 00 _{hex}	Element not present
06 _{hex} 09 _{hex} 00 _{hex} 31 _{hex}	Value too high (during write accesses)
06 _{hex} 09 _{hex} 00 _{hex} 32 _{hex}	Value too low (during write accesses)
08 _{hex} 00 _{hex} 00 _{hex} 00 _{hex}	General error occurred
08 _{hex} 00 _{hex} 00 _{hex} 21 _{hex}	Data not available at present

Example

b maXX[®] 1000 CANopen slave 4 object 1008_{hex} subindex 01_{hex} is to be read. Object 1008_{hex} *manufacturer device name* has however only subindex 00_{hex}.

Request

		CS	Multiplexor				D0	D1	D2	D3
COB ID	DLC	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	
604 _{hex}	08 _{hex}	40 _{hex}	08 _{hex}	10 _{hex}	01 _{hex}	00 _{hex}	00 _{hex}	00 _{hex}	00 _{hex}	

Response

		CS	Multiplexor				D0	D1	D2	D3
COB ID	DLC	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	
584 _{hex}	08 _{hex}	80 _{hex}	08 _{hex}	10 _{hex}	01 _{hex}	11 _{hex}	00 _{hex}	09 _{hex}	06 _{hex}	

Basic address 580_{hex}
+ slave address 4_{hex}

Object 10 08_{hex}

Subindex 01_{hex}

Code 06 09 00 11_{hex}

The command specifier CS (4 byte 0, 80_{hex}) in the response telegram specifies, that it is an abort telegram. The request and response multiplexors agree.

- **Process data (PDO)**

Process data objects are unconfirmed telegrams with high-priority COB IDs: They are optimized for the exchange of data with real time requests. In the PDOs, the entire CAN data frame (8 byte) can be used for user data transmission. The format of the data exchange via PDOs must therefore be defined before the start of communication between transmitter and receiver (mapping).

Note

The b maXX[®] 1000 CANopen slave can write only predefined 6xxxx_{hex} object (see [▶B.3.3.4 Transmit PDO Mapping Parameter](#) from page 199)

- **Mapping**

Mapping is a method of assigning variables/objects to PDOS. These variables/objects are moved across the CAN bus with the PDOs. Cyclic data exchange is configured by means of the mapping. SDOs are used for this parameterizing. Mapping is set in the object directory via addressable objects. There are four such objects for each PDO.

Process data object	Object for content	Object for the communication relationship
TX-PDO1	1A00 _{hex}	1800 _{hex}
TX-PDO2	1A01 _{hex}	1801 _{hex}
TX-PDO3	1A02 _{hex}	1802 _{hex}
TX-PDO4	1A03 _{hex}	1803 _{hex}
RX-PDO1	1600 _{hex}	1400 _{hex}
RX-PDO2	1601 _{hex}	1401 _{hex}
RX-PDO3	1602 _{hex}	1402 _{hex}
RX-PDO4	1603 _{hex}	1403 _{hex}

Mapping cannot be changed in the OPERATIONAL state. New mapping will only be activated after switching to OPERATIONAL.

- **Set value mapping**

The permissible cyclical set values are marked in a table with the column 'PDO mapping' as 'RX'. The b maXX[®] 1000 CANopen can only predefined six thousands object numbers (6xxxx_{hex}). The parameter is found in [▶B.3.3.4 Transmit PDO Mapping Parameter](#) from page 199.

- **Actual value**

The permissible cyclic actual values are marked in a table with the column 'PDO mapping' as 'TX'. The parameter is found in [▶B.3.3.4 Transmit PDO Mapping Parameter](#) from page 199 (for the predefined six thousands object numbers). The two thousands parameters are the manufacturer- specific parameters.

- **b maXX[®] 1000 standard transmissions type**

Value in sub-index 02 _{hex}	Type	Effect	
		Tx-PDO 1800 _{hex} – 1803 _{hex}	Rx-PDO 1400 _{hex} – 1403 _{hex}
01 _{hex} (1)	synchronous	Transmission occurs after each received SYNC telegram	PDOs with a matching COB-ID received before the last SYNC telegram are accepted
02 _{hex} - F0 _{hex} (2 -- 240)	synchronous	Transmission occurs after receiving the set number of SYNC telegrams	PDOs with a matching COB-ID received before the last SYNC telegram are accepted

- **Synchronization**

In order to synchronize the slaves a SYNC telegram is used. This telegram is unconfirmed (broadcast). It contains no data. The COB ID is stipulated in object 1005_{hex} COB ID SYNC. By default, 80_{hex} is specified. The b maXX[®] 1000 CANopen slave can receive SYNC telegrams. It is not a SYNC master!

- **Time stamp object**

Time Stamp object is not supported.

- **Monitoring and error message frame (EMCY)**

Emergency telegrams serve as information for b maXX[®] 1000 errors. This telegram is transmitted, as soon as b maXX[®] 1000 recognizes an internal error. An emergency telegram is transmitted at each new error.

The user data area of the emergency message frame is organized into 3 sections:

Emergency message frame structure:

COB-ID	DLC	Byte0	Byte1	Byte2	Byte3 to byte7
80 _{hex} + Node-ID	08 _{hex}	Emergency error code		Error register	Manufacturer specific error field

In accordance with the predefined connection set, the COB ID results from 80_{hex} + Node-ID.

The Emergency error code (byte 0, 1) is defined in CANopen DSP 402.

The conversion to b maXX[®] 1000 error numbers in error table from [▶page 188<](#).

The error register corresponds to the content of object 1001_{hex} (also see [▶page 188<](#) error register)

The first two bytes of the manufacturer-specific error field contain the b maXX[®] 1000 error number.

If several errors are present and one is cleared, the CANopen slave option module will transmit the EMCY message frame with the next error number. If all errors are acknowledged, the message frame "Error reset / no error" will be transmitted by the slave.

COB-ID	DLC	Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
80 _{hex} + Node-ID	08 _{hex}	00 _{hex}	00 _{hex}	00 _{hex}	00 _{hex}	00 _{hex}	00 _{hex}	00 _{hex}	00 _{hex}

Example

Slave 5 has recognized an encoder error at encode card (communication error encode card).
The EMCY telegram then is the following type:

COB-ID	DLC	Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
85 _{hex}	08 _{hex}	00 _{hex}	73 _{hex}	84 _{hex}	00 _{hex}	70 _{hex}	00 _{hex}	00 _{hex}	00 _{hex}

• Error Table

Drive error and warning code	Description (from b maXX [®] 1000 drives)	Abbr.	CANopen error code
0000 _{hex}	Reserve		--
0003 _{hex}	NMI interrupt has occurred - incorrect bus access	oc	7400 _{hex}
0021 _{hex}	CAN error	cPtE, cc04 to cc08, cc02	
0030 _{hex}	Error in analog option card	AnCd	7300 _{hex}
0050 _{hex}	Communications error USB CARD(CME-USB01)	UbCd	
0052 _{hex}	UIC overvoltage (Uzk)	ov	3210 _{hex}
0054 _{hex}	Ground current	GFF	2240 _{hex}
0062 _{hex}	Motor temperature fault - switch-off threshold exceeded	PtC1	7120 _{hex}
0063 _{hex}	Fault I2t > 100%	oL1	7120 _{hex}
0070 _{hex}	Communication error PG card(option card)	PG_ERR	7300 _{hex}
00A0 _{hex}	1= Modbus communication time monitoring	cE10	
00A1 _{hex}	1= control board/power board communication time monitoring	cP10	7500 _{hex}
00B0 _{hex}	EEPROM error	cF10; cF11; cF20; cF21	5530 _{hex}
00B2 _{hex}	Checksum error in EEPROM	Ecnt	5530 _{hex}
0500 _{hex}	IGBT inside temperature exceed	oH1	4310 _{hex}
0501 _{hex}	Lower than standard voltage	Lv	3220 _{hex}

Drive error and warning code	Description (from b maXX [®] 1000 drives)	Abbr.	CANopen error code
0502 _{hex}	Phase loss	PHL	3130 _{hex}
0503 _{hex}	Password don't match	codeE	6320 _{hex}
0505 _{hex}	Temperature sensor fault detect	cF34	4310 _{hex}
0506 _{hex}	Control board ACI loss	Aerr	FF00 _{hex}
0507 _{hex}	AC driver loading exceed	oL	2310 _{hex}
0509 _{hex}	Motor loading exceed	oL2	2310 _{hex}
050A _{hex}	CC current clamp	HPF1	5000 _{hex}
050B _{hex}	OV Hardware error	HPF2	5000 _{hex}
050C _{hex}	GFF Ground Hardware error	HPF3	5000 _{hex}
050D _{hex}	OC Hardware error	HPF4	5000 _{hex}
050E _{hex}	DC BUS Checking Error	cF33	3210 _{hex}
0512 _{hex}	Motor PTC temperatur Error	PtC2	
0513 _{hex}	IO PID feedback error	FbE	
0515 _{hex}	U-phase error	cF30	2300 _{hex}
0516 _{hex}	V-phase error	cF31	2300 _{hex}
0517 _{hex}	W-phase error	cF32	2300 _{hex}
0518 _{hex}	Current exceed at acceleration process	ocA	2310 _{hex}
0519 _{hex}	Current exceed at deceleration process	ocd	2310 _{hex}
051A _{hex}	Current exceed at steady state	ocn	2310 _{hex}
051B _{hex}	Power BD Over Heat	oH2	4310 _{hex}
051C _{hex}	External Fault	EF	9000 _{hex}

B.3.3 Objects for communication control

Identification

NAME	Index	Sub-index	Data type	Access type	Default value
Identity Object	1018 _{hex}	00 _{hex}	U8	RO	3 _{hex}
Vendor ID		01 _{hex}	U32	RO	reserved
Product Code		02 _{hex}	U32	RO	reserved
Revision Number		03 _{hex}	U32	RO	1 _{hex}

This object contains some information on the device.

Device type

NAME	Index	Sub-index	Data type	Access type	Default value
Device Type	1000 _{hex}	00 _{hex}	U32	RO	00010192 _{hex}

Error Register

NAME	Index	Sub-index	Data type	Access type	Default Value
Error Register	1001 _{hex}	00 _{hex}	U8	RO	0 _{hex}

The object 1001_{hex} contains a column of error-bits, which have the following meaning:

Bit	Meaning
0	Error has occurred, general error
1	Current error
2	Power error
3	Temperature error
4	CAN communication error
5	Device profile-specific error
6	Not used
7	Manufacturer-specific error

SYNC-Message

NAME	Index	Sub-index	Data type	Access type	Default value
COB-ID SYNC-Message	1005 _{hex}	00 _{hex}	U32	RO	80 _{hex}

This object contains information about the SYNC slave behavior. The slave is not a SYNC master, e.g. only SYNC telegrams can be received. The lower 11 is in the low word specify the identifier of the SYNC telegram (80), only readable.

Communication cycle period

NAME	Index	Sub-index	Data type	Access type	Default value
Communication cycle period	1006 _{hex}	00 _{hex}	U32	RW	00 _{hex}

In case the SYNC telegram is active, the SYNC interval must be to the time of SYNC telegram (1 ms, 2 ms, 4 ms or 8 ms).

Node ID

NAME	Index	Sub-index	Data type	Access type	Default value
Node ID	100B _{hex}	00 _{hex}	U32	RO	Address

It contains the CANopen node address (node ID). Only the low byte is valid.

Guarding Time

NAME	Index	Sub-index	Data type	Access type	Default value
Guarding time	100C _{hex}	00 _{hex}	U16	RW	00 _{hex}

In this object the node guarding time basis is set in milliseconds. By writing the value '0', node guarding will be deactivated.

Guarding factor

NAME	Index	Sub-index	Data type	Access type	Default value
Guarding factor	100D _{hex}	00 _{hex}	U8	RW	00 _{hex}

The value of this object is multiplied by object 100C_{hex} and from this the node guarding period results. By writing the value '0', node guarding will be deactivated.

COB ID guarding protocol

NAME	Index	Sub-index	Data type	Access type	Default value
COB ID guarding protocol	100E _{hex}	00 _{hex}	U32	RW	700 _{hex} +node ID

This object contains the identifier of the node guarding telegram. The identifier can be changed – cannot be saved.

Store Parameter

NAME	Index	Sub-index	Data type	Access type	Default value
Store parameters	1010 _{hex}	00 _{hex}	U8	RO	02 _{hex}
Save all parameters (not supported)		01 _{hex}	U32	RW	not supported
Save communication parameters		02 _{hex}	U32	RW	01 _{hex}

Subindex 01_{hex} is currently not supported. The 01_{hex} in subindex 02_{hex} indicates that saving is supported, here in particular saving mapping and communication parameters. Saving, only possible in the stop state of the drive, is initialised with the value 65766173_{hex} as U32. The values last set for the mapping and communication parameters will be saved.

Restore parameter

NAME	Index	Sub-index	Data type	Access type	Default value
Restore Parameters	1011 _{hex}	00 _{hex}	U8	RO	02 _{hex}
Restore all Parameters (not supported)		01 _{hex}	U32	RW	not supported
Restore Default Communication Parameters		02 _{hex}	U32	RW	01 _{hex}

The communication parameters are set according to default values for this object.

Subindex 01 is currently not supported. With the value 01_{hex} in subindex 02_{hex}, the mapping and communication parameter default values are set. This occurs only in the stop state of the Drive by entering the value 64616F6C_{hex} as U32.



WARNING



The following **can occur**, if you disregard this warning instruction:

- serious personal injury
- death

The danger is: **changed mapping**.

Modified mapping causes parameters to be used other than those planned and consequently the drive can react unexpectedly.

In your application, prevent mapping from being modified in an uncontrolled manner.

Heartbeat consumer time

NAME	Index	Sub-index	Data type	Access type	Default value
Heartbeat consumer time	1017 _{hex}	00 _{hex}	U16	RW	00 _{hex}

Heartbeat producer time

NAME	Index	Sub-index	Data type	Access type	Default value
Heartbeat producer time	1017 _{hex}	00 _{hex}	U16	RW	00 _{hex}

The producer heartbeat time defines the cycle time of the heartbeat. The producer heartbeat time is 0 if it not used. The time has to be a multiple of 1ms.

Node state values:

- 4 = Stopped
- 5 = Operational
- 127 = Pre-operational

B.3.3.1 Receive PDO Communication Parameter

NAME	Index	Sub-index	Data type	Access type	Default value
1. Receive PDO Parameter	1400 _{hex}	00 _{hex}	U8	RO	2 _{hex}
COB-ID used by PDO		01 _{hex}	U32	RW	200 _{hex} + Node-ID
Transmission Type		02 _{hex}	U8	RW	01 _{hex}

NAME	Index	Sub-index	Data type	Access type	Default value
2. Receive PDO Parameter	1401 _{hex}	00 _{hex}	U8	RO	2 _{hex}
COB-ID used by PDO		01 _{hex}	U32	RW	300 _{hex} + Node-ID
Transmission Type		02 _{hex}	U8	RW	01 _{hex}

NAME	Index	Sub-index	Data type	Access type	Default value
3. Receive PDO Parameter	1402 _{hex}	00 _{hex}	U8	RO	2 _{hex}
COB-ID used by PDO		01 _{hex}	U32	RW	400 _{hex} + Node-ID
Transmission Type		02 _{hex}	U8	RW	01 _{hex}

NAME	Index	Sub-index	Data type	Access type	Default value
4. Receive PDO Parameter	1403 _{hex}	00 _{hex}	U8	RO	2 _{hex}
COB-ID used by PDO		01 _{hex}	U32	RW	500 _{hex} + Node-ID
Transmission Type		02 _{hex}	U8	RW	01 _{hex}

B.3.3.2 Receive PDO Mapping Parameter

NAME	Index	Sub-index	Data type	Access type	Default value	
1. Receive PDO Mapping	1600 _{hex}	00 _{hex}	U8	RW	1 _{hex}	
		01 _{hex}	U16	RW	60400010 _{hex}	
		08 _{hex}	U16	RW		

6040_{hex} = P0300 (control word)

NAME	Index	Sub-index	Data type	Access type	Default value	
2. Receive PDO Mapping	1601 _{hex}	00 _{hex}	U8	RW	21 _{hex}	
		01 _{hex}	U16	RW	60400010 _{hex}	
		02 _{hex}	U8	RW	60600008 _{hex}	
		08 _{hex}	U16	RW		

6040_{hex} = P0300 (control word)

6060_{hex} = P1000 (operation mode set value)

NAME	Index	Sub-index	Data type	Access type	Default value	
3. Receive PDO Mapping	1602 _{hex}	00 _{hex}	U8	RW	2 _{hex}	
		01 _{hex}	U16	RW	60400010 _{hex}	
		02 _{hex}	U32	RW	60420020 _{hex}	
		08 _{hex}	U16	RW		

6040_{hex} = P0300 (controlword)

6060_{hex} = P0910 (speed set value)

NAME	Index	Sub-index	Data type	Access type	Default value	
4. Receive PDO Mapping	1603 _{hex}	00 _{hex}	U8	RW	0 _{hex}	
		01 _{hex}	U16	RW	60400010 _{hex}	
		02 _{hex}	U32	RW	607A0020 _{hex}	
		08 _{hex}	U16	RW		

6040_{hex} = P300 (control word)

607A_{hex} = Dummy Object

Notice for Receive PDO mapping parameter

The total number of the mapped bytes at each receive PDO may not exceed the CAN-message frame limit of **8 bytes maximum**.

B.3.3.3 Transmit PDO Communication Parameter

NAME	Index	Sub-index	Data type	Access type	Default value
1. Transmit PDO Parameter	1800 _{hex}	00 _{hex}	U8	RO	5 _{hex}
COB-ID used by PDO		01 _{hex}	U32	RW	180 _{hex} + Node-ID
Transmission Type		02 _{hex}	U8	RW	F0 _{hex}
Inhibit Time		03 _{hex}	U16	RW	0 _{hex}
CMS-Priority Group		04 _{hex}	U8	RW	3 _{hex}
Event Timer		05 _{hex}	U16	RW	0 _{hex}

NAME	Index	Sub-index	Data type	Access type	Default Value
2. Transmit PDO Parameter	1801 _{hex}	00 _{hex}	U8	RO	5 _{hex}
COB-ID used by PDO		01 _{hex}	U32	RW	280 _{hex} + Node-ID
Transmission Type		02 _{hex}	U8	RW	F0 _{hex}
Inhibit Time		03 _{hex}	U16	RW	0 _{hex}
CMS-Priority Group		04 _{hex}	U8	RW	3 _{hex}
Event Timer		05 _{hex}	U16	RW	0 _{hex}

NAME	Index	Sub-index	Data type	Access type	Default Value
3. Transmit PDO Parameter	1802 _{hex}	00 _{hex}	U8	RO	5 _{hex}
COB-ID used by PDO		01 _{hex}	U32	RW	380 _{hex} + Node-ID
Transmission Type		02 _{hex}	U8	RW	F0 _{hex}
Inhibit Time		03 _{hex}	U16	RW	0 _{hex}
CMS-Priority Group		04 _{hex}	U8	RW	3 _{hex}
Event Timer		05 _{hex}	U16	RW	0 _{hex}

NAME	Index	Sub-index	Data type	Access type	Default Value
4. Transmit PDO Parameter	1803 _{hex}	00 _{hex}	U8	RO	5 _{hex}
COB-ID used by PDO		01 _{hex}	U32	RW	480 _{hex} + Node-ID
Transmission Type		02 _{hex}	U8	RW	F0 _{hex}
Inhibit Time		03 _{hex}	U16	RW	0 _{hex}
CMS-Priority Group		04 _{hex}	U8	RW	3 _{hex}
Event Timer		05 _{hex}	U16	RW	0 _{hex}

Notice for Transmit PDO Communication parameter

At the Sub-index 03_{hex} the inhibit time is adjusted, which is the minimal deceleration time for a transmission interval. The input value is defined as a multiplier of 100.

Sub-index 04_{hex} is not used.

Sub-index 05_{hex} is for setting the time of timer triggered Transmit PDOs. The resolution is 1 millisecond.

B.3.3.4 Transmit PDO Mapping Parameter

NAME	Index	Sub-index	Data type	Access type	Default value
1. Transmit PDO Mapping	1A00 _{hex}	00 _{hex}	U8	RW	3 _{hex}
		01 _{hex}	U16	RW	60410010 _{hex}
		02 _{hex}	U32	RW	606C0020 _{hex}
		03 _{hex}	U16	RW	60770010 _{hex}

6041_{hex} = P0301 (status word)

606C_{hex} = P 2073 (speed actual value)

6077_{hex} = P2113 (torque actual value)

NAME	Index	Sub-index	Data type	Access type	Default value
2. Transmit PDO Mapping	1A01 _{hex}	00 _{hex}	U8	RW	2 _{hex}
		01 _{hex}	U16	RW	60410010 _{hex}
		02 _{hex}	U8	RW	60610008 _{hex}

6041_{hex} = P0301 (status word)

6061_{hex} = P0304 (operation mode actual value)

NAME	Index	Sub-index	Data type	Access type	Default value
3. Transmit PDO Mapping	1A02 _{hex}	00 _{hex}	U8	RW	3 _{hex}
		01 _{hex}	U16	RW	60410010 _{hex}
		02 _{hex}	U32	RW	606C0020 _{hex}
		03 _{hex}	U16	RW	60780010 _{hex}

6041_{hex} = P0301 (status word)

606C_{hex} = P 2073 (speed actual value)

6078_{hex} = P2117 (current actual value)

NAME	Index	Sub-index	Data type	Access type	Default value
4. Transmit PDO Mapping	1A03 _{hex}	00 _{hex}	U8	RW	3 _{hex}
		01 _{hex}	U16	RW	60410010 _{hex}
		02 _{hex}	U32	RW	60640020 _{hex}
		03 _{hex}	U16	RW	60770010 _{hex}

6041_{hex} = P301 (status word)

6064_{hex} = P2067 (encode increment)

6077_{hex} = P2113 (torque actual value)

Notice for Transmit PDO mapping parameter

The total number of the mapped bytes at each transmit PDO may not exceed the CAN- message frame limit of **8 bytes maximum**.

B.3.4 Parameters and handling

• Error System

NAME	Index	Sub-index	Data type	Access type	Default value
Error System	40C8 _{hex}	00 _{hex}	U32	RO	0 _{hex}

Error System

Bit-No.	Meaning	Error name	Reaction
10	Error in drive manager	SYS_ERR_DRIVE_MANAGER	adjustable

• Control word

NAME	Index	Sub-index	Data type	Access type	Default value
Control word	6040 _{hex}	00 _{hex}	U16	RW	0 _{hex}

6040_{hex} = P0300 (b maXX[®] 1000 parameter)

Control word used in the status machine of the unit control

Bit-No.	Meaning
0	1: Command „switch on“ 0: Command „shut down“
1 ¹⁾	1: Command „inhibit no voltage“ (operating status) 0: Command „inhibit voltage“
2 ¹⁾	1: Command „ no quickstop“ (operating status) 0: Command „quickstop“
3	1: Command „operation enabled“ 0: Command „inhibit operation“
4	Ramp function generator Inhibit ¹⁾ : output frequency fixed to 0
5	Ramp function generator Stop ¹⁾ : freeze output frequency
6	Ramp function generator Zero ¹⁾ : set output frequency by ramp to 0
7	0 to 1 : reset error
8-15	Reserved

¹⁾: these Bits are low-active.

- Status word

NAME	Index	Sub-index	Data type	Access type	Default value
Status word	6041 _{hex}	00 _{hex}	U16	RO	0 _{hex}

6041_{hex} = P0301 (b maXX[®] 1000 parameter)

The status word used in the status machine of the unit control

Bit-No.	Meaning
0 ²⁾	1: ready to operate 0: not ready to operate
1 ²⁾	1: switched on 0: not ready for use
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 quickstop requirement is present)
6 ²⁾	1: inhibit start 0: no inhibit start
7	1: warning 0: no warning
8	RFG stop
9	Reserved
10	1: set value reached 0: set value not reached
11	1: internal limit active (for example: current limit, speed limit...) 0: not internal limit active
12	Speed =0, output frequency = 0
13	Reserved
14	Reserved
15	Status synchronous drive = True

1): These Bits are low-active.

2): Display operational status

- Operation mode set value

NAME	Index	Sub-index	Data type	Access type	Default value
Operation mode set value	6060 _{hex}	00 _{hex}	U8	RW	6 _{hex}

6060_{hex} = P1000 (b maXX[®] 1000 parameter)

- Operation mode actual value

NAME	Index	Sub-index	Data type	Access type	Default value
Operation mode actual value	6061 _{hex}	00 _{hex}	U8	RO	6 _{hex}

6061_{hex} = P0304 (b maXX[®] 1000 parameter)

Will be mapped in PDO and periodically transmitted. With actual-mode = set-mode = 2 b maXX[®] 1000 (drives) or rather set-frequency is active

- Speed set value

NAME	Index	Sub-index	Data type	Access type	Default value
Set. speed	6042 _{hex}	00 _{hex}	U16 _{hex}	RW	0 _{hex}

6042_{hex} = P0910 (b maXX[®] 1000 parameter): Set Value speed = -32768...32767

- Ramp-up time

NAME	Index	Sub-index	Data type	Access type	Default value
Ramp Uptime	604F _{hex}	00 _{hex}	U32	RW	2710 _{hex}

604F_{hex} = P1172 (b maXX[®] 1000 parameter)

(1 = 1/1000s, ⇒ 1 s = 1000) the resolution is 10 ms

- Ramp-down time

NAME	Index	Sub-index	Data type	Access type	Default value
Ramp Downtime	6050 _{hex}	00 _{hex}	U32	RW	2710 _{hex}

6050_{hex} = P1173 (b maXX[®] 1000 parameter)

(1 = 1/1000s, ⇒ 1 s = 1000) the resolution is 10 ms

- Quickstop time

NAME	Index	Sub-index	Data type	Access type	Default value
Quick stop time	6051 _{hex}	00 _{hex}	U32	RW	3E8 _{hex}

6051_{hex} = P1174 (b maXX[®] 1000 parameter)
 (1 = 1/1000s, ⇒ 1 s = 1000) the resolution is 10 ms

- Speed actual value

NAME	Index	Sub-index	Data type	Access type	Default value
Speed actual value	606C _{hex}	00 _{hex}	U32	RO	0 _{hex}

606C_{hex} = P2073 (b maXX[®] 1000 parameter)

- Output current actual value

NAME	Index	Sub-index	Data type	Access type	Default value
Output current actual value	6078 _{hex}	00 _{hex}	U16	RO	0 _{hex}

6078_{hex} = P2117 (b maXX[®] 1000 parameter)

- Output Torque actual value

NAME	Index	Sub-index	Data type	Access type	Default value
Output torque actual value	6077 _{hex}	00 _{hex}	U16	RO	0 _{hex}

6077_{hex} = P2113 (b maXX[®] 1000 parameter)

- Encode value

NAME	Index	Sub-index	Data type	Access type	Default value
Encode value	6064 _{hex}	00 _{hex}	U32	RO	0 _{hex}

6064_{hex} = P2067 (b maXX[®] 1000 parameter)



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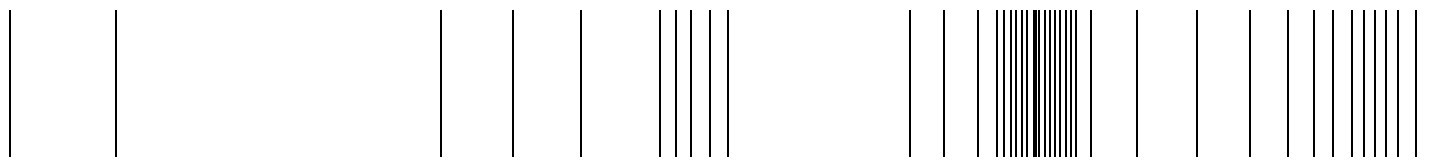
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Revision survey

Version	Date of issue	Changings
5.07004.01	21.12.2007	<ul style="list-style-type: none">◦ First edition
5.07004.02	15.01.2008	<ul style="list-style-type: none">◦ Added parameter attributes
5.07004.03	08.02.2008	<ul style="list-style-type: none">◦ Parameters changed: P0036, P0123, P0124, P0909, P0805, P0871, P2140, P0296, P1211, P1212, P1380, P1382◦ Parameters deleted: P0804, P1367

be in motion



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