Lift Vector AC Drives

ARTDriveL

ARTDriveL

AVy...-...-AC
AVy...-...-AC4
AVy...-...-BR
AVy...-...-BR4

..... Instruction Manual

GEFRAN SIEI

Thank you for choosing this Gefran-Siei product.
We will be glad to receive any possible information which could help us improving this manual. The e-mail address is the following: techdoc@siei.it.
Before using the product, read the safety instruction section carefully.
Keep the manual in a safe place and available to engineering and installation personnel during the product functioning period.
The manufacturer has the right to modify products, data and dimensions without notice.
The data can only be used for the product description and they can not be understood as legally stated properties.
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This manual is updated according to software version 3.5XX and RV33-4 regulation card.
The identification number of the software version can be read on the inverter nameplate or on the label on the FLASH memories mounted on the regulation card.

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Safety Symbol Legend - Precautions de securité

Indicates a procedure, condition, or statement that, if not strictly observed, could result in personal injury or death.
Indique le mode d'utilisation, la procédure et la condition d'exploitation. Si ces consignes ne sont pas strictement respectées, il y a des risques de blessures corporelles ou de mort.

Indicates a procedure, condition, or statement that, if not strictly observed, could result in damage to or destruction of equipment.
Indique et le mode d'utilisation, la procédure et la condition d'exploitation. Si ces consignes ne sont pas strictement respectées, il y a des risques de détérioration ou de destruction des appareils

Indicates a procedure, condition, or statement that should be be strictly followed in order to optimize these applications.
Indique le mode d'utilisation, la procédure et la condition d'exploitation. Ces consignes doivent être rigoureusement respectées pour optimiser ces applications..

NOTE!

Indicates an essential or important procedure, condition, or statement.
Indique un mode d'utilisation, de procédure et de condition d'exploitation essentiels ou importants

According to the EEC standards the ARTDriveL and accessories must be used only after checking that the machine has been produced using those safety devices required by the 89/392/EEC set of rules, as far as the machine industry is concerned. These standards do not apply in the Americas, but may need to be considered in equipment being shipped to Europe.
Drive systems cause mechanical motion. It is the responsibility of the user to insure that any such motion does not result in an unsafe condition. Factory provided interlocks and operating limits should not be bypassed or modified.
Selon les normes EEC, les drives ARTDRiveL et leurs accessoires doivent être employés seulement après avoir verifié que la machine ait été produit avec les même dispositifs de sécurité demandés par la réglementation 89/392/EEC concernant le secteur de l'industrie.
Les systèmes provoquent des mouvements mécaniques. L'utilisateur est responsable de la sécurité concernant les mouvements mécaniques. Les dispositifs de sécurité prévues par l'usine et les limitations operationelles ne doivent être dépassés ou modifiés.

Electrical Shock and Burn Hazard:
When using instruments such as oscilloscopes to work on live equipment, the oscilloscope's chassis should be grounded and a differential amplifier input should be used. Care should be used in the selection of probes and leads and in the adjustment of the oscilloscope so that accurate readings may be made. See instrument manufacturer's instruction book for proper operation and adjustments to the instrument.
Décharge Èlectrique et Risque de Brúlure :
Lors de l'utilisation d'instruments (par example oscilloscope) sur des systémes en marche, le chassis de l'oscilloscope doit être relié à la terre et un amplificateur différentiel devrait être utilisé en entrée.
Les sondes et conducteurs doivent être choissis avec soin pour effectuer les meilleures mesures à l'aide d'un oscilloscope. Voir le manuel d'instruction pour une utilisation correcte des instruments.

Fire and Explosion Hazard:
Fires or explosions might result from mounting Drives in hazardous areas such as locations where flammable or combustible vapors or dusts are present. Drives should be installed away from hazardous areas, even if used with motors suitable for use in these locations.
Risque d'incendies et d'explosions:
L'utilisation des drives dans des zônes à risques (présence de vapeurs ou de poussières inflammables), peut provoquer des incendies ou des explosions. Les drives doivent être installés loin des zônes dangeureuses, et équipés de moteurs appropriés.

Strain Hazard:
Improper lifting practices can cause serious or fatal injury. Lift only with adequate equipment and trained personnel.
Attention à l'Élévation:
Une élévation inappropriée peut causer des dommages sérieux ou fatals. Il doit être élevé seulement avec des moyens appropriés et par du personnel qualifié.

Drives and motors must be ground connected according to the NEC.
Tous les moteurs et les drives doivent être mis à la terre selon le Code Electrique National ou équivalent.

Replace all covers before applying power to the Drive. Failure to do so may result in death or serious injury.
Remettre tous les capots avant de mettre sous tension le drive. Des erreurs peuvent provoquer de sérieux accidents ou même la mort.

Adjustable frequency drives are electrical apparatus for use in industrial installations. Parts of the Drives are energized during operation. The electrical installation and the opening of the device should therefore only be carried out by qualified personnel. Improper installation of motors or Drives may therefore cause the failure of the device as well as serious injury to persons or material damage.
Drive is not equipped with motor overspeed protection logic other than that controlled by software.Follow the instructions given in this manual and observe the local and national safety regulations applicable.
Les drives à fréquence variable sont des dispositifs électriques utilisés dans des installations industriels. Une partie des drives sont sous tension pendant l'operation. L'installation électrique et l'ouverture des drives devrait être executé uniquement par du personel qualifié. De mauvaises installations de moteurs ou de drives peuvent provoquer des dommages materiels ou blesser des personnes.On doit suivir les instructions donneés dans ce manuel et observer les régles nationales de sécurité.

Always connect the Drive to the protective ground (PE) via the marked connection terminals (PE2) and the housing (PE1). AC Input filters have ground discharge currents greater than 3.5 mA. EN 50178 specifies that with discharge currents greater than 3.5 mA the protective conductor ground connection (PE1) must be fixed type and doubled for redundancy.
Il faut toujours connecter le variateur à la terre (PE) par les des bornes (PE2) et le châssis (PE1). Le courant de dispersion vers la terre est supérieur à 3,5 mA sur les filtres à courant alterné (CA). Les normes EN 50178 spécifient qu'en cas de courant de dispersion vers la terre, supérieur à 3,5 ma, la mise à la terre (PE1) doit avoir une double connexion pour la redondance.

The drive may cause accidental motion in the event of a failure, even if it is disabled, unless it has been disconnected from the AC input feeder.
En cas de panne, le variateur peut causer une mise en marche accidentelle, même s'il est désactivé, sauf s'il a été débranché de l'alimentateur à courant alterné.

Never open the device or covers while the AC Input power supply is switched on. Minimum time to wait before working on the terminals or inside the device is listed in section 4.12 on Instruction manual .
Ne jamais ouvrir l'appareil lorsqu'il est suns tension. Le temps minimum d'attente avant de pouvoir travailler sur les bornes ou bien à l'intérieur de l'appareil est indiqué dans la section 4.12.

If the front plate has to be removed because of ambient temperature higher than 40 degrees, the user has to ensure that no occasional contact with live parts may occur.
Si la plaque frontale doit être enlevée pour un fonctionnement avec la température de l'environnement plus haute que 40°C, l'utilisateur doit s'assurer, par des moyens opportuns, qu'aucun contact occasionnel ne puisse arriver avec les parties sous tension.

Do not connect power supply voltage that exceeds the standard specification voltage fluctuation permissible. If excessive voltage is applied to the Drive, damage to the internal components will result.
Ne pas raccorder de tension d'alimentation dépassant la fluctuation de tension permise par les normes. Dans le cas d' une alimentation en tension excessive, des composants internes peuvent être endommagés.

Power supply and grounding / Attention ! Alimentation puissance et mise à la terre
In case of a three phase supply not symmetrical to ground, an insulation loss of one of the devices connected to the same network can cause functional problem to the drive, if the use of a wye/delta transformer is avoided.

1 The drives are designed to be powered from standard three phase lines that are electrically symmetrical with respect to ground (TN or TT network).
2 In case of supply with IT network, the use of wye/delta transformer is mandatory, with a secondary three phase wiring referred to ground.

Please refer to the following connection sample.

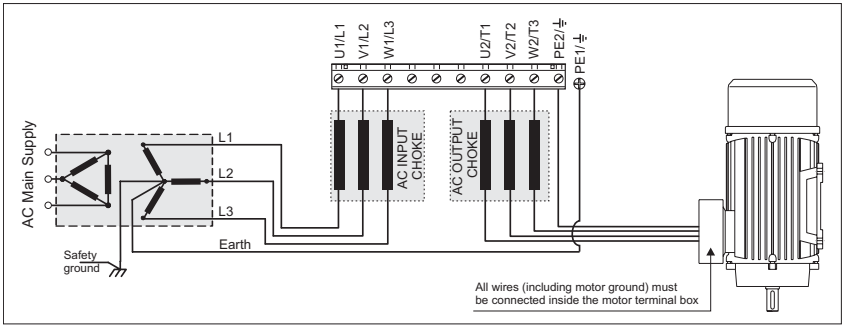
Si le réseau n'est pas équilibré par rapport à la terre et qu'il n'y a pas de transformateur raingle/étoile, une mauvaise isolation d'un appareil électrique connecté au même réseau que le variateur peut lui causer

des troubles de fonctionnement.

1 Les variateurs sont prévus pour être alimentés par un réseau triphasé équilibré avec un régime de neutre standard (TN ou TT).

2 Si le régime de neutre est IT, nous vous recommendons d'utiliser un tranformateur triangle/étoile avec point milieu ramené à la terre

Vous pouvez trouver ci-après des exemples de câblage.



Do not operate the Drive without the ground wire connected. The motor chassis should be grounded to earth through a ground lead separate from all other equipment ground leads to prevent noise coupling.

Ne pas faire fonctionner le drive sans prise de terre. Le chassis du moteur doit être mis à la terre à l'aide d'un connecteur de terre separé des autres pour éviter le couplage des perturbations. Le connecteur de terre devrait être dimensionné selon la norme NEC ou le Canadian Electrical code.

Caution

The grounding connector shall be sized in accordance with the NEC or Canadian Electrical Code. The connection shall be made by a UL listed or CSA certified closed-loop terminal connector sized for the wire gauge involved. The connector is to be fixed using the crimp tool specified by the connector manufacturer.

Le raccordement devrait être fait par un connecteur certifié et mentionné à boucle fermé par les normes CSA et UL et dimensionné pour l'épaisseur du cable correspondant. Le connecteur doit être fixé a l'aide d'un instrument de serrage specifié par le producteur du connecteur.

Do not perform a megger test between the Drive terminals or on the control circuit terminals.

Ne pas exécuter un test megger entre les bornes du drive ou entre les bornes du circuit de contrôle.

Because the ambient temperature greatly affects Drive life and reliability, do not install the Drive in any location that exceeds the allowable temperature. Leave the ventilation cover attached for temperatures of 104° F (40° C) or below.
Étant donné que la température ambiante influe sur la vie et la fiabilité du drive, on ne devrait pas installer le drive dans des places ou la temperature permise est dépassée. Laisser le capot de ventilation en place pour températures de 104°F (40°C) ou inférieures.

If the Drive's Fault Alarm is activated, consult the TROUBLESHOOTING section of this instruction book, and after correcting the problem, resume operation. Do not reset the alarm automatically by external sequence, etc.
Si la Fault Alarm du drive est activée, consulter la section du manuel concernant les défauts et après avoir corrigé l'erreur, reprendre l'opération. Ne pas réiniliatiser l'alarme automatiquement par une séquence externe, etc

Be sure to remove the desicant dryer packet(s) when unpacking the Drive. (If not removed these packets may become lodged in the fan or air passages and cause the Drive to overheat).
Lors du déballage du drive, retirer le sachet déshydraté. (Si celui-ci n'est pas retiré, il empêche la ventilation et provoque une surchauffe du drive).

The Drive must be mounted on a wall that is constructed of heat resistant material. While the Drive is operating, the temperature of the Drive's cooling fins can rise to a temperature of 194° F (90°C).
Le drive doit être monté sur un mur construit avec des matériaux résistants à la chaleur. Pendant le fonctionnement du drive, la température des ailettes du dissipateur thermique peut arriver à 194°F (90°).

Do not touch or damage any components when handling the device. The changing of the isolation gaps or the removing of the isolation and covers is not permissible.
Manipuler l'appareil de façon à ne pas toucher ou endommager des parties. Il n'est pas permis de changer les distances d'isolement ou bien d'enlever des matériaux isolants ou des capots.

Protect the device from impermissible environmental conditions (temperature, humidity, shock etc.)
Protéger l'appareil contre des effets extérieurs non permis (température, humidité, chocs etc.).

No voltage should be connected to the output of the drive (terminals U2, V2 W2). The parallel connection of several drives via the outputs and the direct connection of the inputs and outputs (bypass) are not permissible.
Aucune tension ne doit être appliquée sur la sortie du convertisseur (bornes U2, V2 et W2). Il n'est pas permis de raccorder la sortie de

plusieurs convertisseurs en parallèle, ni d'effectuer une connexion directe de l'entrée avec la sortie du convertisseur (Bypass).

A capacitative load (e.g. Var compensation capacitors) should not be connected to the output of the drive (terminals U2, V2, W2).
Aucune charge capacitive ne doit être connectée à la sortie du convertisseur (bornes U2, V2 et W2) (par exemple des condensateurs de mise en phase).

The electrical commissioning should only be carried out by qualified personnel, who are also responsible for the provision of a suitable ground connection and a protected power supply feeder in accordance with the local and national regulations. The motor must be protected against overloads.
La mise en service électrique doit être effectuée par un personnel qualifié. Ce dernier est responsable de l'existence d'une connexion de terre adéquate et d'une protection des câbles d'alimentation selon les prescriptions locales et nationales. Le moteur doit être protégé contre la surcharge

No dielectric tests should be carried out on parts of the drive. A suitable measuring instrument (internal resistance of at least 10 kΩ/V) should be used for measuring the signal voltages.
Il ne faut pas éxécuter de tests de rigidité diélectrique sur des parties du convertisseurs. Pour mesurer les tensions, des signaux, il faut utiliser des instruments de mesure appropriés (résistance interne minimale 10 kΩ/V).

NOTE!

If the Drives have been stored for longer than two years, the operation of the DC link capacitors may be impaired and must be "reformed".
Before commissioning devices that have been stored for long periods, connect them to a power supply for two hours with no load connected in order to regenerate the capacitors, (the input voltage has to be applied without enabling the drive).
En cas de stockage des variateurs pendant plus de deux ans, il est conseillé de contrôler l'état des condensateurs CC avant d'en effectuer le branchement. Avant la mise en service des appareils, ayant été stockés pendant longtemps, il faut alimenter variateurs à vide pendant deux heures, pour régénérer les condensateurs : appliquer une tension d'alimentation sans actionner le variateur .

NOTE!

The terms "Inverter", "Controller" and "Drive" are sometimes used interchangably throughout the industry. We will use the term "Drive" in this document.
Les mots "Inverter", "Controller" et "Drive" sont interchangeables dans le domaine industriel. Nous utiliserons dans ce manuel seulement le mot "Drive".

Chapter 1 - Functions and General Features

1.1 Drive

The ARTDrive Lift is a field-oriented vector drive with excellent speed control properties and a high torque dedicated to elevator industry and in general to hoisting applications. It can be applied to both geared and gearless systems.
Available control modes according to the installed firmware are:

	AVy ... AC / AVy ... AC4 Asynchronous motor firmware	**AVy ... BR / AVy ... BR4 Synchronous motor firmware**
Control Modes	- Field oriented vector control - Sensorless vector control - V/f advanced control	-Brushless control

Dedicated features

- **Lift sequence**
  Typical sequence of input / output signals used in elevator application, brake, output contactor & door control
- **Parameters in linear units**
  It is possible to select different engineering units for principal parameters determining the movement, rpm for speed and rpm/s, rmp/s^2 for acceleration referred to motor or mm/s for speed, mm/s^2, mm/s^3 for acceleration referred to car.
- **Lift mechanical parameters**
  Parameters of mechanical system like Pulley diameter and Gearbox ratio for transformation between unit systems and System weights to calculate inertia and tune speed regulator for desired response.
- **Ramp generation**
  Two independent S ramps selectable through digital input with 4 independent jerk settings. Dedicated deceleration ramp corresponding to stop command.
- **Multi speed**
  8 preset speed reference values. At start, possibility to overwrite with additional value to achieve smooth start.
- **Pre-torque**
  Initialisation of speed regulator from weight sensor to avoid saging or lifting at start.
- **Landing control**
  Precision control of car position in floor zone through internal position regulator.
- **Higher overload**
  Overload capability corresponding to typical load cycle used in elevator application.
- **Fan control logic function** (only for sizes AVy2040AC4 / BR4 up to AVy5550AC4 / BR4)

Fan control logic function allows to run internal inverter fans only when the drive is enabled. Fan control logic function signal is also repeated on the drive power board FEXT terminals, for an auxiliary external fan.

- **Emergency Module Supply**
  Emergency Module Supply control (EMS or MW22U) allows emergency lift maneuvres (auxiliary battery pack is required). Both devices must be signal interfaced with drive power board EM terminal. Please refer to EMS or MW22U user manual for technical specification.
- **Easy of use menu**
  Menus with elevator terminology separated for MONITORing, motor STARTUP and TRAVEL settings.

Drive features

- Self tuning procedure for current, flux and speed regulators, automatic phasing for brushless motors.
- Space vector modulation keeps the noise level to a minimum.
- Switching frequencies selectable 2, 4, 8, 12, 16 kHz.
- Output voltage up to 98% of input voltage.
- Fault register storing the last 30 fault alarms with the associated lifetime.
- Overload protection for drive, motor and brake unit.
- Three freely configurable analog inputs on the standard device.
- Expansion of the analog / digital outputs and analog / digital inputs via option cards (EXP D8R4, EXP D14A4F).
- Speed and torque current regulation possible.
- Management of many different types of speed feeedback devices (encoder).
- Adaptive speed regulation.
- Speed-related alarms.

Simple operation of the drive can be via

- the terminal strip
- the user-friendly keypad
- the PC program supplied and the RS485 serial interface
- a fieldbus connection (optional): INTERBUS-S, PROFIBUS-DP, GENIUS, CANopen or DeviceNet.

The Drives are fitted with IGBTs (insulated gate bipolar transistors).
The output is protected against ground fault and phase to phase output short circuit.
Regulator power supply via switched-mode power supply unit from the DC Bus circuit. Power supply backup in the event of short-term voltage dips.
Galvanic isolation between control section and command terminals.
Analog inputs designed as differential inputs.

1.2 Motors

The AVy Drives designed for the field oriented regulation of standard three-phase induction AC motors. A sinusoidal encoder or digital encoder can be used for feedback in proportion to speed.

The electrical and mechanical data of standard three-phase motors refers to a particular operating range. The following points should be noted when these motors are connected to an AC Drive:

Is it possible to use standard induction motors?
With the AVy Drives it is possible to use standard induction motors. Some features of the motor have a great influence on the obtained performances. Notice also what is stated in section 2.3.2, "AC Output", about the voltages and the motor power.

Which properties of the asynchronous motors have an unfavorable result in operation with frequency inverters?
Motors with double squirrel-cage rotors or deep rotor bars should not be used.

Star or delta connection?
Motors can be connected in both star or delta connections. Experience has shown that star connected motors have better control properties, so star connections are preferred.

Cooling
The cooling of three-phase motors is normally implemented by means of a fan that is mounted on the motor shaft. Remember that the air flux produced by the fan is reduced when the motor is running at lower speeds, which in certain circumstances may mean that the cooling is insufficient for the motor. Check with the motor manufacturer whether an external fan is required and the motor speed range in the application concerned.

Operation above the rated speed
Due to the mechanical factors involved (bearings, unbalance of rotor) and due to the increased iron losses, consult the manufacturer of the motor if this is operated above the rated speed .

What motor data is required for connecting the frequency inverter?
Motor nameplate specifications

Asynchronous induction motor

- Rated voltage
- Rated frequency
- Rated current
- Rated speed
- Rated power
- Cosphi
- Efficiency

Synchronous brushless motor

- Rated voltage	- Torque constant
- Rated current	- EMF constant
- Rated speed	- Stator resistance
- Pole pairs	- Ls S inductance

Motor protection

Thermistors

PTC thermistors according to DIN 44081 or 44082 fitted in the motor can be connected directly to the frequency inverter via terminals 78 and 79. In this case the resistor (1Kohm) mounted between the terminals 78 and 79 has to be removed.

Temperature-dependent contacts in the motor winding

Temperature-dependent contacts “Klixon” type can disconnect the drive via the external control or can be reported as an external fault on the frequency inverter (terminal 15). They can also be connected to the terminals 78 and 79 in order to have a specific error signal. In this case connect the existing 1 Kohm resistor in series to the wiring, note that one side of it must be connected directly to terminal 79.

NOTE! The motor PTC interface circuit (or klixon) has to be considered and treated as a signal circuit. The connections cables to the motor PTC must be made of twisted pairs with a shield, the cable route should not be parallel to the motor cable or far away at least 20 cm.

Current limitation of the frequency inverter

The current limitation can protect the motor from impermissible overloads. For this the current limitation and the motor overload control function of the Drive (“Motor protection”) must be set so that the current is kept within the permissible range for the motor concerned.

NOTE! Remember that the current limitation can control an overheating of the motor only due to overload, not due to insufficient ventilation. When the drive is operated at low speeds the additional use of PTC resistors or temperature-dependent contacts in the motor windings is recommended, unless separate forced ventilation is available.

Output chokes

When using general purpose standard motors, output chokes are recommended to protect winding isolation in some cases. See section 4.8.2, “Output chokes”.

Chapter 2 - Inspection procedures, Components Identification and Standard Specifications

2.1 Upon Delivery Inspection Procedures

2.1.1 General

A high degree of care is taken in packing the ARTDriveL drives and preparing them for delivery. They should only be transported with suitable transport equipment (see weight data). Observe the instructions printed on the packaging. This also applies when the device is unpacked and installed in the control cabinet.

Upon delivery, check the following:
- the packaging for any external damage
- whether the delivery note matches your order.

Open the packaging with suitable tools. Check whether:
- any parts were damaged during transport
- the device type corresponds to your order

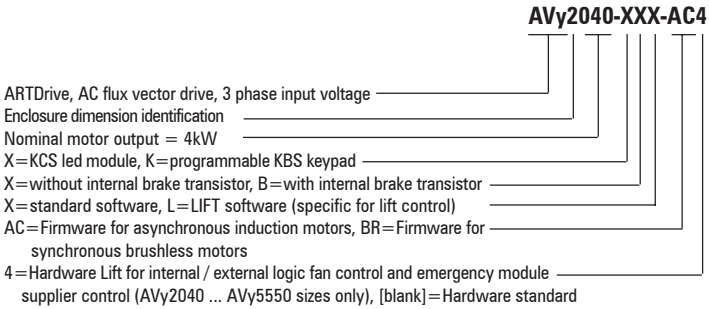
In the event of any damage or of an incomplete or incorrect delivery please notify the responsible sales offices immediately.
The devices should only be stored in dry rooms within the specified temperature ranges.

NOTE!

A certain degree of moisture condensation is permissible if this arises from changes in temperature (see section 2.3.1, "Permissible Environmental Conditions"). This does not, however, apply when the devices are in operation. Always ensure that there is no moisture condensation in devices that are connected to the power supply!

2.1.2 Inverter type designation

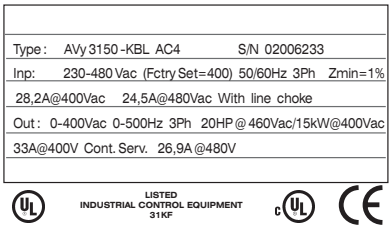
The technical specification of the AVy Drive is stated in the type code. Example:



2.1.3 Nameplate

Check that all the data stated in the nameplate enclosed to the inverter correspond to what has been ordered.

Figure 2.1.3.1: Identification nameplate

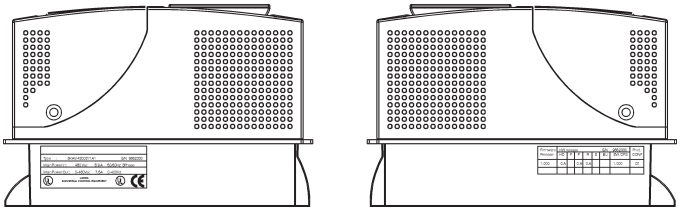


Type: Inverter model
S/N: Serial number
Inp: Power supply voltage range, frequency and AC Input current
Out: Output voltage, Output frequency, Output power and current

Figure 2.1.3.2: Firmware & Card revision level nameplate

Firmware Release	HW release D	F	P	R	S	BU	S/N 0162330 SW. CFG	Prod. CONF
1.000	0.A		0.A	0.A			1.000	D1

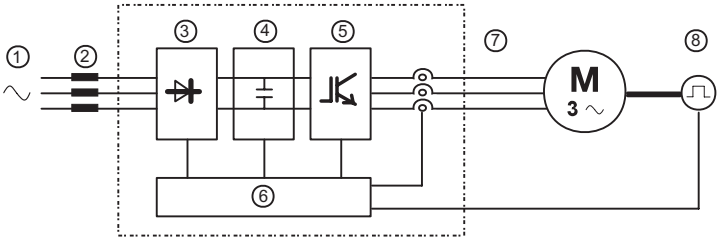
Figure 2.1.3.3: Nameplates position



2.2 Component Identification

An ARTDriveL converts the constant voltage and frequency of a three-phase power supply into a direct voltage and then converts this direct voltage into a new three-phase power supply with a variable voltage and frequency. This variable three-phase power supply can be used for infinitely variable adjustment of the speed of three-phase asynchronous and synchronous motors.

Figure 2.2.1: Basic Setup of Frequency Inverter



1 AC Input supply voltage

2 AC Mains choke
See section 4.8.1

3 Three-phase rectifier bridge
Converts the alternating current into direct current using a three phase full wave bridge.

4 DC intermediate circuit
With charging resistor and smoothing capacitor.
Direct voltage (U_{DC}) = $\sqrt{2}$ x Mains voltage (U_{LN})

5 IGBT inverter
Converts direct voltage to a variable three-phase alternating voltage with variable frequency.

6 Configurable control section
Modules for open-loop and closed-loop control of the power section. This is used for processing control commands, reference values and actual values.

7 Output voltage
Three-phase, variable alternating voltage.

8 Encoder
For speed feedback (see section 3.4.2).

2.3 Standard Specifications

2.3.1 Permissible Environmental Conditions

ENVIRONMENT

T_A Ambient temperature [°C]	0 … +40; +40…+50 with derating
T_A Ambient temperature [°F]	32 … +104; +104…+122 with derating
Installation location	Pollution degree 2 or better (free from direct sunlight, vibration, dust, corrosive or inflammable gases, fog, vapour oil and dripped water, avoid saline environment)
Degree of protection	IP20 IP54 for the cabinet with externally mounted heatsink (size type 1007 to 3150)
Installation altitude	Up to 1000 m (3280 feet) above sea level; for higher altitudes a current reduction of 1.2% for every 100 m (328 feet) of additional height applies .
Temperature:	
operation [1]	0…40°C (32°…104°F)
operation [2]	0…50°C (32°…122°F)
storage	-25…+55°C (-13…+131°F), class 1K4 as per EN50178 -20…+55°C (-4…+131°F), for devices with keypad
transport	-25…+70°C (-13…+158°F), class 2K3 as per EN50178 -20…+60°C (-4…+140°F), for devices with keypad
Air humidity:	
operation	5 % to 85 %, 1 g/m³ to 25 g/m³ without moisture condensation or icing (Class 3K3 as per EN50178)
storage	5% to 95 %, 1 g/m³ to 29 g/m³ (Class 1K3 as per EN50178)
transport	95 % [3], 60 g/m³ [4]
Air pressure:	
operation	[kPa] 86 to 106 (class 3K3 as per EN50178)
storage	[kPa] 86 to 106 (class 1K4 as per EN50178)
transport	[kPa] 70 to 106 (class 2K3 as per EN50178)

STANDARD

Climatic conditions	IEC 68-2 Part 2 and 3
Clearance and creepage	EN 50178, UL508C, UL840 degree of pollution 2
Vibration	IEC68-2 Part 6
EMC compatibility	EN61800-3 (see “EMC Guidelines” instruction book)
Approvals	CE, UL, cUL

1) Parameter Ambient temp = 40°C (104°)
Ambient temp = 0 ... 40°C (32°...104°F)
Over 40°C: - current reduction of 2% of rated output current per K
- remove front plate (better than class 3K3 as per EN50178)
2) Parameter Ambient temp = 50°C (122°F)
Ambient temp = 0 ... 50°C (32°...122°F)
Current derated to 0.8 rated output current
Over 40°C (104°): removal of the top cover (better than class 3K3 as per EN50178)
3) Greatest relative air humidity occurs with the temperature @ 40°C (104°F) or if the temperature of the device is brought suddenly from -25 ...+30°C (-13°...+86°F).
4) Greatest absolute air humidity if the device is brought suddenly from 70°...15°C (158°...59°F).

DISPOSAL OF THE DEVICE

The AVy Drive can be disposed as electronic scrap in accordance with the currently valid national regulations for the disposal of electronic parts.
The plastic covers of the Drives (up to size 3150) are recyclable: the material used is >ABS+PC< .

2.3.2 AC Input/Output Connection

The AVy Drive must be connected to an AC mains supply capable of delivering a symmetrical short circuit current (at 480V +10% Vmax) lower or equal to the values indicated on table 2.3.4.1. For the use of an AC input choke see chapter 4.8.1.
No external connection of the regulator power supply to the existing AC Input supply is required since the power supply is taken from the DC Link circuit. When commissioning, set the **Mains voltage** parameter to the value of the AC Input voltage concerned. This automatically sets the threshold for the Undervoltage alarm at the appropriate level.

NOTE! In some cases AC Input chokes, and possibly noise suppression filters should be fitted on the AC Input side of the device. See chapter “Chokes/Filters”.

Adjustable Frequency Drives and AC Input filters have ground discharge currents greater then 3.5 mA. EN 50178 specifies that with discharge currents greater than 3.5 mA the protective conductor ground connection (PE1) must be fixed type.

2.3.3 AC Input

The Input current of the Drive depends on the operating state and the service conditions of the connected motor, and the use of input reactors. The table 2.3.4.1 shows the values corresponding to rated continuous service (IEC 146 class 1), keeping into account typical output power factor for each size

2.3.4 AC Output

The output of the AVy Drive is ground fault and phase to phase short protected. The switching frequency is constant in the speed range and depends on the drive size.
The connection of an external voltage to the output terminals of the Drive is not permitted!

NOTE! **It is allowed to disconnect the motor from the Drive output, by means of output contactor only after the Drive has been disabled.**

The value for the continuous output current rating (I_{CONT}) depends on AC Input voltage (K_V), Ambient temperature (K_T) and Switching frequency (K_F), values of derating factor are the listed on table 2.3.4.1:

$$I_{CONT} = I_{2N} \times K_V \times K_T \times K_F$$

The applicable deratings are automatically set when selecting the appropriate values of AC Input voltage, Ambient temperature and Switching frequency.

Figure 2.3.4.1: Rating of Drive in Function of Switching Frequency

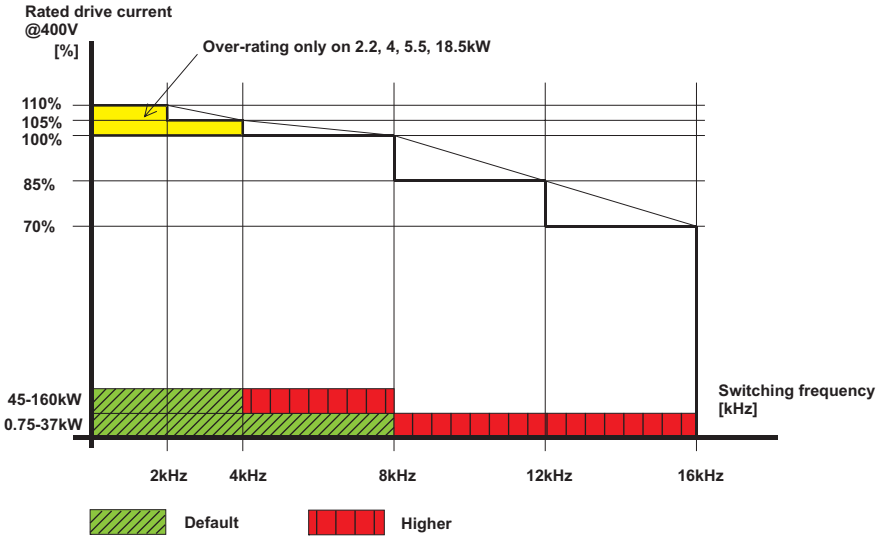


Table 2.3.4.2 shows overload current values for typical service profiles (Ambient temperature =40°C [104°F], standard switching frequency).

After overload cycle, the output current is reduced to nominal output current by the drive control. In order to allow next overload cycle, output current should be decreased (reducing the load) to value less then nominal. Table states overload recovery (pause) time with current reduced to 90% continuous current.

The coordination of the motor rated powers with the Drive type presented in the table below refers to the use of standard 4 poles motors with a rated voltage equal to the rated voltage of the input supply.
As for those motors with different voltages, the type of Drive to use is determined by the rated current of the motor.

Motor nominal current cannot be lower than 0,3 x I_{2N} . Magnetizing motor current must not be higher of I_{CONT}.

Table 2.3.4.1: AC Input/Output Specifications

	Type		1007	1015	1022	1030	2040	2055	2075	3110	3150	4185	4220 4221	4300 4301	4370 4371	5450	5550	6750	7900	71100	71320	81600
OUTPUT	Inverter Output (IEC 146 class1), Continuous service	[kVA]	1.6	2.7	3.8	5	6.5	8.5	12	16.8	22.4	26.5	32	42	55	64	79	98	128	145	173	224
	P_N mot (recommended motor output):																					
	@ U_{LN}=230Vac; f_{SW}=default; IEC 146 class 1	[kW]	0.37	0.75	1.1	1.5	2.2	3	4	5.5	7.5	9	11	18.5	22	22	30	37	55	55	75	90
	@ U_{LN}=400Vac; f_{SW}=default; IEC 146 class 1	[kW]	0.75	1.5	2.2	3	4	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160
	@ U_{LN}=460Vac; IEC 146 class 1	[Hp]	1	2	3	3	5	7.5	10	15	20	23	30	40	50	60	75	100	125	150	150	200
	U_2 Max output voltage	[V]	0.98 x U_{LN} (AC Input voltage)																			
	f_2 Max output frequency (*)	[Hz]	400													200						
	I_{2N} Rated output current :																					
	@ U_{LN}=230-400Vac; f_{SW}= default; IEC 146 class 1	[A]	2.4	4	5.6	7.5	9.6	12.6	17.7	24.8	33	39	47	63	79	93	114	142	185	210	250	324
	@ U_{LN}=460Vac; f_{SW}=default; IEC 146 class 1	[A]	2.1	3.5	4.9	6.5	8.3	11	15.4	21.6	28.7	34	40	54	68	81	99	124	160	183	217	282
	f_{SW} switching frequency (Default)	[kHz]	8													4						
	f_{SW} switching frequency (Higher)	[kHz]	12 / 16													8						--
	Derating factor:																					
	K_V at 460/480Vac		0.87					0.96	0.87	0.93	0.90	0.87										
	K_T for ambient temperature		0.8 @ 50°C (122°F)																			
	K_F for switching frequency		0.7 for f_{SW}=16, 0.85 for f_{SW}=12													0.7 for f_{SW} higher then default						
INPUT	U_{LN} AC Input voltage	[V]	230 V -15% ... 480 V +10%, 3Ph																			
	AC Input frequency	[Hz]	50/60 Hz ±5%																			
	I_N AC Input current for continuous service :																					
	- Connection with 3-phase reactor																					
	@ 230Vac; IEC 146 class1	[A]	1.7	2.9	4	5.5	7	9.5	14	18.2	25	32.5	39	55	69	84	98	122	158	192	220	n.a.
	@ 400Vac; IEC 146 class1	[A]	1.9	3.3	4.5	6.2	7.9	10.7	15.8	20.4	28.2	36.7	44	62	77	94	110	137	177	216	247	309
	@ 460Vac; IEC 146 class1	[A]	1.7	2.9	3.9	5.4	6.7	9.3	13.8	17.8	24.5	32.5	37	53	66	82	96	120	153	188	214	268
	- Connection without 3-phase reactor																					
	@ 230Vac; IEC 146 class1	[A]	3.6	4.4	6.8	7.9	11	15.5	21.5	27.9	35.4	For these types an external inductance is recommended										
	@ 400Vac; IEC 146 class1	[A]	3.9	4.8	7.4	9	12	16.9	24.2	30.3	40											
	@ 460Vac; IEC 146 class1	[A]	3.4	4.2	6.4	7.8	10.4	14.7	21	26.4	34.8											
	Max short circuit power without line reactor (Zmin=1%)	[kVA]	160	270	380	500	650	850	1200	1700	2250	2700	3200	4200	5500	6400	7900	9800	12800	14500	17300	22400
Overvoltage threshold		[V]	820 V_{DC}																			
Undervoltage threshold		[V]	230 V_{DC} (for 230 V_{AC} mains), 400 V_{DC} (for 400V_{AC} mains), 460 V_{DC} for 460 V_{AC} mains)																			
Braking IGBT Unit (standard drive)			Standard internal (with external resistor); Braking torque 150%										Option internal (with external resistor); Braking torque 150%					External braking unit (optional)			

(*) Max output frequency refer to regulation in field oriented mode. See table at chapter 3.3.6 for other details

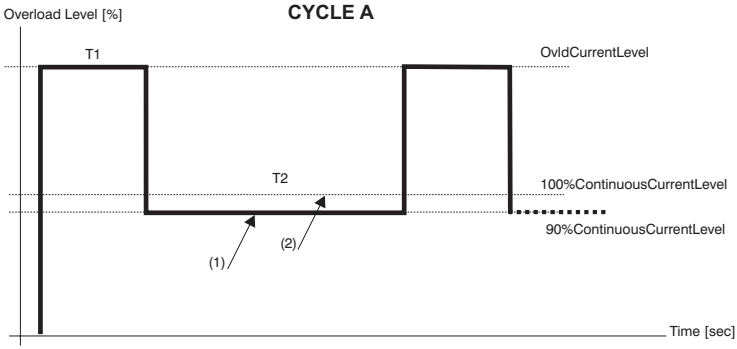
TADL2010

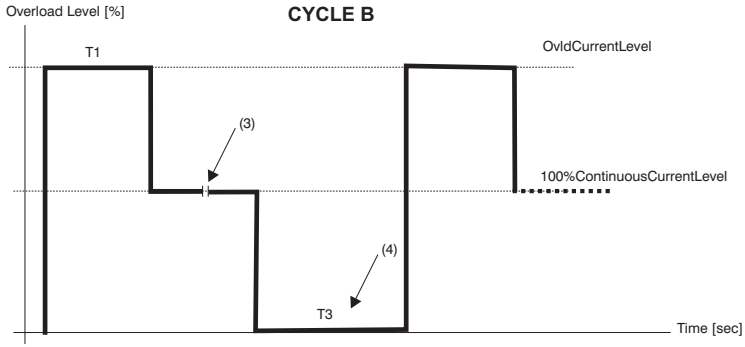
For AVy…AC4 and AVy…BR4 series only the models on grey field are available.

Table 2.3.4.2-A: Overload Capability (Sizes 1007 ... 4370)

Model	Continuous current @400V	Overload factor	T1 Overload time	Overload current	T2 Overload pause time @90% Cont curr	T3 Overload pause time @ 0% Cont curr	LOW Frequency < 3Hz overload factor	LOW Frequency < 3Hz overload time
	[A]		[sec]	[A]	[sec]	[sec]		[sec]
1007	2.4	1.83	10	4.4	124	24	1.5	2
1015	4			7.3				
1022	5.6			10.2				
1030	7.5			13.7				
2040	9.6			17.6				
2055	12.6			23.1				
2075	17.7			32.4				
3110	24.8			45.4				
3150	33			60.4				
4185	39			71.4				
4221	47			86.0			1.36	
4301	63			115.3				
4371	79			144.6				

TL2020



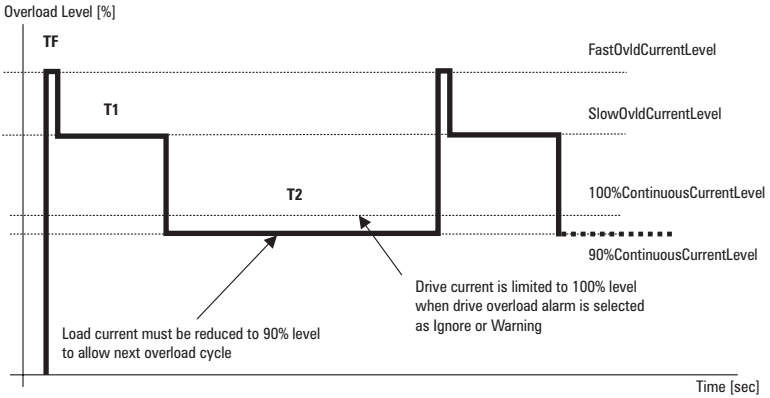


(1) Load current must be reduced to 90% level to allow next overload cycle.
(2) Drive current is limited to 100% level when drive overload alarm is selected as Ignore or Warning
(3) No limit on duration of this time interval @100% Cont current
(4) Next overload cycle is allowed after T3

Table 2.3.4.2-B: Overload Capability (Sizes 5450... 81600)

Model	Continuous current @400V	SLOW Overload factor	T1 SLOW Overload time	SLOW Overload current	T2 SLOW Overload pause time @90% Cont curr	FAST Overload factor	TF FAST Overload time [sec]	FAST Overload current	LOW Frequency < 3Hz overload factor	LOW Frequency < 3Hz overload time
	[A]		[sec]	[A]	[sec]		[sec]	[A]		[sec]
5450	93	1.36	60	126.5	300	1.83	0.5	170.2	1.36	2
5550	114			155				208.6		
6750	142			193.1				259.9		
7900	185			251.6				338.6		
71100	210			285.6				384.3		
71320	250			340				457.5		
81600	324			440.6		1.4	1.0	453.6		

TL2021



2.3.5 I/O and Encoder Specifications

I/O

Enable inputs	0 / 15...30 V	3.2...6.4 mA	(5 mA @ 24 V)
Analog inputs	Selectable	0... ± 10 V	0.25mA max
	0...20 mA	10V max	
	4...20 mA	10 V max	
	Max common mode voltage: 0...± 10 V		
Analog outputs	0...± 10 V	5 mA max per output	
Digital inputs	0 / 15...30 V	3.2...6.4 mA	(5 mA @ 24 V)
Digital outputs	Supply	+ 15...35 V	
	Signals	+ 15...35 V	40 mA max per output

Int. voltage supply

Load capacity	+ 5 V, 160 mA		Plug connector
	+ 10 V, 10 mA		Terminal 7
	- 10 V, 10 mA		Terminal 8
	+ 24 V, 120 mA		Terminal 19
Tolerance	+ 10 V	± 3 % [1]	
	- 10 V	± 3 % [1]	
	+ 24 V	+ 20 ... 30 V, not stabilized	
	XE for digital encoder, PIN 7/9		

[1] The tolerance between positive and negative amplitudes is ± 0.5%

2.3.6 Accuracy

Table 2.3.6.1: Maximum / Minimum Output Frequency

Regulation mode	Output frequency (Hz)					
	Maximum				Minimum *(a)*	Resolution
	Switching frequency (kHz)					
	2	**4**	**8**	**16**		
Field oriented	200	200	400	400	0	0.005
Sensorless vect	200	200	200	200	0.6	
V/f control	200	300	600	600	2*motor slip freq	
Brushless	200	200	400	400	0	

(a): 1.5 * Rated motor torque capability

Table 2.3.6.2: Speed Reference / Feedback Resolution and Maximum Limits

Regulation mode	Speed reference resolution (rpm)	Speed feedback resolution (rpm)				FSS max value (rpm)	Limit speed (rpm)
		Enc Sin	Enc Dig Fmode	Enc Dig Fpmode	SinCos/Res.		
Field oriented	0.03125 0.125 0.25 0.5 1	Higher from [60000/(4096*ppr) - SpdD ref res]	Higher from [60000/(40*ppr)-SpdD ref res]	SpdD ref res	N/A	512 2048 4096 8192 16384	1024 4096 8192 16384 32768
Sensorless vect	0.03125 0.125 0.25 0.5 1	Highest value from (0.3 - SpdD ref res) *(b)*			N/A	512 2048 4096 8192 16384	1024 4096 8192 16384 32768
V/f control	0.03125 0.125 0.25 0.5 1	N/A				512 2048 4096 8192 16384	1024 4096 8192 16384 32768
Brushless	0.03125 0.125 0.25 0.5 1	Higher value of either [60000/(4096*ppr)] or SpdD ref res	Highest value of either [60000/(40*ppr)] or SpdD ref res	SpdD ref res	2.5	512 2048 4096 8192 16384	1024 4096 8192 16384 32768

(b): 4 pole motor

Table 2.3.6.3: Speed Regulator Bandwidth

Regulation mode	Spd Control range	Max Spd reg bandwidth (rad/sec)				Typ Spd Reg Accuracy *(c)* [%]
		Enc Sin	Enc Dig Fmode	Enc Dig Fpmode	SinCos/Res.	
Field oriented	>10000:1	450	100	300 (Spd>15rpm for ppr=1024)	N/A	0.01
Sensorless vect	>500:1	100 (Spd>FSS/100)			N/A	0.3@FSS 0.5@FSS/50
V/f control	>100:1	N/A				1%
Brushless	>10000:1	450	100	300 (Spd>15rpm for ppr=1024)	100	0.01%

(c): Standard 1500rpm

Table 2.3.6.4: Torque Specifications

Regulation mode	Torque ref resolution	Typ Torque Reg Accuracy *(d)* [%]	Trq Control range	Typ Trq Rise time [ms]
Field oriented	>1:1000	4	>20:1	0.8
Sensorless vect	>1:1000	8	>20:1	0.8
V/f control	N/A	N/A	N/A	N/A
Brushless	>1:1000	1	>20:1	0.8

(d): Mot rated torque=100%
Spd range: Max=Mot Rated speed; min=Mot Rated speed/10
Torque range: Max=Mot Rated torque; min=Mot Rated torque/10

Chapter 3 - Mechanical Installation Guidelines

3.1 Dimensions and Mounting Methods

Figure 3.1.1: Drive Dimensions (Sizes 1007 ... 3150)

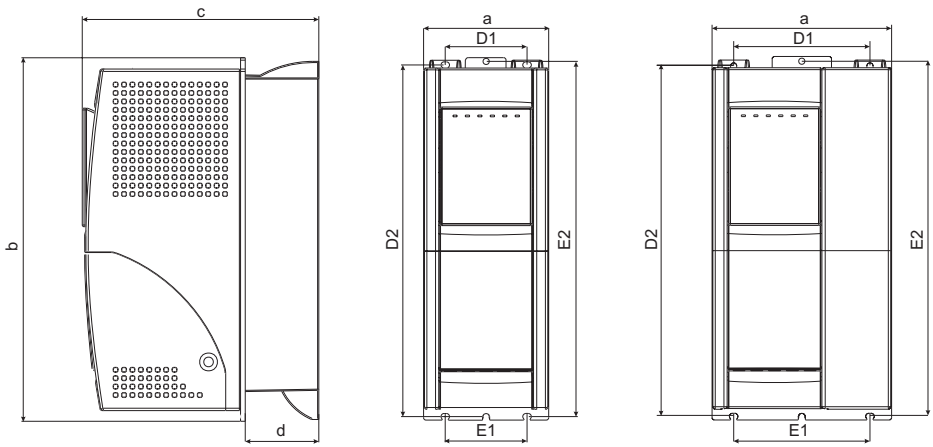
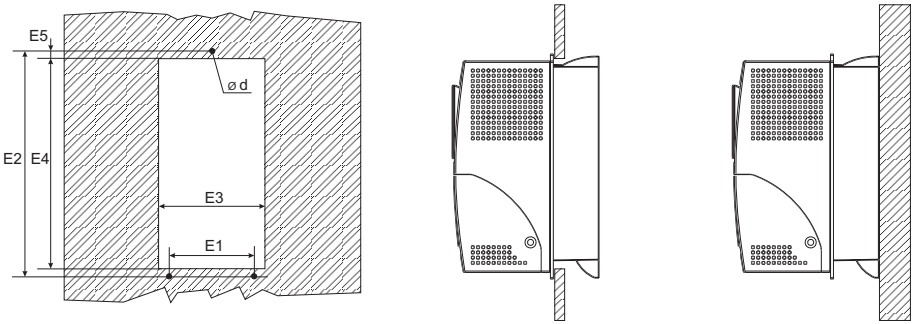


Figure 3.1.2: Mounting Methods (Sizes 1007 ... 3150)



Mounting with external dissipator (E)

Mounting wall (D)

Table 3.1.1: Drive Dimensions and Weights (Sizes 1007 ... 3150)

Type		1007	1015	1022	1030	2040	2055	2075	3110	3150
Drive dimensions:										
a	mm (inch)	105.5 (4.1)				151.5 (5.9)			208 (8.2)	
b	mm (inch)	306.5 (12.0)							323 (12.7)	
c	mm (inch)	199.5 (7.8)							240 (9.5)	
d	mm (inch)	62 (2.4)							84 (3.3)	
D1	mm (inch)	69 (2.7)				115 (4.5)			168 (6.6)	
D2	mm (inch)	296.5 (11.6)							310.5 (12.2)	
E1	mm (inch)	69 (2.7)				115 (4.5)			164 (6.5)	
E2	mm (inch)	299.5 (11.7)							315 (12.4)	
E3	mm (inch)	99.5 (3.9)				145.5 (5.7)			199 (7.8)	
E4	mm (inch)	284 (11.2)							299.5 (11.8)	
E5	mm (inch)	9 (0.35)								
Ø d		M5								
Weight	kg (lbs)	3.5 (7.7)	3.6 (7.9)	3.7 (8.1)		4.95 (10.9)			8.6 (19)	

tadl3100

Figure 3.1.3: Drive Dimensions (Sizes 4220 ... 81600)

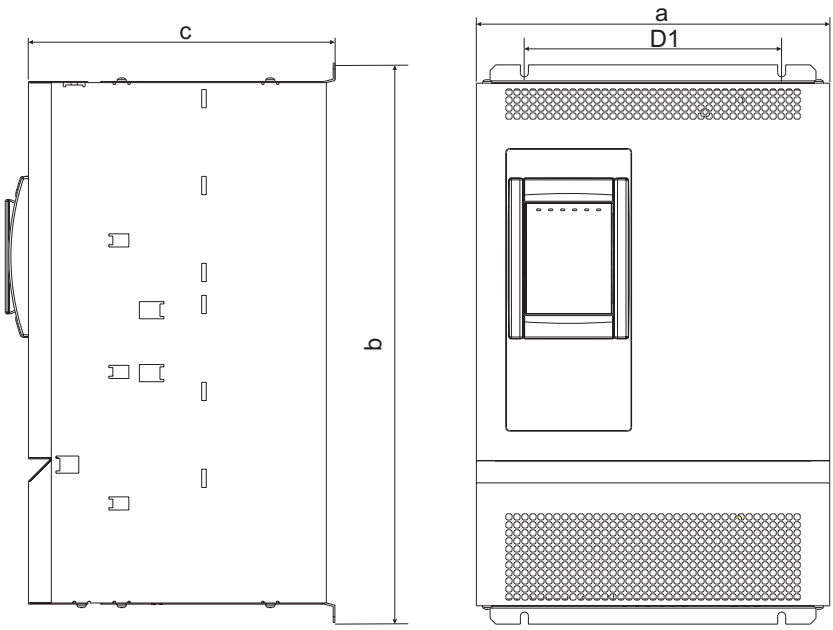


Figure 3.1.4: Mounting Methods (Sizes 4220 ... 81600)

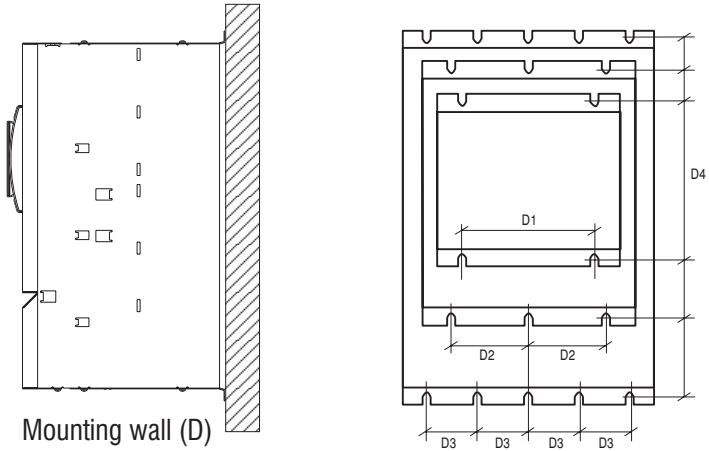


Table 3.1.2: Drive Dimensions and Weights (Sizes 4220 ... 81600)

Type		4185-4221	4300-4301	4370-4371	5450	5550	6750	7900	71100	71320	81600
Drive dimensions:											
a	mm (inch)	309 (12.1)			376 (14.7)		509 (20)				
b	mm (inch)	489 (19.2)			564 (22.2)		741 (29.2)	909 (35.8)			965 (38)
c	mm (inch)	268 (10.5)	308 (12.1)				297.5 (11.7)				442 (17.4)
D1	mm (inch)	225 (8.8)									
D2	mm (inch)				150 (5.9)						
D3	mm (inch)						100 (3.9)				
D4	mm (inch)	475 (18.7)			550 (21.6)		725 (28.5)	891 (35)			947 (37.3)
Ø		M6									
Weight	**kg**	18	22	22.2	34	34	59	75.4	80.2	86.5	109
	lbs	39.6	48.5	48.9	74.9	74.9	130	166.1	176.7	190.6	240.3

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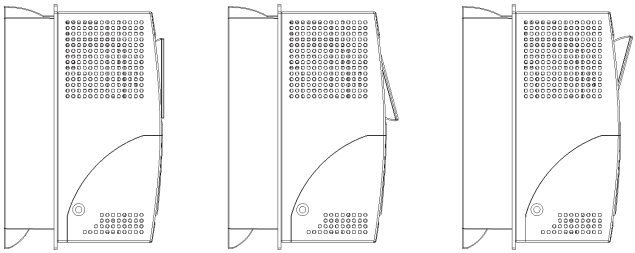
Figure 3.1.5: Keypad Positioning



To allow a confortable viewing angle, the keypad can be oriented on three different positions.

3.2 Watts Loss, Heat Dissipation, Internal Fans and Minimum Cabinet Opening Suggested for the Cooling

The heat dissipation of the Drives depends on the operating state of the connected motor. The table below shows values that refer to operation at default switching frequency (see section 2.3.2, "AC Input/Output Connection"), Tamb ≤ 40°C, typ. motor power factor and nominal continuous current.

Table 3.2.1: Heat Dissipation and Required Air Flow

Type	Heat Dissipation [W]		Airflow of fan [m^3/h]	
	@U_{LN}=400Vac 1)	@U_{LN}=460Vac 1)	Internal fan	Heatsink fans
1007	48.2	45.0	11	-
1015	77.5	72.0	11	30
1022	104.0	96.3	11	30
1030	138.3	126.7	11	30
2040	179.5	164.1	11	2x30
2055	233.6	215.6	11	2x30
2075	327.4	300.8	11	2x30
3110	373	340	30	2x79
3150	512	468	30	2x79
4185	560	500		80
4220-4221	658	582		80
4300-4301	864	780		170
4370-4371	1100	1000		170
5450	1250	1100		340
5550	1580	1390		340
6750	1950	1750		650
7900	2440	2200		975
71100	2850	2560		975
71320	3400	3050		975
81600	4400	3950		1820

tadl0040

1) f_{SW}=default; I_2=I_{2N}

NOTE!

All the Drives have internal fans.
Heat dissipation losses refer to default Switching frequency.

Table 3.2.2: Minimum Cabinet Opening Suggested for the Cooling

Type	Minimum cooling opening [cm^2] (sq.inch)	
	Control section	Heatsink
1007 ... 1030	31 (4.8)	36 (5.6)
2040 ... 2075	31 (4.8)	72 (11.1)
3110 ... 3150	36 (5.6)	128 (19.8)
4185 ... 4221	2x150 (2x 23.5)	2x150 (2x 23.5)
4300 ... 4371	2x200 (2x31)	2x200 (2x31)
5450 ... 5550	2x370 (2x57.35)	2x370 (2x57.35)
6750 ... 71320	2x620 (2x96.1)	2x620 (2x96.1)
81600	2 x 1600 (2 x 248)	2 x 1600 (2 x 248)

tadl0050

3.2.1 Cooling Fans Power Supply

Fan Control Logic function
(only for sizes AVy2040AC4 / BR4 up to AVy5550AC4 / BR4)
It allows to run internal fans **only when the drive is enabled**. Fans will stop when the drive is disabled after a period of 300sec and heatsink temperature is below 60 degrees.
Fan control logic function signal is also repeated on the drive power board FEXT terminals, for an auxiliary external fan.

Cooling Fans Power Supply for sizes AVy1007 to AVy5550
Power supply (+24VAC) for these fans is provided from the internal drive power supply unit.

Cooling Fans Power Supply for sizes AVy6750 to AVy81600
Power supply for the fans is externally connected by the user. AC Input voltage is connected at the power terminal strip:
- AVy6750: 0.8A@115V/60Hz, 0.45A@230V / 50Hz
- AVy7900 ... AVy71320: 1.2A@115V/60Hz, 0.65A@230V / 50Hz
- AVy81600: 1.65A@115V/60Hz, 0.70A@230V / 50Hz

Figure 3.2.1: UL Type Fans Connections on AVy7900, AVy71100 and AVy71320 Sizes

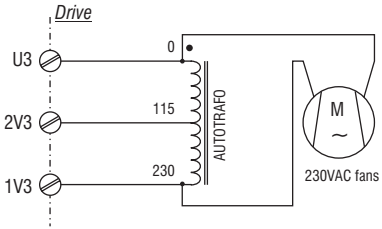


Figure 3.2.2: UL Type Fans Connections on AVy6750 and AVy81600 Sizes

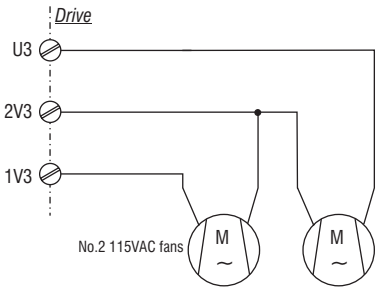
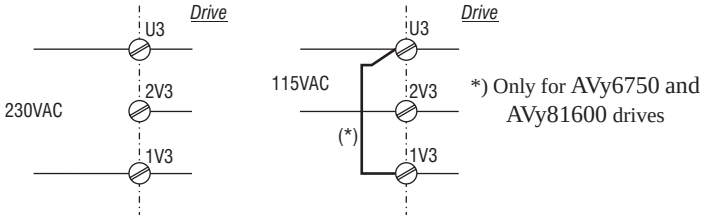


Figure 3.2.3: Example for External Connection

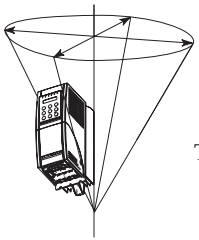


NOTE! An internal fuse (2.5A 250VAC slo-blo) for AVy7900, AVy71100 and AVy71320 sizes is provided.
On AVy6750 and AVy81600 sizes the fuse must be mounted externally.

3.3 Installation Mounting Clearance

NOTE! The dimensions and weights specifed in this manual should be taken into consideration when the device is mounted. The technical equipment required (carriage or crane for large weights) should be used. Improper handling and the use of unsuitable tools may cause damage.

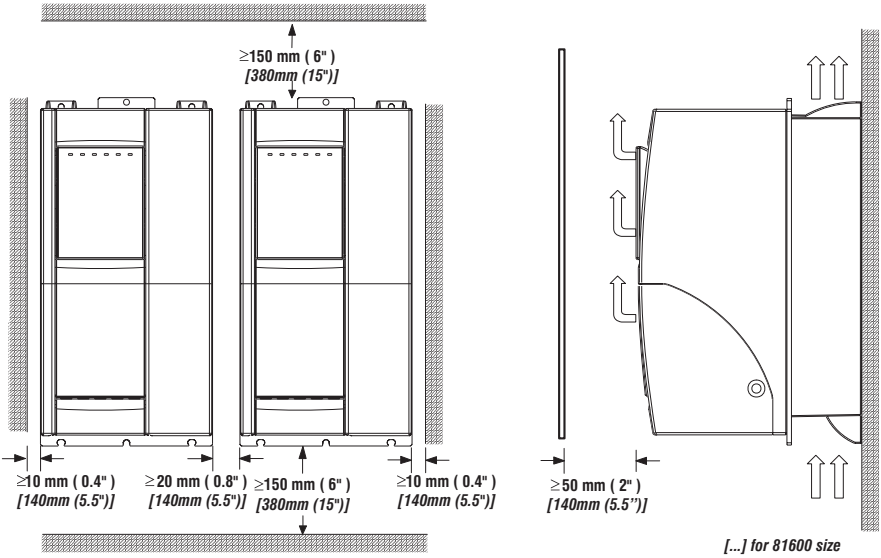
Figure 3.3.1: Max. Angle of Inclination



The maximum angle of inclination is 30°

NOTE! The drives must be mounted in such a way that the free flow of air is ensured. The clearance to the device must be at least 150 mm (6 inches). A space of at least 50 mm (2 inches) must be ensured at the front.
On size 81600 the top and bottom clearance must be at least 380 mm (15 inches), on front and sides must be ensured a space of at least 140 mm (5.5 inches). Devices that generate a large amount of heat must not be mounted in the direct vicinity of the drive.

Figure 3.3.2: Mounting Clearance



NOTE! Fastening screws should be re-tightened after a few days of operation.

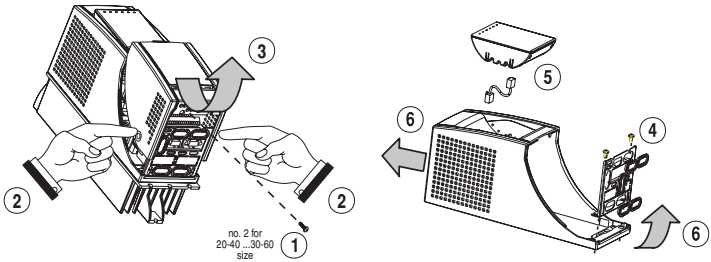
Chapter 4 - Wiring Procedure

4.1 Accessing the Connectors

4.1.1 Removing the Covers

NOTE! Observe the safety instructions and warnings given in this manual. The devices can be opened without the use of force. Only use the tools specified.

Figure 4.1.1: Removing the Covers (Sizes 1007 to 3150)



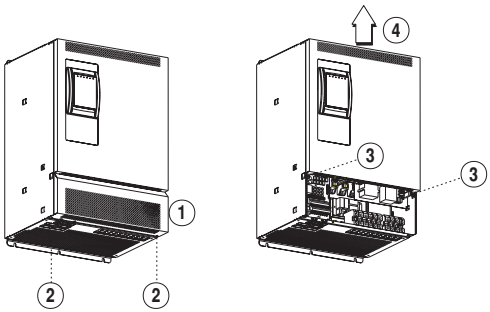
Sizes 1007 to 2075:
The terminal cover and cable entry plate of the device must be removed in order to fit the electrical connections:
- unscrew the screw (1), remove the cover of devices (2) by pressing on both sides as shown on the above figure (3).
- unscrew the two screws (4) to remove the cable entry plate.

The top cover must be removed in order to mount option cards and change the internal jumper settings:
- remove the keypad and disconnect the connector (5)
- lift the top cover on the bottom side (over the connector level) and then push it to the top (6).

Sizes 3110 to 3150:
The terminal cover and cable entry plate of the device must be removed in order to fit the electrical connections:
- unscrew the two screws (1) and remove the cover of devices
- unscrew the two screws (4) to remove the cable entry plate.

The top cover must be removed in order to mount the option card and change the internal jumper settings:
- remove the keypad and disconnect the connector (5)
- lift the top cover on the bottom side (over the connector level) and then push it to the top (6)

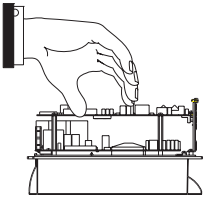
Figure 4.1.2: Removing the Covers (Sizes 4185 to 81600)



Sizes 4185 to 81600:
The terminal cover of the device must be removed in order to fit the electrical connections: unscrew the two screw (2) and remove the cover (1)
The top cover must be removed in order to mount the option card and change the internal jumper settings: unscrew the two screw (3) and remove the top cover by moving it as indicated on figure (4).

Caution

In order to avoid damage to the drive it is not allowed to transport it by holding the cards!



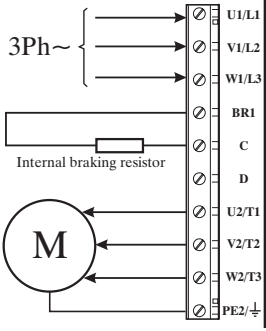
4.2 Power Section

Caution

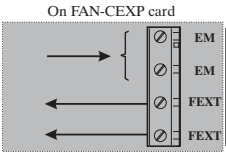
Please note that a wrong connection on motor phases can cause the motor to move without control and can destroy the drive.
Please check that motor phases are connected in the right sequence before enabling the drive.

4.2.1 Terminal Assignment on Power Section / Cable Cross-Section

Table 4.2.1.1: Power Section Terminals from 1007 to 3150



Function	max
AC mains voltage	230V -15% … 460V+15%, 3Ph
Braking unit resistor command (braking resistor must be connected between BR1 and C)	
Intermediate circuit connection	770V DC / 1.65 output current
Motor connection	AC line volt 3Ph 1.36 output current
Motor ground connection	



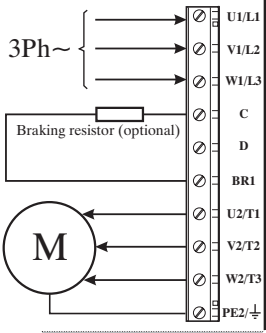
Emergency module signal required to interface the drive with the EMS device (Emergency Module Supplier)	0.22A
Logic fan control signal repeated on an external fan (*)	250Vac 1A

Grounding (protective earth) conductor

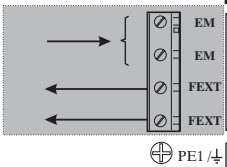
Note!

EM and FEXT terminals are available on sizes AVy2040AC4 / BR4 up to AVy5550AC4 / BR4 only.

Table 4.2.1.2: Power Section Terminals from 4185 to 81600



Function	max
AC mains voltage	230V -15% … 460V+15%, 3Ph
Intermediate circuit connection	770V DC / 1.65 output current
Braking unit resistor command (braking resistor must be connected between BR1 and C)	
Motor connection	AC line volt 3Ph 1.36 output current
Motor ground connection	



Emergency module signal required to interface the drive with the EMS device (Emergency Module Supplier)	0.22A
Logic fan control signal repeated on an external fan (*)	250Vac 1A

Grounding (protective earth) conductor

Note!

EM and FEXT terminals are available on sizes AVy2040AC4 / BR4 up to AVy5550AC4 / BR4 only.

(*) Fans will be always start when the drive is enabled.
Fans will stop when the drive is disabled after a period of 300 sec. and heatsink temperature is below 60°C.

Power terminals lay-out sizes 1007 to 3150

The terminals of the devices are made accessible by removing the cover and the cable entry plate (see section 4.1, "Accessing the connectors"), on some drive types it is also possible to extract the removable connector. All the power terminals are located on the power card PV33-...

Power terminals lay-out sizes 4185 to 81600

The terminals of the devices are made accessible by removing the cover (see section 4.1, "Accessing the connectors").

Maximum cable sizes for power terminals U1, V1, W1, U2, V2, W2, C, D, PE

Table 4.2.1.3: Maximum Cable Cross Section for Power Terminals

Type		1007	1015	1022	1030	2040	2055	2075	3110	3150	4185...4221	4300-3401
U1,V1,W1,U2,V2,W2,C,D terminals	AWG	14				12	10		8	6		4
	mm^2	2				4			8	10	16	25
	(sq in)	(0.003)				(0.006)			(0.012)	(0.016)	(0.025)	(0.039)
Tightening torque	Nm	0.5 to 0.6							1.2 to 1.5		2	3
	(lbf . in)	(4.4) to (5.3)							(10.6) to (13.2)		(17.7)	(26.5)
BR1 terminals	AWG	14				12	10		8	6	10	8
	mm^2	2				4			8	10	6	10
	(sq in)	(0.003)				(0.006)			(0.012)	(0.016)	(0.009)	(0.016)
Tightening torque	Nm	0.5 to 0.6							1.2 to 1.5		0.9	1.6
	(lbf . in)	(4.4) to (5.3)							(10.6) to (13.2)		(7.9)	(14.1)
PE1, PE2 terminals	AWG	14				12	10		8	6		6
	mm^2	2				4			8	10	16	16
	(sq in)	(0.003)				(0.006)			(0.012)	(0.016)	(0.025)	(0.025)
Tightening torque	Nm	0.5 to 0.6							1.2 to 1.5		2	3
	(lbf . in)	(4.4) to (5.3)							(10.6) to (13.2)		(17.7)	(26.5)

Type		4370-4371	5450	5550	6750	7900	71100	71320	81600
U1,V1,W1,U2,V2,W2,C,D terminals	AWG	2		1/0	2/0	4/0	300*	350*	4xAWG2
	mm^2	35		50	70	95	150	185	4x35
	(sq in)	(0.054)		(0.078)	(0.109)	(0.147)	(0.233)	(0.287)	(0.006x0.054)
Tightening torque	Nm	4			12		10 - 30		
	(lbf . in)	(0.006)			(106.2)		(88.5) - (265.5)		
BR1 terminals	AWG	8	6	terminals not available					
	mm^2	10	16						
	(sq in)	(0.016)	(0.025)						
Tightening torque	Nm	1.6	3						
	(lbf . in)	(14.1)	(26.5)						
PE1, PE2 terminals	AWG	6	2						
	mm^2	16	50						
	(sq in)	(0.025)	(0.078)						
Tightening torque	Nm	3	4						
	(lbf . in)	(26.5)	(35.4)						

* = kcmils

Type		2040 up to 5550
EM, FEXT terminals	AWG	28 … 16
	mm^2	0.14 … 1.5
	(sq in)	
Tightening torque	Nm	0.4
	(lbf . in)	

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The grounding conductor of the motor cable may conduct up to twice the value of the rated current if there is a ground fault at the output of the ARTDriveL drive.

NOTE! Use 60°C / 75°C copper conductor only.

Maximum Cable Sizes for control terminals

Table 4.2.1.4: Maximum Permissible Cable Cross-section on the Plug-in Terminals of the Regulator Section

Terminals	Maximum Permissible Cable Cross-Section [mm^2]		AWG	Tightening torque [Nm]
	flexible	multi-core		
1 ... 79	0.14 ... 1.5	0.14 ... 1.5	28 ... 16	0.4
80 ... 85	0.14 ... 1.5	0.14 ... 1.5	28 ... 16	0.4

txv0065L

The use of a 75 x 2.5 x 0.4 mm (3 x 0.1 x 0.02 inch) flat screwdriver is recommended. Remove 6.5 mm (0.26 inch) of the insulation at the cable ends. Only one unprepared wire (without ferrule) should be connected to each terminal point.

Maximum Cable Length

Table 4.2.1.5: Maximum Control Cable Lengths

Cable section [mm^2]	0.22	0.5	0.75	1	1.5
Max Length m [feet]	27 [88]	62 [203]	93 [305]	125 [410]	150 [492]

avy3130

4.3 Regulation Section

4.3.1 RV33-4 Regulation Card Switch & Jumpers

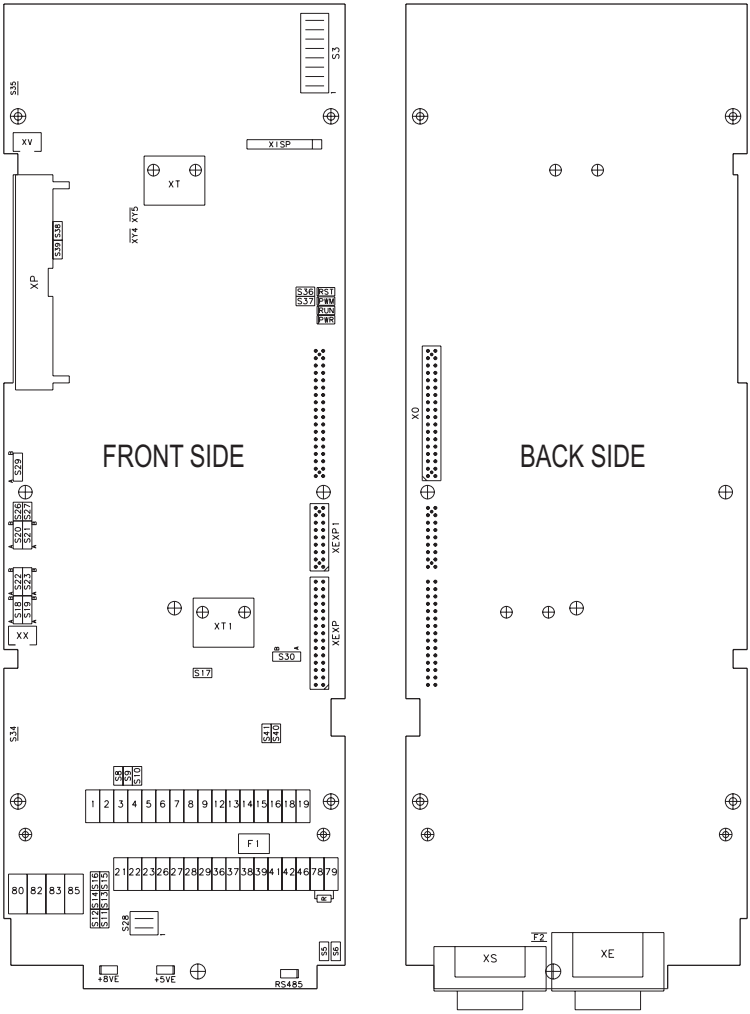


Table 4.3.1.1: LEDs & Test points on Regulation Card

Designation	Color	Function
PWR	green	LED lit when the voltage +5V is present and at correct level
RST	red	LED lit during the Hardware Reset
PWM	green	LED lit during IGBT modulation
RUN	green	LED is flashing when regulation is running (not in STARTUP menu)
RS485	green	LED lit when RS485 interface is supplied
+5VE	green	LED lit when encoder power supply +5V (XE-9)
+8VE	red	LED lit when encoder power supply +8V (XE-2)
XY4	(test point)	Phase current signal (U)
XY5	(test point)	Reference point

Table 4.3.1.2: Jumpers and dip-switches on Regulation Card RV33

Designation	Function	Factory setting
S3	Factory use, the setting must not be changed	-
S5 - S6	Terminating resistor for the serial interface RS485 ON= Termination resistor IN OFF= No termination resistor	ON (*)
S8	Adaptation to the input signal of analog input 1 (terminals 1 and 2) ON=0...20 mA / 4...20 mA OFF=0...10 V / -10...+10 V	OFF
S9	Adaptation to the input signal of analog input 2 (terminals 3 and 4) ON=0...20 mA / 4...20 mA OFF=0...10 V / -10...+10 V	OFF
S10	Adaptation to the input signal of analog input 3 (terminals 5 and 6) ON=0...20 mA / 4...20 mA OFF=0...10 V / -10...+10 V	OFF
S11 - S12 - S13 S14 - S15 - S16 (**)	Encoder setting (jumpers on kit EAM_1618 supplied with the drive) ON=Sinusoidal SE or SESC encoder OFF=Digital DE or DEHS encoder	OFF
S17 (**)	Monitoring of the C-channel of the digital encoder ON=C-Channel monitored OFF=C-Channel not monitored (required for single-ended channels)	OFF
S18 - S19 S20 - S21 (**)	Encoder setting Pos. B=digital DEHS encoder Pos. A= sinusoidal SESC encoder	A
S22 - S23 (**)	Analog input 3 enabling (alternative with SESC encoder) Pos. A= if SESC encoder is used Pos. B=analog input 3 enabled Pos. OFF= resolver	A
S26 - S27 (**)	Resover use enabling Pos. ON=when resolver is not used Pos. OFF=resolver	ON
S28	Encoder Internal power supply selection ON / ON = +5 V OFF / OFF = +8 V	ON/ON
S29	Internal use	A
S30	Second encoder qualifier input A=from EXP-… board B=from digital input "6" on RV33-4	B
S34	Jumper to disconnect 0V (+24V power supply) from ground ON = 0V connected to ground OFF = 0V disconnected from ground	ON (hard-wire)
S35	Jumper to disconnect 0V (regulation board) from ground ON = 0V connected to ground OFF = 0V disconnected from ground	ON (hard-wire)
S36	Internal use	not mounted
S37	Internal use	not mounted
S38-S39	Inverter size setting ON = Read size on power board OFF = Read size on regulation board (dip-switch or configuration file)	ON
S40-S41 (***)	Power supply for the serial interface RS485 ON = Internal power supply (from pins XS.5 / XS.9) OFF = External power supply (to pins XS.5 / XS.9)	OFF

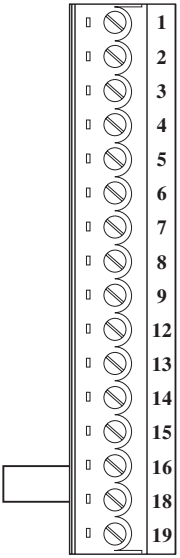
AL4060

(*) on multidrop connection the jumper must be ON only for the last drop of a serial line
(**) see table 4.5.2 for more details on encoder jumper setting
(***) see chapter 5.

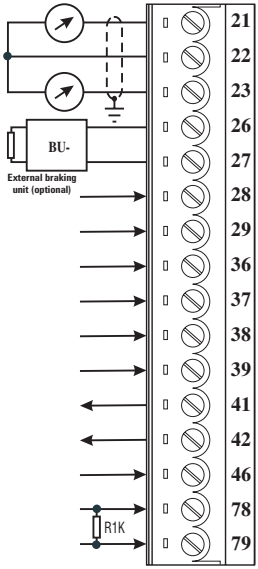
The devices are factory set accordingly.
When fitting a regulation card as a spare, remember to set again the encoders jumpers.

4.3.2 Terminal Assignments on Regulation Section

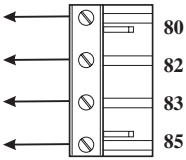
Table 4.3.2.1: Plug-in Terminal Strip Assignments



Strip X1		Function	max
1	Analog input 1	Programmable/configurable analog differential input. Signal: terminal 1. Reference point: terminal 2.	±10V 0.25mA (20mA when current loop input)
2			
3	Analog input 2	Programmable/configurable analog differential input. Signal: terminal 3. Reference point: terminal 4.	
4			
5	Analog input 3	Programmable/configurable analog differential input. Signal: terminal 5. Reference point: terminal 6.	
6			
7	+10V	Reference voltage +10V; Reference point: terminal 9	+10V/10mA
8	-10V	Reference voltage -10V; Reference point: terminal 9	-10V/10mA
9	0V	Internal 0V and reference point for±10V	-
12	Enable/ Digital input 0	Inverter ENABLE, active=high. Concurrently, it can be used as a programmable input. (Default none)	+30V 3.2mA @ 15V 5mA @ 24V 6.4mA @ 30V
13	Digital input 1	Programmable input, Default setting: **START FWD**	
14	Digital input 2	Programmable input, Default setting: **START REW**	
15	Digital input 3	Programmable input, Default setting: **NULL**	
16	COM D I/O	Reference point for digital inputs and outputs, term.12...15, 36...39, 41...42	-
18	0 V 24	Reference point for + 24V OUT supply, terminal 19	-
19	+24V OUT	+24V supply output. Reference point: terminal 18 or 27 or 28	+22…28V 120mA @ 24V



21	Analog output 1	Programmable analog output; Default setting: **NULL**	±10V/5mA
22	0V	Internal 0V and reference point for terminals 21 and 23	-
23	Analog output 2	Programmable analog output; Default setting: **NULL**	±10V/5mA
26	BU comm. output	VeCon controlled BU-... braking units command. Ref. point: term.27.	+28V/15mA
27	0 V 24	Reference point for BU-... command, terminal 26	-
28	RESERVED		-
29	RESERVED		
36	Digital input 4	Default setting: **MLT SPD S0**	+30V 3.2mA @ 15V 5mA @ 24V 6.4mA @ 30V
37	Digital input 5	Default setting: **MLT SPD S1**	
38	Digital input 6	Default setting: **MLT SPD S2.** Configurable as 2nd encoder index qualifier (setting via S30 jumper, "Digital input 6" parameter must be set as not used)	
39	Digital input 7	Default setting: **FAULT RESET.** Configurable as 1st encoder index qualifier "Digital input 7" parameter must be set as not used)	
41	Digital output 2	Programmable output; Default setting: **DRIVE READY**	+30V/40mA
42	Digital output 3	Programmable output; Default setting: **SPEED IS 0**	
46	Supply D O	Supply input for digital outputs on terminals 41/42. Ref. point: term.16.	+30V/80mA
78	Motor PTC	Motor PTC sensing for overtemperature (cutoff R1k if used)	1.5mA
79			

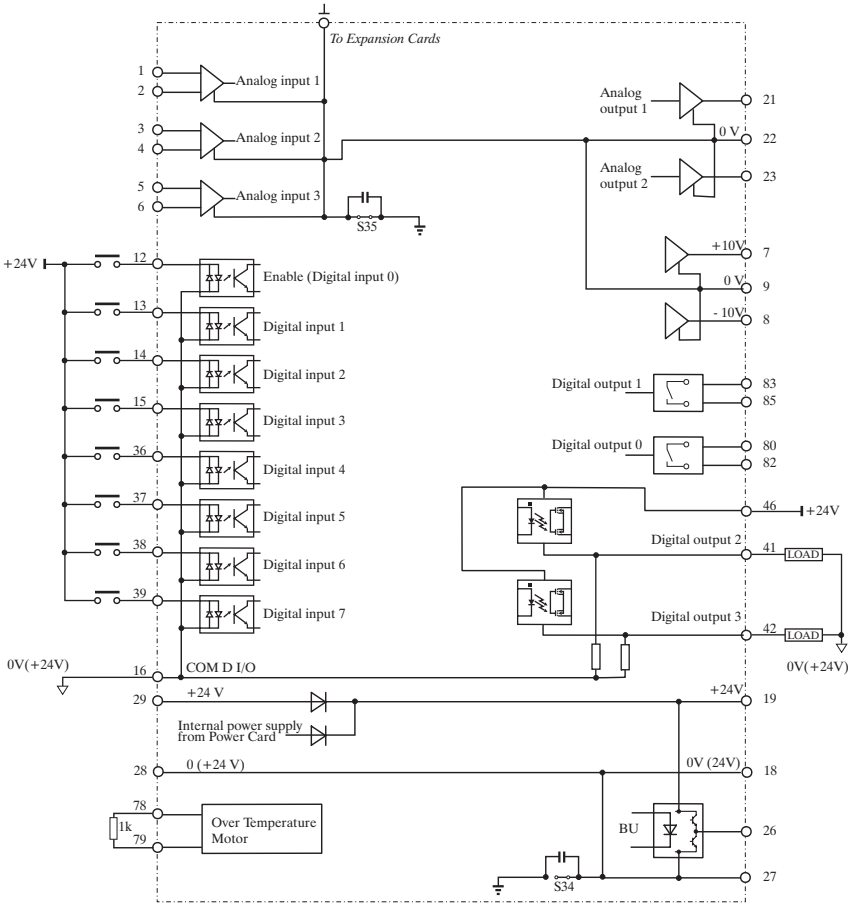


Strip X2		Function	Max.
80	Digital output 0 Relay	Potential- free relay contact, programmable output, **Default=DRIVE OK**	250V AC 1 A
82			
83	Digital output 1 Relay	Potential- free relay contact, programmable output, **Default=BRAKE CONT MON**	250V AC 1 A
85			

4.4 Potentials of the Control Section

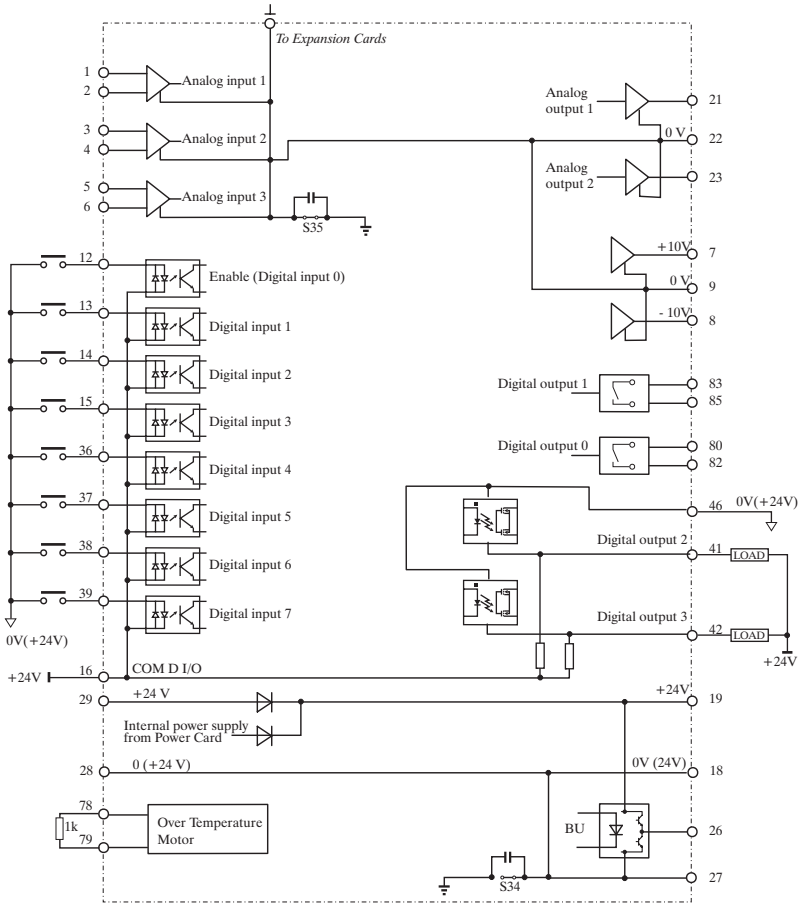
The potentials of the regulation section are isolated and can be disconnected via jumpers from ground.
The connections between each potential are shown in Figure 4.4.1 .
The analog inputs are designed as differential amplifiers.
The digital inputs are optocoupled with the control circuit.
The digital inputs have terminal 16 as reference point.
The analog outputs are not designed as differential amplifiers and have a common reference point (terminal 22). The analog outputs and the ±10V reference point have same potential (terminal 9 and 22).
The digital outputs are optocoupled with the control circuit. The digital outputs (terminal 41 and 42) have same potential (terminal 16) and terminal 46 as common supply.

Figure 4.4.1-A: Potentials of the control section, Digital I/O NPN connection



NOTE! Combination NPN inputs / PNP outputs and viceversa is not permitted.

Figure 4.4.1-B: Potentials of the control section, Digital I/O PNP connection



NOTE! Combination NPN inputs / PNP outputs and viceversa is not permitted.

4.5 Encoders

Several types of encoders may be connected to the XE connector (high density 15-pole socket, fitted on device), see the table 4.5.2 for the jumper settings.

• AVy ... AC / AC4 :

- **DE:** digital incremental encoder with A+/A-,B+/B-,C+/C- traces
- **SE**: sinusoidal incremental encoder with A+/A-,B+/B-,C+/C traces

• AVy ... BR / BR4 :

- **SEHS**: sinusoidal incremental encoder with A+/A-,B+/B-,C+/C- traces and three digital "Hall sensor" absolute position traces for initial synchronization (factory setting).
- **SESC**: sinusoidal incremental encoder with A+/A-,B+/B-,C+/C- traces and two analog Sin Cos absolute position traces for initial synchronization.
- **SExtern**: sinusoidal incremental encoder with A+/A-,B+/B-,C+/C- traces and absolute position information thought SSI serial interface for initial synchronization (requires APC100y card).
- **DEHS**: digital incremental encoder with A+/A-,B+/B-,C+/C- traces and three digital "Hall sensor" absolute position traces (factory setting).
- **DExtern**: digital incremental encoder with A+/A-,B+/B-,C+/C traces and absolute position information thought SSI serial interface for initial synchronization (requires APC100y card).
- **SC**: sinusoidal encoder with two analog SinCos absolute position traces
- **RES**: resolver (requires EXP-RES card)
- **SEHiperface**: sinusoidal incremental encoder with A+/A-,B+/B-, traces and Hiperface interface
- **SE Intern** sinusoidal incremental encoder with A+/A-,B+/B-,C+/C- traces, absolute position traces are not necessary because phasing is performed automatically at every start
- **DE Intern** digital incremental encoder with A+/A-,B+/B-,C+/C- traces, absolute position traces are not necessary because phasing is performed automatically at every start .

Encoders are used to feed back a speed signal to the drive. The encoder should be coupled to the motor shaft with a backlash free connection.
Optimal regulation results are ensured when using sinusoidal encoders. Digital encoders may also be used but regulation properties get worse at low speeds.
The encoder cable must made of twisted pairs with a global shield should be connected to the ground on the Drive side. Typically shield should not be connected to ground on the motor side. In some installation with high electromagnetical noise connecting the shield also on motor side helps to suppress pickup of false encoder pulses and reduces amount of disturbanes in the measured speed.

In case of brushless motor or where the cable length is more than 100 meters (328 feet), a cable with a shield on each conductor pair must be used. The shield must be connected to the common point (0V). The global shield must always be grounded.
Some types of sinusoidal encoders may require installation with galvanic isolation from the motor frame and shaft.

Table 4.5.1: Recommended Cable Section and Length for the Connection of Encoders

Cable section	**mm²**	0.22	0.5	0.75	1	1.5
Max Length	**(m) [feet]**	27 [88]	62 [203]	93 [305]	125 [410]	150 [492]

txv0055

Table 4.5.2: Encoders Setting via S11...S23 Jumpers

Encoder / Jumpers setting	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20	S21	S22	S23	S26	S27
DE	OFF	OFF	OFF	OFF	OFF	OFF	(*)	-	-	-	-	-	-	-	-
SE	ON	ON	ON	ON	ON	ON	(*)	-	-	-	-	-	-	-	-
SEHS	ON	ON	ON	ON	ON	ON	(*)	B	B	B	B	-	-	-	-
SESC	ON	ON	ON	ON	ON	ON	(*)	A	A	A	A	A	A	ON	ON
SExtern	ON	ON	ON	ON	ON	ON	(*)	-	-	-	-	-	-	-	-
DEHS	OFF	OFF	OFF	OFF	OFF	OFF	(*)	B	B	B	B	-	-	-	-
DExtern	OFF	OFF	OFF	OFF	OFF	OFF	(*)	-	-	-	-	-	-	-	-
SC	-	-	-	-	-	-	(*)	A	A	A	A	A	A	ON	ON
RES	-	-	-	-	-	-	(*)	-	-	-	-	OFF	OFF	OFF	OFF
RES (**)	-	-	-	-	-	-	(*)	OFF	OFF	OFF	OFF	A	A	ON	ON
SEHiperface	ON	ON	ON	ON	ON	ON	(*)	-	-	-	-	-	-	-	-

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(*) If the encoder is not provided of the zero channel : S17=OFF
(**) With EXP-RES + Regulation card RV33-4B and higher

The jumper S17 selects the inhibition or the enabling of the channel C pulses reading. It has to be correctly selected in order to detect appropriately the encoder loss alarm.
S17 ON : channel C (index) reading=ON
S17 OFF: channel C (index) reading=OFF

Table 4.5.3: Encoders Connections

Regulation card

Encoder type	**Shielded cable**	**XE CONNECTOR PIN**														
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
		B-	**+8V**	**C+**	**C-**	**A+**	**A-**	**0V**	**B+**	**+5V**	**E+**	**E-**	**F+**	**F-**	**G+**	**G-**
Internal +5V Encoder Power Supply																
DE	8 pole	●		●	●	●	●	●	●	●						
SE	8 pole	●		●	●	●	●	●	●	●						
SESC	12 pole	●		●	●	●	●	●	●	●	●	●	●	●		
DEHS	14 pole	●		●	●	●	●	●	●	●	●	●	●	●	●	●
SEHS	14 pole	●		●	●	●	●	●	●	●	●	●	●	●	●	●
Internal +8V Encoder Power Supply																
DE	8 pole	●	●	●	●	●	●	●	●							
SE	8 pole	●	●	●	●	●	●	●	●							
SESC	12 pole	●	●	●	●	●	●	●	●		●	●	●	●		
DEHS	14 pole	●	●	●	●	●	●	●	●		●	●	●	●	●	●
SEHS	14 pole	●	●	●	●	●	●	●	●		●	●	●	●	●	●

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Regulation card

Encoder type	Shielded cable	XE CONNECTOR PIN (RV33-3)														
		1 B-	2 +8V	3 C+	4 C-	5 A+	6 A-	7 0V	8 B+	9 +5V	10 E+	11 E-	12 F+	13 F-	14 G+	15 G-
SEHiperface	6 pole	●	●			●	●	●	●							
		TERMINALS XS connector														
		1	2	3 RxA TxA	4	5 0V	6	7 RxB TxB	8	9 +5V						
	2 pole			●		connect with pin 8	connect with pin 9	●	●	●						

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Note: - In this case the cable must be split in two

Encoder / Jumpers setting	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20	S21	S22	S23	S26	S27
DE	OFF	OFF	OFF	OFF	OFF	OFF	(*)	-	-	-	-	-	-	-	-
SE	ON	ON	ON	ON	ON	ON	(*)	-	-	-	-	-	-	-	-
SEHS	ON	ON	ON	ON	ON	ON	(*)	B	B	B	B	-	-	-	-
SESC	ON	ON	ON	ON	ON	ON	(*)	A	A	A	A	A	A	ON	ON
SExtern	ON	ON	ON	ON	ON	ON	(*)	-	-	-	-	-	-	-	-
DEHS	OFF	OFF	OFF	OFF	OFF	OFF	(*)	B	B	B	B	-	-	-	-
DExtern	OFF	OFF	OFF	OFF	OFF	OFF	(*)	-	-	-	-	-	-	-	-
SC	-	-	-	-	-	-	(*)	A	A	A	A	A	A	ON	ON
RES	-	-	-	-	-	-	(*)	-	-	-	-	OFF	OFF	OFF	OFF
RES (**)	-	-	-	-	-	-	(*)	OFF	OFF	OFF	OFF	A	A	ON	ON
SEHiperface	ON	ON	ON	ON	ON	ON	(*)	-	-	-	-	-	-	-	-

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Requirements:

Sinusoidal encoders (XE connector on Regulation card)

Max. frequency _____ 80 kHz (select the appropriate number of pulses depending on required max. speed)
Number of pulses per revolution __ min 512, max 9999 (see table below)
Channels _____ two-channel, differential
Input Voltage _____ 1 V pp
Power supply _____ + 5 V / +8V (Internal supply) *
Load capacity _____ > 8.3 mA pp per channel (input resistance = 124 Ohms).
Cable max. _____ 500 feet (150 m), screened, 4 twisted pairs.

Configure drive software for the signal amplitude range of the encoder in use (STARTUP / Startup config / Encoders config / Std sin enc Vp)

Speed D reference resolution (rpm)	Recommended min number of encoder pulses (ppr)						Max number of encoder pulses (ppr)
0.003125	4096	4096	4096	4096	4096	4096	
0.125	1024	1024	1024	1024	1024	1024	
0.25	512	512	512	1024	1024	1024	80kHz* 60/FSS
0.5	512	512	512	1024	1024	1024	
1	512	512	512	1024	1024	1024	
Mot.pole pairs (rpm@50Hz)	**1(3000)**	**2(1500)**	**3(1000)**	**4(750)**	**5(600)**	**6(500)**	
Mot.pole pairs (rpm@60Hz)	**1(3600)**	**2(1800)**	**3(1200)**	**4(900)**	**5(720)**	**6(600)**	(FSS=Full scale speed)

Digital encoders (XE connector on Regulation card)

Type _____ standard and inverted signal

Max. frequency _____ 150 kHz (select the appropriate number of pulses depending on required max. speed)

Number of pulses per revolution __ min 512, max 9999 (see table below)

Channels _____ - two-channel, differential A+ / A-, B+ / B-, C+ / C-. An encoder loss detection is possible via firmware setting.

- two channel, (A,B). Encoder loss detection is not possible.

Input Voltage _____ 5V

Power supply _____ + 5 V / +8V (Internal supply) *

Load capacity _____ > 4.5 mA / 6.8 ... 10 mA per channel

* Via keypad (STARTUP / Startup config / Encoder config) it is possible to select 4 different values of internal encoder supply voltage to compensate the voltage reduction due to encoder cable length and load current encoder.
Selection available, according to S28 jumper, are: 5.41V, 5.68V, 5.91V, 6.18V and 8.16V, 8.62V, 9.00V, 9.46V via **Std enc supply** parameter.

Speed D reference resolution (rpm)	Recommended min number of encoder pulses (ppr)						Max number of encoder pulses (ppr)
0.003125	512	512	512	1024	1024	1024	
0.125	256	512	512	1024	1024	1024	
0.25	256	512	512	1024	1024	1024	150kHz* 60/FSS
0.5	256	512	512	1024	1024	1024	
1	256	512	512	1024	1024	1024	
Mot.pole pairs (rpm@50Hz)	**1(3000)**	**2(1500)**	**3(1000)**	**4(750)**	**5(600)**	**6(500)**	
Mot.pole pairs (rpm@60Hz)	**1(3600)**	**2(1800)**	**3(1200)**	**4(900)**	**5(720)**	**6(600)**	(FSS=Full scale speed)

Encoder power supply test (if the internal supply +5V is used)

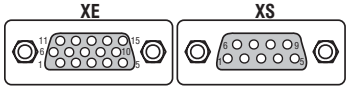
During the start up of the drive:

- verify the encoder power supply to the encoders terminals with all the encoders channels connected
- via **Std enc supply** parameter set the appropriate voltage if the encoder supply characteristic (example: +5V ± 5%) is out of range.

Terminals for external encoder connections

Male terminals type: _____ 15 poles high density (VGA type)

Connector cover: _____ Standard 9 poles low profile (Example manufacturer code: AMP 0-748676-1, 3M 3357-6509)



The connection with the drive is through a 15 poles high density sub-D connector (VGA type). Please note that it is mandatory to use a shielded cable with al least 80 % coverage. The shield should be connected to ground on both sides.

NOTE! For synchronous brushless firmware it is possible to use only encoder having pulses per revolution equal to number that is power of 2.
Example: 512 ppr, 1024 ppr, 2048 ppr, etc.

Table 4.5.4: Assignment of the High Density XE Connector for a Sinusoidal or a Digital Encoder

Designation		Function	I/O	Max. voltage	Max. current
PIN 1	**ENC B-**	Channel B- Incremental encoder signal B negative	I	5 V digital or 1 V pp analog	10 mA digital or 8.3 mA analog
PIN 2		+8V Encoder supply voltage (see table 4.5.3)	O	+8 V	200 mA
PIN 3	**ENC C+**	Channel C+ Incremental encoder signal Index positive	I	5 V digital or 1 V pp analog	10 mA digital or 8.3 mA analog
PIN 4	**ENC C-**	Channel C- Incremental encoder signal Index negative	I	5 V digital or 1 V pp analog	10 mA digital or 8.3 mA analog
PIN 5	**ENC A+**	Channel A+ Incremental encoder signal A positive	I	5 V digital or 1 V pp analog	10 mA digital or 8.3 mA analog
PIN 6	**ENC A-**	Channel A- Incremental encoder signal A negative	I	5 V digital or 1 V pp analog	10 mA digital or 8.3 mA analog
PIN 7	**GND**	Reference point for +5V encoder supply voltage	O	–	–
PIN 8	**ENC B+**	Channel B+ Incremental encoder signal B positive	I	5 V digital or 1 V pp analog	10 mA digital or 8.3 mA analog
PIN 9	**AUX+**	+5V encoder supply voltage (see table 4.5.3)	O	+5 V	200 mA
PIN 10	**HALL 1+/SIN+**	Channel HALL1 + / SIN+ Hall 1 positive / Analog encoder Sin positive	I	5 V digital or 1 V pp analog	10 mA digital or 8.3 mA analog
PIN 11	**HALL 1-/SIN-**	Channel HALL 1- / SIN- Hall 1 negative / Analog encoder Sin negative	I	5 V digital or 1 V pp analog	10 mA digital or 8.3 mA analog
PIN 12	**HALL 2+/COS+**	Channel HALL 2+ / COS+ Hall 2 positive / Analog encoder Cos positive	I	5 V digital or 1 V pp analog	10 mA digital or 8.3 mA analog
PIN 13	**HALL 2-/COS-**	Channel HALL 2- / COS- Hall 2 negative / Analog encoder Cos negative	I	5 V digital or 1 V pp analog	10 mA digital or 8.3 mA analog
PIN 14	**HALL 3+**	Channel HALL 3 + Hall 3 positive	I	5 V digital or 1 V pp analog	10 mA digital
PIN 15	**HALL 3-**	Channel HALL 3 - Hall 3 negative	I	5 V digital or 1 V pp analog	10 mA digital

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4.5.1 XFR Connector Assignments (on optional EXP-RES Expansion Board for Resolver)

The connection with the drive is through a 15 poles high density sub-D connector (VGA type). Please note that for resolver feedback it is mandatory to use a twisted pair cable with shields on each pair and a global shield. The shield should be connected to ground on both sides.

Assignment		Function	I/O	Max. voltage	Max.current
Pin 1 … 2	-	-	-	-	-
Pin 3	RES-SINP	Input sin +	I	1 V pp analog	3.8 mA analog
Pin 4	RES-SINN	Input sin -	I	1 V pp analog	3.8 mA analog
Pin 5	RES-COSP	Input cos +	I	1 V pp analog	3.8 mA analog
Pin 6	RES-COSN	Input cos -	I	1 V pp analog	3.8 mA analog
Pin 7 … 9	-	-	-	-	-
Pin 10	RES-ROTN	Excitation - Output	O	6 Volts	50 mA rms max
Pin 11 … 14	-	-	-	-	-
Pin 15	RES-ROTP	Excitation + Output	O	6 Volts	50 mA rms max

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WARNING! The pins number 1, 2, 7...9, 11...14 are reserved.

NOTE! Refer to EXP-RES manual (code 1S5E66) for more details.

4.5.2 Encoder Simulation

The expansion board EXP-RES provides one incremental encoder output, with TTL Line Driver levels, that can be used for simulation of a servomotor feedback device.
This function is performed by the microprocessor and it is possible to simulate an encoder output with a programmable number of pulses/rev.
The output interface is optically isolated and therefore the encoder output must be supplied with an external 15.24 V supply that can be connected to terminals 96 and 97 of the EXP-RES expansion board.
The encoder output signals are available on the XFO connector with the following connection diagram:

Designation		Function
Pin 1	B-	Digital Encoder Simulation. B - channel
Pin 2		
Pin 3	C+	Digital Encoder Simulation.C + channel
Pin 4	C-	Digital Encoder Simulation. C- channel
Pin 5	A+	Digital Encoder Simulation. A+ channel
Pin 6	A-	Digital Encoder Simulation. A - channel
Pin 7		
Pin 8	B+	Digital Encoder Simulation. B+ channel
Pin 9 .. 15		

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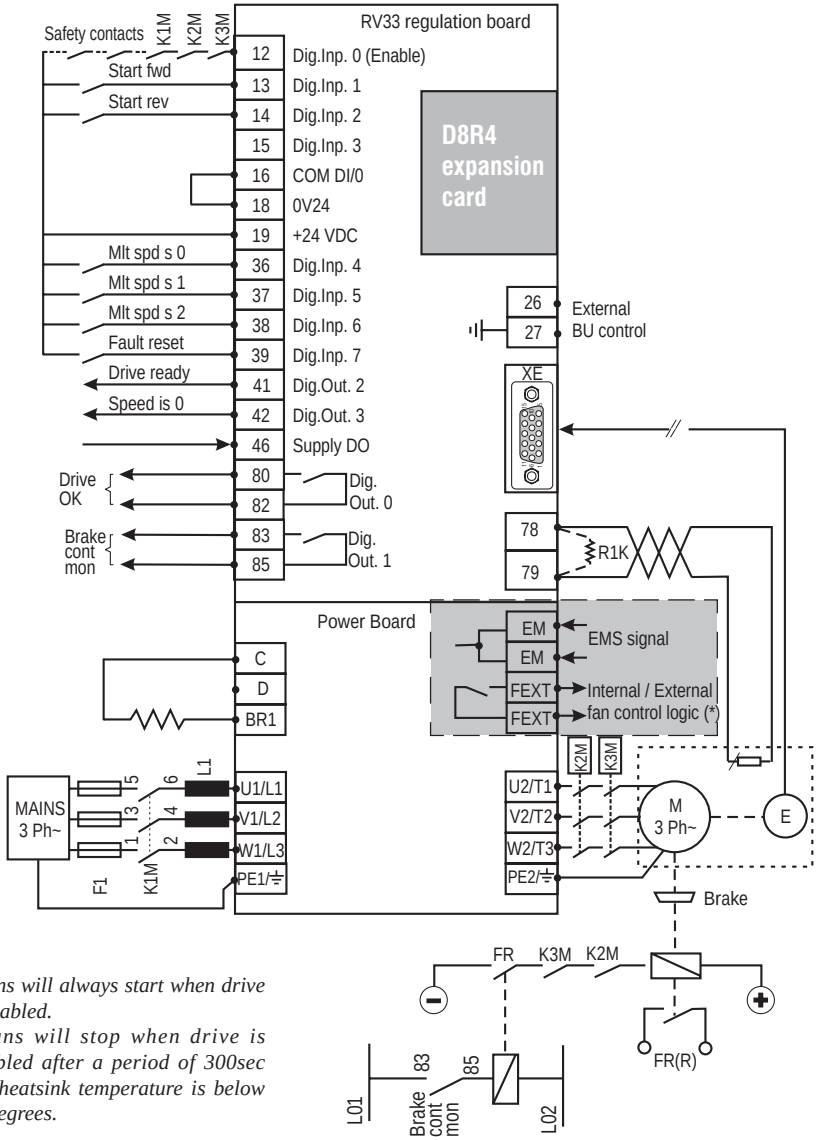
NOTE! Jumper S2 and S3 on the EXP-RES optional board must be OFF.

NOTE! To enable encoder simulation set Rep/sim encoder parameter.

4.6 Connection Diagrams

Figure 4.6.1: Standard Connection Diagram

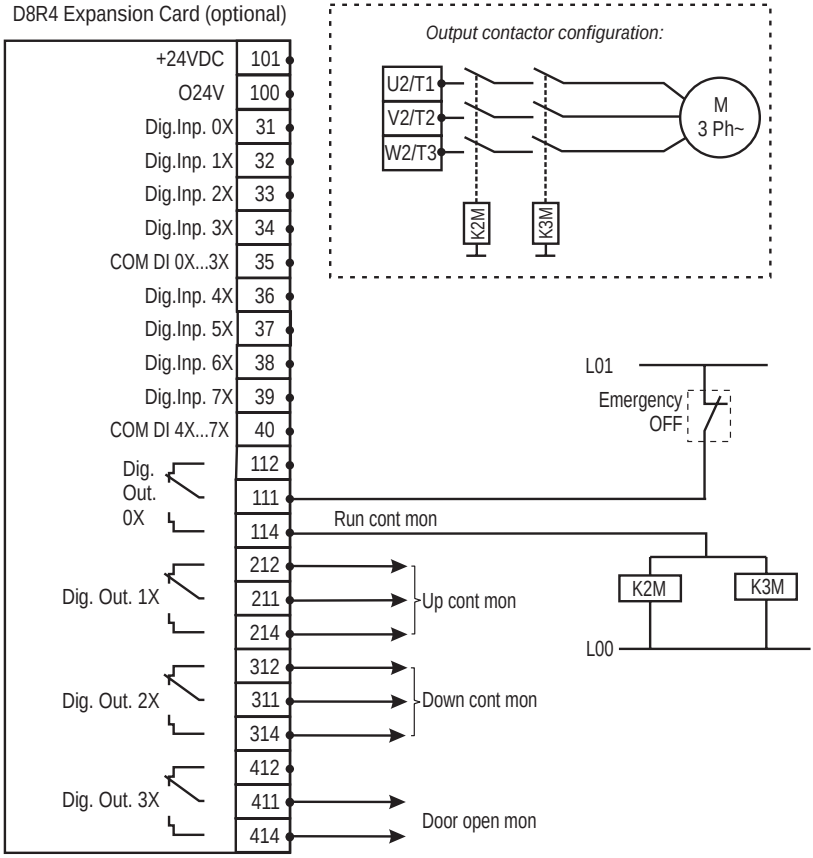


(*): - Fans will always start when drive is enabled.
- Fans will stop when drive is disabled after a period of 300sec and heatsink temperature is below 60 degrees.

NOTE! **Fan Control Logic function (only for sizes AVy2040AC4 / BR4 up to AVy5550AC4 / BR4)**

4.6.1 Expansion Card Connection

Figure 4.6.2: Common Output Contactors Management



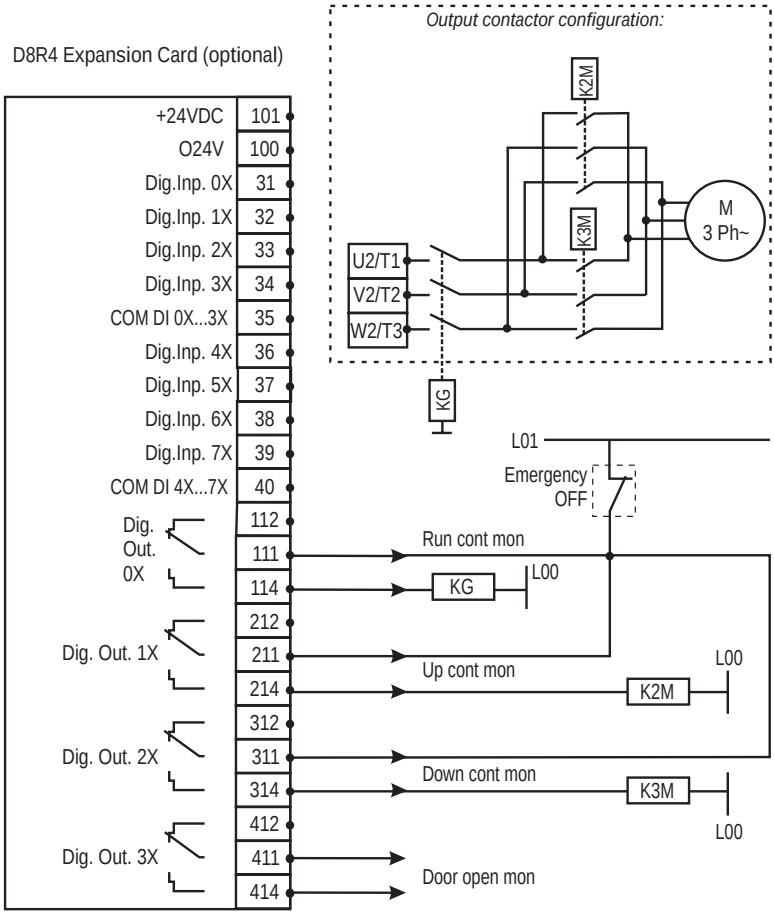
NOTES!

Phase sequence does not change. This configuration must be used in FOC & BRS modes.

Expansion board digital outputs must be enabled via software through menu I/O CONFIG \ Digital Outputs\ Exp dig out en

In this example an expansion board is used, but same functionality can be accomplished also using standard digital outputs.

Figure 4.6.3: Separate Output Contactors Management



NOTES!

Phase sequence changes according to direction selected. This configuration can be used in VF & SLS modes only.

Expansion board digital outputs must be enabled via software through menu I/O CONFIG \ Digital Outputs\ Exp dig out en

In this example an expansion board is used, but same functionality can be accomplished also using standard digital outputs.

4.7 Circuit Protection

4.7.1 External Fuses for the Power Section

The inverter must be fused on the AC Input side. Use fast fuses only.

NOTE! Connections with three-phase inductance on AC input are not essential but will improve the DC link capacitors lifetime.

Table 4.7.1.1: External Fuse Types for AC Input Side

Drive type	DC link capacitors life time [h]	F1 - Fuses type (code)			
		Europe	USA		
		Connections without three-phase reactor on AC input			
1007	25000	GRD2/10 (F4D13) or Z14GR10 (F4M03)	A70P10	FWP10	(S7G49)
1015					
1022	25000	GRD2/16 (F4D14) or Z14GR16 (F4M05)	A70P20	FWP20	(S7G48)
1030	10000				
2040	25000	GRD2/20 (F4D15) or Z14GR20 (F4M07)	A70P20	FWP20	(S7G48)
2055	25000	GRD2/25 (F4D16) or Z14GR25 (F4M09)	A70P25	FWP25	(S7G51)
2075	10000	GRD3/35 (F4D20) or Z22GR40	A70P35	FWP35	(S7G86)
3110	25000	Z22GR63 (F4M17)	A70P60	FWP60	(S7G88)
3150	10000				
4185 … 81600	10000	For these types an external reactor is mandatory if the AC input impedence is equal or less than 1%			
Connections with three-phase reactor on AC input					
1007	50000	GRD2/10 (F4D13) or Z14GR10 (F4M03)	A70P10	FWP10	(S7G49)
1015	50000				
1022	50000		A70P10	FWP10	(S7G49)
1030	50000	GRD2/16 (F4D14) or Z14GR16 (F4M05)	A70P20	FWP20	(S7G48)
2040	50000				
2055	50000	GRD2/20 (F4D15) or Z14GR20 (F4M07)	A70P20	FWP20	(S7G48)
2075	50000	GRD2/25 (F4D16) or Z14GR25 (F4M09)	A70P25	FWP25	(S7G51)
3110	50000	Z22GR63 (F4M17)	A70P60	FWP60	(S7G88)
3150	50000				
4185 … 4221	25000	S00üf1/80/80A/660V or Z22gR80	A70P80	FWP80	(S7G54)
4300	25000				
4301 - 4370	25000	S00üf1/80/100A/660V or M00üf01/100A/660V (F4G18)	A70P100	FWP100	(S7G55)
4371	25000	S00üf1/80/125A/660V	A70P150	FWP150	(S7G56)
5450	25000	S00üf1/80/160A/660V or M00üf01/160A/660V (F4E15)	A70P175	FWP175	(S7G57)
5550	25000				
6750	25000	S00üf1/110/250A/660V or M1üf1/250A/660V (F4G28)	A70P300	FWP300	(S7G60)
7900	25000				
71100	25000	S2üf1/110/400A/660V or M2üf1/400A/660V (F4G34)	A70P400	FWP400	(S7G62)
71320	25000				
81600	25000				

TADL4120

Fuse manufacturers: Type GRD2... (E27), GRD3... (E33), M... (blade fuses), Jean Müller, Eltville
Z14... 14 x 51 mm, Z22... 22 x 58 mm, S.... Gould Shawmut
A70P... Bussmann
FWP...

NOTE! The technical data of the fuses, e.g. dimensions, weights, heat dissipation, auxiliary contactors, are found in the manufacturers data sheets.

4.7.2 External Fuses for the Power Section DC Input Side

Use the following fuses when a SR-32 Line Regen is used (see SR-32 instruction book for more details).

Table 4.7.2.1: External Fuses Type for DC Input Side

Drive type	Europe		USA		
	Fuses type	Code	Fuses type		Code
1007	Z14GR10	F4M03	A70P10	FWP10A14F	S7G49
1015					
1022	Z14GR16	F4M05	A70P20	FWP20A14F	S7G48
1030	Z14GR20	F4M07	A70P20-1	FWP20A14F	S7G48
2040	Z14GR32	F4M11	A70P25-1	FWP25A14F	S7G51
2055					
2075	Z14GR50	F4M15	A70P50	FWP50B	S7G53
3110	Z22GR63	F4M17	A70P60-4	FWP60B	S7I34
3150	S00üF1/80/80A/660V	F4M19	A70P80	FWP80	S7G54
4185 - 4220					
4221 - 4300	S00üF1/80/100A/660V	F4G18	A70P100	FWP100	S7G55
4301 - 4370	S00üF1/80/125A/660V	F4G20	A70P150	FWP150	S7G56
4371 - 5450	S00üF1/80/160A/660V	F4E15	A70P175	FWP175	S7G57
5550	S00üF1/80/200A/660V	F4G23	A70P200	FWP200	S7G58
6750	S1üF1/110/250A/660V	F4G28	A70P250	FWP250	S7G59
7900	S1üF1/110/315A/660V	F4G30	A70P350	FWP350	S7G61
71100	S1üF1/110/400A/660V	F4G34	A70P400	FWP400	S7G62
71320	S1üF1/110/500A/660V	F4E30	A70P500	FWP500	S7G63
81600	S1üF1/110/500A/660V	F4E30	A70P500	FWP500	S7G63

TAVy4140

Fuse manufacturers: Type Z14..., Z22, S00 ..., S1...	Jean Müller, Eltville
A70P...	Gould Shawmut
FWP...	Bussmann

NOTE! The technical data of the fuses, e.g. dimensions, weights, heat dissipation, auxiliary contactors, are found in the manufacturers data sheets.

4.7.3 Internal Fuses

Table 4.7.3.1: Internal Fuses

Drive type	Designation	Protection of	Fuse (source)	Fitted on:
4185 to 81600	F1	+24V	2A fast 5 x 20 mm (Bussmann: SF523220 or Schurter: FSF0034.1519 or Littlefuse: 217002)	Power card PV33-4- "D" and higher
				Power card PV33-5- "B" and higher
1007 to 81600	F1	+24V	Resettable fuse	Regulation card RV33
	F2	RS485 serial interface supply circuit	Resettable fuse	Regulation card RV33-4 and higher
6750 to 71320	F3	Fans transformer	2.5A 6.3x32 (Bussmann: MDL 2.5, Gould Shawmut: GDL1-1/2, Siba: 70 059 76.2,5 , Schurter: 0034.5233)	Bottom cover (power terminals side)

tadl0170

4.8 Chokes / Filters

4.8.1 AC Input Chokes

A three-phase inductance is strongly reccomended to be connected on the AC Input side in order to:

- limit the input RMS current of ARTDriveL series drives.
- prolong the life time of the DC link capacitors and the reliability of the input rectifier.
- reduce the AC mains harmonic distortion
- reduce the problems due to a low impedence AC mains (≤ 1%).

The inductance can be provided by an AC Input choke or an AC Input transformer.

Table 4.8.1.1: 3-Phase AC Input Chokes

Drive type	Three-phase choke type	Code
1007	LR3y-1007	S7AAD
1015	LR3y-1015	S7AAE
1022	LR3y-1022	S7AAF
1030	LR3y-1030	S7AB3
2040	LR3y-2040	S7AAG
2055	LR3y-2055	S7AB5
2075	LR3y-2075	S7AB6
3110	LR3y-3110	S7AB7
3150	LR3y-3150	S7AB8
4185 - 4221	LR3-022	S7FF4
4300-4301	LR3-030	S7FF3
4370-4371	LR3-037	S7FF2
5450	LR3-055	S7FF1
5550		
6750	LR3-090	S7D19
7900		
71100	LR3-160	S7D40
71320		
81600		

TAVy4135

NOTE! The current rating of these inductors (reactors) is based on the nominal current of standard motors, listed in table 2.3.4.1.

4.8.2 Output Chokes

The AVy Drive can be used with general purpose standard motors or with motors specially designed for Drive use. The latter usually have a higher isolation rating to better withstand PWM voltage.

Follow example of reference regulation:

Low voltage general purpose standard motors		
VDE 0530:	max peak voltage	1 kV
	max. dV/dt	500 V/us
NEMA MG1 part 30:	max. peak voltage	1 kV
	min. rise time	2 us
Low voltage motors for use on inverters		
NEMA MG1 part 31:	max. peak voltage	1.6 kV
	min. rise time	0.1 us.

Motors designed for use with Adjustable Frequency Drives do not require any specific filtering of the voltage waveform from the Drive. For general purpose motors and using drives up to 2075 size, especially with long cable runs (typically over 100 m [328 feet]) an output choke is recommended to mantain the voltage waveform within the specified limits. Suggested choke ratings and part numbers are listed in table 5.7.2.1.
The rated current of the filters should be approx. 20% above the rated current of the frequency Drive in order to take into account additional losses due to PWM waveform.

Table 4.8.2.1: Recommended Output Chokes

Drive type	Three-phase choke type	Code
1007	LU3-003	S7FG2
1015		
1022		
1030		
2040	LU3-005	S7FG3
2055		
2075	LU3-011	S7FG4
3110		
3150	LU3-015	S7FM2
4185 - 4221	LU3-022	S7FH3
4300 - 4301	LU3-030	S7FH4
4370 - 4371	LU3-037	S7FH5
5450	LU3-055	S7FH6
5550		
6750	LU3-090	S7FH7
7900		
71100	LU3-160	S7FH8
71320		
81600		

TAVy4150

NOTE! When the drive is operated at the rated current and at 50 Hz, the output chokes cause a voltage drop of approx. 2% of the output voltage.

4.8.3 Interference Suppression Filters

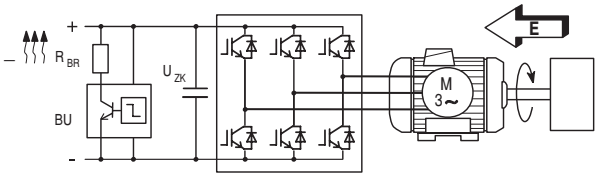
The inverters of AVy series must be equipped with an external EMI filter in order to reduce the radiofrequency emissions on to the mains line. The filter selection is depending on the drive size and the installation environment. For this purpose see the “EMC Guidelines” instruction book. In the Guide it is also indicated how to install the cabinet (connection of filter and mains reactors, cable shield, groundig, etc.) in order to make it EMC compliant according the EMC Directive 89/336/EEC. The document describes the present situation concerning the EMC standards and the compliance tests made on the Gefran-Siei drives.

NOTE! For the use of output sinusoidal filters, please contact the factory.

4.9. Braking Units

In oversynchronous or regenerative operation, the frequency-controlled three-phase motor feeds energy back to the DC link circuit via the drive. This creates an increase in the intermediate circuit voltage.
Braking units (BU) are therefore used in order to prevent the DC voltage rising to an impermissible value. When used, these activate a braking resistor that is connected in parallel to the capacitors of the intermediate circuit. The feedback energy is converted to heat via the braking resistor (R_{BR}), thus providing very short deceleration times and restricted four-quadrant operation.

Figure 4.9.1: Operation with Braking Unit (Principle)



Drive sizes 1007 up to 3150 have, as standard configuration, an internal braking unit. Drive sizes 4220 up to 5550 can have an optional internal braking unit (see section 2.1.2 “Inverter type designation”) factory mounted. All the standard AVy... drive can be equipped with an external braking unit (BU-32... or BUy-...) connected to the terminals C and D.

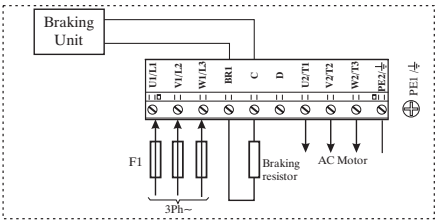
NOTE! When the internal braking unit is present, or when circuit terminals C and D are connected to external devices, the AC Input must be protected with superfast semiconductor fuses! Observe the mounting instruction concerned. For braking resistor connection (terminals BR1 and C) a twisted cable has to be used. In case the braking resistor is supplied with thermal protection (klixon), it may be connected to the "External fault" drive input.

Warning The braking resistors can be subject to unforeseen overloads due to possible failures. The resistors have to be protected using thermal protection devices. Such devices do not have to interrupt the circuit where the resistor is inserted but their auxiliary contact must interrupt the power supply of the drive power section.
In case the resistor foresees the precence of a protection contact, such contact has to be used together with the one belonging to the thermal protection device.

4.9.1 Internal Braking Unit

The Internal Braking Unit is included as standard (up to size 3150). The braking resistor is optional and has always to be mounted externally. For parameter setting refer to parameter list. The figure below shows the configuration for internal brake unit operation.

Figure 4.9.1.1: Connection with Internal Braking Unit and External Braking Resistor



4.9.2 External Braking Resistor

Recommended resistors for use with internal braking unit:

Table 4.9.2.1: Lists and Technical Data of the External Standard Resistors

Inverter Type	Resistor Type	P_{NBR} [kW]	R_{BR} [Ohm]	E_{BR} [kJ]
1007	**MRI/T600 100R**	0.6	100	22
1015				
1022				
1030				
2040				
2055	**MRI/T900 68R**	0.9	68	33
2075				
3110	**MRI/T1300 49R**	1.3	49	48
3150	**MRI/T2200 28R**	2.2	28	82
4185 - 4221	**MRI/T4000 15R4**	4	15.4	150
4300 - 4301	**MRI/T4000 11R6**	4	11.6	150
4370 - 4371	**MRI/T4000 11R6**	4	11.6	150
5450	**MRI/T8000 7R7**	8	7.7	220
5550	**MRI/T8000 7R7**	8	7.7	220

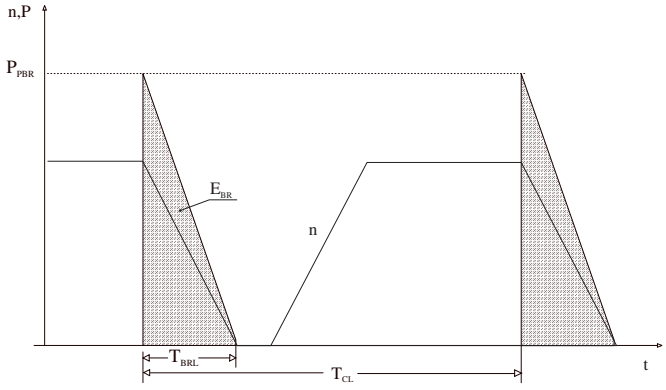
TADL0250

Parameters description:

P_{NBR} Nominal power of the braking resistor
R_{BR} Braking resistor value
E_{BR} Max surge energy which can be dissipated by the resistor
P_{PBR} Peak power applied to the braking resistor
T_{BRL} Maximum braking time in condition of limit operating cycle (braking power = **P_{PBR}** with typical triangular profile)

$$T_{BRL} = 2\frac{E_{BR}}{P_{PBR}} = [s]$$

Figure 4.9.2.2: Limit Operating Braking Cycle with Typical Triangular Power Profile



$\mathbf{T_{CL}}$ Minimum cycle time in condition of limit operating cycle (braking power = $\mathbf{P_{PBR}}$ with typical triangular profile)

$$T_{CL} = \frac{1}{2} T_{BRL} \frac{P_{PBR}}{P_{NBR}} = [s]$$

The **BU overload** alarm occurs if the duty cycle exceeds the maximum data allowed in order to prevent possible damage to the resistor.

Resistor model: **Standard resistor data**

Example code: MRI/T900 68R

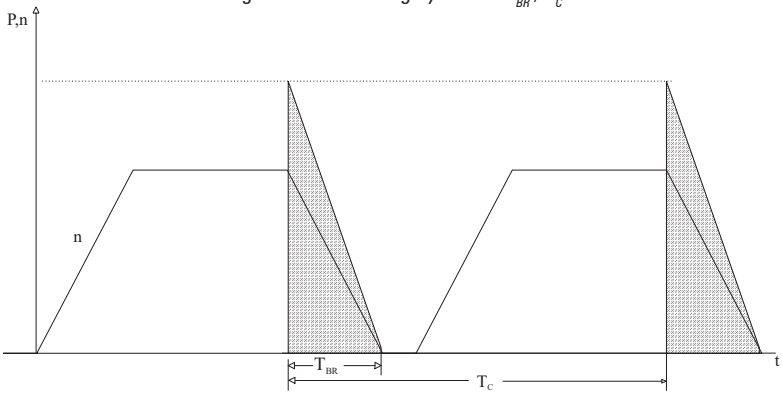
MRI = resistor type
900 = nominal power (900 W)
T= with safety thermostat
68R = resistor value (68 ohm)

NOTE!

The suggested match of resistor-model and inverter-size, allows a braking stop at nominal torque with duty cycle $\mathbf{T_{BR}} / \mathbf{T_C} = 20\%$

Where: $\mathbf{T_{BR}}$ = Braking time, $\mathbf{T_C}$ = Cycle time

Figure 4.9.2.3: Braking Cycle with $T_{BR} / T_C = 20\%$



The standard resistor can be used for couplings, different from the ones above reported. These resistors, whose technical data are reported in the table 5.8.2.1, have been dimensioned to tolerate an overload equal to 4 time their nominal power for 10 seconds.
In any event they can tolerate also an overload, whose energy dissipation is the same of the maximum power level defined by:

$$P_{PBR} = \frac{V_{BR}^{\ 2}[V]}{R_{BR}[ohm]} = [w]$$

Where:
$\mathbf{V_{BR}}$ = braking unit threshold (see table 4.9.2.2)
With reference to the figure 4.9.2.4, where the power profile is the typical triangular one, the following example can be taken into consideration (see also table 4.9.2.1).

Resistor model: MRI/T600 100R

Nominal power $\mathbf{P_{NBR}}$ = 600 [W]
Maximum energy $\mathbf{E_{BR}}$ = 4 x 600[W] x 10[s] = 24000[J]
Inverter mains supply = 460V
Voltage threshold: $\mathbf{V_{BR}}$ =780V

$$\mathbf{P_{PBR} = \frac{V_{BR}^2}{R_{BR}} = \frac{780^2}{100} = 6084\ [W]} \qquad \mathbf{T_{BRL} = 2\ \frac{E_{BR}}{P_{PBR}} = 2\ \frac{24000}{6084} = 7.8[s]}$$

It is necessary to consider the following relation:

A) If $\mathbf{T_{BR} \leq E_{BR} / P_{NBR}}$ verify:

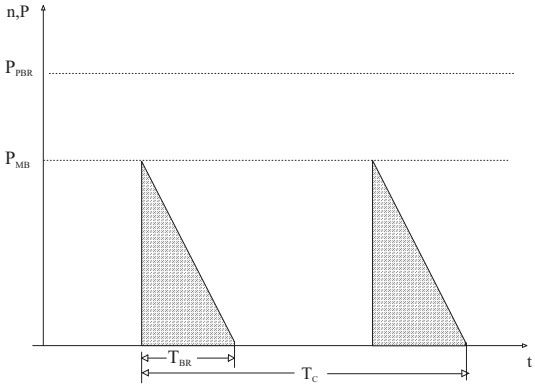
1) $\mathbf{P_{MB} \leq 2 * E_{BR} / T_{BR}}$ Where: $\mathbf{P_{MB}}$ is the average power of the cycle (see.fig. 4.9.2.4)

2) $$\frac{P_{MB} \cdot T_{BR}}{2\ T_C} \leq P_{NBR}$$

The average power of the cycle must not be higher than the nominal power of the resistor.

B) If $\mathbf{T_{BR} > E_{BR} / P_{NBR}}$ that is to say, in case of very long braking time, it must be dimensioned $\mathbf{P_{MB} \leq P_{NBR}}$

Figure 4.9.2.4: Generic Braking Cycle with Triangular Profile



If one of the above mentioned rules is not respected, it is necessary to increase the tested power of the resistor, respecting the limit of the internal braking unit (reported intable 4.9.2.3), or an external BU if necessary.
In order to protect these resistors from dangerous overload, software overload control logic is also available (STARTUP / Startup config / BU protection).
The default parameters in the drive match the recomended resistor paring as for the table 4.9.2.1.
For no-standard paring resistor see “STARTUP / Startup config / BU protection.

Table 4.9.2.2: Braking Thresholds for Different Mains

Mains voltage	Braking threshold V_{BR} [V]
230Vac	400
400Vac	680
460Vac/480Vac	780

avy4200

When the duty cycle exceeds the data entered, the alarm **BU overload** automatically occurs in order to prevent possible damages to the resistor. The following table can be used to choose an external resistor, different from the standard series.

Table 4.9.2.3: Technical Data of the Internal Braking Units

Inverter type	I_{RMS} [A]	I_{PK} [A]	T [s]	Minimum R_{BR} [ohm]
1007	4.1	7.8	19	100
1015				
1022				
1030				
2040				
2055	6.6	12	16	67
2075				
3110	12	22	17	36
3150	17	31	16	26
4185 … 4221	18	52	42	15
4300 - 4301	37	78	23	10
4370 - 4371	29		37	
5450	50	104	22	7.5
5550				
6750	External braking unit (optional)			
7900				
71100				
71320				
81600				

Tavy4210

I_{RMS} Nominal current of the braking unit
I_{PK} Peak current deliverable for 60 seconds max.
T Minimum cycle time for a working at **I_{PK}** for 10 seconds

Generally the following condition must be satisfed

$$I_{RMS} \geq \sqrt{\frac{1}{2} \cdot \frac{P_{PBR}}{R_{BR}} \cdot \frac{T_{BR}}{T_C}}$$

Each drive is provided of the terminals 26 and 27 which allows control of one or more external braking units, parallel connected. The drive will act as Master and the external braking units BU32 must be configured as Slave. In this way it will be possible to utilize the internal I^2 t protection.
If more than one BU is used, each BU shall be connected to a single resistor. All Braking Unit shall be the same model and have same type resistor.

4.10 Buffering the Regulator Supply

The power supply of the control section is provided by a switched mode power supply unit (SMPS) from the DC Link circuit. The drive is disabled as soon as the voltage of the DC Link circuit is below the threshold value (U_{Buff}). The regulator supply is buffered by the energy of the DC Link circuit until the limit value (U_{min}) is reached. The buffer time is determined by the capacitance of the DC Link capacitors. The minimum values are shown in the table below. The buffer time (t_{Buff}) can be extended (only on 11 kW drive and higher) by connecting external capacitors in parallel (on terminal C and D).

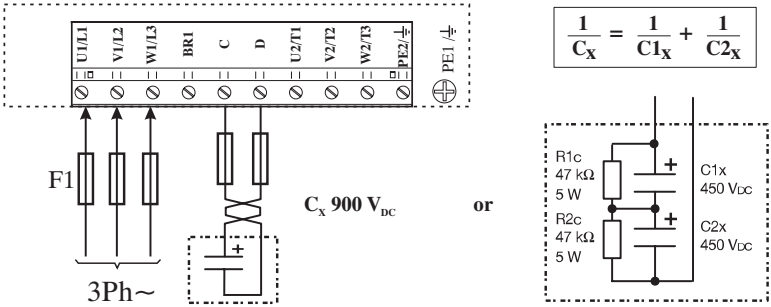
Table 4.10.1: DC Link Buffer Time

Inverter type	Internal capacitance C_{std} [μF]	Buffer time t_{Buff} (minimum value) with the internal capacitance at : AC Input voltage =230V [s]	AC Input voltage =400V [s]	AC Input voltage =460V [s]	Maximum permissible external capacitance C_{ext} [μF]	Maximum power required by switched mode power supply P_{SMPS} [W]
1007	220	0.02	0.165	0.25	0	65
1015	220	0.02	0.165	0.25	0	65
1022	330	0.03	0.24	0.37	0	65
1030	330	0.03	0.24	0.37	0	65
2040	830	0.08	0.62	0.95	0	65
2055	830	0.08	0.62	0.95	0	65
2075	830	0.08	0.62	0.95	0	65
3110	1500	0.28	1.12	1.72	1500	65
3150	1500	0.28	1.12	1.72	1500	65
4185 ... 4221	1800	0.58	1.54	2.3	4500	70
4300 - 4301	2200	0.62	1.88	2.8	4500	70
4370 - 4371	3300	0.72	2.83	4.2	4500	70
5450	4950	0.87	4.24	6.3	4500	70
5550	4950	0.87	4.24	6.3	4500	70
6750	6600	0.61	5.6	8.1	0	70
7900	6600	0.61	5.6	8.1	0	70
71100	9900	0.91	8.4	12.1	0	70
71320	14100	1.30	12.8	17.2	0	70
81600	14100	1.30	12.8	17.2	0	70

avy4220L

SMPS = Switched Mode Power Supply

Figure 4.10.1: Buffering the Regulator Supply by Means of Additional Intermediate Circuit Capacitors



NOTE! When connecting the intermediate circuit terminals C and D the AC Input side **must** be protected with superfast semiconductor fuses!

Formula for calculating the size of the external capacitors:

$$C_{ext} = \frac{2 \bullet P_{SMPS} \bullet t_{Buff} \bullet 10^{6}}{U^2_{Buff} - U^2_{min}} - C_{std}$$

fA018

C_{ext}, C_{std}	[µF]	
P_{SMPS}	[W]	U_{Buff} = 400 V at U_{LN} = 400 V
t_{Buff}	[s]	U_{Buff} = 460 V at U_{LN} = 460 V
U_{Buff}, U_{min}	[V]	U_{min} = 250 V

Calculation example

An AVy4220 drive is operated with an AC Input supply U_{LN} = 400 V. A voltage failure buffer is required for max. 1.5 s.

P_{SMPS}	70 W	t_{Buff}	1.5 s
U_{Buff}	400 V	U_{min}	250 V
C_{std}	1800 µF		

$$C_{ext} = \frac{2 \,.\, 70\,W \,.\, 1.5\,s \,.\, 10^{6}\mu F / F}{(400\,V)^{2} - (250\,V)^{2}} - 1800\mu F = 2154\mu F - 1800\mu F = 354\mu F$$

4.11 Discharge Time of the DC-Link

Table 4.11.1: DC Link Discharge Time

Type	I_{2N}	Time (seconds)	Type	I_{2N}	Time (seconds)
1007	2.1	90	**4300 - 4301**	58	60
1015	3.5		**4370 - 4371**	76	90
1022	4.9	150	**5450**	90	120
1030	6.5		**5550**	110	
2040	8.3	205	**6750**	142	
2055	11		**7900**	180	
2075	15.4		**71100**	210	
3110	21.6	220	**71320**	250	
3150	28.7		**81600**	310	
4185 - 4221	42	60			

Tavy4250

This is the minimum time that must be elapsed when an AVy Drive is disconnected from the AC Input before an operator may service parts inside the drive to avoid electric shock hazard.

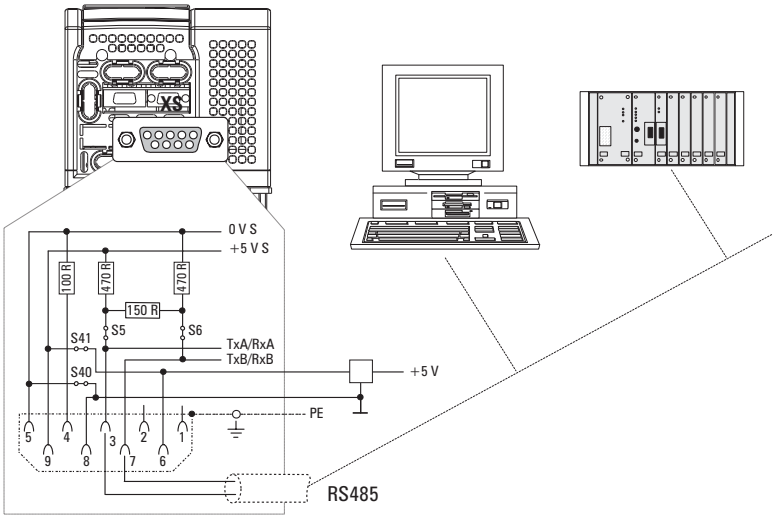
CONDITION The value consider the time to turn-off for a drive supplied at 480Vac +10%, without any options (the charge for the switching supply is the regulation card, the keypad and the 24Vdc fans “if mounted”).
The drive is disabled. This represents the worst case condition.

NOTE:

Chapter 5 - Serial Interface Description

The RS 485 serial interface enables data transfer via a loop made of two symmetrical, twisted conductors with a common shield. The maximum transmission distance is 1200 m (3936 feet) with a transfer rate of up to 38,400 KBaud. The transmission is carried out via a differential signal. RS 485 interfaces are bus-compatible in half-duplex mode, i.e. sending and receiving take place in sequence. Up to 31 ARTDriveL devices (up to 128 address selectable) can be networked together via the RS 485 interface. Address setting is carried out via the **Slave address** parameter. Further information concerning the parameters to be transfered, their type and value range is given in paragraph 9.2, COMMUNICATION \ RS 485.

Figure 5.1: RS485 Serial Interface



The RS 485 on the ARTDriveL series devices is located on the Regulation card in the form of a 9-pole SUB-D socket connector (XS).The communication may be with or without galvanic isolation: when using galvanic isolation an external power supply is necessary (+5V). Communication without galvanic isolation is suggested only in case of temporary connections for setup with one drive connected. The differential signal is transferred via PIN 3 (TxA/RxA) and PIN 7 (TxB/RxB). Bus terminating resistors must be connected at the physical beginning and end of an RS 485 bus in order to prevent signal reflection. The bus terminating resistors on ARTDriveL drives are connected via jumpers S5 and S6. This enables a direct point-to-point connection with a PLC or PC.

NOTE! Ensure that only the first and last drop of an RS 485 bus have a bus terminating resistor (S5 and S6 mounted). In all other cases (within the line) jumpers S5 and S6 must not be mounted. With S40 and S41 mounted the drive supply the serial line. This modality is allowed on point-to-point connection without galvanic isolation only.

NOTE!

A connection point to point can be done using “PCI-485” option interface (S40 and S41 mounted).
For multidrop connection (two or more drive), an external power supply is necessary (pin 5 / 0V and pin 9 / +5V).
Pins 6 and 8 are reserved for use with the “PCI-485” interface card.

When connecting the serial interface ensure that:
- only shielded cables are used
- power cables and control cables for contactors/relays are routed separately

The communication protocol can be chosen between Slink4, Modbus, Jbus, ISO 1745 or Hiperface through “Protocol type” parameter (COMMUNICATION / RS 485 / Protocol type).

5.1 RS 485 Serial Interface Connector Description

Table 5.1.1: Assignment of the Plug XS Connector for the RS 485 Serial Interface

Designation	Function	I/O	Elec. Interface
PIN 1	Internal use	–	–
PIN 2	Internal use	–	–
PIN 3	RxA/TxA	I/O	RS485
PIN 4	Internal use	–	–
PIN 5	0V (Ground for 5 V)	–	Power supply
PIN 6	Internal use	–	–
PIN 7	RxB/TxB	I/O	RS 485
PIN 8	Internal use	–	–
PIN 9	+5 V	–	Power supply

ai4110

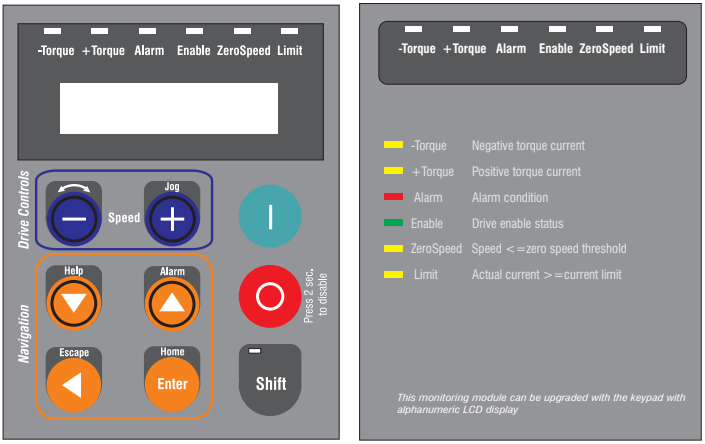
I = Input O = Output

Chapter 6 - Keypad Operation

The keypad is made of a LCD display with two 16-digit lines, seven LEDs and nine function keys. It is used:

- to start and stop the drive (this function can be disabled)
- to display the speed, voltage, diagnostics etc. during the operation
- to set parameters and enter commands

The LED module is made of 6 LEDs. It is used to display status and diagnostic information during the operation. Keypad and LED module can be installed or removed also while the drive is running.



NOTE! a replacement keypad cable longer than 20 cm must be shielded.

6.1 LEDs & Keys

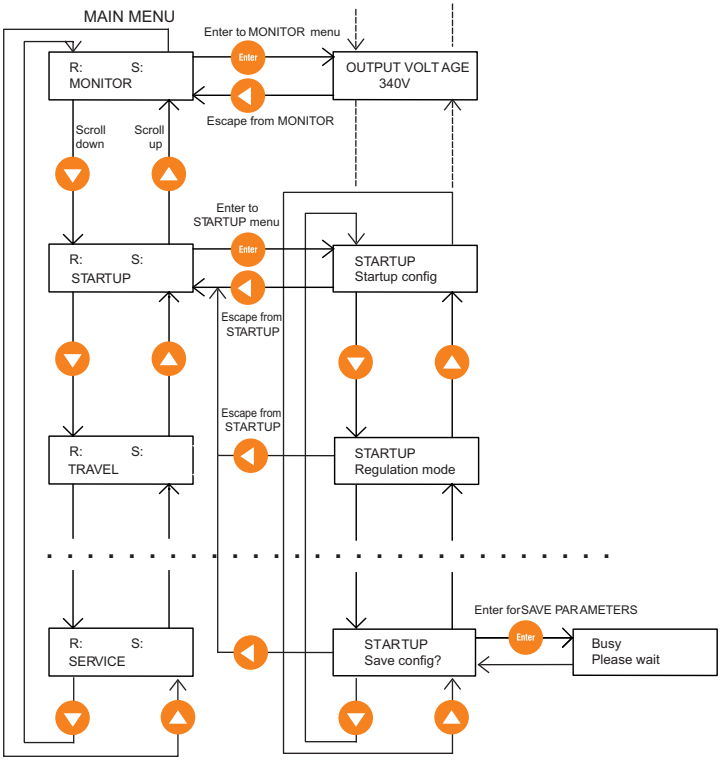
The LEDs present on the keypad are used to quickly diagnose the operating state of the drive.

Designation	Color	Function
-Torque	yellow	the LED is lit when the drive operates with a negative torque
+Torque	yellow	the LED is lit when the drive operates with a positive torque
ALARM	red	the LED is lit when the drive signals a trip
ENABLE	green	the LED is lit when the drive is enabled
Zero speed	yellow	the LED is lit when motor speed is zero
Limit	yellow	the LED is lit when the drive operates at a current limit
Shift	yellow	the LED is lit when the keypad second functions are enabled

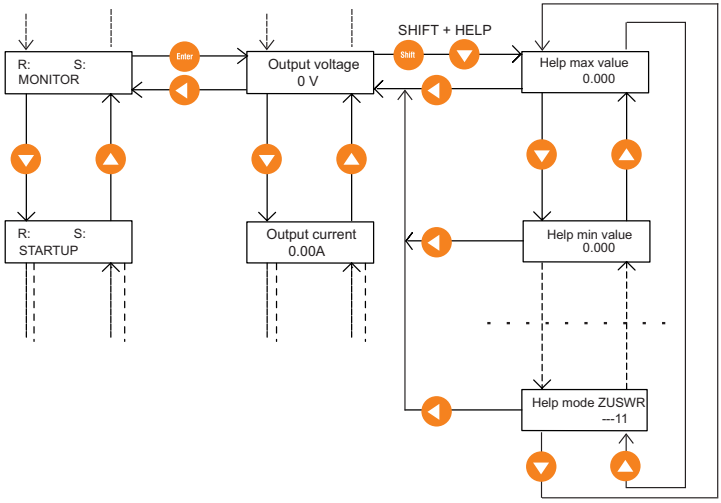
ts030g

Control Keys	Text reference	Function
	[START]	START key commands the drive to Enable and Start.(***Command select*** = I O key)
	[STOP]	STOP key commands to Stop and disable (***Command select*** = I O key) Stop key also resets the sequencer after an alarm event
	[Increase] / [Jog]	Motor pot and Jog functions are not available on ARTDriveL version.
	[Decrease] / [Rotation control]	Motor pot and Jog functions are not available on ARTDriveL version.
	[Down arrow] / [Help]	Used to scroll down menu items in menu navigation, picklists in selectors, or digit values in numeric editing. After pressing shift key, an item-specific information menu is entered when applicable. Help menu can be browsed with up/down arrows. Left arrow returns to normal mode.
	[Up arrow] / [Alarm]	Used to scroll up menu items in menu navigation, picklists in selectors, or digit values in numeric editing. After pressing Shift key, the Alarm list display mode is entered. Active alarms and Alarms pending for acknowledge can be browsed with up/downs arrows. Alarms can be acknowledged whit the Enter key. Left arrow returns to normal mode.
	[Left arrow] / [Escape]	Used to go up one level in menu navigation; to scroll digits in numeric edit mode, to return to normal mode from alarm list or help modes. After pressing shift key, it is used to Escape out of numeric edit or selection with no change.
	[Enter] / [Home]	Used to go down one level in menu navigation; to enter Selections or numeric values after editing, to issue commands, to acknowledge alarms in the Alarm list mode. Home second function, return to Monitor menu from any main menu level.
	[Shift]	Shift button enables the keypad second functions (Rotation control, Jog, Help, Alarm, Escape, Home)

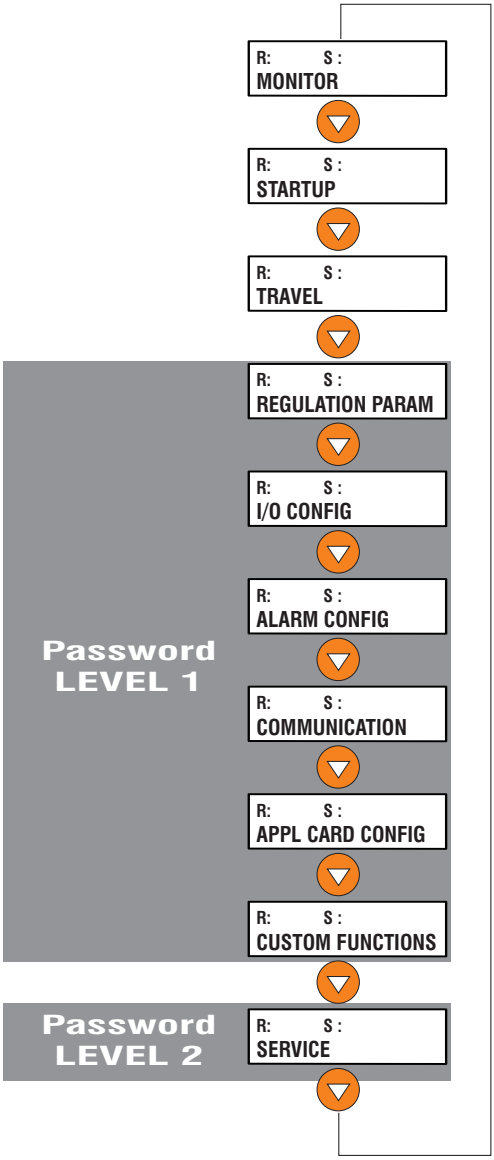
6.2 Moving Inside a Menu



6.3 Using Keypad Help



6.4 Drive Main Menu



* SERVICE menu allows the setting of the password to enable Level 1 drive menus: 12345. To have the access of Level 1 drive menus, edit 12345 password into “Insert Password” parameter and confirm it using “Enter” button.

NOTE! Level 1 password must be set every recycle drive supply

Chapter 7 - Commissioning via Keypad

The ARTDrive Lift can operate with advanced Voltage /Frequency control (as default), Sensorless vector control (open-loop), Field Oriented vector control (closed-loop) and Brushless.
All the regulation modes have their own-independent parameter sets.
A commissioning executed in one mode should be repeated or transferred to another regulation mode.

7.1 Commissioning for AVy...AC / AC4 (Asychronous Motors)

Commissioning Set-up Procedure

Step	Function	Description
	Closed-loop - Field Oriented mode (see chapter 7.1.1)	
1	**Select the Regulation mode**	Drive comes factory defaulted to V/f control, change to Field Oriented vector control.
2	**Set Drive data**	Go to Setup mode for drive data parametrization: Mains voltage, Ambient temp, Switching freq, Speed reference resolution
3	**Set Motor data**	Go to Setup mode for motor data parametrization: Rated voltage, Rated frequency, Rated current, Rated speed, Rated power, Cosphi
4	**Run motor Autotune**	Autotune procedure is a real motor parameters measurement; two options are available: - "**Complete still**" can be used when motor is coupled to gearbox, brake is applied and lift car is installed. **It could cause limited shaft rotation** when brake is not applied. - "**Complete rot**" can be used when motor is uncoupled or gearbox does not represent more than 5% load and lift car is not installed. **It causes motor shaft rotation close to the rated speed**.
5	**Set all system mechanical data**	System mechanical data: Gearbox ratio, Pulley diameter, Full scale speed.
6.1 or 6.2	**Encoder type configuration**	**- 6.1 :** Feedback from encoder connected to XE connector on Regulation card **- 6.2 :** Feedback from encoder connected to XFI connector on EXP-... optional card

Go to step 6 up to step 9 of chapter 7.1.3

Step	Function	Description
	Open-loop - Sensorless vector mode (see chapter 7.1.2)	
1	**Select the Regulation mode**	Drive comes factory defaulted to V/f control; Sensorless vector mode selection.

Go to step 2 up to step 9 of chapter 7.1.3

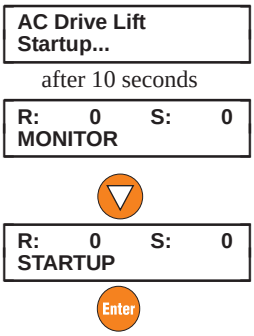
Step	Function	Description
	V/f control mode (see chapter 7.1.3)	
1	**Switch-on**	Drive comes factory defaulted to V/f control.
2	**Set Drive data**	Go to Setup mode for drive data parametrization: Mains voltage, Ambient temperature and Switching freq.
3	**Set Motor data**	Go to Setup mode for motor data parametrization: Rated voltage, Rated frequency, Rated current, Rated speed, Rated power, Cosphi.
4	**Run motor Autotune**	Autotune procedure is a real motor parameters measurement; two options are available: - "**Complete still**" can be used when motor is coupled to gearbox, brake is applied and lift car is installed. **It could cause limited shaft rotation** when brake is not applied. - "**Complete rot**" can be used when motor is uncoupled or gearbox does not represent more than 5% load and lift car is not installed. **It causes motor shaft rotation close to the rated speed**.
5	**Set all system mechanical data**	System mechanical data: Gearbox ratio, Pulley dameter, Full scale speed.
6	**Set all system weight data**	System weights data: Cabin weight, Counter weight, Load weight, Rope weight, Motor inertia, Gearbox inertia.
7	**Set braking unit parameters**	Braking Unit parameters: Braking unit type (internal / external), Braking unit resistance, Braking unit power.
8	**Set speed profile**	A binary combination of three digital input allows to select up to 8 different speed setpoints
9	**Set ramp profile**	Accelerations jerk and decelerations jerk can be set in the ramp profile

NOTE! Drive Startup procedure below take as example an AVy4220-KBL-AC4 drive (software revision 3.500).

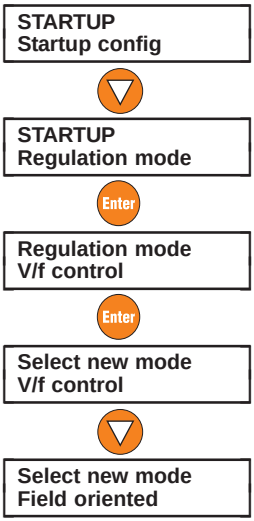
7.1.1 Field Oriented mode

1
Field oriented
mode set up

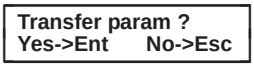
Power up the drive.This operation will take about 10 seconds and the drive will display (LEDs blink for test):



NOTE! Upon opening the STARTUP menu, the drive enters in the parametrization mode.



Press Enter to confirm Regulation mode database selected.



Press Enter to transfer parameters from previous regulation mode to a newly selected regulation mode. This operation is convenient only if some parameters have been set in previous regulation mode. Otherwise press Esc to not transfer parameters.

2

Set Drive data

The drive will restart in the new regulation mode, this will take around 5 seconds:

Restart
Please wait

then

STARTUP
Regulation mode

Scroll ▲ and Enter

STARTUP
Startup config

Enter

The drive will show:

Startup config
Enter setup mode

then press Enter. The drive will restart to **SETUP MODE** menu, wait few seconds, messages sequence will follow:

Restart
Please wait

then

SETUP MODE
Drive data

Press Enter and set **Drive data** parameters:

SETUP MODE
Drive data

Enter

Mains voltage
400 V

Enter

Press ▲ or ▽ to select AC input voltage from the following list:

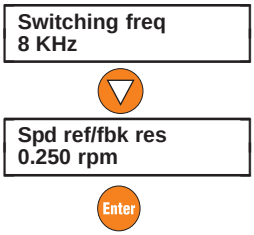
460 - 440 - 415 - 400 - 380 - 230V, press Enter to confirm.

If necessary, it is also possible to change : Ambient temperature and Switching frequency.

▽

Ambient temp
40° C

▽



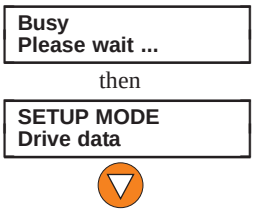
Press or to select a speed resolution value based on max motor speed.

E.g.: if rated speed is 1460 rpm, set 0.125 rpm (see table)

Speed resolution (Spd ref/fbk res)	Max speed value
0.125 rpm	2048 rpm
0.25 rpm	4096 rpm
0.5 rpm	8192 rpm
1 rpm	16384rpm
0.03125 rpm	512 rpm

Press Enter to confirm the selection.

Press to exit from **Drive data**. The drive will show:



NOTE! If any changes have been made to **Drive data** menu parameters, with this operation, internal drive values will be calculated and autotune results will be initialized.

3

Set **Motor data**

Set **Motor nameplate** parameters in Motor data menu (values accepted depend on drive size):

SETUP MODE Motor data

Enter

Rated voltage 380.00 V

Enter to edit motor voltage. To confirm the new value press Enter, to cancel edit press Shift + Escape or scroll ▽ to:

Rated frequency 50.00 Hz

Enter to edit motor frequency, to confirm the new value press Enter.

▽

Rated current 43 A

Enter to edit motor current, to confirm the new value press Enter.

NOTE! The value should not be less than approx 0.3 times the drive rated current, output current class 1 @400V on the drive nameplate.

▽

Rated speed 1460.00 rpm

Enter to edit motor speed, to confirm the new value press Enter.

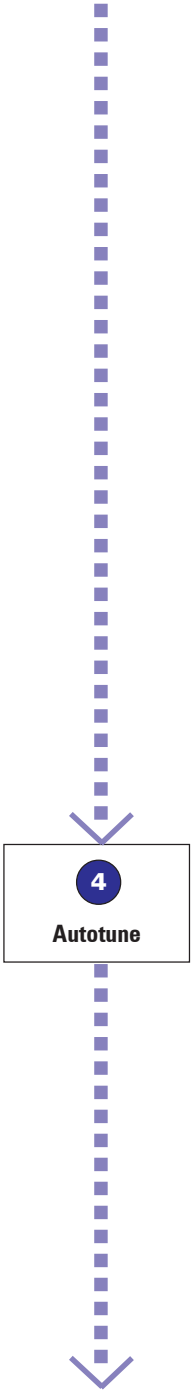
NOTE! The value is intended to be the motor full load speed at the rated frequency. If Slip is available on the motor nameplate, set “Rated speed” parameter as following:
Rated speed = Synchronous speed - Slip

▽

Rated power 22 kW

Enter to edit motor power, to confirm the new value press Enter.

NOTE! For a motor nameplate rated in HP, set **Rated power kW** = 0.736 x motor **Hp** rating.



Cosfi
0.85

Enter to edit motor cos φ (power factor), to confirm the new value press Enter.

NOTE! Leave default value for Cos φ if the data is not available from the nameplate.

Efficiency
91.20 %

Enter to edit motor efficiency, to confirm the new value press Enter.

NOTE! Leave default value for efficiency if the data is not available from the nameplate.

Press to exit from **Motor data**; for some seconds the drive will show:

Busy
Please wait ...

then

SETUP MODE
Motor data

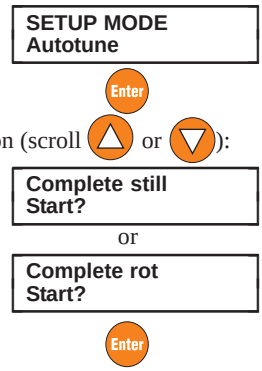
NOTE! If any changes have been made to **Motor data** menu parameters, with this operation internal drive values will be calculated and autotune results will be initialized.
If the operation generates any error messages or alarm led comes on, please check consistency of motor parameters and try again or see specific directions in section 10, Troubleshooting.

Scroll to perform Autotune procedure; two options can be used for this procedure: "**Complete still**" or "**Complete rot**".

NOTE! When motor is coupled to gearbox and lift is installed, **use "Complete still"**(motor still)**.**
When motor is uncoupled or gearbox does not represent more than 5% of load and lift car is not installed, **use "Complete rot"**(motor in rotation)**.**

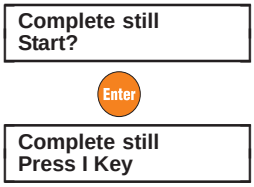
WARNING ! Option "**Complete still**" may also cause limited shaft rotation.

WARNING ! Option "**Complete rot**" causes motor shaft rotation close to rated speed. It is preferred one for the higher accuracy, but it requires free uncoupled rotation of the motor shaft.



Select the desired option (scroll or):

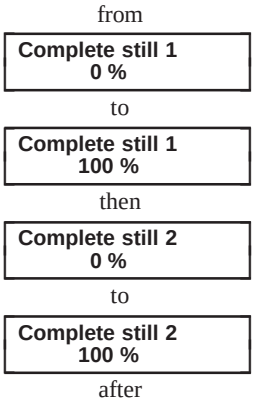
As standard example with motor and machine installed on system, **Complete still** are used. Connect terminal 12 (Enable) to terminal 19 (+24VDC) through relays or local switch, switch on the output contactors and leave the brake closed.



press to start

NOTE! Autotune can be aborted at any time by pressing .

The Autotune procedure will start; the drive will display:



End Autotune

blinking

Press 2 times to exit from the procedure:

SETUP MODE Autotune

Switch off the output contactors and disconnect terminal 12 (Enable).

NOTE! Autotune procedure can take up to different minutes to be completed.

If the operation generates any error messages, for example when the drive is disabled during procedure execution:

Autotune err#1: Abort

and red LED alarm blinking

press to exit 2 times,

then try to repeat the autotune procedure. For more information about error messages and alarms, please refer to section 10, Troubleshooting.

Press to Exit from **SETUP MODE** menu.

Wait few seconds, message sequence will follow:

Busy Please wait ...

then

Restart Please wait ...

then

R: S: MONITOR

then

Load setup? Yes->Ent No->Esc

Press to load Autotune data.

Busy Please wait ...

then

Load setup? Yes->Ent No->Esc

5

Mechanical data

Press ◁ to exit from menu:

Startup config
Load setup

Scroll ▽ till:

Startup config
Mechanical data

Press Enter to set “Gearbox ratio”, “Pulley diameter” and “Full scale speed” of the system:

Travel unit sel
Revolution

“Travel unit sel” parameter determines all Speed and Ramp profile parameters units:

- Revolution = rpm, rpm/s and rpm/s^2
- Millimeters = mm/s, mm/s^2 and mm/s^3.

▽

Gearbox ratio
35.00

Press Enter and set gearbox ratio of the system, press Enter to confirm.

▽

Pulley diameter
500 mm

Press Enter and set pulley diameter of the system, press Enter to confirm.

▽

Full scale speed
1460 rpm

Press Enter to edit max speed (in lift application set this parameter to rated motor speed), press Enter to confirm .

NOTE! It defines the 100% of the application speed referenced. The absolute speed handling range is ± 200% Full scale speed.

Press ◁ to exit from **Mechanical data** menu:

Busy
Please wait ...

then

Startup config
Mechanical data

For encoder type configuration go to step:

- 6.1 Feedback from encoder connected to **XE** connector on Regulation card

or

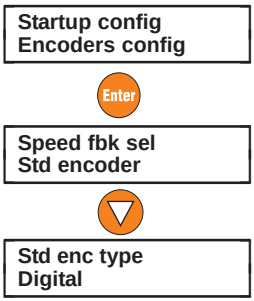
- 6.2 Feedback from encoder connected to XFI connector on EXP-... optional card

6.1

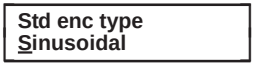
Encoder type configuration **(Encoder config)**

Feedback from encoder connected to **XE** connector on Regulation card

Scroll ▽ to **Encoders config** menu:



Press Enter to set from Digital to Sinusoidal, press Enter to confirm:



Scroll ▽ to set encoder pulses per revolution (factory setting = 1024ppr):

Press Enter and set the new encoder pulses, press Enter to confirm.

Press ◁ to exit from **Encoders config** menu.

Now go to step 6 up to step 9 of chapter 7.1.3.

6.2

Encoder type configuration **(Encoder config)**

Feedback from encoder connected to **XFI** connector on EXP-... optional card

Scroll ▽ to **Encoders config** menu:

Startup config
Encoders config

Enter

Speed fbk sel
Std encoder

Enter

Speed fbk sel
Std encoder

△

Speed fbk sel
Exp encoder

Enter

Speed fbk sel
Exp encoder

Press ▽ seven times.

Exp enc pulses
1024 ppr

Press Enter and set the new encoder pulses, press Enter to confirm.

Press ◁ to exit from **Encoders config** menu.

Now go to step **6** up to step **9** of chapter 7.1.3.

7.1.2 Sensorless vector mode

1

Sensorless vector mode set up

Power up the drive.This operation will take about 10 seconds and the drive will display (LEDs blink for test):

```
AC Drive Lift
Startup...
```

after 10 seconds

```
R:    0    S:    0
MONITOR
```

▽

```
R:    0    S:    0
STARTUP
```

Enter

NOTE! Upon opening the STARTUP menu, the drive enters in the parametrization mode.

```
STARTUP
Startup config
```

▽

```
STARTUP
Regulation mode
```

Enter

```
Regulation mode
V/f control
```

Enter

```
Select new mode
V/f control
```

Press ▽ two times.

```
Select new mode
Sensorless vect
```

Press Enter to confirm Regulation mode database selected.

```
Transfer param ?
Yes->Ent    No->Esc
```

Press Enter to transfer parameters from previous regulation mode to a newly selected regulation mode.
This operation is convenient only if some parameters have been set in previous regulation mode. Otherwise press Esc to not transfer parameters.
The drive will restart in the new regulation mode, this will take around 5 seconds:

```
Restart
Please wait
```

Now go to step 2 up to step 9 of chapter 7.1.3.

then

STARTUP Regulation mode

Press ◁ to exit from **STARTUP** menu.

7.1.3 V/f Control mode

1 **V/f Control** switch-on

2 **V/f Control** mode set up

Power up the drive.This operation will take about 10 seconds and the drive will display (LEDs blink for test):

AC Drive Lift Startup...

after 10 seconds

R: 0 S: 0 MONITOR

▽

R: 0 S: 0 STARTUP

Enter

NOTE! Upon opening the STARTUP menu, the drive enters in the parametrization mode.

STARTUP Startup config

Enter

STARTUP CONFIG Enter setup mode

Enter, wait few seconds:

SETUP MODE Drive data

Enter

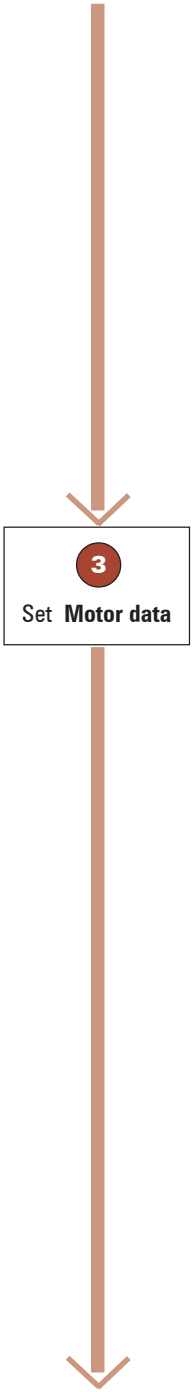
Mains voltage 400 V

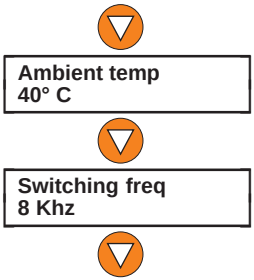
Enter

Press △ or ▽ to select AC input voltage from the following list:

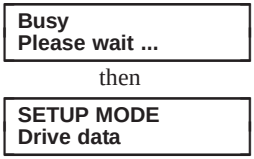
460 - 440 - 415 - 400 - 380 - 230V, press Enter to confirm.

If necessary, it is also possible to change : Ambient temperature and Switching frequency.

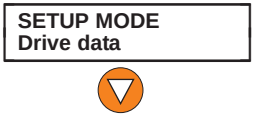




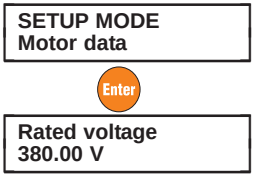
Press , the drive will show:



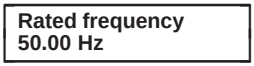
then



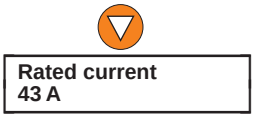
Set **Motor nameplate** parameters in Motor data menu (values accepted depend on drive size):



Enter to edit motor voltage. To confirm the new value press Enter, to cancel edit press Shift + Escape or scroll to:

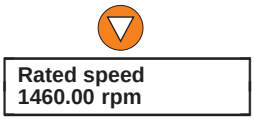


Enter to edit motor frequency, to confirm the new value press Enter



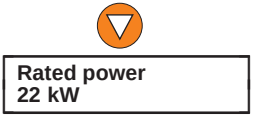
Enter to edit motor current, to confirm the new value press Enter.

NOTE! The value should not be less than approx 0.3 times the drive rated current, output current class 1 @400V on the drive nameplate.



Enter to edit motor speed, to confirm the new value press Enter.

Note! The value is intended to be the motor full load speed at the rated frequency. If Slip value is available on the motor nameplate data, set “Rated speed” parameter as following:
Rated speed = Synchronous speed - Slip

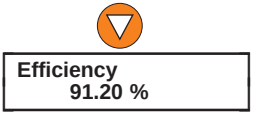


Enter to edit motor power, to confirm the new value press Enter.

Note! For a motor nameplate rated in HP, set
Rated power kW = 0.736 x motor **Hp** rating.

Enter to edit motor cos φ (power factor), to confirm the new value press Enter.

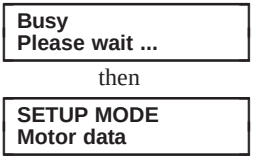
Note! Leave default value for Cos φ if the data is not available from the nameplate.



Enter to edit motor efficiency, to confirm the new value press Enter.

Note! Leave default value for efficiency if the data is not available from the nameplate.

Press to exit from **Motor data**; for some seconds the drive will show:



4 Autotune

Note! If any changes have been made to **Motor data** menu parameters, with this operation internal drive values will be calculated and autotune results will be initialized.
If the operation generates any error messages or alarm led comes

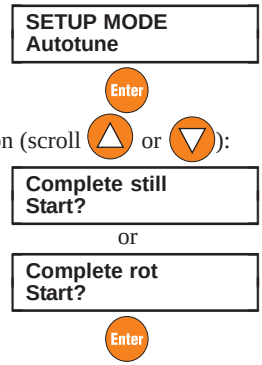
on, please check consistency of motor parameters and try again or refer to section 10, Troubleshooting.

Scroll to perform Autotune procedure; two options can be used for this procedure: "**Complete still**" or "**Complete rot**".

NOTE! When motor is coupled to gearbox and lift is installed, **use "Complete still"**(motor still)**.**
When motor is uncoupled or gearbox does not represent more than 5% of load and lift car is not installed, **use "Complete rot"**(motor on rotation)**.**

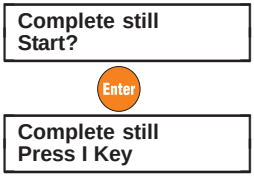
WARNING ! Option "**Complete still**" may also cause limited shaft rotation.

WARNING ! Option "**Complete rot**" causes motor shaft rotation close to rated speed. It is preferred one for the higher accuracy, but it requires free uncoupled rotation of the motor shaft.



Select the desired option (scroll or):

As standard example with motor and machine installed on system, **Complete still** are used. Connect terminal 12 (Enable) to terminal 19 (+24VDC) through relays or local switch, switch on the output contactors and leave the brake closed.



press to start

NOTE! Autotune can be aborted at any time by pressing .

The Autotune procedure will start through which the drive will display:

from

Complete still 1 0 %

to

Complete still 1 100 %

then

Complete still 2 0 %

to

Complete still 2 100 %

after

End Autotune

blinking

Press 2 times to exit from the procedure:

SETUP MODE Autotune

Switch off the output contactors and disconnect terminal 12 (Enable).

NOTE! Autotune procedure can take up to different minutes to be completed.

If the operation generates any error messages, for example when the drive is disabled during procedure execution:

Autotune err#1: Abort

and red LED alarm blinking

press to exit 2 times,

then try to repeat the autotune procedure. For more information about error messages and alarms, please refer to section 10, Troubleshooting.

Press to Exit from **SETUP MODE** menu.

Wait few seconds, message sequence will follow:

Busy Please wait ...

then

Restart Please wait ...

then

5

Mechanical data

```
R:        S:
MONITOR
```

then

```
Load setup?
Yes->Ent     No->Esc
```

Press Enter to load Autotune data.

```
Busy
Please wait ...
```

then

```
Load setup?
Yes->Ent     No->Esc
```

Press ◁ to exit from menu:

```
Startup config
Load setup
```

Scroll ▽ till:

```
Startup config
Mechanical data
```

Press Enter to set “Gearbox ratio”, “Pulley diameter” and “Full scale speed” of the system:

```
Travel unit sel
Revolution
```

“Travel unit sel” parameter determines all Speed and Ramp profile parameters units:

- Revolution = rpm, rpm/s and rpm/s^2
- Millimeters = mm/s, mm/s^2 and mm/s^3.

▽

```
Gearbox ratio
      35.00
```

Press Enter and set gearbox ratio of the system, press Enter to confirm.

▽

```
Pulley diameter
      500 mm
```

Press Enter and set pulley diameter of the system, press Enter to confirm.

▽

```
Full scale speed
      1460 rpm
```

Press Enter to edit max speed (in lift application set this parameter to rated

motor speed), press Enter to confirm.

NOTE! It defines the 100% of the application speed referenced. The absolute speed handling range is ± 200% Full scale speed.

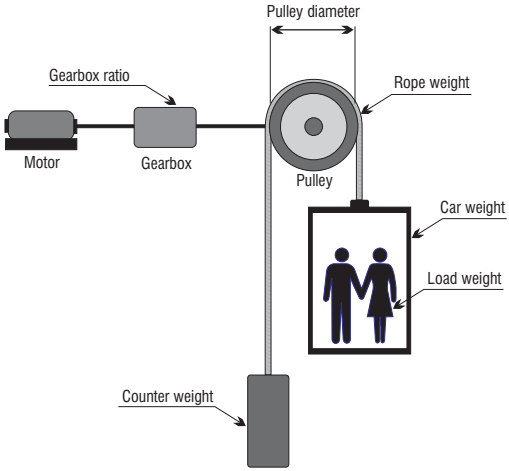
Press ◁ to exit from **Mechanical data** menu:

Busy
Please wait ...

then

Startup config
Mechanical data

6
Weight



Scroll ▽ to Weights menu:

Startup config
Weights

Press Enter to set Car weight (weight of the lift car), Counter weight, Load weight, Rope weight, Motor and Gearbox inertia parameter:

Car weight
0 Kg

Press Enter and edit the value of Car weight, press Enter to confirm.

▽

Counter weight
0 Kg

Press Enter and the value of Counter weight (car weight to achive balance

system) parameter, press Enter to confirm.

Press Enter and edit the value of Load weight (maximum lift load weight) parameter, press Enter to confirm.

Press Enter and edit the value of Rope weight (total inertia of cabin rope) parameter, press Enter to confirm.

Press Enter and edit the value of Motor inertia (if not available, leave to default), press Enter to confirm.

Press Enter and edit the value of Gearbox inertia (if not available, leave to default), press Enter to confirm.

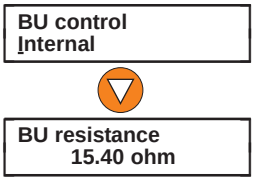
NOTE! "Gearbox inertia" is intended as inertia of all rotating masses on slow side of gearbox, ex. pulley inertia, etc...

Press ◁ to exit from **Weight menu**.

Press ▽ 2 times.

Follow the points below to set the BU resistance parameters:

7 Braking unit setting **[BU protection]**

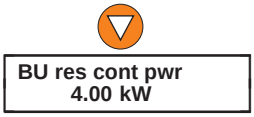


Press Enter and edit the resistance value, press Enter to confirm.

NOTE! See section 4.9.2 for the minimum permissible value of the resistor.

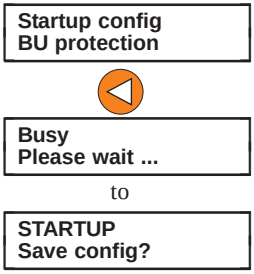
For the thermal protection of the braking resistence, a time reverse characteristic is defined. This requires definition of resistor power in continous service, ***BU res cont pwr***.

NOTE! Refer to chapter 9.2 for details on BU protection



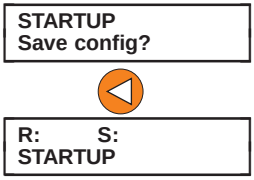
Press Enter to edit the power value, press Enter to confirm.

Press ◁ to exit from Encoder Config menu.



The prompt displays “Save config ?” (Recommended).
For this operation the drive will take around 5 seconds.

Press Enter to execute the procedure:

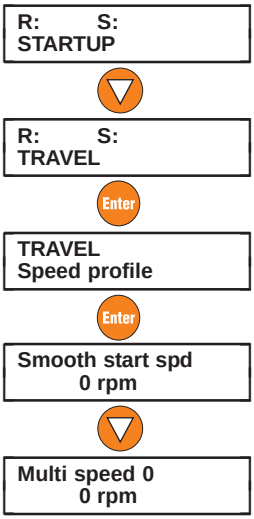


NOTE! Upon closing the **STARTUP** menu, the drive exits from parametrization mode and becomes operational.

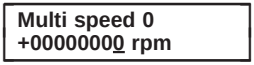
8
Speed setting
[Speed profile]

NOTE! The drive cannot be enabled when STARTUP menu is open.

AVyL drive allows to set a Speed profile trough 8 different speed point: “Multi speed 0” ... “Multi speed 7”

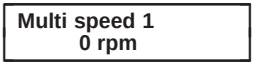


Press Enter to set “Multi speed 0” set point:



Edit the value requested by the system and press Enter to confirm.

Scroll ▽ to set “Multi speed 1” set point:



Press Enter and repeat the procedure as for “Multi speed 0”. Scroll ▽ to set all the others Multi speed required by the system.

ATTENTION ! Through the combination of “Mlt spd s0 src” (equal Digital input 4), “Mlt spd s1 src” (equal Digital input 5) and “Mlt spd s2 src” (equal Digital input 6), is possible to select Multi speed desired, according to next table:

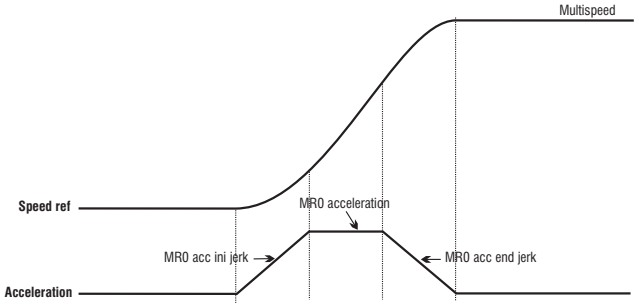
Mtl spd sel 2 src	Mtl spd sel 1 src	Mtl spd sel 0 src	ACTIVE SPEED
0	0	0	Multi speed 0
0	0	1	Multi speed 1
0	1	0	Multi speed 2
0	1	1	Multi speed 3
1	0	0	Multi speed 4
1	0	1	Multi speed 5
1	1	0	Multi speed 6
1	1	1	Multi speed 7

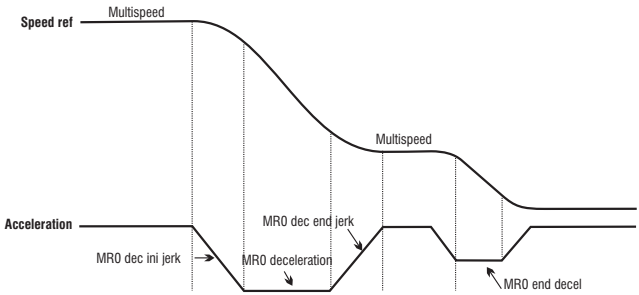
TAV3i011

Press ◁ to exit from Speed profile menu.

9
Ramp setting
[Ramp profile]

AVyL drive allows to set a Ramp profile as the picture shows below:





TRAVEL
Speed profile

▽

TRAVEL
Ramp profile

Enter

MR0 acc ini jerk
1000 rpm/s²

Press Enter to set “MR0 acc ini jerk” parameter, press Enter to confirm:

▽

MR0 acceleration
500 rpm/s

Press Enter to set “MR0 acceleration” parameter, press Enter to confirm:

▽

MR0 acc end jerk
1000 rpm/s²

Press Enter to set “MR0 acc end jerk” parameter, press Enter to confirm:

▽

MR0 dec ini jerk
1000 rpm/s²

Press Enter to set “MR0 dec ini jerk” parameter, press Enter to confirm.

▽

MR0 deceleration
500 rpm/s

Press Enter to set “MR0 deceleration” parameter, press Enter to confirm.

▽

MR0 dec end jerk
1000 rpm/s²

Press Enter to set “MR0 dec end jerk” parameter, press Enter to confirm.

▽

MR0 end decel
1000 rpm/s

Press Enter to set “MR0 end decel” parameter, press Enter to confirm.

▽

TRAVEL
Ramp profile

Press ▽ 9 times to open the saving procedure

TRAVEL
SAVE PARAMETERS

Press Enter to execute the procedure:

```
Busy
Please wait ...
```

to

```
TRAVEL
SAVE PARAMETERS
```

Press Shift + Enter.

```
R:    0    S:    0
MONITOR
```

Now the drive is set with commands for standard sequence.

7.2 Commissioning for AVy...BR / BR4 (Brushless Motors)

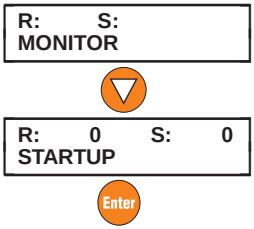
Commissioning Set-up Procedure

Step	Function	Description
1	**Set Drive data**	Drive Data parameters: Mains voltage, Ambient temp, Switching freq, Speed reference resolution
2	**Set Motor data**	Motor Data parameters: Rated voltage, Rated current, Rated speed, Pole pairs, Torque constant, EMF constant, Stator resistance and LsS inductance.
3	**Run current Regulator Autotune**	Autotune procedure measures a real motor parameters: - "Curr Reg autotune" can be used when motor is coupled to gearbox and lift car is installed. **It could cause limited shaft rotation.**
4	**Escape setup mode**	During this operation a "Load setup" is required to load all datas changes into SETUP MODE.
5	**Set all system mechanical data**	System mechanical data: Gearbox ratio, Pulley diameter, Full scale speed.
6	**Set all system weight data**	System weights data: Cabin weight, Counter weight, Load weight, Rope weight, Motor inertia, Gearbox inertia
7	**Encoder configuration**	Feedback source type selection: Sinusoidal Hall, Sinusoidal SinCos, Sinusoidal Extern, Digital Hall, DigitalExtern, SinCos, Resolver and Hyperface.
8	**Set braking unit parameters**	Braking Unit parameters: Braking unit type (internal / external), Braking unit resistance, Braking unit power
9	**Save configuration made in startup menu**	Use "Save Config ?" to save all the changes made in the Startup menu.
10	**Set speed profile**	A binary combination of three digital input allows to select up to 8 different speed setpoints
11	**Set ramp profile**	Accelerations jerk and decelerations jerk can be set in the ramp profile
12	**Encoder phasing**	Two options are available: - motor rotating or still.
13	**Save all the parameters**	

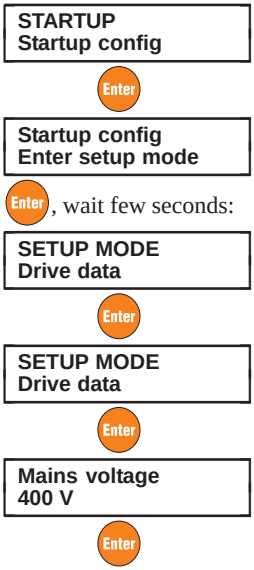
NOTE! Drive Startup procedure below take as example an AVyL 4220 BR4 drive (software revision 3.300).

1 Set **drive parameters (Drive data)**

Power up the drive, after few seconds the drive will display the main menu:



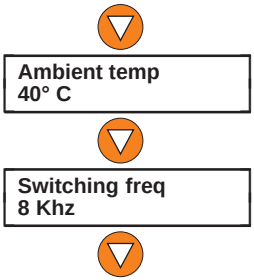
NOTE! Upon opening the STARTUP menu, the drive enters in the parametrization mode.



Press ▲ or ▼ to select AC input voltage from the following list:

460 - 440 - 415 - 400 - 380 - 230V, press Enter to confirm.

If necessary, it is also possible to change : Ambient temperature, Switching frequency and Speed resolution.



Spd ref/fbk res
0.250 rpm

Enter

Press ▲ or ▼ to select a speed resolution value based on max motor speed.

E.g.: if rated speed is 144 rpm, set 0.03125 rpm (see table)

Speed resolution (Spd ref/fbk res)	Max speed value
0.125 rpm	2048 rpm
0.25 rpm	4096 rpm
0.5 rpm	8192 rpm
1 rpm	16384rpm
0.03125 rpm	512 rpm

Spd ref/fbk res
0.03125 rpm

Press Enter to confirm the selection.

Press ◀, the drive will show:

Busy
Please wait ...

then

SETUP MODE
Drive data

▼

2
Set **motor parameters (Motor data)**

Set **Motor nameplate** parameters in Motor data menu (values accepted depend on drive size):

Enter

Rated voltage
330.00 V

Press Enter to edit rated motor voltage.

Press again Enter to confirm the new value.

▼

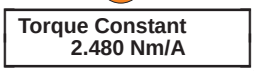
Rated current
35 A

Press Enter to edit rated motor current. Press again Enter to confirm.

▼

Press Enter to edit rated synchronous motor speed. Press again Enter to confirm the value.

Press Enter to edit motor pole pairs. Press again Enter to confirm the value.



Press Enter to edit motor torque value. Press again Enter to confirm the value.

NOTE! If Torque Constant is not available, it should be calculated with the following:

$$K_{T1} = \frac{P_n}{\left(\frac{2\,\pi\,S_n}{60}\right) I_n}$$

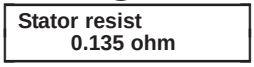
Where:
P_n = Rated power [W]
I_n = Rated current [A]
S_n = Rated speed [rpm]

$$K_{T1} = \frac{T_n}{I_n}$$

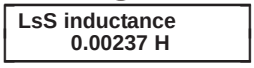
Where:
T_n = Rated torque [Nm]
I_n = Rated current [A]

Press Enter to edit motor back EMF constant from motor type plate (*).

Press Enter to confirm.



Press Enter to edit motor stator resistance value (*). Press Enter to confirm.



Press Enter to edit motor stator value (*). Press Enter to confirm.

(*) NOTE! If “EMF costant”, “Stator resistance” and “LsSinductance” values are unknowed, set them to zero before running current self-tuning procedure.

Press to exit from **Motor data**; for few seconds the drive will show:

Busy Please wait ...

then

SETUP MODE Motor data

3
Autotune

NOTE! If any changes have been made to **Motor data** menu parameters, with this operation internal drive values will be calculated and autotune results will be initialized.
If the operation generates any error messages or alarm led comes on, please check consistency of motor parameters and try again or see specific directions in section 10, Troubleshooting.

Scroll to perform Current Regulator Autotune procedure.

Warning

This operation may cause limited shaft rotation.

SETUP MODE Autotune

CurrReg Start?

Connect terminal 12 (Enable) to terminal 19 (+24VDC) through relays or local switch, then switch on the output contactors. It is suggested to open the brake (the rope must be removed), if not possible leave the brake closed.

CurrReg Press I Key

Press to start the Autotune procedure.

NOTE! Autotune procedure can take different minutes to be completed.

Autotune can be aborted at any time by pressing .

The drive will display from:

```
CurrReg
      0 %
```

to

```
CurrReg
    100 %
```

after

```
End
Autotune
```

blinking to show the end of procedure.

Press ◁ 2 times to exit from the procedure:

```
SETUP MODE
Autotune
```

Switch off the output contactors and disconnect terminal 12 (Enable).

4 Load setup

Press ◁ and wait few seconds

```
Load setup?
Yes->Ent     No->Esc
```

Enter

```
Busy
Please wait ...
```

then

```
Load setup?
Yes->Ent     No->Esc
```

Press ◁ to exit from menu:

```
Startup config
Load setup
```

5 Mechanical data

Scroll ▽ till:

```
Startup config
Mechanical data
```

Press Enter to set “Gearbox ratio”, “Pulley diameter” and “Full scale speed” of the system:

```
Travel unit sel
Revolution
```

“Travel unit sel” parameter determines all Speed and Ramp profile parameters units:

- Revolution = rpm, rpm/s and rpm/s^2
- Millimeters = mm/s, mm/s^2 and mm/s^3.

Press Enter and ▽ or △ to select the units, press Enter to confirm.

▽

Gearbox ratio
35.00

Press Enter to set gearbox ratio of the system, press Enter to confirm.

▽

Pulley diameter
500 mm

Press Enter and edit the pulley diameter of the system, press Enter to confirm.

Pulley diameter
+0000500 mm

▽ to **Full scale speed** parameter

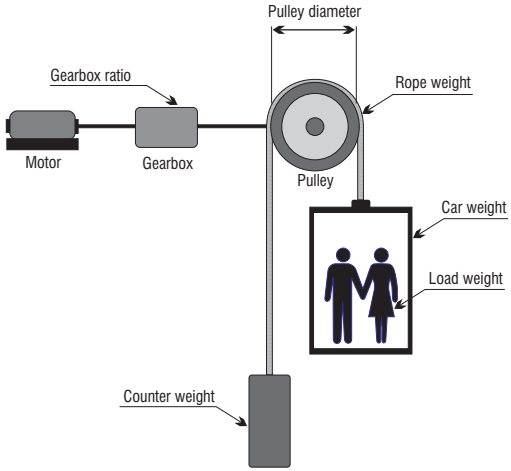
Full scale speed
2000 rpm

Press Enter and edit the value of max speed (in lift application set this parameter to rated motor speed), press Enter to confirm. Press ◁ to exit from **Mechanical data** menu.

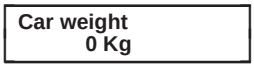
Scroll ▽ to Weights menu:

6
Weights

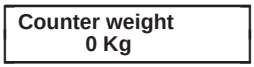
Startup config
Weights



Press Enter to set Car weight (weight of the lift car), Counter weight, Load weight, Rope weight, Motor and Gearbox inertia parameter:



Press Enter and edit the value of Car weight, press Enter to confirm.

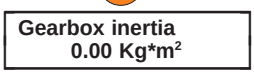


Press Enter and the value of Counter weight (car weight to achive balance system) parameter, press Enter to confirm.

Press Enter and edit the value of Load weight (maximum weight of lift load) parameter, press Enter to confirm.

Press Enter and edit the value of Rope weight (total inertia of cabin rope) parameter, press Enter to confirm.

Press Enter and edit the value of Motor inertia (if it is not available, leave to default), press Enter to confirm.



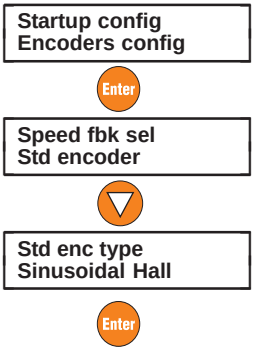
Press Enter and edit the value of Gearbox inertia (if it is not available, leave to default), press Enter to confirm.

NOTE! "Gearbox inertia" is intended as inertia of all rotating masses on slow rotating side of gearbox, e.g. pulley inertia, etc...

Press ◁ to exit from **Weight menu**.

7
Encoder type configuration **(Encoder config)**

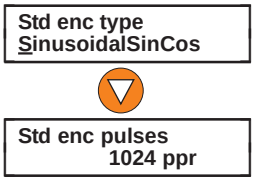
Press ◁ 2 times.



Press △ to select the parameter (see following list) according to the encoder type, press Enter to confirm.

Parameter	*Description*
SinusoidalHall	is a sinusoidal incremental encoder with A+/A-,B+/B-,C+/C- traces and three digital "Hall sensor" absolute position traces for initial synchronization (**XE** connector)
SinusoidalSinCos	is a sinusoidal incremental encoderwith A+/A-,B+/B-,C+/C- traces and two analog Sin Cos absolute position traces for initial synchronization (**XE** connector).
SinusoidalExtern	is a sinusoidal incremental encoder with A+/A-,B+/B- traces and absolute position information through SSI serial interface for initial synchronization (**XE** connector, requires **APC100y** card).
DigitalHall	is a digital incremental encoder with A+/A-,B+/B-,C+/C- traces and three digital "Hall sensor" absolute position traces for initial synchronization (**XE** connector).
DigitalExtern	is a digital incremental encoder with A+/A-,B+/B- traces and absolute position information through SSI serial interface for initial synchronization (**XE** connector, requires **APC100y** card).
SinCos	is a sinusoidal absolute encoder with SinCos traces.
Resolver	is resolver feedback, using option cards: EXP-RES, refer its manual for details (**XFR** connector on EXP-RES card).
SinusoidalHiperface	Absolute encoder with Hiperface protocol (**XE** connector).
Sinusoidal Intern	sinusoidal incremental encoder with A+/A-,B+/B-,C+/C- traces, absolute position traces are not necessary because phasing is performed automatically at every start.
Digital Intern	digital incremental encoder with A+/A-,B+/B-,C+/C- traces, absolute position traces are not necessary because phasing is performed automatically at every start.

CAUTION! For each encoder feedback, set the correct jumpers configuration on the regulation card RV33.



Press Enter to edit the number according to encoder data, press Enter to confirm.

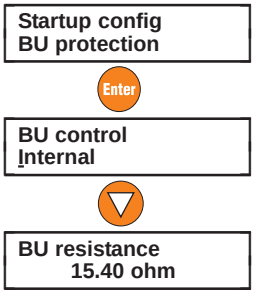
NOTE! It is possible to use only encoder having pulses per revolution equal to a multiple of 2.
Example: 512 ppr, 1024 ppr, 2048 ppr, etc.

Press ◁ to exit from Encoder Config menu.

Press ◁ 2 times.

Follow the points below to set the BU resistance parameters:

8
Braking unit setting
[BU protection]

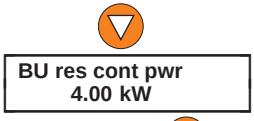


Press Enter and edit the resistance value, press Enter to confirm.

NOTE! See section 4.9.2 for the minimum permissible value of the resistor.

For the thermal protection of the braking resistence, a time reverse characteristic is defined. This requires definition of resistor power in continous service, ***BU res cont pwr***.

NOTE! Refer to chapter 9.2 for details on BU protection



Press Enter to edit the power value, press Enter to confirm.

9
Save configuration

Press ◁ to exit from Encoder Config menu.

Press ◁ to exit from Startup Config menu.

```
STARTUP
Save config?
```

The prompt displays “Save config ?” (Recommended).
For this operation the drive will take around 5 seconds.

Press Enter to execute the procedure:

```
Busy
Please wait ...
```

to

```
STARTUP
Save config?
```

Press ◁ to exit from STARTUP menu:

```
R:    0    S:    0
STARTUP
```

10
Speed setting
[Speed profile]

AVyL drive allows to set a Speed profile through 8 different speed point:
“Multi speed 0” ... “Multi speed 7”

```
R:      S:
STARTUP
```

▽

```
R:      S:
TRAVEL
```

Enter

```
TRAVEL
Speed profile
```

Enter

```
Smooth start spd
      0 rpm
```

▽

```
Multi speed 0
      0 rpm
```

Press Enter to set “Multi speed 0” set point:

```
Multi speed 0
+0000000 rpm
```

Edit the value requested by the system and press Enter to confirm.

Scroll ▽ to set “Multi speed 1” set point:

Multi speed 1
0 rpm

Press Enter and repeat the procedure as for "Multi speed 0". Scroll ▽ to set all the others Multi speed required by the system.

ATTENTION ! Through the combination of "Mlt spd s0 src" (equal Digital input 4), "Mlt spd s1 src" (equal Digital input 5) and "Mlt spd s2 src" (equal Digital input 6), is possible to select Multi speed desired, according to next table:

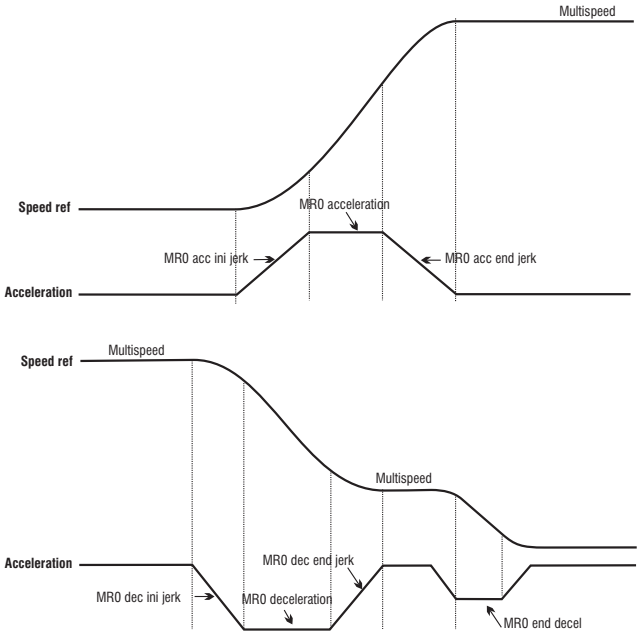
Mtl spd sel 2 src	Mtl spd sel 1 src	Mtl spd sel 0 src	ACTIVE SPEED
0	0	0	Multi speed 0
0	0	1	Multi speed 1
0	1	0	Multi speed 2
0	1	1	Multi speed 3
1	0	0	Multi speed 4
1	0	1	Multi speed 5
1	1	0	Multi speed 6
1	1	1	Multi speed 7

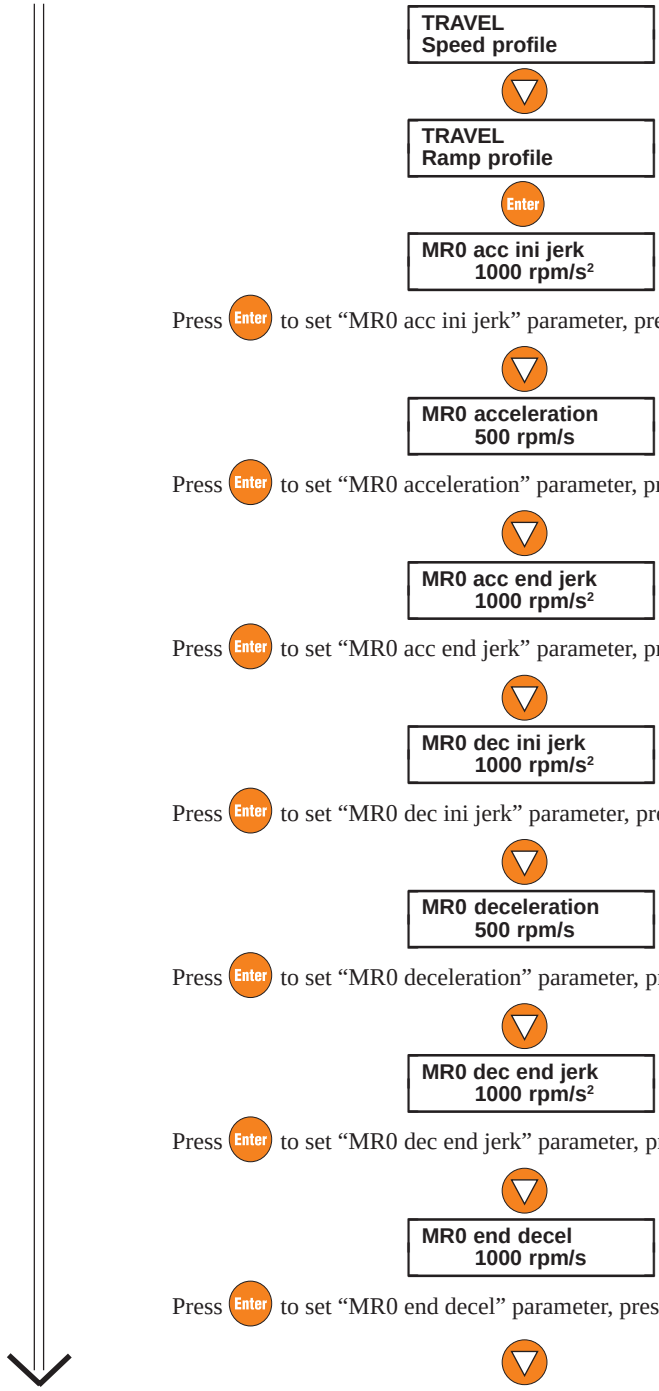
TAV3i011

11
Ramp setting
[Ramp profile]

Press ◁ to exit from Speed profile menu.

AVyL drive allows to set a Ramp profile as the picture shows below:




TRAVEL
Speed profile
TRAVEL
Ramp profile
Enter
MR0 acc ini jerk
1000 rpm/s²
Press Enter to set “MR0 acc ini jerk” parameter, press Enter to confirm:
MR0 acceleration
500 rpm/s
Press Enter to set “MR0 acceleration” parameter, press Enter to confirm:
MR0 acc end jerk
1000 rpm/s²
Press Enter to set “MR0 acc end jerk” parameter, press Enter to confirm:
MR0 dec ini jerk
1000 rpm/s²
Press Enter to set “MR0 dec ini jerk” parameter, press Enter to confirm.
MR0 deceleration
500 rpm/s
Press Enter to set “MR0 deceleration” parameter, press Enter to confirm.
MR0 dec end jerk
1000 rpm/s²
Press Enter to set “MR0 dec end jerk” parameter, press Enter to confirm.
MR0 end decel
1000 rpm/s
Press Enter to set “MR0 end decel” parameter, press Enter to confirm.

12

Encoder phasing
[Autophase]

Required only if encoder / motor are not aligned in factory !

TRAVEL **Ramp profile**

Press ▽ 9 times to open the saving procedure

TRAVEL **SAVE PARAMETERS**

Press Enter to execute the procedure:

Busy **Please wait ...**

to

TRAVEL **SAVE PARAMETERS**

◁

Press Shift + Enter.

R:	**0**	**S:**	**0**
MONITOR			

Now the drive is set with commands for standard sequence.

△

R:	**0**	**S:**	**0**
SERVICE			

Enter.

SERVICE **Insert password**

Press Enter twice.

Insert password +00000

the last digit will blinking

Enter

Insert password **+12345**

Insert the "**12345**" password and press Enter

Insert password **+00000**

Press ◁ twice

R:	**0**	**S:**	**0**
SERVICE			

Press ▽ four times.

R: 0 S: 0
REGULATION PARAM

Enter

Press ▽ four times.

REGULATION PARAM
Flux config

Enter

Flux config
Magnetiz config

Enter

Now it is possible to select two different modes of phasing procedure: rotation (brake opened) or still (brake closed)

Autophase rot
Start ?

or ▽

Autophase still
Start ?

Switch on the output contactors and press Enter.

Autophase
Waiting start ...

When the drive will display “Waiting start ...”, give Enable and Start commands, then wait until the end of phasing procedure.

Autotune
End

When the drive will display “Autotune End”, close the brake, remove the Enable and Start commands, switch off the output contactors.

Press ◁ three times.

REGULATION PARAM
Flux config

Press ▽ twice

REGULATION PARAM
SAVE PARAMETERS

13
Save all changes

Press Enter to save the changes.

NOTE:

External contactor control
It is possible to delegate output contactor control to external devices like PLC etc. In this case it must be ensured that contactor is closed prior drive enable and is open only after drive disable signal has been issued. Contactor mechanical opening and closing times must be taken into consideration.

External brake control
Also brake control can be accomplished by an external means. In this case, brake can be opened only when Drive ready signal is asserted. Brake must be closed after Start fwd/rev command is removed and Ref is zero or Ref is zero dly signal programmed on digital output becomes active. In FOC and BRS modes it is possible to refer to Ref is zero dly signal and adjust with parameter **Spd 0 ref delay** time for signal activation when motor has come to a complete stop, such that stopping shock is avoided. In case of SLS and VF control since it is not possible to guarantee required torque at low frequencies it is better to refer to signal Ref is zero. Threshold for signal activation can be set by parameter **Spd 0 ref thr.** Brake opening time and closing time must also be considered.

When output contactor or brake are not controlled by the drive it is possible to set corresponding delay times to zero and implement required delay intervals in external control.

Contactor & Brake drive control
Standard command sequence diagram shows most complete sequence in which output contactor and brake are controlled by the drive.

Start of contactor control sequence in case that contactor is controlled by the drive depends on parameter **Seq start mode**. In case that it is set as Start fwd/rev contactor is closed when asserting the Start fwd or Start rev command. Enable command is not required for closing contactors! It is required only to start sequence of motor magnetization and therefore it can be provided for example using auxiliary contact of output contactor. Drive will wait until Enable command is given. In case that selection Enable is made contactors sequence starts when Enable command is asserted.
Start fwd/rew commands are not required and one of them must be connected to 24V or more easily set corresponding source to ONE. Since Start command is not used, zero speed in this configuration must be obtained through multi speed selection. Change of direction must be accomplished by multi speed selection where some parameters are set to negative values or through **Ramp ref inv src** parameter pointing to an digital input controlling direction.
In case that selection **Seq start mode** = Mlt spd out!=0 is made, sequence is started by selecting any multispeed value different from zero. When output of multispeed selection is zero, it is equivalent to a stop command.

Start fwd/rev commands are not required and for their management is valid what is written for selection Enable .
In general, direction is controlled by Start fwd/rew commands, but if preferred only one of these commands can be used and delegate direction control to a simple multispeed selection. Another possibility is to use digital input controlling parameter **Ramp ref inv src**.

Figure 8.1: Standard Commands Sequence

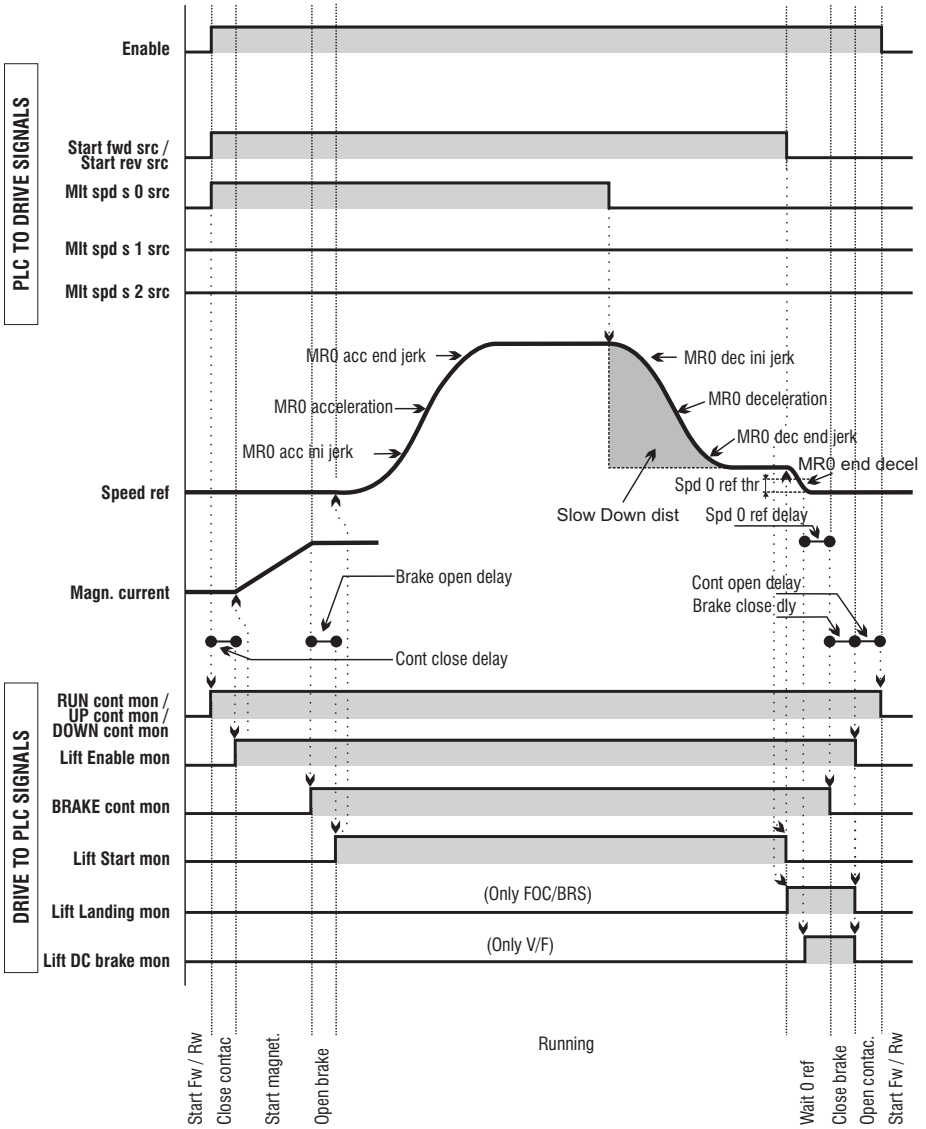


Figure 8.2: Detail Starting

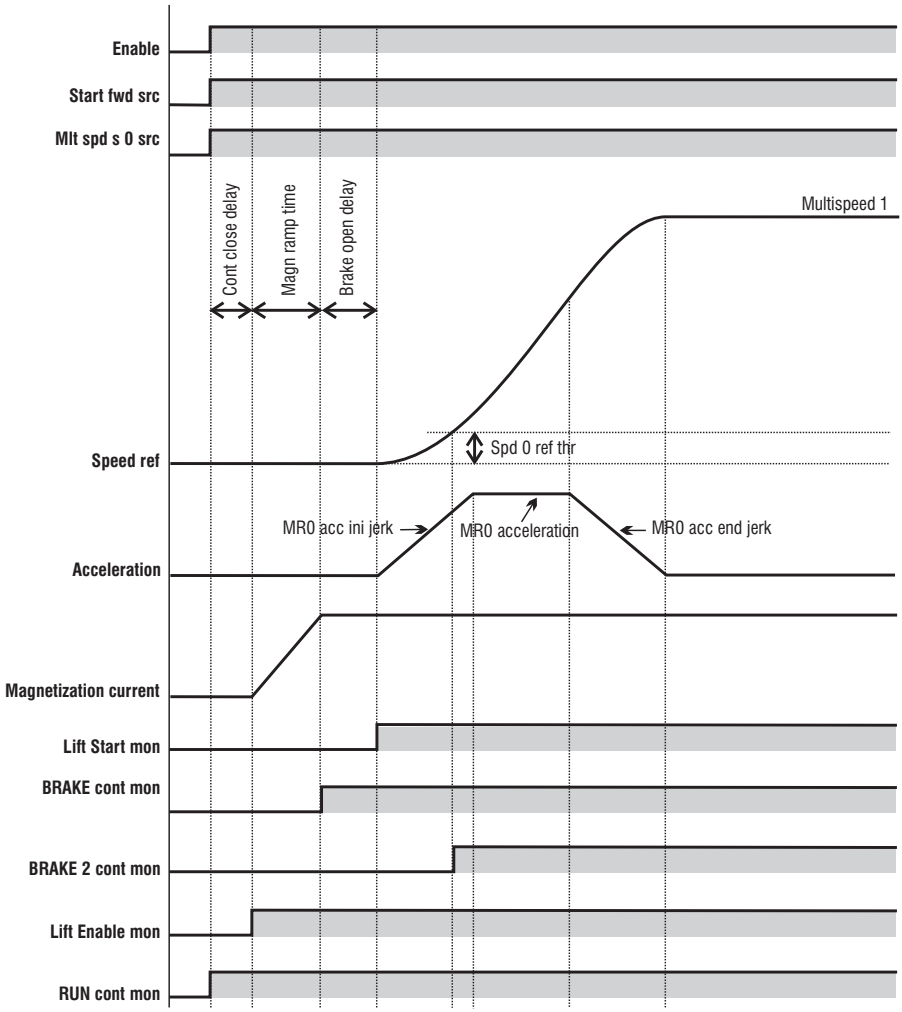


Figure 8.3: Detail Stopping

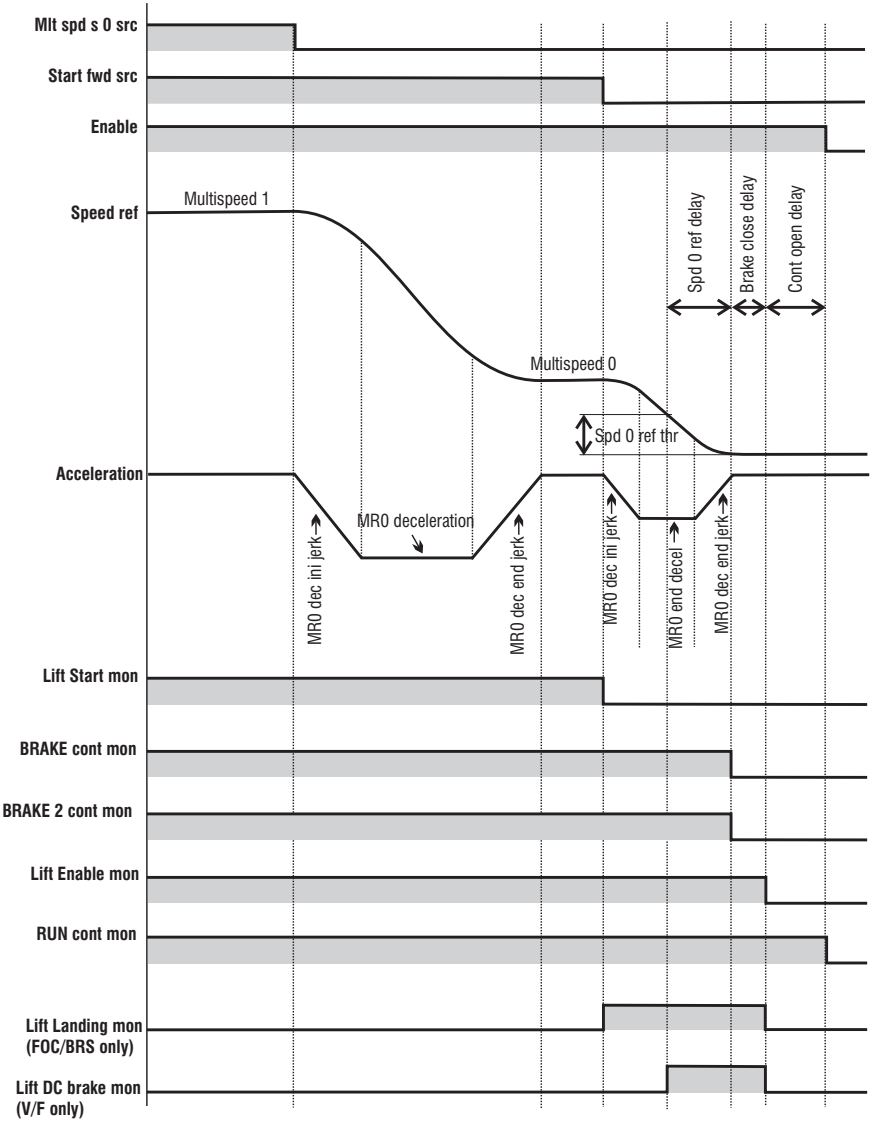
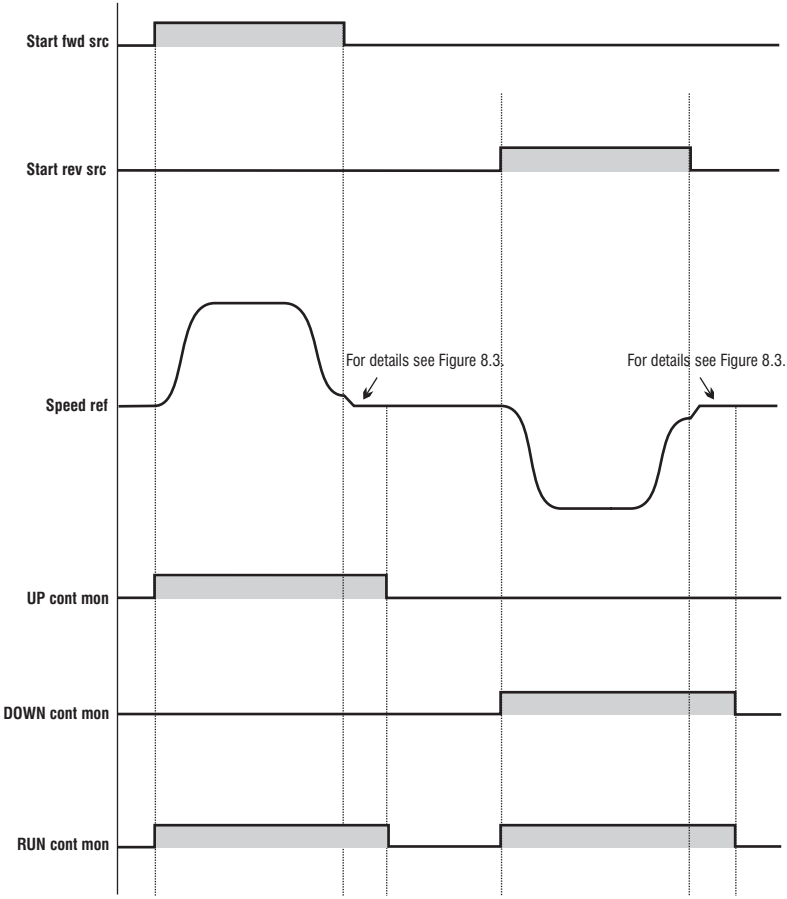
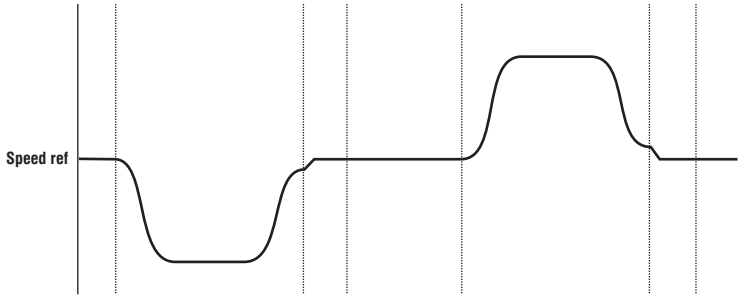


Figure 8.4: Relation between Direction Commands and Contactor Control Signals



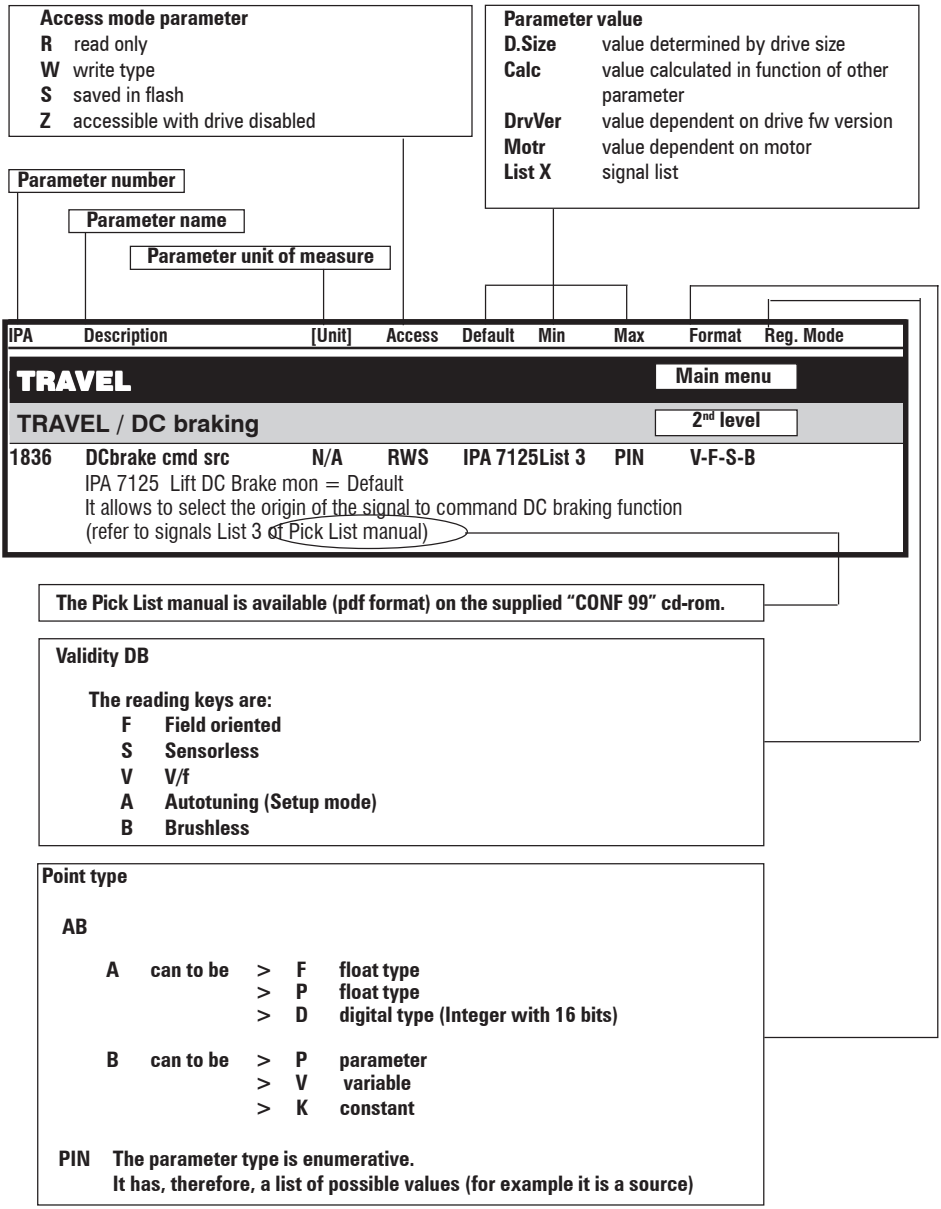
NOTE! To invert the sign of Speed ref corresponding to Start fwd and Start rev commands set parameter in TRAVEL \ Ramp rev inv src = UP cont mon.



NOTE:

Chapter 9 - Parameter

9.1 Parameter Legend



IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode

MONITOR

This menu displays a series of variables useful to check the Drive state. The variable function is clearly explained by the variable name.

Monitor

3060	**Output voltage** Voltage on the drive output terminals	**[V]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**V-F-S-B**
3070	**Output current** Current on the drive output terminals	**[A]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**V-F-S-B**
3080	**Output frequency** Drive output frequency	**[Hz]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**V-F-S-B**
3090	**Output power** Drive output power. **UNIT**: **[kW]** for AVy ... AC/AC4, **[kVA]** for AVy ... BR/BR4.		**R**	**0.00**	**0.00**	**0.00**	**PV**	**V-F-S-B**
9405	**Norm Speed** Speed of the motor	**[rpm]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**V-F-S-B**
3210	**Speed ref** Drive speed reference	**[rpm]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**V-F-S-B**
3200	**Ramp ref** Drive ramp reference	**[rpm]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**V-F-S-B**
162	**Enable SM mon** It shows the drive Enable state	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
163	**Start SM mon** It shows the drive Start state 0 OFF 1 ON	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
164	**FastStop SM mon** It shows the drive FastStop state 0 OFF 1 ON	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**

MONITOR / I/O status

4028	**DI 7654321E** Standard digital inputs status, from 0 to 7; E (Enable) = Digital Input 0	**N/A**	**R**	**0**	**0**	**1**	**DP**	**V-F-S-B**
4064	**DO 3210** Standard digital outputs status, from 0 to 3	**N/A**	**R**	**0**	**0**	**1**	**DP**	**V-F-S-B**
4057	**DIX BA9876543210** Expanded digital inputs status, from 0 to 11; A = Digital InputX 10, B = Digital InputX 11 (X suffix means expanded)	**N/A**	**R**	**0**	**0**	**1**	**DP**	**V-F-S-B**
4078	**DOX 76543210** Expanded digital outputs status, from 0 to 7 (X suffix means expanded)	**N/A**	**R**	**0**	**0**	**1**	**DP**	**V-F-S-B**

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
MONITOR / Advanced Status								
3100	**DC link voltage** Drive DC link voltage	**[V]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**V-F-S-B**
3110	**Magnetizing curr** Drive magnetizing current	**[A]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**V-F-S-B**
3120	**Torque curr** Drive torque current	**[A]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**V-F-S-B**
3130	**Magn curr ref** Drive magnetizing current reference	**[A]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**F-S-B**
3140	**Torque curr ref** Drive torque current reference	**[A]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**F-S-B**
3180	**Flux ref** Drive flux reference	**[Wb]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**F-S-B**
3190	**Flux** Drive flux	**[Wb]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**F-S-B**
1670	**Mot OL accum %** Motor I2t overload accumulator. When 100% is reached Mot overload alarm is generated and output inverter current is reduced to motor continuous current	**[%]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**V-F-S-B**
1781	**BU OL accum %** Braking Unit I2t overload accumulator. When 100% is reached BU overload alarm is generated.	**[%]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**V-F-S-B**
1540	**Drv OL accum %** Drive Unit I2t overload accumulator. When 100% is reached Drv overload alarm is generated and output inverter current is reduced to drive continuous current. .	**[%]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**V-F-S-B**
3222	**Norm Std enc spd[rpm]** Encoder speed of standard feedback (connector "XE"on RV33 regulation board)	**R**	**0.00**	**0.00**	**0.00**	**PV**	**V-F-S-B**	
3223	**Norm Exp enc spd** Encoder speed of expanded feedback (encoder connector on expansion optional boards)	**[rpm]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**V-F-S-B**
9553	**Std enc position** Raw accumulated encoder pulses of the standard encoder, measured in ppr x 4	**[cnt]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**F-B**
9554	**Exp enc position** Raw accumulated encoder pulses of the expanded encoder, measured in ppr x 4	**[cnt]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**F-B**
9555	**Std sin enc mod** Module of "A" and "B" trace of sinusoidal encoder on std port. Encoder peak voltage is constantly monitored and the alarm Speed feedback loss is generated if it is outside the range: min=IPA 1902/5, max=IPA 1902 * 2.	**[cnt]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**F-B**
9072	**HT sensor temp** Drive Heatsink temperature	**[°C]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**V-F-S-B**
9073	**RG sensor temp** Temperature on the regulation card RV33	**[°C]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**V-F-S-B**
9095	**IA sensor temp** Temperature of the heatsink incoming air temperature (available from 18.5kW up to 160kW)	**[°C]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**V-F-S-B**
9090	**Sequencer status** Sequencer status of drive State Machine. It controls the drive running and starting, accounting for protection & alarming, command sequence, and reset status.	**N/A**	**R**	**0.00**	**0.00**	**- - -**	**DV**	**V-F-S-B**

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
	State Sequencer status							
	1 Magnetization running							
	2 Magnetization completed, Stop							
	3 Start							
	4 Fast stop, Stop							
	5 Fast stop, Start							
	9 No alarm, drive is ready to accept all commands							
	10 Magnetization running and Start command already present							
	12 Alarm active							
	16 Alarm not active, waiting for reset							
3230	**CPU1 runtime**	**[%]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**V-F-S-B**
	Time needed by the CPU1 (microprocessor)							
3240	**CPU2 runtime**	**[%]**	**R**	**0.00**	**0.00**	**0.00**	**PP**	**V-F-S-B**
	Time needed by the CPU2 (microprocessor)							

MONITOR - Drive ID Status

1460	**Drive cont curr**	**[A]**	**RW**	**CALC**	**0.00**	**0.00**	**FK**	**V-F-S-B**
	Drive maximum continuos current rating; its default value depends by the drive size and applicable derating factors.							
114	**Drive size**	**N/A**	**R**	**D.Size**	**0**	**20**	**DK**	**V-F-S-B**
	Drive size rating in kW (ULN = 400VAC, IEC 146 Class 1) of Hp (ULN = 460VAC, IEC 146 Class 2):							
	0 0.75 kW - 0.75 Hp							
	1 1.5 kW -1.5 Hp							
	2 2.2 kW - 2.0 Hp							
	3 3.0 kW - 3.0 Hp							
	4 4.0 kW - 5.0 Hp							
	5 5.5 kW - 7.5 Hp							
	6 7.5 kW - 10 Hp							
	7 11 kW - 15 Hp							
	8 15 kW - 20 Hp							
	9 22 kW - 25 Hp							
	10 30 kW - 30 Hp							
	11 37 kW - 40 Hp							
	12 45 kW - 50 Hp							
	13 55 kW - 60 Hp							
	14 75 kW - 75 Hp							
	15 90 kW - 100 Hp							
	16 110 kW - 125 Hp							
	17 132 kW - 150 Hp							
	18 160 kW - 200 Hp							
	19 250 kW - 300 Hp							
	20 315 kW - 450 Hp							
	21 18.5kW - 22.5 Hp							
300	**Drive type**	**N/A**	**R**	**288**	**0**	**0**	**DK**	**V-F-S-B**
	288 460V default settings for AVy ... AC/AC4							
	289 460V default settings for AVy ... BR/BR4							
	34 400V default settings for AVy ... AC/AC4							
	35 400V default settings for AVy ... BR/BR4							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
115	**Drive name**	**N/A**	**RWS**	**0.00**	**0.00**	**0.00**	**FK**	**V-F-S-B**
	ACDRV	asynchronous firmware						
	ACDRVM	brushless drive firmware						
810	**Actual setup**	**N/A**	**R**	**0**	**0**	**0**	**DK**	**V-F-S-B**
	Setup motor file in use (reserved)							
107	**Software version**							
	Drive software version (factory installed), example: V 3. 0. 0							
110	**Software type**	**N/A**	**R**	**DrvVer**	**0**	**0**	**DV**	**V-F-S-B**
	Software type factory use							
111	**Software status**	**N/A**	**R**	**DrvVer**	**0**	**0**	**DV**	**V-F-S-B**
	Software state factory use							
99	**Life time**	**[hrs]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**V-F-S-B**
	Drive life time accumulated with power on							
98	**Sys time-ddmmyy**	**[h/m/s]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**V-F-S-B**
	Time and date setting from PC configurator or serial communications. Clock is active only when the Drive is powered on							
	NOTE! On a new regulation card the variable takes value: 00:00:00 (time) 010170 (date)							

MONITOR / Alarm log

This function provides a list of last 30 drive trips or various system error messages. Together with cause indications also time and data infornations is provided. Alarm log message is referred to “Sys time - dd mm yy” variable.

Example:
01:02:36 01 02 00
Undervoltage

01:02:36	time of alarm
02 02 00	date of alarm
Undervoltage	alarm description

MONITOR / Alarm log clear?

It deletes all the alarms listed in the Alarm log.

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode

STARTUP

STARTUP / Startup config / Enter setup mode

Enter setup mode command allows the access to SETUP MODE to set drive basic parameters and motor plate data. Drive will reboot and few seconds are required. All changes and operations done in the SETUP MODE will be automatically saved, every time the user executes exits setup mode.

SETUP MODE / Drive data

380 **Mains voltage** **[V]** **RW** **2** **0** **5** **DK** **V-F-S-B**

Drive power supply voltage. Select supply voltage parameter accurately, according to actual drive supply voltage. After changing this parameter, selftune data are initialized to default, self-tuning must be repeated !

0 230 V
1 380 V
2 400 V
3 415 V
4 440 V
5 460 V

1350 **Ambient temp** **[°C]** **RW** **0** **0** **1** **DK** **V-F-S-B**

Drive ambient temperature. Selecting 50°C will result in drive derating, see chapter 2.3. After changing this parameter selftune data are initialized to default, self-tuning must be repeated !

0 40°C
1 50°C

170 **Switching freq** **[kHz]** **RW** **D.Size** **0** **3** **DK** **V-F-S-B**

Drive PWM switching frequency. Selecting higher switching frequency then default, results in drive derating, see table 2.3.4.1. Selecting lower value results in higher continuous output current.
After changing this parameter, selftune data are initialized to default, self-tuning must be repeated !

0 2 kHz
1 4 kHz
2 8 kHz
3 16 kHz
4 12 kHz

1880 **Spd ref/fbk res** **[rpm]** **RW** **1** **0** **5** **DK** **V-F-S-B**

Resolution of the speed references referred to the maximum process speed (1885. “Full scale speed” parameter). After changing this parameter, selftune data are initialized to default, self-tuning must be repeated !

0 0.125 rpm -> 2048 rpm maximum process speed
1 0.250 rpm -> 4096 rpm maximum process speed
2 0.500 rpm -> 8192 rpm maximum process speed
3 1.000 rpm -> 16384 rpm maximum process speed
4 0.03125 rpm -> 512 rpm maximum process speed

SETUP MODE / Motor data *(for AVy . AC series)*

670 **Rated voltage** **[V]** **RW** **D.Size** **Calc** **Calc** **FK** **V-F-S-B**

Motor rated voltage

680 **Rated frequency** **[Hz]** **RW** **D.Size** **Calc** **Calc** **FK** **V-F-S**

Motor rated frequency

690 **Rated current** **[A]** **RW** **D.Size** **Calc** **Calc** **FK** **V-F-S-B**

Motor rated current

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
	Note! The value should be not less then approx 0.3 times the drive rated current (output current Class 1 @ 400V on the motor nameplate).							
700	**Rated speed**	**[rpm]**	**RW**	**D.Size**	**Calc**	**Calc**	**FK**	**V-F-S-B**
	Motor full load speed at the rated frequency. If Slip is available on the motor nameplate data, set "Rated speed" parameter as following: Rated speed = Synchronous speed - Slip							
710	**Rated power**	**[kW]**	**RW**	**D.Size**	**Calc**	**Calc**	**FK**	**V-F-S**
	Motor rated power ***Note!*** For a motor nameplate rated in Hp, set Rated power kW = motor Hp rating * 0.736							
720	**Cosfi**	**N/A**	**RW**	**D.Size**	**Calc**	**Calc**	**FK**	**V-F-S**
	Motor rated power factor							
730	**Efficiency**	**N/A**	**RW**	**D.Size**	**Calc**	**Calc**	**FK**	**V-F-S**
	Motor Efficiency (if not available, leave the default data)							

Load default mot

It selects and loads the motor standard parameters:

0 Standard 400V

1 Standard 460V

Note! By selecting one of the two options, the motor standard parameters with 400V (or 460V) are loaded making reference to the used Drive size. Through this process, motor data is overwritten.

SETUP MODE / Motor data *(for AVy . BR series)*

670	**Rated voltage**	**[V]**	**RW**	**D.Size**	**Calc**	**Calc**	**FK**	**V-F-S-B**
	Motor rated voltage							
690	**Rated current**	**[A]**	**RW**	**D.Size**	**Calc**	**Calc**	**FK**	**V-F-S-B**
	Motor rated current ***Note!*** The value should be not less then approx 0.3 times the drive rated current (output current Class 1 @ 400V on the drive nameplate).							
700	**Rated speed**	**[rpm]**	**RW**	**D.Size**	**Calc**	**Calc**	**FK**	**V-F-S-B**
	Motor synchronous speed							
930	**Pole pairs**	**N/A**	**RW**	**4.0**	**0.0**	**0.0**	**FK**	**B**
	Must be integer number.							
990	**Torque constant**	**[Nm/A]**	**RW**	**D.Size**	**0.0**	**0.0**	**FK**	**B**
	Motor torque costant. This parameter is usually stated by the motor manufacturer. If not, it can be calculated from motor rated power, speed and current as: $\text{Torque Constant} = \frac{\text{P [W]}}{2\pi \,.\, \frac{\text{S [rpm]}}{60} \,.\, \text{I [A]}}$ Current in torque constant unit [Nm/A is RMS current.							
775	**EMF constant**	**[V.s]**	**RW**	**D.Size**	**0.0**	**0.0**	**FK**	**B**
	If the number is unknown, set the parameter to zero: the drive will automatically calculate an approximate value.							
970	**Stator resistance**	**[ohm]**	**RW**	**D.Size**	**0.0**	**0.0**	**FK**	**B**
	Motor stator resistance value.							
980	**LsS inductance**	**[H]**	**RW**	**D.Size**	**0.0**	**0.0**	**FK**	**B**
	Motor stator inductance value							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode

Note! If "EMF costant", "Stator resistance" and "LsSinductance" values are unknown, set them to zero before running the current self-tuning procedure.

Load default mot

It selects and loads the motor standard parameters:

0 Set 0

1 Set 1

Note! By this selection, the motor standard parameters with "Set 1" (or "Set 2") are loaded making reference to the used Drive size. Through this process, motor data is overwritten.

SETUP MODE / Autotune

Complete still ***(for AVy . AC series)***

Complete self-tuning of current and flux loop with a **stopped** rotor

"Start ?" enable data detection command (12 drive terminal must be cycle to +24Vdc)

Complete rot ***(for AVy . AC series)***

Complete self -tuning of current and flux loop with a **moving** rotor

"Start ?" enable data detection command (12 drive terminal must be cycle to +24Vdc)

CurrReg ***(for AVy . AC and BR series)***

Self-tuning of current loop only with stopped motor

"Start ?" enable data detection command (12 drive terminal must be cycle to +24Vdc)

FluxReg rot ***(for AVy . AC series)***

Self-tuning of flux loop with a **moving** rotor only

"Start ?" enable data detection command (12 drive terminal must be cycle to +24Vdc)

FluxReg still ***(for AVy . AC series)***

Self-tuning of flux loop with a **stopped** rotor only

"Start ?" enable data detection command (12 drive terminal must be cycle to +24Vdc)

SETUP MODE / Autotune / Results

2780	**Measured Rs**	**[ohm]**	**RW**	**Calc**	**Calc**	**Calc**	**FK**	**V-F-S-B**
	Value of the phase resistance detected on the stator of the motor							
2790	**Measured DTL**	**[V]**	**RW**	**Calc**	**0**	**Calc**	**FK**	**V-F-S-B**
	IGBT dead time limit							
2800	**Measured DTS**	**[ohm]**	**RW**	**Calc**	**0**	**Calc**	**FK**	**V-F-S-B**
	IGBT dead time slope							
2810	**Measured LsSigma**	**[H]**	**RW**	**Calc**	**Calc**	**Calc**	**FK**	**V-F-S-B**
	Value of inductance detected on the stator of the motor							
2820	**Measured Rr**	**[ohm]**	**RW**	**Calc**	**Calc**	**Calc**	**FK**	**V-F-S**
	Value of resistance detected on the rotor of the motor							
2830	**Measured Rr2**	**[ohm]**	**RW**	**Calc**	**Calc**	**Calc**	**FK**	**V-F-S**
	Value of resistance 2 detected on the rotor of the motor							
2840	**Measured P1 flux**	**N/A**	**RW**	**Calc**	**0.00**	**1.000**	**FK**	**V-F-S**
	P1 coefficient of the Flux curve measured							
2850	**Measured P2 flux**	**N/A**	**RW**	**Calc**	**3**	**18**	**FK**	**V-F-S**
	P2 coefficient of the Flux curve measured							
2860	**Measured P3 flux**	**N/A**	**RW**	**Calc**	**0.00**	**1.00**	**FK**	**V-F-S**
	P3 coefficient of the Flux curve measured							
2870	**Measured Im Nom**	**[A]**	**RW**	**Calc**	**0.00**	**0.00**	**FK**	**V-F-S**
	Value of the rated magnetizing current							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
2880	**Measured Im Max**	**[A]**	**RW**	**Calc**	**0.00**	**0.00**	**FK**	**V-F-S**
	Value of the maximum magnetizing current							
2890	**Measured Flux Nom**	**[Wb]**	**RW**	**Calc**	**0.00**	**0.00**	**FK**	**V-F-S**
	Value of the rated Flux							
2900	**Measured Flux Max**	**[Wb]**	**RW**	**Calc**	**0.00**	**0.00**	**FK**	**V-F-S**
	Value of the maximumFlux							

STARTUP / Startup config / Load setup

Load setup

Load setup command is required to load all SETUP MODE settings into the regulation mode selected. Entering this parameter, on the display will appear:

Load setup?
Yes -> Ent No -> Esc

- Press Enter to load the SETUP MODE settings.
- Press Escape if you do not want to load the SETUP MODE settings

NOTE! The operation is required for every Regulation mode (V, F, S and B)
It is also required for every new setting made in the SETUP MODE.

If any changes / settings in **Motor data** and **Drive data** are detected, Load setup command is presented automatically to the user, respond Yes to load data.

STARTUP / Startup config / Mechanical data

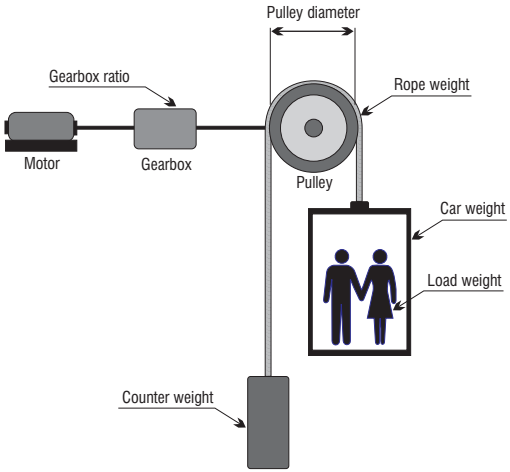
1015	**Travel units sel**	**N/A**	**RWZ**	**0**	**0**	**1**	**DK**	**V-F-S-B**
	0 Revolutions							
	1 Millimeters							
	It determines the units of “TRAVEL / Speed profile” and “TRAVEL / Ramp profile” menu parameters: Revolutions = rpm, rpm/s and rpm/s^2 - Millimeters = mm/s, mm/s^2 and mm/s^3							
1002	**Gearbox ratio**	**N/A**	**RWZ**	**35**	**1**	**100**	**FK**	**V-F-S-B**
	Ratio between motor shaft speed and pulley speed. Eventual roping ratio must also be included.							
1003	**Pulley diameter**	**[mm]**	**RWZ**	**500**	**100**	**2000**	**FK**	**V-F-S-B**
	Diameter of the pulley							
1885	**Full scale speed**	**[rpm]**	**RW**	**1500**	**Calc**	**Calc**	**PV**	**V-F-S-B**
	It defines the 100% of the application speed referenced. The absolute speed handling range is ± 200% Full scale speed. For lift application set this parameter to maximum allowed motor speed, typically rated speed of the motor. This parameter will also set the limit on all multispeed values IPA 7060 - 7067.							

STARTUP / Startup config / Weights

1004	**Car weight**	**[kg]**	**RWZ**	**0.00**	**0.00**	**0.00**	**FK**	**V-F-S-B**
	Weight of the Lift car							
1005	**Counter weight**	**[kg]**	**RWZ**	**0.00**	**0.00**	**0.00**	**FK**	**V-F-S-B**
	Weight of the counter mass to achieve balanced system							
1006	**Load weight**	**[kg]**	**RWZ**	**0.00**	**0.00**	**0.00**	**FK**	**V-F-S-B**
	Maximum weight of Lift load (total persons weight)							
1007	**Rope weight**	**[kg]**	**RWZ**	**0.00**	**0.00**	**0.00**	**FK**	**V-F-S-B**
	Total weight of Rope							
1011	**Motor inertia**	**[kgm^2]**	**RWZ**	**0.000**	**0.000**	**0.000**	**FK**	**V-F-S-B**
	Inertia of the motor, refer to motor manufacturer (if it is not available, leave to default)							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
1012	**Gearbox inertia**	**[kgm²]**	**RWZ**	**0.000**	**0.000**	**0.000**	**FK**	**V-F-S-B**

Inertia of the gearbox, refer to manufacturer (if it is not available, leave to default).
Can be set here the inertia of all mechanical parts at slow side of gearbox (ex. pulley, etc...)



STARTUP / Startup config / Landing zone

9411	**Landing control**	**N/A**	**RWZ**	**0**	**0**	**1**	**DP**	**F-B**

0 Disabled
1 Enabled
Enable/Disable of accurate position control in landing zone

9419	**Landing init src**	**N/A**	**RWSZ**	**IPA 7124**		**List 3**	**PIN**	**F-B**

IPA 7124 Lift Landing mon = Default
It allows to select the signal to initialize the close loop position control in the Landing Zone
(leave to default if landing should be managed by internal lift control sequence;
refer to signals List 3 of Pick List manual))

9412	**Landing distance**	**[mm]**	**RWZ**	**100**	**10**	**1000**	**PP**	**F-B**

Total distance between landing zone signal and floor position. Higher value allows faster positioning.

9420	**Landing ratio**	**[%]**	**RWZ**	**50**	**0**	**90**	**PP**	**F-B**

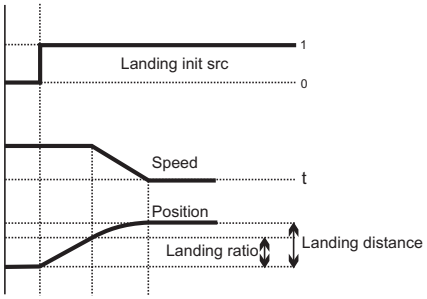
Percentage of landing distance during which car runs at constant speed

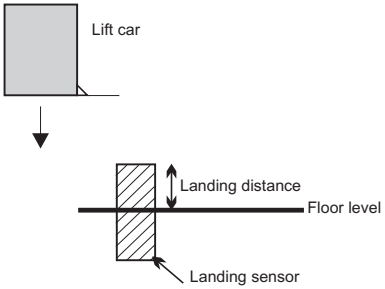
9417	**Pos P gain**	**[%]**	**RWZ**	**1**	**0**	**100**	**PP**	**F-B**

Proportional gain of position regulator

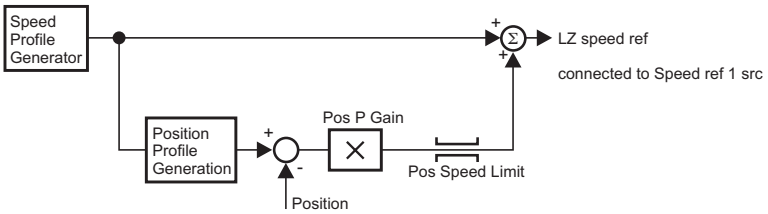
IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
9410	**Pos speed limit**	**[rpm]**	**RWZ**	**200**	**0**	**Calc**	**PP**	**F-B**

Maximum speed allowed to use by position controller





Landing sensor output can be interfaced to the drive through digital input which can become command to initialize landing control.



STARTUP / Startup config / Encoders config

1940	**Speed fbk sel**	**N/A**	**RW**	**0**	**0**	**1**	**DV**	**V-F-B**

0 Std encoder
1 Exp encoder

It allows to switch the feedback between the encoder standard port “XE” (on RV33 regulation card) and the encoder expanded (from encoder optional cards: EXP-F2E and EXP-D14A4F)

Note! Expansion encoder cannot be used for speed feedback in Brushless mode. It can be used only for setting speed reference.

1925	**Std enc type**	**N/A**	**RWZ**		**0**	**12**	**DK**	**V-F-B**

Encoder type connected to the standard input. **Default**: **1** for AVy ... AC/AC4, **4** for AVy ... BR/BR4

Set allowed for AVy ... AC/AC4:

0	Sinusoidal	sinusoidal encoder, select the correct jumper settings on the reg. card, RV33
1	Digital	digital encoder
2	Frequency input	digital single channel frequency input: channel A. Signal +5V must be connected between A and power supply common.

Set allowed for AVy ... BR/BR4:

3	Sinusoidal Hall	sinusoidal incremental encoder with A+ / A-, B+ / B-, C+ /C traces and three digital “Hall sensor” absolute position traces for initial synchronisation (factory setting)
4	Sinusoidal SinCos	sinusoidal incremental encoder with A+ / A-, B+ / B-, C+ /C- traces and two Sin/Cos absolute position traces for initial synchronisation
5	Sinusoidal Extern	sinusoidal incremental encoder with A+ / A-, B+ / B- traces and

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
	absolute position information through SSI serial interface for initial synchronisation (requires APC card)							
	6 Digital Hall	digital incremental encoder with A+ / A-, B+ / B-, C+ / C- traces and three digital “Hall sensor” absolute position traces for initial synchronisation (factory setting)						
	7 DigitalExtern	digital incremental encoder with A+ / A-, B+ / B- traces and absolute position information through SSI serial interface for initial synchronisation (requires APC card)						
	8 SinCos	Sin / Cos absolute position traces for initial synchronisation, incremental information is not used.						
	9 Resolver	resolver using option cards: EXP-RES (refer its manual for jumpers 0 configurations)						
	10 Sinusoidal Hiperface	absolute encoder with Hiperface protocol *(from software rel. 3.300)*						
	11 Sinusoidal Intern	sinusoidal incremental encoder with A+/A-,B+/B-, C+/C- traces, absolute position traces are not necessary because phasing is performed automatically at every start *(from software rel. 3.500)*						
	12 Digital Intern	digital incremental encoder with A+/A-,B+/B-, C+/C- traces, absolute position traces are not necessary because phasing is performed automatically at every start *(from software rel. 3.500)*						
1890	**Std enc pulses**	**[ppr]**	**RWZ**	**1024**	**Calc**	**Calc**	**FK**	**V-F-S-B**
	Encoder pulses per revolution (ppr) value of the standard input. For brushless motors it is possible to use only the following values: 512, 1024, 2048, 4096, 8192.							
1931	**Std dig enc mode**	**N/A**	**RWZ**	**0**	**0**	**1**	**DP**	**V-F-S-B**
	0 FP mode frequency and period measuring							
	1 F mode frequency measuring							
	Measuring method of the digital encoder speed connected to the standard input							
1927	**Std enc supply**	**N/A**	**RWZ**	**0**	**0**	**3**	**DP**	**V-F-S-B**
	0 5.41 / 8.16 V							
	1 5.68 / 8.62 V							
	2 5.91 / 9.00 V							
	3 6.16 / 9.46 V							
	Selection between 5V / 8V range is done through dip-switch S28. Power supply voltage of the standard Encoder input. Increse this value in case of long encoder cable.							
1902	**Std sin enc Vp**	**[V]**	**RW**	**0.5**	**0**	**1.5**	**FK**	**V-F-B**
	Peak voltage value of the sinusoidal encoder connected to the standard input							
1300	**Std enc cnt dir**	**N/A**	**RWSZ**	**0**	**0**	**1**	**DP**	**V-F-S-B**
	0 Not inverted							
	1 Inverted							
	Selection of standard encoder counting direction. It allows to change sign of measured speed, it is equivalent of swaping encoder channels AA- <-> BB-.							
1926	**Exp enc type**	**N/A**	**RW**	**1**	**1**	**2**	**DK**	**V-F-B**
	Encoder type connected to the expanded input							
	1 Digital	digital encoder						
	2 Frequency input	digital single channel frequency input: channel A. Signal +5V must be connected between A and power supply common.						
	NOTE! For brushless motors expanded encoder cannot be used for speed feddback. It can be used only for setting speed reference.							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
1900	**Exp enc pulses**	**[ppr]**	**RWZ**	**1024**	**Calc**	**Calc**	**FK**	**V-F-B**

Encoder pulses per revolution (ppr) value of the expanded input.

1301 **Exp enc cnt dir** **N/A** **RWSZ** **0** **0** **1** **DP** **V-F-B**

0 Not inverted
1 Inverted

Selection of expansion encoder counting direction. It allows to change sign of measured speed, it is equivalent of swaping encoder channels AA- <-> BB-.

STARTUP / Startup config / Encoders config / Rep/Sim encoder

1962 **Rep/Sim enc sel** **N/A** **RWZ** **0** **0** **1** **DK** **V-F**

Selection of the encoder to be repeated using the optional card EXP-F2E.

0	Repeat std enc	repeat standard encoder
1	Repeat exp enc	repeat expanded encoder
2	Simulate std	simulate digital incremental encoder in case of SinCos or Resolver selections as feedback devices in Std enc type parameter.

1952 **Sim enc pulses** **N/A** **RWZ** **1024** **1** **Calc** **FK** **B**

Simulated encoder pulses per revolution (ppr) value (factory setting = 1024 ppr)

STARTUP / Startup config / Encoders config / Index storing

9550 **Index storing en** **N/A** **RWSZ** **0** **0** **3** **DV** **F-B**

Index storing function.

The encoder counts can be latched allowing the user to determine the position of the encoder relative to an absolute position.

0	Off	
1	Storing enabled	enables the capturing of the encoder count as described by the setting of the control word. The control word is the value of "Int IS ctrl" or the word selected by "IS ctrl src"
2	Control std enc	it constantly reads all the generated pulses on the std encoder
3	Control exp enc	it constantly reads all the generated pulses on the exp encoder

9551 **Int IS ctrl** **N/A** **RWS** **0** **0** **0X0000** **DV** **F-B**

Fixed programming at Index Storing Function according to following table.

9557 **IS ctrl src** **N/A** **RWSZ** **IPA 9551** **List 39** **PIN** **F-B**

IPA 9551 Int IS ctrl = Default
It allows to select the origin of the signal for "Index storing function" command.
For example a SBI word or DGFC word (refer to signals List 39 of Pick List manual)

NOTE! Digital inputs 6 and 7 (terminals 38 and 39) are dedicated to the use of the "Index Qualifier" (home position switch) when Index storing is enabled.

In the next table are showed the values of ***IS ctrl src*** from SBI word, DGFC word or *Int IS ctrl* if:
IS ctrl src = *Int IS ctrl*

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode

No. bit	Name	Description	Access (Read/Write)	Default
0-1	-	Not used	-	-
2	POLNLT	It indicates the encoder index edge polarity: 0= rising edge 1= falling edge	R/W	0
3	-	Not used	-	-
4-5	ENNQUAL	It sets the qualifier input state to activate the encoder index reading: =0, switched off when dig.input 7 = 0 =1, switched off when dig.input 7 = 1 =2, through signal = 0 =3, through signal = 1	W	0
6	Target Enc Num	It points out for which encoder the values of this parameter are reported: =0, operations requested on the Std Encoder input =1, operations requested on the Exp Encoder input	R/W	0
7	-	Not used	-	-
8-9	ENNLT	Control function of the encoder index reading =0, switched off, function disabled =1, once, enables the reading of the first index signal edge only. =2, continuous, enables the reading of the index signal	R/W	0

TAV13241

For the Index storing function, **the status Registers are not available via keypad** and are to be used for the configuration and the data reading. These are:
L index register IPA9556
H index register IPA9555
In the next table are showed the registers values:

Ipa	No. bit	Name	Description	Access (Read/ Write)	Default
9556	0	Source Enc Num	It indicates which encoder is used for index storing: =0, register data are referred to the Std Encoder input =1, register data are referred to the Exp Encoder input	R	0
	1	MP_IN	Actual Qualifier input value (digital input 7): =0, qualifier input level is low =1, qualifier input level is high	R	0
	2-3	STATNLT	Status of the acquisition function; as: 0=OFF 1=Once, storing is not executed yet 2=Once, storing is already executed 3=Continuous	R	0
9555	0-15	CNTNLT	Position counter value corresponding to the index. Value is only valid when STANLT is equal to 2 or 3	R	0

indexstorpar

1936 Motor pp/sens pp N/A RW Calc Calc 32 PP B

Ratio between motor pole pairs and feedback sensor pole pairs, typically used for resolver.

STARTUP / Startup config / SpdReg gain calc

2048 Calc method N/A RWZ 0 0 1 DK F-S-B

With “Calc method” two gain calculation methods can be selected:

0 Variable bandw speed regulation bandwidth is internally selected according to the principle that bandwidth is decreased as inertia is increased

1 Fixed bandw speed regulation bandwidth is specified by parameter “Bandwidth”

It allows to perform the speed regulator gain calculation. Inertia must be entered throught the “Calc Inertia” parameter or specifying parameters in Weights menu.

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
2610	**Calc Inertia**	**[kgm²]**	**RWZ**	**D.Size**	**0**	**0**	**FK**	**F-S-B**

Inertia of the load. When parameters in Weights menu have been set, the result of system inertia referred to the motor shaft is set in this parameter.

2049	**Bandwidth**	**[rad/s]**	**RWZ**	**50**	**1**	**400**	**FK**	**F-S-B**

Speed regulator bandwidth. Higher bandwidth value makes motor respond faster and overall result is more stiff control.

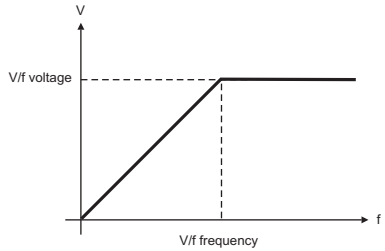
STARTUP / Startup config / V/f config

3420	**V/f voltage**	**[V]**	**RWZ**	**Motr**	**Calc**	**Calc**	**FK**	**V**

Base voltage for the V/f mode. This parameter is set according to motor nominal voltage, but can be changed to modify V/f characteristic.

3430	**V/f frequency**	**[Hz]**	**RWZ**	**Motr**	**5**	**Calc**	**FK**	**V**

Base frequency for the V/f mode. This parameter is set according to motor nominal frequency, but can be changed to modify V/f characteristic.



STARTUP / Startup config / Motor protection

I2t function is similar to the protection of the motor by the thermal relay. It states the I2t typical behavior.
The integrator state is given by **Mot OL accum** %, it gives the percentage state of the Rms current integration, 100 % = **I2t** alarm level. **Mot OL trip** signal is available in the pick-list selections.
It states that the trip condition of **I2t** has been reached and overload is not allowed.
The intervention time depends on the value of the motor current as follows:

$$\text{Overload time} = \frac{(\text{Motor Rated current} * \text{Service factor} * \text{Motor OL factor})\ \hat{}\ 2 * \text{Motor OL time}}{(\text{Motor current})\ \hat{}\ 2}$$

It is possible to generate an alarm condition or reduce eventual overload current to nominal current of the motor.
For various options of alarm configuration see menu ALARM CONFIG / Motor overload.

1612	**Motor OL control**	**N/A**	**RW**	**0**	**0**	**1**	**DK**	**V-F-S-B**

0 Disabled
1 Enabled
Enable / disable motor current limit control and overload I2t protection function
(from software rel. 3.300).

1611	**Service factor**	**N/A**	**RW**	**1**	**0.5**	**1.5**	**FK**	**V-F-S-B**

Service factor. Some motors have a motor continuous current (Ic) higher than the rated current (In). The service factor makes reference to the Ic/In ratio.

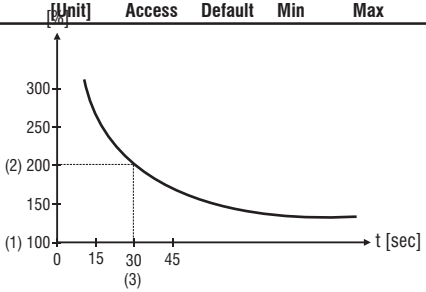
1610	**Motor OL factor**	**N/A**	**RW**	**2**	**1.2**	**Calc**	**FK**	**V-F-S-B**

Allowed motor overload factor referring to the Motor rated current * Service factor

1650	**Motor OL time**	**[sec]**	**RW**	**30**	**10**	**Calc**	**FK**	**V-F-S-B**

Allowed overload time with overload level equal to Motor OL factor.

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode



(1) Rated current • Service factor = 100%
(2) Motor OL factor
(3) Motor OL time

STARTUP / Startup config / BU protection

The function protects braking resistor by monitoring current in the resistor according to I2t characteristic. When the protection becomes active, it is possible to generate an alarm condition. According to the different cases it is possible to use the device internal IGBT (or external braking unit).

1700 BU control — **N/A** **RWZ** **1** **0** **2** **DP** **V-F-S-B**

0	Off	Function disabled
1	Internal	Enable Braking Unit internal device (Default)
2	External	Enable Braking Unit external BUy device

The parameter enables the Braking Unit function.

1740 BU resistance — **[ohm]** **RWZ** **D.Size** **Calc** **10000** **FK** **V-F-S-B**

Braking Unit resistance value, mounted optional on the power section terminals or external (C & BR1)

1710 BU res cont pwr — **[kW]** **RWZ** **D.Size** **0** **0** **FK** **V-F-S-B**

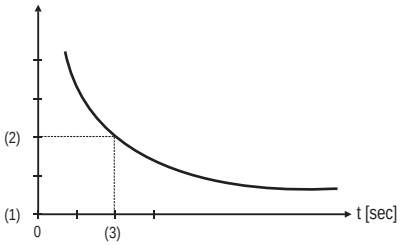
Braking Unit resistance continuous power

1720 BU res OL time — **[sec]** **RWZ** **D.Size** **1** **1000** **FK** **V-F-S-B**

Resistance allowed overload time referring to the overload power. The control of the external braking unit and of the resistance I2t protection is independent of BU type (BU digital output command, is available, on the regulation card terminals).

1730 BU res OL factor — **N/A** **RWZ** **D.Size** **1.2** **20** **FK** **V-F-S-B**

Allowed overload factor referring to the overload power of the braking resistance. Overload factor = overload Power/ rated Power



(1) BU res cont power
(2) BU res OL factor
(3) BU res OL time

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode

STARTUP / Startup config / Load default ?

Load default ?

Drive reset with default parameter values in the selected regulation mode only.

Each regulation mode has its own “Load default ?” command.

NOTE! “Load default ?” command does not reset SETUP MODE with default parameter values; Drive, Motor data and Autotune values are mantained.

Use Save config command to save default parameter values such that are preserved for next power up.

STARTUP / Startup config / Load saved ?

Load saved ?

Reload of the last saved database selected.

STARTUP / Regulation mode

100	Regulation mode	N/A	R	0	0	5	DK	V-F-S-B

It allows to select the desired regulation mode. When the Regulation mode parameter is selected, the active regulation mode is displayed; in order to change it to a new mode press “Enter”; Select new mode will be displayed, then scroll the list:

0 V/f control
1 Field oriented
2 Sensorless
3 Setup mode (asynchronous motors)
4 Brushless
5 Setup mode (brushless motors)

After new regulation mode is selected, it is possible to copy (transfer) parameters from previous regulation mode. This operation is convenient if drive has been parametrized in previous regulation mode *(from software rel. 3.500).*

NOTE! Appropriate firmware is required using the drive in Brushless mode

STARTUP / Import recipe

In recipe user can store its configuration of parameters for a given application. By re-calling appropriate recipe file all the necessary application parameters are set by a single command. Recipe files must be filled with parameters in the factory (please contact drive manufacturer). Available are 7 recipe files that are empty in default configuration. Only parameters outside STARTUP menu can be put to recipe files.

Select recipe:

1 User 1
2 User 2
3 User 3
4 User 4
5 User 5
6 User 6
7 User 7

STARTUP / Save config ?

AVyL drive allows two different commands to save the parameters modified in the regulation mode selected:

- by STARTUP menu, “Save Config?” command
- by all other menus, “SAVE PARAMETERS” command

Any changes made in STARTUP menu require “Save Config?” command, which saves all entire regulation mode selected. It is recommended every time the user made any changes into STARTUP menu.
“SAVE PARAMETERS” command saves all the changes made out of STARTUP menu only.
When on the keypad display appears blinking message “Use Save Config”, use “Save Config?” command.

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode

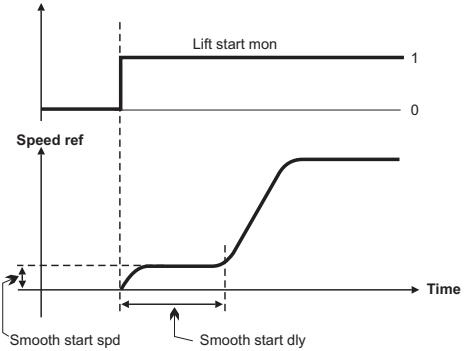
TRAVEL

TRAVEL / Speed profile

The parameters unit is defined by IPA 1015 in “STARTUP / Startup config / Mechanical data” menu, changing the IPA 1015 setting from [0] Revolutions (default) to [1] Millimeters, the units in this menu change as follows: [rpm] becomes [mm/s], [rpm/s] becomes [mm/s^2], [rpm/s^2] becomes [mm/s^3].

7110	**Smooth start spd**	**[rpm]**	**RWS**	**0**	**Calc**	**Calc**	**PP**	**V-F-S-B**

Smooth start speed is selected automatically after start command independently from multispeed value. Duration of this special speed depends on Smooth start dly parameter. If this parameter is zero, Smooth start spd is not selected and multispeed values prevails. Smooth start speed can be used to optimise feeling at starting in some types of installations.



Note! “Smooth start dly” can be set in TRAVEL / Lift sequence menu.

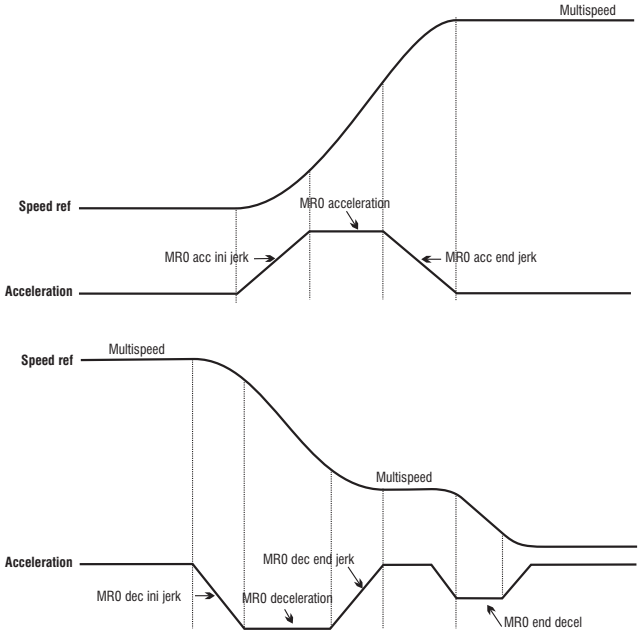
7060	**Multi speed 0** Speed 0 value	**[rpm]**	**RWS**	**0**	**Calc**	**Calc**	**PV**	**V-F-S-B**
7061	**Multi speed 1** Speed 1 value	**[rpm]**	**RWS**	**0**	**Calc**	**Calc**	**PP**	**V-F-S-B**
7062	**Multi speed 2** Speed 2 value	**[rpm]**	**RWS**	**0**	**Calc**	**Calc**	**PP**	**V-F-S-B**
7063	**Multi speed 3** Speed 3 value	**[rpm]**	**RWS**	**0**	**Calc**	**Calc**	**PP**	**V-F-S-B**
7064	**Multi speed 4** Speed 4 value	**[rpm]**	**RWS**	**0**	**Calc**	**Calc**	**PP**	**V-F-S-B**
7065	**Multi speed 5** Speed 5 value	**[rpm]**	**RWS**	**0**	**Calc**	**Calc**	**PP**	**V-F-S-B**
7066	**Multi speed 6** Speed 6 value	**[rpm]**	**RWS**	**0**	**Calc**	**Calc**	**PP**	**V-F-S-B**
7067	**Multi speed 7** Speed 7 value	**[rpm]**	**RWS**	**0**	**Calc**	**Calc**	**PP**	**V-F-S-B**
7134	**Max linear speed**	**[mm/s]**	**R**	**Calc**	**0**	**0**	**FK**	**V-F-S-B**

TRAVEL / Ramp profile

The parameters unit is defined by IPA 1015 in “STARTUP / Startup config / Mechanical data” menu, changing the

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode

IPA 1015 setting from [0] Revolutions (default) to [1] Millimeters, the units in this menu change as follows: [rpm] becomes [mm/s], [rpm/s] becomes [mm/s^2], [rpm/s^2] becomes [mm/s^3].
Two different sets of ramp profiles (MRO ... and MR1 ...) are available; the selection is done by parameter Mlt ramp sel src (IPA 8090) into "TRAVEL / Lift sequence" menu. Default is MRO ... .



8046	**MR0 acc ini jerk**	**[rpm/s^2]**	**RWS**	**1000**	**0.349**	**750*100**	**PP**	**V-F-S-B**
	Acceleration initial jerk, set 0							
8040	**MR0 acceleration**	**[rpm/s]**	**RWS**	**500**	**1**	**1.5*106**	**PP**	**V-F-S-B**
	Acceleration ramp, set 0							
8041	**MR0 acc end jerk**	**[rpm/s^2]**	**RWS**	**1000**	**0.349**	**750*106**	**PP**	**V-F-S-B**
	Acceleration end jerk, set 0							
8047	**MR0 dec ini jerk**	**[rpm/s^2]**	**RWS**	**1000**	**0.349**	**750*106**	**PP**	**V-F-S-B**
	Deceleration initial jerk, set 0							
8042	**MR0 deceleration**	**[rpm/s]**	**RWS**	**500**	**1**	**1.5*106**	**PP**	**V-F-S-B**
	Deceleration ramp, set 0							
8043	**MR0 dec end jerk**	**[rpm/s^2]**	**RWS**	**1000**	**0.349**	**750*106**	**PP**	**V-F-S-B**
	Deceleration end jerk, set 0							
8044	**MR0 end decel**	**[rpm/s]**	**RWS**	**1000**	**1**	**1.5*106**	**PP**	**V-F-S-B**
	Final deceleration slope corresponding to removal of START command.							
8056	**MR1 acc ini jerk**	**[rpm/s^2]**	**RWS**	**1000**	**0.349**	**750*106**	**PP**	**V-F-S-B**
	Acceleration initial jerk, set 1							
8050	**MR1 acceleration**	**[rpm/s]**	**RWS**	**500**	**1**	**1.5*106**	**PP**	**V-F-S-B**
	Acceleration ramp, set 1							
8051	**MR1 acc end jerk**	**[rpm/s^2]**	**RWS**	**1000**	**0.349**	**750*106**	**PP**	**V-F-S-B**
	Acceleration end jerk, set 1							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
8057	**MR1 dec ini jerk**	**[rpm/s²]**	**RWS**	**1000**	**0.349**	**750*106**	**PP**	**V-F-S-B**
	Deceleration initial jerk, set 1							
8052	**MR1 deceleration**	**[rpm/s]**	**RWS**	**500**	**1**	**1.5*106**	**PP**	**V-F-S-B**
	Deceleration ramp, set 1							
8053	**MR1 dec end jerk**	**[rpm/s²]**	**RWS**	**1000**	**0.349**	**750*106**	**PP**	**V-F-S-B**
	Deceleration end jerk, set 1							
8054	**MR1 end decel**	**[rpm/s]**	**RWS**	**1000**	**1**	**1.5*106**	**PP**	**V-F-S-B**
	Final deceleration slope corresponding to removal of START command.							
9421	**SlowDown dist**	**[mm]**	**RW**	**0.00**	**0.00**	**0.00**	**FK**	**V-F-S-B**
	It allows to calculate the distance from running speed to approach speed if for running speed and approach speed Multispeed 1 and Multispeed 0 are used respectively.							

SlowDown dist Calculate ?

Executing “Calculate ?” using Enter key, will be calculate the distance from running speed to approach speed.

Note! It is available only if IPA 1015 Travel units sel parameter is set to Millimeters.

TRAVEL / Lift sequence

7100	**Cont close delay**	**[ms]**	**RWS**	**200**	**0.00**	**65535**	**PP**	**V-F-S-B**
	Output contactor close delay. See Chapter 8 - Lift Sequencies							
7101	**Brake open delay**	**[ms]**	**RWS**	**0.00**	**0.00**	**65535**	**PP**	**V-F-S-B**
	See Chapter 8 - Lift Sequencies							
7102	**Smooth start dly**	**[ms]**	**RWS**	**0.00**	**0.00**	**65535**	**PP**	**V-F-S-B**
	See IPA 7110 into “TRAVEL / Speed profile” menu.							
7103	**Brake close dly**	**[ms]**	**RWS**	**200**	**0.00**	**65535**	**PP**	**V-F-S-B**
	See Chapter 8 - Lift Sequencies							
7104	**Cont open delay**	**[ms]**	**RWS**	**200**	**0.00**	**65535**	**PP**	**V-F-S-B**
	Output contactors open delay. See Chapter 8 - Lift Sequencies							
7105	**Seq start mode**	**N/A**	**RWS**	**0**	**0**	**2**	**DP**	**V-F-S-B**
	0 Start fwd/rev 1 Enable 2 Mlt spd out !=0 *(from software rel. 3.500).* It changes the way how contactor sequence starts: “Start fwd/rev” selection allows to start contactor sequence without Enable command (Enable is required only to run the motor). Enable signal can be given by an auxilary contact of output contactors “Enable” selection allows to start contactor sequences only with Enable command. “Mlt spd out !=0” selection allows to start contactor sequencies with multispeed selection. Non zero multi speed value will cause sequence start. Start command must be also asserted.							
7106	**Seq start sel**	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
	0 Standard inp Using Start fwd / rev src input 1 Alternative inp Using Start alt src input							
7115	**Start fwd src**	**N/A**	**RWS**	**IPA 4021**		**List 3**	**PIN**	**V-F-S-B**
	IPA 4021 DI 1 monitor = Default (refer to signals List 3 of Pick List manual)							
7116	**Start rev src**	**N/A**	**RWS**	**IPA 4022**		**List 3**	**PIN**	**V-F-S-B**
	IPA 4022 DI 2 monitor = Default (refer to signals List 3 of Pick List manual)							
7117	**Start alt src**	**N/A**	**RWS**	**IPA 4000**		**List 3**	**PIN**	**V-F-S-B**
	IPA 4000 NULL = Default							
7072	**Mlt spd s 0 src**	**N/A**	**RWS**	**IPA 4024**		**List 3**	**PIN**	**V-F-S-B**
	DI 4 monitor = Default It allows to select the origin of the signals stating the input combination of multispeed function.							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
	(Mlt spd s 0 - 1 - 2 sources; refer to signals List 3 of Pick List manual)							
7073	**Mlt spd s 1 src**	**N/A**	**RWS**	**IPA 4025**		**List 3**	**PIN**	**V-F-S-B**
	DI 5 monitor = Default It allows to select the origin of the signals stating the input combination of multispeed function. (Mlt spd s 0 - 1 - 2 sources; refer to signals List 3 of Pick List manual)							
7074	**Mlt spd s 2 src**	**N/A**	**RWS**	**IPA 4025**		**List 3**	**PIN**	**V-F-S-B**
	DI 6 monitor = Default It allows to select the origin of the signals stating the input combination of multispeed function. (Mlt spd s 0 - 1 - 2 sources; refer to signals List 3 of Pick List manual)							

Mtl spd sel 2 src	Mtl spd sel 1 src	Mtl spd sel 0 src	ACTIVE RAMP REF
0	0	0	Multi speed 0
0	0	1	Multi speed 1
0	1	0	Multi speed 2
0	1	1	Multi speed 3
1	0	0	Multi speed 4
1	0	1	Multi speed 5
1	1	0	Multi speed 6
1	1	1	Multi speed 7

7069	**Mlt spd sel mon**	**N/A**	**R**	**0**	**0**	**7**	**DP**	**V-F-S-B**
	Active selection displaying (Multispeed 0, Multispeed 1, etc.)							
7070	**Mlt spd out mon**	**[rpm]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**V-F-S-B**
	It displays multispeed block output signal							
8090	**Mlt ramp sel src**	**N/A**	**RWS**	**IPA 4000**		**List 3**	**PIN**	**V-F-S-B**
	IPA 4000 NULL = Default It allows to select the origin of the signals stating Multi ramp input combination (Mlt ramp s0-1 src; refer to signals List 3 of Pick List manual)							

Multi Ramp sel src	Active set
0	MR0
1	MR1

8078	**Mlt ramp sel mon**	**N/A**	**R**	**0**	**0**	**3**	**DP**	**V-F-S-B**
	Displaying of the selected ramp set							
7143	**Door open src**	**N/A**	**RWS**	**IPA 4000**		**List 3**	**PIN**	**V-F-S-B**
	IPA 4000 NULL = Default (refer to signals List 3 of Pick List manual) Source to Enable the function through the digital input.							
7138	**Door open speed**	**[rpm]**	**RWS**	**0.00**	**0.00**	**Calc**	**PP**	**V-F-S-B**
	Door open speed threshold.							

Door open control function.

This function allows anticipated door open control before the car arrival at the floor level. Door open signal can be given on digital output when speed drops below settable threshold. The function must be enabled by the digital input. Status of the speed checking command execution to open the door can be checked by providing the feedback from door open mechanism to drive digital input.

Alarm can be generated if command and feedback don't match.

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
7118	**Brake open src**	**N/A**	**RWS**	**IPA 4001**		**List 3**	**PIN**	**V-F-S-B**

Source to enable brake release through the digital input. In standard sequence brake release is controlled by the drive and therefore this parameter is set to ONE. In case that brake release should be conditioned by some external control (e.g. PLC), set this parameter to digital input controlled by PLC.

Internal sequence for brake release will wait until this input is asserted.

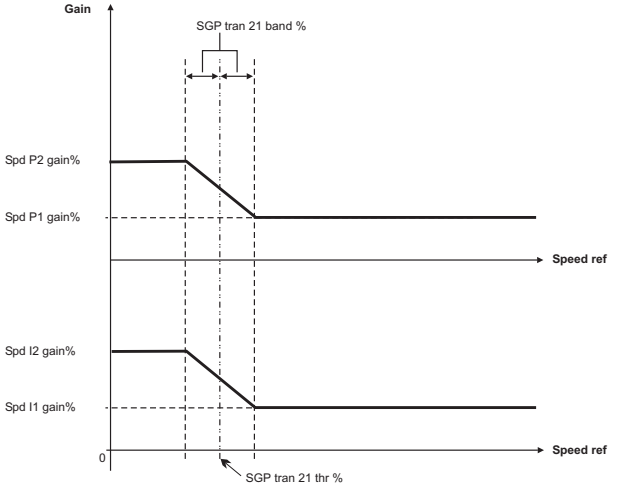
During run brake will be closed whenever this input becomes not asserted.

TRAVEL / Speed reg gains

Allows to change speed regulation gain according to speed reference. Typically at low speed high gains are required to have good starting behavior. At high speed lower gains are preferred to suppress eventual vibrations due to mechanical imperfections. In case that values above 100% are required to achieve desired speed response increase gains base values in menu “REGULATION PARAM / Spd regulator / Base values”, IPA 2075 and 2077.
When base values are increased percentage values are reduced such that resulting gain used by regulator preserves original value. At this point percentage values can be increased.

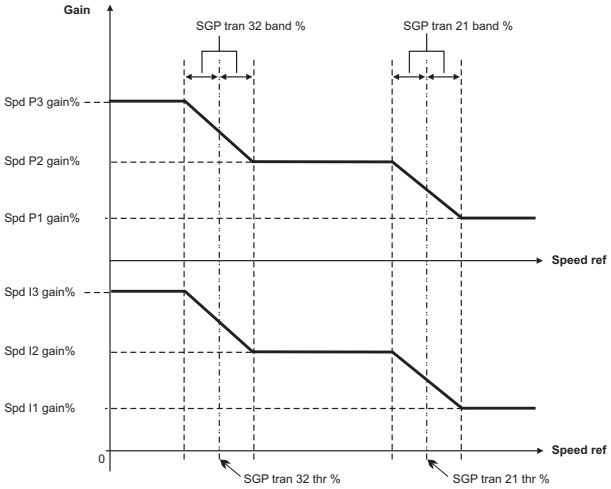
NOTE! “Bands %” and “Thr%” can be set in TRAVEL/Speed threshold menu.

Default configuration (Spd 0 enable = Disable, only parameters 21 are set):
Gains #1 are used for middle (accel / decel) and high speed
Gains #2 are used at low speed (starting and approach speed)



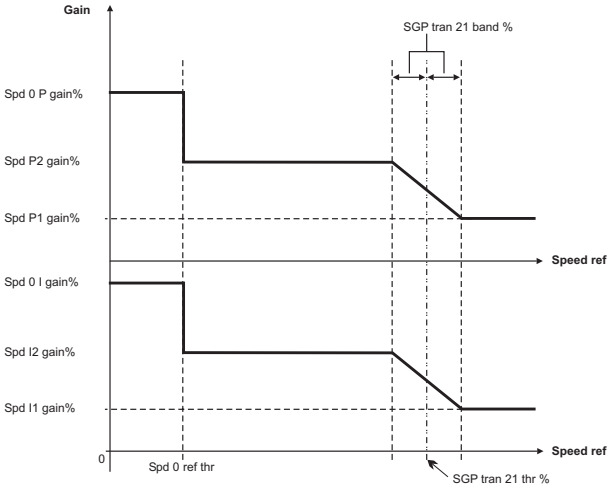
Possible configuration (Spd 0 enable = Disable, also parameters 32 are set):

Gains #1 are used for high speed (running)
Gains #2 are used for middle (accel / decel) speed
Gains #3 are used for low speed (starting / stopping)



Possible configuration (Spd 0 enable =Enable as spd 0, only parameters 21 are set):

Gains #1 are used for high speed (running)
Gains #2 are used for middle (accel / decel) speed
Gains #0 are used for low speed (starting / stopping)



IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode

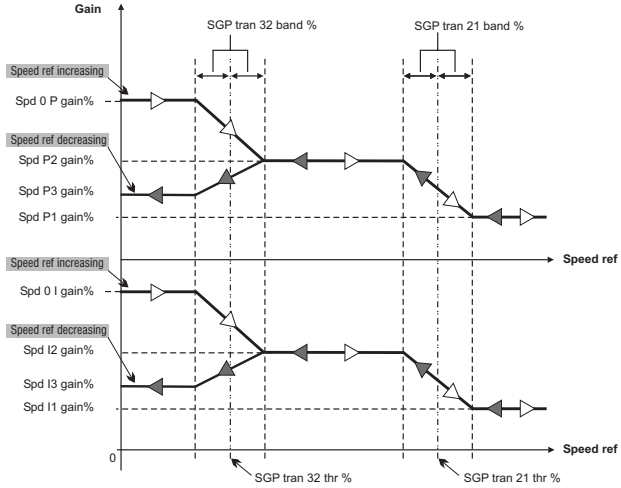
Possible configuration (Spd 0 enable =Enable as start, also parameters 32 are set):

Gains #1 are used for high speed (running)

Gains #2 are used for middle (accel / decel) speed

Gains #3 are used for stopping

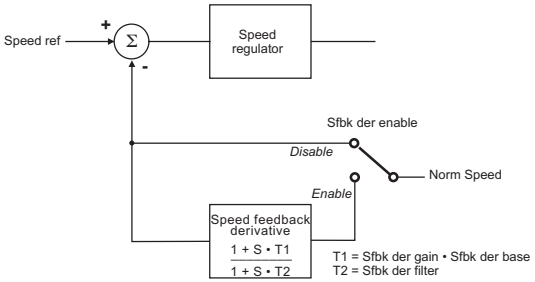
Gains #0 are used for starting



3700	**SpdP1 gain %**	**[%]**	**RWS**	**10**	**0**	**100**	**PP**	**F-S-B**
	Proportional speed 1 regulator gain at high speed							
3701	**SpdI1 gain %**	**[%]**	**RWS**	**10**	**0**	**100**	**PP**	**F-S-B**
	Integral speed 1 regulator gain at high speed							
3702	**SpdP2 gain %**	**[%]**	**RWS**	**10**	**0**	**100**	**PP**	**F-S-B**
	Proportional speed 2 regulator gain at medium speed							
3703	**SpdI2 gain %**	**[%]**	**RWS**	**10**	**0**	**100**	**PP**	**F-S-B**
	Integral speed 2 regulator gain at medium speed							
3704	**SpdP3 gain %**	**[%]**	**RWS**	**10**	**0**	**100**	**PP**	**F-S-B**
	Proportional speed 3 regulator gain at low speed							
3705	**SpdI3 gain %**	**[%]**	**RWS**	**10**	**0**	**100**	**PP**	**F-S-B**
	Integral speed 3 regulator gain at low speed							
3720	**Spd 0 enable**	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**F-S-B**
	Apart from gain adaptive function, it is possible to have another set of gains when speed reference is below Speed 0 reference threshold parameter. Function must be enabled by this parameter. 0 Disable 1 Enable as spd 0 2 Enable as start (from software rel. 3.300).							
3722	**Spd 0 P gain %**	**[%]**	**RWS**	**Calc**	**0**	**100**	**PP**	**F-S-B**
	Proportional speed 0 regulator gain at zero speed							
3723	**Spd 0 I gain %**	**[%]**	**RWS**	**Calc**	**0**	**100**	**PP**	**F-S-B**
	Integral speed 0 regulator gain at zero speed							
2530	**Sfbk der enable**	**N/A**	**RWSZ**	**0**	**0**	**1**	**DV**	**F-S-B**
	Speed feedback derivative function enable / disable.							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode

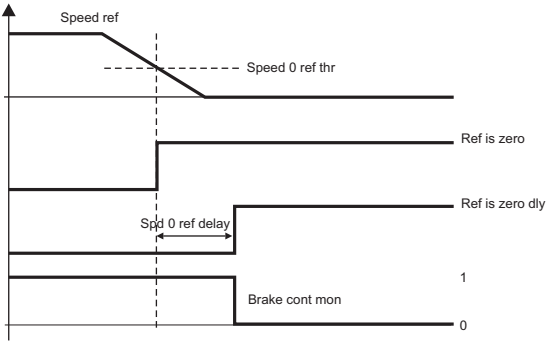
0 Disable
1 Enable



2540	**Sfbk der gain**	**[%]**	**RWS**	**0**	**-100**	**100**	**PV**	**F-S-B**
	Speed feedback derivative gain.							
2550	**Sfbk der base**	**[ms]**	**RWS**	**10000**	**0**	**10000**	**FK**	**F-S-B**
	Base feedback derivative gain.							
2560	**Sfbk der filter**	**[ms]**	**RWS**	**5**	**0**	**1000**	**PP**	**F-S-B**
	Speed feeedback derivative filter							
2380	**Prop filter**	**[ms]**	**RWS**	**1.5**	**0.15**	**1000**	**PP**	**F-S-B**
	Filter on the proportional part of torque reference. Can be used to suppress the noise.							

TRAVEL / Speed threshold

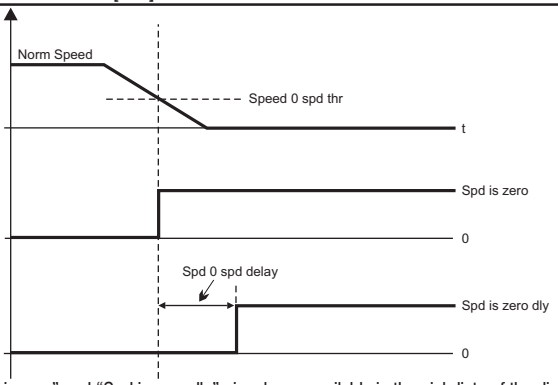
3726	**Spd 0 ref thr**	**[rpm]**	**RWS**	**30**	**0**	**0**	**PP**	**V-F-S-B**
	Speed 0 reference threshold							
3727	**Spd 0 ref delay**	**[ms]**	**RWS**	**500**	**0**	**30000**	**PP**	**V-F-S-B**
	Speed 0 reference delay							



Note! "Ref is zero" and "Ref is zero dly" signals are available in the pick-lists of the digital outputs. "Brake cont mon" signal is available a digital relay output (83-85 terminals).

3724	**Spd 0 speed thr**	**[rpm]**	**RWS**	**30**	**0**	**0**	**PP**	**V-F-S-B**
	Speed 0 speed threshold.							
3725	**Spd 0 spd delay**	**[ms]**	**RWS**	**1000**	**0**	**30000**	**PP**	**V-F-S-B**
	Speed 0 speed delay							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode

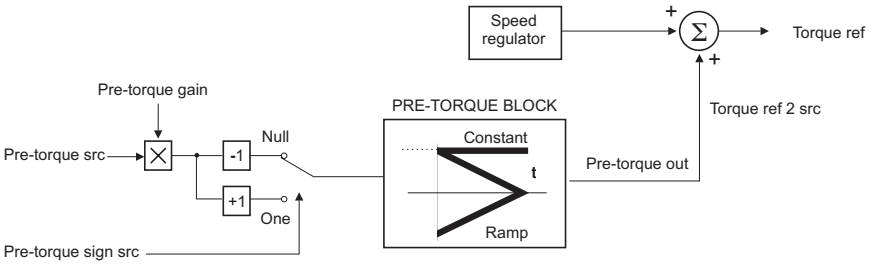


NOTE! "Spd is zero" and "Spd is zero dly" signals are available in the pick-lists of the digital and analog outputs.

3706	**SGP tran21 h thr**	**[%]**	**RWS**	**15**	**0**	**100**	**PP**	**F-S-B**
	See "Possible/Default configuration" figures on "TRAVEL / Speed reg gains" menu.							
3707	**SGP tran32 l thr**	**[%]**	**RWS**	**0**	**0**	**100**	**PP**	**F-S-B**
	See "Possible/Default configuration" figures on "TRAVEL / Speed reg gains" menu.							
3708	**SGP tran21 band**	**[%]**	**RWS**	**10**	**0**	**100**	**PP**	**F-S-B**
	See "Possible/Default configuration" figures on "TRAVEL / Speed reg gains" menu.							
3709	**SGP tran32 band**	**[%]**	**RWS**	**0**	**0**	**100**	**PP**	**F-S-B**
	See "Possible/Default configuration" figures on "TRAVEL / Speed reg gains" menu.							

TRAVEL / Pre-torque

Pre torque function helps to ensure smooth starting without initial jerk. This is achieved by setting the torque prior to open the brake to a value that corresponds to the load. Pre torque value applied to the motor as well as direction of applied torque can be provided by mounting load cell on the lift car. Load cell signal is acquired through analog input and scaled appropriately, if pre-torque function is used.
If load cell is not available it is possible to work with fixed value of torque and provide only torque direction. In this case fixed value is optimized only for one load condition.



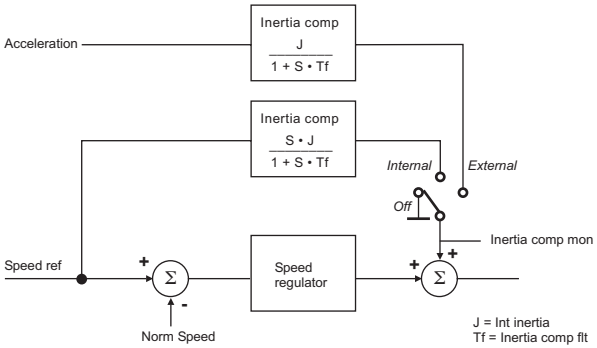
9431	**Int Pre-torque**	**[%]**	**RWS**	**0**	**0**	**100**	**PV**	**F-S-B**
	Internal (fixed) motor pre-torque value							
9432	**Pre-torque time**	**[sec]**	**RWS**	**1.0**	**0.01**	**5**	**PP**	**F-S-B**
	Pre-torque duration in case that IPA 9439 is selected as ramp.							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
9438	**Pre-torque gain**	**[%]**	**RWS**	**1.0**	**0**	**4.0**	**PP**	**F-S-B**
	Gain factor of the Pre-torque function to scale value from load sensor. Pre-torque gain value is automatically calculated after mechanical and weights data have been entered.							
9439	**Pre-torque type**	**N/A**	**WSZ**	**0**	**0**	**1**	**DV**	**F-S-B**
	0 Ramp — Initial torque will be removed in ramp 1 Costant — Initial torque remains constant Pre-torque type control							
9434	**Pre-torque src**	**N/A**	**RWSZ**	**IPA 9431**		**List 2**	**PIN**	**F-S-B**
	IPA 9431 Int Pre-torque = Default It allows to select an analog input to provide motor pre-torque value (refer to signals List 2 of Pick List manual)							
9435	**Pre-trq sign src**	**N/A**	**RWSZ**	**IPA 4000**		**List 3**	**PIN**	**F-S-B**
	IPA 4000 NULL = Default It connects the selected signal to the selector of the multiplier input: if the signal is 0, multiply by +1, or if the signal is 1, multiply by –1 (refer to signals List 3 of Pick List manual).							

TRAVEL / Inertia comp

Inertia compensation function can be used to compensate the inertia caused by the load of the motor during acceleration / deceleration phase. It avoids also speed overshoot at the end of ramp.

2580	**Inertia comp en**	**N/A**	**RWS**	**1**	**0**	**1**	**DV**	**F-S-B**
	0 OFF — Inertia compensation function is switched off 1 Internal — Inertia compensation function is using speed reference to calculate acceleration 2 External — Inertia compensation function is using speed acceleration provided by external control through SBI card. It enables inertia compensation function							
2054	**Int Inertia**	**[kgm²]**	**RWS**	**0**	**0**	**Calc**	**PV**	**F-S-B**
	Internal value of the moment of Inertia. Inertia value is automatically calculated after mechanical and weights data have been entered.							
2590	**Inertia comp flt**	**[ms]**	**RWS**	**30**	**0**	**1000**	**PP**	**F-S-B**
	Filter on the compensation							
2625	**Inertia comp mon**	**[Nm]**	**R**	**0.00**	**0.00**	**0.00**	**DV**	**F-S-B**
	It displays Inertia compensation torque contribution.							



Note! "Inertia comp mon" signals is available in the pick-lists of the analog outputs.

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode

TRAVEL / DC braking

DC current injection can help to stop the motor and ensure that lift car arrives exactly at floor level.

1836 **DCbrake cmd src** **N/A** **RWS** **IPA 7125** **List 3** **PIN** **V-F-S-B**

IPA 7125 Lift DC Brake mon = Default

It allows to select the origin of the signal to command DC braking function, normally if is controled by lift sequence. (refer to signals List 3 of Pick List manual)

1833 **DCbrake delay** **[sec]** **RWS** **0.1** **0.01** **30** **PP** **V-F-S-B**

Delay between the injection command and the injection of the current itself

1834 **DCbrake duration** **[sec]** **RWS** **1** **0.01** **30** **PP** **V-F-S-B**

Duration of the current injection

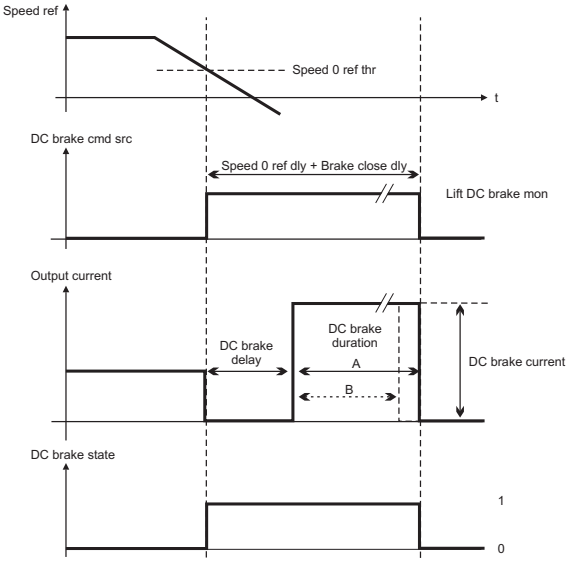
1835 **DCbrake current** **[%]** **RWS** **100** **0** **100** **PP** **V-F-S-B**

Braking current as a percentage of **Drive continuos current**

1837 **DCBrake state** **N/A** **R** **0** **0** **1** **DV** **V-F-S-B**

0 non-active
1 active
State of DC Brake functon.

NOTE! Sequence available only when IPA 7105 set as Start fwd/rev.
Lift DC brake mon signal that controls DC current braking is not available.

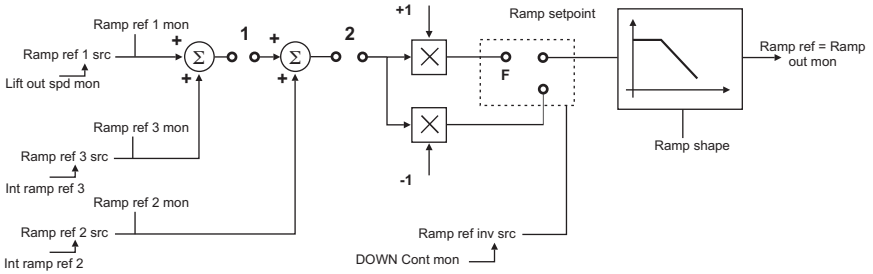


A = DC brake delay + DC brake duration > Spd 0 ref dly + Brake close dly

B = DC brake delay + DC brake duration < Spd 0 ref dly + Brake close dly

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
TRAVEL / Ramp function								
8031	**Ramp out enable** 0 Disabled 1 Enabled Ramp function enabling	**N/A**	**WSZ**	**1**	**0**	**1**	**DP**	**V-F-S-B**
8021	**Ramp shape** 0 Linear 1 S-Shaped Ramp selection. Linear or S-shaped ramp	**N/A**	**RWS**	**1**	**0**	**1**	**DV**	**V-F-S-B**
TRAVEL / Ramp setpoint								
The Function of this block is to generate the Set point for the ramp. Set reference by algebraically adding its inputs. All parameters in this menu have default values set for lift application.								
TRAVEL / Ramp setpoint / Ramp ref src								
7035	**Ramp ref 1 src** IPA 7130 Lift out spd mon = Default It select the origin of the signal of Ramp ref 1 (refer to signals List 7 of Pick List manual)	**N/A**	**RWS**	**IPA 7130**		**List 7**	**PIN**	**V-F-S-B**
7036	**Ramp ref 2 src** IPA 7031 Int ramp ref 2 = Default It select the origin of the signal of Ramp ref 2 (refer to signals List 8 of Pick List manual)	**N/A**	**RWS**	**IPA 7031**		**List 8**	**PIN**	**V-F-S-B**
7029	**Ramp ref 3 src** IPA 7038 Int ramp ref 3 = Default It select the origin of the signal of Ramp ref 3	**N/A**	**RWS**	**IPA 7038**		**List 45**	**PIN**	**V-F-S-B**
7037	**Ramp ref inv src** IPA 7121 DOWN Count mon = Default It connects the selected signal to the selector of the multiplier input:if the signal is 0, multiply by +1, or if the signal is 1, multiply by –1. The multiplier allows to invert Ramp reference signal (refer to signals List 3 of Pick List manual). By using DOWN cont mon / Up cont mon it is possible to invert lift movement direction that corresponds to commands **Start fwd src** (IPA 7115), **Start rev src** (IPA 7116).	**N/A**	**RWS**	**IPA 4000**		**List 3**	**PIN**	**V-F-S-B**
TRAVEL / Ramp setpoint / Ramp ref cfg								
7030	**Int ramp ref 1** Value of the Int ramp ref 1 variable	**[rpm]**	**RWS**	**0**	**Calc**	**Calc**	**PV**	**V-F-S-B**
7031	**Int ramp ref 2** Value of the Int ramp ref 2 variable	**[rpm]**	**RWS**	**0**	**Calc**	**Calc**	**PV**	**V-F-S-B**
7038	**Int ramp ref 3** Value of the Int ramp ref 3 variable	**[rpm]**	**RWS**	**0**	**Calc**	**Calc**	**PV**	**V-F-S-B**
TRAVEL / Ramp setpoint / Ramp ref mon								
7032	**Ramp ref 1 mon** Displaying of the Ramp ref 1 signal	**[rpm]**	**R**	**0.00**	**0.00**	**0.00**	**PP**	**V-F-S-B**
7033	**Ramp ref 2 mon** Displaying of the Ramp ref 2 signal	**[rpm]**	**R**	**0.00**	**0.00**	**0.00**	**PP**	**V-F-S-B**
7039	**Ramp ref 3 mon** Displaying of the Ramp ref 3 signal	**[rpm]**	**R**	**0.00**	**0.00**	**0.00**	**PP**	**V-F-S-B**
7034	**Ramp setpoint** Displaying of the Ramp setpoint output signal	**[rpm]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**V-F-S-B**

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode



1. Switch is closed if Ramp out enable = Enabled & Start. Switch is opened if Ramp out enable = Enabled & Stop
2. Switch is closed if Ramp out enable = Enabled & (!Fast stop). Switch is opened if Ramp out enable = Enabled & Fast stop
Both switches are closed if Ramp out enable = Disabled

TRAVEL / Speed setpoint

The function of the block is to generate the set point for the speed regulator by algebraically adding its inputs, see ramp set point. All parameters in this menu have default values set for lift application.

TRAVEL / Speed setpoint / Speed ref src

7050	**Speed ref 1 src**	**N/A**	**RWS**	**IPA 7040**		**List 9**	**PIN**	**V-F-S-B**
	IPA 7040 Int speed ref 1 = Default It select the origin of the signal of Speed ref 1 in V/f, SLS. LZ speed ref (IPA 9408) in FOC, BRS (refer to signals List 9 of Pick List manual)List 9)							
7051	**Speed ref 2 src**	**N/A**	**RWS**	**IPA 7041**		**List 10**	**PIN**	**V-F-S-B**
	IPA 7041 Int speed ref 2 = Default It select the origin of the signal of Speed ref 2. (Refer to signals List 10 of Pick List manual).							
7053	**Speedref inv src**	**N/A**	**RWS**	**IPA 4000**		**List 3**	**PIN**	**V-F-S-B**
	IPA 4000 NULL = Default It connects the selected signal to the selector of the multiplier input: if the signal is 0, multiply by +1, or if the signal is 1, multiply by –1. The multiplier allows to invert Speed reference signal (refer to signals List 3 of Pick List manual)							

TRAVEL / Speed setpoint / Speed ref cfg

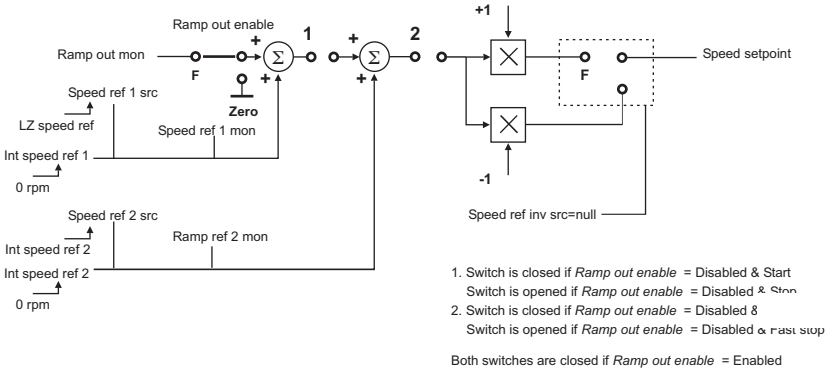
7040	**Int speed ref 1**	**[rpm]**	**RWS**	**0**	**Calc**	**Calc**	**PV**	**V-F-S-B**
	Value of the Int speed ref 1 variable							
7041	**Int speed ref 2**	**[rpm]**	**RWS**	**0**	**Calc**	**Calc**	**PV**	**V-F-S-B**
	Value of the Int speed ref 2 variable							

TRAVEL / Speed setpoint / Speed ref mon

8022	**Ramp out mon**	**[rpm]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**V-F-S-B**
	Displaying of Ramp output signal							
7045	**Speed ref 1 mon**	**[rpm]**	**R**	**0.00**	**0.00**	**0.00**	**PP**	**V-F-S-B**
	Displaying of the Speed ref 1 signal							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
7046	**Speed ref 2 mon**	**[rpm]**	**R**	**0.00**	**0.00**	**0.00**	**PP**	**V-F-S-B**

Displaying of the Speed ref 2 signal



1. Switch is closed if *Ramp out enable* = Disabled & Start
   Switch is opened if *Ramp out enable* = Disabled & Stop
2. Switch is closed if *Ramp out enable* = Disabled &
   Switch is opened if *Ramp out enable* = Disabled & Fast stop

Both switches are closed if *Ramp out enable* = Enabled

SAVE PARAMETERS

AVyL drive allows two different commands to save the parameters modified in the regulation mode selected:
- by STARTUP menu, “Save Config?” command
- by all other menus, “SAVE PARAMETERS” command

Any changes made in STARTUP menu require “Save Config?” command, which saves all entire regulation mode selected.
It is recommended every time the user made any changes into STARTUP menu.
“SAVE PARAMETERS” command saves all the changes made out of STARTUP menu only.
When on the keypad display appears blinking message “Use Save Config”, use “Save Config?” command

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode

REGULATION PARAM

Most of the parameters in this menu are initialized by autotune procedure. The access to REGULATION PARAM menu is allowed by Level 1 password: 12345. It must to be set in the SERVICE menu.

REGULATION PARAM / V/f reg param

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
3400	**Voltage boost**	**[%]**	**RWS**	**Calc**	**0.00**	**0.00**	**PV**	**V**
	Torque boost at low speed. It allows to increase the output voltage at zero Hz. Initialized by autotune procedure							
3531	**Slip comp**	**[rpm]**	**RWS**	**Calc**	**0.00**	**Calc**	**PV**	**V**
	Compensation of speed drop due to load. Initialized by autotune procedure. When Slip comp mode = Encoder, it acts as a limit on the amount of speed correction obtained from encoder feedback. In general parameter must be increased to about 4 times of rated motor slip. Low values of Slip comp parameter may cause instability.							
3541	**Slip comp filter**	**[sec]**	**RWS**	**0.50**	**Calc**	**10**	**PP**	**V**
	Slip compensation filter.							
3411	**Slip comp mode**	**N/A**	**RWS**	**0**	**0**	**2**	**DP**	**V**
	0 Normal — Standard slip compensation using load current							
	1 Encoder — Slip compensation using encoder feedback in closed loop speed control, see IPA 3531							
	2 Lift — Slip compensation using load current, suitable for lift application *(from software rel. 3.500).*							
3412	**Slip P gain**	**[%]**	**RWS**	**2.0**	**0**	**100**	**PP**	**V**
	Proportional gain of slip regulator. It must be adjusted according to actual load conditions (inertia). In general, if there are oscillations, the proportional gain must be increased.							
3413	**Slip I gain**	**[%]**	**RWS**	**0.5**	**0**	**100**	**PP**	**V**
	Integral gain of slip regulator. It must be adjusted according to actual load conditions (inertia). In general, if there are oscillations, the integral gain must be reduced.							
3585	**Antioscill gain**	**[%]**	**RWS**	**0**	**0**	**100**	**PP**	**V**
	It allows to damp the current oscillations in the motor, which could be developed in the middle range of the rated speed							
3520	**V/f ILim P gain**	**[rpm_A]**	**RWS**	**Calc**	**Calc**	**Calc**	**PP**	**V**
	Proportional gain of the pseudo current loop regulator in V/f mode							
3530	**V/f ILim I gain**	**[rpm_A]**	**RWS**	**Calc**	**Calc**	**Calc**	**PP**	**V**
	Integral gain of the pseudo current loop regulator in V/f mode							

REGULATION PARAM / Spd regulator

REGULATION PARAM / Spd regulator / Percent values

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
3700	**SpdP1 gain %**	**[%]**	**RWS**	**Calc**	**0.00**	**00**	**PP**	**F-S-B**
	Proportional speed 1 gain regulator at high speed							
3701	**SpdI1 gain %**	**[%]**	**RWS**	**Calc**	**0.00**	**00**	**PP**	**F-S-B**
	Integral speed 1 gain regulator at high speed							

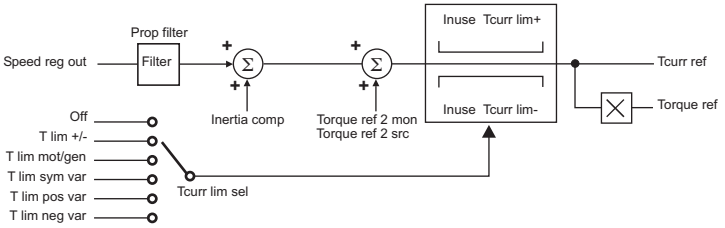
REGULATION PARAM / Spd regulator / Base values

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
2075	**SpdP base value**	**[A/rpm]**	**RWS**	**Calc**	**0.00**	**0.00**	**FK**	**F-S-B**
	Basic value of the speed Proportional gain							
2077	**SpdI base value**	**[A/rpm]**	**RWS**	**Calc**	**0.00**	**Calc**	**FK**	**F-S-B**
	Basic value of the speed Integral gain							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
REGULATION PARAM / Spd regulator / In use values								
2063	**InUse SpdP gain%** In use value of the speed Proportional gain	**[%]**	**R**	**10**	**0**	**100**	**PV**	**F-S-B**
2065	**InUse SpdI gain%** In use value of the speed Integral gain	**[%]**	**R**	**10**	**0**	**100**	**PV**	**F-S-B**
REGULATION PARAM / Curr regulator								
REGULATION PARAM / Curr regulator / Percent values								
1999	**CurrP gain %** Proportional gain of current loop	**[%]**	**RWS**	**Calc**	**0.00**	**100**	**PP**	**V-F-S-B**
2000	**CurrI gain %** Integral gain of current loop	**[%]**	**RWS**	**Calc**	**0.00**	**100**	**PP**	**V-F-S-B**
REGULATION PARAM / Curr regulator / Base values								
2005	**CurrP base value** Basic value of the proportional gain of current loop	**[V/A]**	**RWS**	**Calc**	**0.00**	**Calc**	**FK**	**V-F-S-B**
2007	**CurrI base value** Basic value of the integral gain of current loop	**[V/A/s]**	**RWS**	**Calc**	**0.00**	**Calc**	**FK**	**V-F-S-B**
REGULATION PARAM / Curr regulator / Dead time comp								
The function allows for compensation of the output voltage distortion due to IGBT voltage drop and its switching characteristics.								
530	**Dead time limit** Value of the voltage compensation	**[V]**	**RWS**	**Calc**	**0.00**	**50**	**PP**	**V-F-S-B**
540	**Dead time slope** Compensation Gradient	**[V/A]**	**RWS**	**Calc**	**0.00**	**100**	**PP**	**V-F-S-B**
REGULATION PARAM / Flux regulator								
REGULATION PARAM / Flux regulator / Percent values								
2013	**FlxP gain %** Proportional gain of flux loop	**[%]**	**RWS**	**Calc**	**0**	**100**	**PP**	**F-S**
2015	**FlxI gain %** Integral gain of flux loop	**[%]**	**RWS**	**Calc**	**0**	**100**	**PP**	**F-S**
REGULATION PARAM / Flux regulator / Base values								
2021	**FlxP base value** Basic value of the proportional gain of flux loop	**[A/Wb]**	**RWS**	**Calc**	**0.00**	**Calc**	**FK**	**F-S**
2022	**FlxI base value** Basic value of the integral gain of flux loop	**[A/Wb/s]**	**RWS**	**Calc**	**0.00**	**Calc**	**FK**	**F-S**
REGULATION PARAM / Vlt regulator								
REGULATION PARAM / Vlt regulator / Percent values								
2031	**VltP gain %** Proportional gain of voltage loop	**[%]**	**RWS**	**Calc**	**0.00**	**100**	**PP**	**F-S-B**
2033	**VltI gain %** Integral gain of voltage loop	**[%]**	**RWS**	**Calc**	**0.00**	**100**	**PP**	**F-S-B**

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
REGULATION PARAM / Vlt regulator / Base values								
2039	**VltP base value**	**[A/V]**	**RWS**	**Calc**	**0.00**	**0.00**	**FK**	**F-S-B**
	Basic value of the proportional gain of voltage loop							
2041	**Vltl base value**	**[A/V/s]**	**RWS**	**Calc**	**0.00**	**0.00**	**FK**	**F-S-B**
	Basic value of the integral gain of voltage loop							

REGULATION PARAM / Torque config



REGULATION PARAM / Torque config / Torque setpoint / T setpoint src

2441	**Torque ref 2 src**	**N/A**	**RWS**	**IPA 9433**		**List15**	**PIN**	**F-S-B**
	IPA 9433 Pre-torque out = Default It allows to select the origin of the signal for torque reference (refer to signals List 15 of Pick List manual)							

REGULATION PARAM / Torque config / Torque setpoint / T setpoint cfg

2440	**Int torque ref 2**	**[Nm]**	**RWS**	**0.00**	**Calc**	**Calc**	**PV**	**F-S-B**
	It allows to set an alternative reference to connect to Torque ref 2 src							

REGULATION PARAM / Torque config / Torque setpoint / T setpoint mon

2442	**Torque ref 2 mon**	**[Nm]**	**R**	**0.00**	**0.00**	**0.00**	**PP**	**F-S-B**
	Torque ref 2 variable displaying							
2450	**Torque ref**	**[Nm]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**F-S-B**
	Overall Torque ref variable displaying							

REGULATION PARAM / Torque config / Torque curr lim / Trq curr lim src

1195	**Trq curr lim src**	**N/A**	**RWS**	**IPA 4000**		**List15**	**PIN**	**V-F-S-B**
	IPA 4000 NULL = Default It allows to select the origin of the signal for torque current limit (refer to signals List 15 of Pick List manual)					*(from software rel. 3.300).*		

REGULATION PARAM / Torque config / Torque curr lim / Trq curr lim cfg

1190	**Tcurr lim sel**	**N/A**	**RWS**	**0**	**0**	**4**	**DV**	**V-F-S-B**
	0 Off	None				Limits depend on drive rating.		
	1 T lim +/-	Positive or negative limit				Limits depend on IPA 1210, IPA1220		
	2 T lim mot/gen	Motor or Generator limit				Limits depend on IPA 1210, IPA1220		
	3 T lim sym var	Limits are controlled by IPA 1195.				*(from software rel. 3.300).*		
	4 T lim pos var	Limits are controlled by IPA 1195.				*(from software rel. 3.300).*		
	5 T lim neg var	Limits are controlled by IPA 1195.				*(from software rel. 3.300).*		
	Selection of the torque Current limit type							
1210	**Tcurr lim +**	**[A]**	**RWS**	**Calc**	**0.00**	**Calc**	**PV**	**V-F-S-B**
	Positive current limit or Motor (Positive power) limit.							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
1220	**Tcurr lim -**	**[A]**	**RWS**	**Calc**	**0.00**	**Calc**	**PV**	**V-F-S-B**

Negative current limit or Generator (Negative power) limit.

REGULATION PARAM / Torque config / Torque curr lim / Trq curr lim mon

1250	**Inuse Tcurr lim+**	**[A]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**V-F-S-B**

Monitor of the positive current limit in use

1260	**Inuse Tcurr lim-**	**[A]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**V-F-S-B**

Monitor for the negative current limit in use

2445	**Tcurr lim state**	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**

Current limit state

0 Not-reached

1 Reached

REGULATION PARAM / Flux config

REGULATION PARAM / Flux config / Magnetiz config

Autophase rot / Start ?

Autophasing command to phase brushless motors. After pressing Start, give the Enable and Start command to drive. Motor must be free of any load, brake must be released.
Motor will first align and then rotate slightly at very low speed.

Autophase still / Start ?

Autophasing command to phase brushless motors. After pressing Start, give the Enable and Start command to drive. Drive will perform phasing procedure without rotation. Brake can be locked

(from software rel. 3.500).

1810	**Magn ramp time**	**[sec]**	**RWS**	**D.Size**	**0.01**	**5**	**PP**	**F-S**

Set of the ramp time of the magnetizing current

1815	**Lock flux pos**	**N/A**	**RWSZ**	**0**	**0**	**1**	**DP**	**F-S-B**

0 Off — No locking of flux position

1 At magnetization — Flux position is locked during magnetization

2 At Spd = 0 — Flux positon is locked when stop command has been issued and signal "Speed is zero delayed" becomes TRUE

3 At Magn & Spd = 0 — Flux positon is locked during magnetization or when stop command has been issued and signal "Speed is zero delayed" becomes TRUE

4 At magn & Ref=0 — Flux positon is locked during magnetization or when both signals "Speed reference is zero delayed" and "Speed is zero delayed" become TRUE

The function is useful for undesidered motor shaft rotation. It allows to lock the Flux position.

REGULATION PARAM / Flux config / Flux max limit / Flux max lim src

This Function allows the user to control the maximum value of the Flux current.
It is linked to the control of the voltage loop. In a condition where the Flux is = 100%, the voltage regulator prevails by controlling the motor. It means that it is only possible to further limit the requirement of the voltage loop. In case the Drive is active in the constant torque area, it is possible to set an overflux up to 115% of the rated flux. Such control is possible, obviously, only if the motor/drive combination is in a position to supply a sufficient magnetizing current.

1121	**Flux level src**	**N/A**	**RWS**	**IPA 1120**		**List 24**	**PIN**	**F-S-B**

IPA 1120 Int flx maxlim = Default

It allows to select the origin of the signal to control the function
(refer to signals List 24 of Pick List manual)

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
REGULATION PARAM / Flux config / Flux max limit / Flux max lim cfg								
1120	**Int flx maxlim**	**[%]**	**RWS**	**0.00**	**0.00**	**0.00**	**PV**	**F-S-B**
	It allows to set an alternative signal to connect to Flux level src							
REGULATION PARAM / Flux config / Flux max limit / Flux max lim mon								
1150	**Inuse flx maxlim**	**[%]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**F-S-B**
	Monitor of flux limit value in use							

REGULATION PARAM / Flux config / Output vlt ref

The Function allows the regulation of the flux in the constant power area where a voltage margin must be available for the regulation. This value is usually equal to 2% of the maximum output voltage.
A higher value allows a faster response of the voltage regulator but with a lower amount of available voltage on the output. A lower value allows a higher output voltage with a decrease of the dynamic performances

REGULATION PARAM / Flux config / Output vlt ref / Out vlt ref src								
1141	**Outvlt lim src**	**N/A**	**RWS**	**IPA 1140**	**List 42**	**PIN**	**F-S-B**	
	IPA 1140 Int Outvlt lim = Default It allows to select the origin of the signal to control the function (refer to signals List 42 of Pick List manual)							
REGULATION PARAM / Flux config / Output vlt ref / Out vlt ref cfg								
1130	**Dyn vlt margin**	**[%]**	**RWS**	**2**	**1**	**10**	**PV**	**F-S-B**
	Voltage margin for the flux regulation							
1140	**Int Outvlt lim**	**[V]**	**RWS**	**Calc**	**Calc**	**Calc**	**PV**	**F-S-B**
	Internal output voltage limit. initialized from motor rated voltage. This parameter determines the start of flux weakening. Connected to Outvlt lim src							
REGULATION PARAM / Flux config / Output vlt ref / Out vlt ref mon								
1170	**Available Outvlt**	**[V]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**F-S-B**
	Monitor for the maximum available output voltage. It is calculated directly starting from the DC link voltage							
1180	**Inuse Outvlt ref**	**[V]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**F-S-B**
	Limit in use on the output voltage							

REGULATION PARAM / Sls SpdFbk gains

In the Sensorless regulation mode the motor speed is estimated through an observer algorithm based on a speed gains profile. The procedure below allows the user to improve the gains profile of the observer circuit at low, medium and high Motoring/Regen speed.

REGULATION PARAM / Sls SpdFbk gains / Motoring gains								
1090	**SLS mot HPgain**	**[%]**	**RWS**	**5**	**0**	**100**	**PP**	**S**
	Motor Proportional High gain							
1091	**SLS mot HIgain**	**[%]**	**RWS**	**5**	**0**	**100**	**PP**	**S**
	Motor Integral High gain							
1092	**SLS mot MPgain**	**[%]**	**RWS**	**5**	**0**	**100**	**PP**	**S**
	Motor Proportional Medium gain							
1093	**SLS mot MIgain**	**[%]**	**RWS**	**5**	**0**	**100**	**PP**	**S**
	Motor Integral Medium gain							
1094	**SLS mot LPgain**	**[%]**	**RWS**	**1**	**0**	**100**	**PP**	**S**
	Motor Proportional Low gain							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
1095	**SLS mot LIgain** Motor Integral Low gain	**[%]**	**RWS**	**0**	**0**	**100**	**PP**	**S**

REGULATION PARAM / SIs SpdFbk gains / Regen gains

1101	**SLS regen HPgain** Regen Proportional High gain	**[%]**	**RWS**	**5**	**0**	**100**	**PP**	**S**
1102	**SLS regen HIgain** Regen Integral High gain	**[%]**	**RWS**	**5**	**0**	**100**	**PP**	**S**
1103	**SLS regen MPgain** Regen Proportional Medium gain	**[%]**	**RWS**	**5**	**0**	**100**	**PP**	**S**
1104	**SLS regen MIgain** Regen Integral Medium gain	**[%]**	**RWS**	**5**	**0**	**100**	**PP**	**S**
1105	**SLS regen LPgain** Regen Proportional Low gain	**[%]**	**RWS**	**1**	**0**	**100**	**PP**	**S**
1106	**SLS regen LIgain** Regen Integral Low gain	**[%]**	**RWS**	**0**	**0**	**100**	**PP**	**S**

REGULATION PARAM / SIs SpdFbk gains / Gain transitions

1096	**SLS H/M tran level** Transition level from High to Medium profile	**[rpm]**	**RWS**	**Calc**	**0.00**	**Calc**	**PP**	**S**
1097	**SLS M/L tran level** Transition level from Medium to Low profile	**[rpm]**	**RWS**	**Calc**	**0.00**	**Calc**	**PP**	**S**
1098	**SLS H/M tran bnd[rpm]** Transition band from High to Medium profile	**RWS**	**Calc**	**0.00**	**Calc**	**PP**	**S**	
1099	**SLS M/L tran bnd** Transition band from Medium to Low profile	**[rpm]**	**RWS**	**Calc**	**0.00**	**Calc**	**PP**	**S**
1107	**SLS 0 tran bnd** Speed 0 transition band (Motoring/Regen/Motoring)	**[rpm]**	**RWS**	**Calc**	**0.00**	**Calc**	**PP**	**S**
1111	**Observer filter** Time constant of the first-order Filter on both gains profile	**[ms]**	**RWS**	**100**	**Calc**	**Calc**	**PP**	**S**

REGULATION PARAM / SIs SpdFbk gains / Gain monitor

1085	**Inuse S P gain** In use Proportional gains of speed observer.	**[%]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**S**
1086	**Inuse S I gain** In use Integral gains of speed observer.	**[%]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**S**
1112	**Observer ref mon** Observer adapt gain reference monitor.	**[%]**	**R**	**0.00**	**0.00**	**0.00**	**PP**	**S**

REGULATION PARAM / Test generator

The tuning of the regulators can be done using an internal test signal generator in order to evaluate the regulator response. This operation requires the use of a digital oscilloscope. The “Test generator” generates signal shaped as a rectangular wave with a programmable frequency and amplitude.
Using the Test generator function it is possible to carry out the manual tunings of Current regulator, Flux regulator Voltage regulator and Speed regulator.

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode

REGULATION PARAM / Test generator / Test gen mode

2756	**Test gen mode**	**N/A**	**RWS**	**0**	**0**	**6**	**DK**	**V-F-S-B**

0	Off	
1	Ramp ref 1	Ramp reference 1
2	Speed ref 1	Speed reference 1
3	Torque ref 2	Torque reference 2
4	Magn curr ref	Magnetizing current reference
5	Flux ref	Flux reference
6	Outvlt lim	Voltage reference

This parameter defines where the test signal is connected in the control scheme.

REGULATION PARAM / Test generator / Test gen cfg

2745	**Gen Hi ref**	**[cnt]**	**RWS**	**0**	**32767**	**-32767**	**PV**	**V-F-S-B**

Value in count of the higher amplitude signal value

2750	**Gen Low ref**	**[cnt]**	**RWS**	**0**	**32767**	**-32767**	**PV**	**V-F-S-B**

Value in count of the lower amplitude signal value

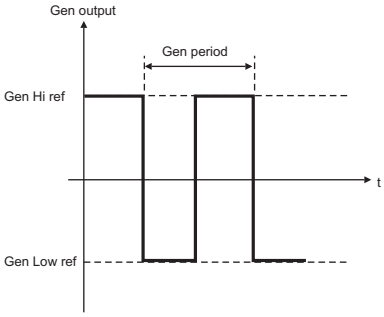
2755	**Gen Period**	**[sec]**	**RWS**	**10**	**0**	**10000**	**PV**	**V-F-S-B**

Period of the square wave

REGULATION PARAM / Test generator / Test gen mon

2760	**Gen output**	**[cnt]**	**R**	**0.00**	**0.00**	**0.00**	**PV**	**V-F-S-B**

Monitorig the test generator output signal.



SAVE PARAMETERS

AVyL drive allows two different commands to save the parameters modified in the regulation mode selected:
- by STARTUP menu, “Save Config?” command
- by all other menus, “SAVE PARAMETERS” command

Any changes made in STARTUP menu require “Save Config?” command, which saves all entire regulation mode selected.
It is recommended every time the user made any changes into STARTUP menu.
“SAVE PARAMETERS” command saves all the changes made out of STARTUP menu only.
When on the keypad display appears blinking message “Use Save Config”, use “Save Config?” command

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode

I/O CONFIG

The access to I/O CONFIG menu is allowed by Level 1 password: 12345. It must all be set in the SERVICE menu.

I/O CONFIG / Commands

Configuration of Enable, Start commands. All parameters in this menu have default values set for lift application.

I/O CONFIG / Commands / Commands src

153 **Term StrStp src** **N/A** **RWS** **IPA 4001** **List 16** **PIN** **V-F-S-B**
IPA 4001 ONE = Default
It allows to select the signal to generate the Start (1) command and of the terminal strip Stop (0) command
(refer to signals List 16 of Pick List manual)

9210 **Term Start src** **N/A** **RWS** **IPA 4000** **List 16** **PIN** **V-F-S-B**
IPA 4000 NULL = Default
It allows to select the signal to generate the terminal strip Start command
(refer to signals List 16 of Pick List manual)

9211 **Term Stop src** **N/A** **RWS** **IPA 4000** **List 16** **PIN** **V-F-S-B**
IPA 4000 NULL = Default
It allows to select the signal to generate the terminal strip Stop command
(refer to signals List 16 of Pick List manual)

156 **Dig Enable src** **N/A** **RWS** **IPA 7128** **List 17** **PIN** **V-F-S-B**
IPA 7128 Lift Enable mon= Default
It allows to select the signal to generate a digital Enable command
(refer to signals List 17 of Pick List manual)

157 **Dig StrStp src** **N/A** **RWS** **IPA 7129** **List 17** **PIN** **V-F-S-B**
IPA 7129 Lift Start mon = Default
It allows to select the signal to generate the a digital Start (1) command and a digital Stop (0) command
(refer to signals List 17 of Pick List manual)

154 **FastStop src** **N/A** **RWS** **IPA 4000** **List 18** **PIN** **V-F-S-B**
IPA 4000 NULL = Default
It allows to select the signal to generate the FastStop command
(refer to signals List 18 of Pick List manual)

I/O CONFIG / Commands / Commands cfg

"Commands select" parameter determines the logic for the Start/Stop Edge sensitive signal or Level sensitive signal or I O keys keypad commands control

4002 **Commands select** **N/A** **RWS** **2** **0** **4** **DV** **V-F-S-B**

0	Terminals Level	The drive is controlled via terminal strip using a Level sensitive signals
1	Terminals Edge	The drive is controlled via terminal strip using a Edge sensitive signals
2	Digital Level	The drive is controlled from a communication or application card using a Level sensitive signals
3	Digital Edge	The drive is controlled from a communication or application card using a Edge sensitive signals
4	I O keys	The drive is controlled from the keyboard using the I O keys; terminal 12 to and terminal 13 to 24Vdc are required

Setting of this parameter is not allowed while terminal enable is active.

4004 **En/Disable mode** **N/A** **RWS** **0** **0** **3** **DP** **V-F-S-B**

0	Off
1	Stop/FS & Spd=0
2	Stop & Spd=0
3	FS & Spd=0

It controls the action time of the stop condition.
Setting of this parameter is not allowed while terminal enable is active.

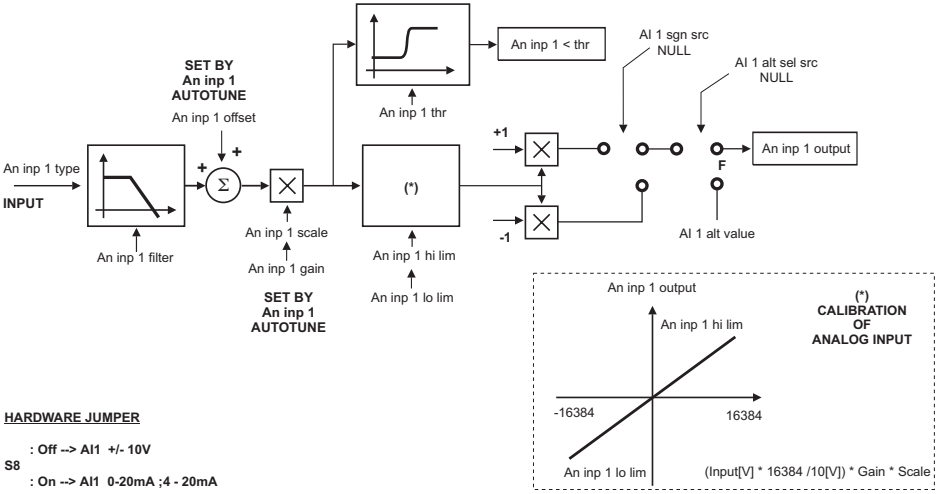
IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
4006	**Spd 0 dis dly**	**[ms]**	**RWS**	**1000**	**16**	**10000**	**PP**	**V-F-S-B**
	Delay time between the zero speed and the disabling procedure							

I/O CONFIG / Commands / Commands mon

150	**Enable cmd mon**	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
	It displays the Enable command state							
151	**Start cmd mon**	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
	It displays the Start command state							
152	**FastStop cmd mon**	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
	It displays the FastStop command state							

I/O CONFIG / Analog inputs

Drive has 3 standard and 2 expanded analog inputs. Each AI block has the following structure.
Analog inputs can also be used as non isolated digital inputs by using An inp X<thr as output and setting appropriately parameter Anp inp X thr.



Analog inputs / Std analog inps / Analog input 1 / An inp 1 src

5011	**AI 1 sgn src**	**N/A**	**RWS**	**IPA 4000**		**List 3**	**PIN**	**V-F-S-B**
	IPA 4000 NULL = Default It connects the selected signal to the selector of the multiplier input: if the signal is 0, multiply by +1, or if the signal is 1, multiply by –1. The multiplier allows to invert Analog Input 1 signal (refer to signals List 3 of Pick List manual)							
5012	**AI 1 alt sel src**	**N/A**	**RWS**	**IPA 4000**		**List 3**	**PIN**	**V-F-S-B**
	IPA 4000 NULL = Default It connects the selected signal to the selector of the alternative reference for An. Inp. 1 block (refer to signals List 3 of Pick List manual)							

Analog inputs / Std analog inps / Analog input 1 / An inp 1 cfg

5000	**An inp 1 type**	**N/A**	**RWS**	**0**	**0**	**2**	**DP**	**V-F-S-B**
	0 -10V...+10V Input connects a signal with a maximum voltage of +/-10V. (The change in							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode

the motor rotation direction is obtained according to the signal polarity).
Input voltage > 10V or >-10V cause saturation of the count value.

1 0..20mA,0..10V On the input it's possible to connect a max voltage of +10V or a 0…20mA current signal. The signal must always have a positive sign, through which, if used as a reference, it is possible to change the motor rotation direction via "AI 1 sgn src"

2 4..20mA On the input it is possible to connect a 4… 20mA current signal. The signal must always have a positive sign through which, if used as a reference, it is possible to change the motor rotation direction via "AI 1 sgn src". Through the An inp X <thr output it is possible to state if the current signal is lower than the one of the set threshold. If the current is <= 4mA , the output supplies a signal (error signal). This, for example, can be combined with a digital output

NOTE! "An inp 1 type" selection requires a correct jumpers configuration of RV33 regulation card:
-10V...+10V & 0..10V S8=OFF – S9=OFF – S10=OFF
0..20mA & 4..20mA S8=ON – S9= ON – S10= ON

5002 **AI 1 alt value** **[cnt]** **RWS** **0** **32767** **-32767** **PV** **V-F-S-B**
Alternative reference value in count for Analog input 1

5003 **An inp 1 thr** **[cnt]** **RWS** **3277** **-16384** **16383** **PP** **V-F-S-B**
Analog Input 1 threshold value in count

5004 **An inp 1 scale** **N/A** **RWS** **1** **-16** **16** **PP** **V-F-S-B**
Analog Input 1 scale factor

5006 **An inp 1 filter** **[sec]** **RWS** **0.0064** **0.00** **4.096** **PP** **V-F-S-B**
Time constant of the Analog Input 1 filter

5007 **An inp 1 low lim** **[cnt]** **RWS** **-16384** **-32768** **32767** **PP** **V-F-S-B**
Lower limit of the Analog Input 1 block output in count (see figure below)

5008 **An inp 1 hi lim** **[cnt]** **RWS** **16383** **-32768** **32767** **PP** **V-F-S-B**
Upper limit of the Analog Input 1 block output in count (see figure below)

AI 1 offs tune / Start?
Autotune command for the Analog Input 1 offset. Input automatic fine-tuning.
To run the autotune, put the input signal to its minimum value and execute "Start ?" command

AI 1 gain tune / Start?
Autotune command for the Analog Input 1 gain. Conditions containing an offset can be compensated.
To run the autotune, put the input signal to its maximum value and execute "Start ?" command

Analog inputs / Std analog inps / Analog input 1 / An inp 1 mon

5009 **An inp 1 output** **[cnt]** **R** **0.00** **-32768** **32767** **PV** **V-F-S-B**
Analog Input 1 output count displaying

5010 **An inp 1 < thr** **N/A** **R** **0** **0** **1** **DV** **V-F-S-B**
Display of threshold compensator state of Analog Input 1 (1 = the condition is true)

5001 **An inp 1 offset** **[cnt]** **RWS** **0** **-16384** **16383** **PP** **V-F-S-B**
Analog Input 1 offset count value displaying

5005 **An inp 1 gain** **N/A** **RWS** **1** **-16** **16** **PP** **V-F-S-B**
Analog Input 1 gain count value displaying

Analog inputs / Std analog inps / Analog input 2 / An inp 2 src

5031 **AI 2 sgn src** **N/A** **RWS** **IPA 4000** **List 3** **PIN** **V-F-S-B**
IPA 4000 NULL = Default
It connects the selected signal to the selector of the multiplier input: if the signal is 0,

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
	multiply by +1, or if the signal is 1, multiply by –1. The multiplier allows to invert Analog Input 2 signal (refer to signals List 3 of Pick List manual)							
5032	**AI 2 alt sel src**	**N/A**	**RWS**	**IPA 4000**	**List 3**	**PIN**	**V-F-S-B**	
	IPA 4000 NULL = Default It connects the selected signal to the selector of the alternative reference for An. Inp. 2 block (refer to signals List 3 of Pick List manual)							

Analog inputs / Std analog inps / Analog input 2 / An inp 2 cfg

5020	**An inp 2 type** 0 -10V ... +10V 1 0..20mA,0..10V 3 4..20mA For “An inp 2 type” description refer to “An inp 1 type” description above	**N/A**	**RWS**	**0**	**0**	**2**	**DP**	**V-F-S-B**
5022	**AI 2 alt value** Alternative reference value in count for Analog input 2	**[cnt]**	**RWS**	**0**	**32767**	**-32767**	**PV**	**V-F-S-B**
5023	**An inp 2 thr** Analog Input 2 threshold value in count	**[cnt]**	**RWS**	**3277**	**-16384**	**16383**	**PP**	**V-F-S-B**
5024	**An inp 2 scale** Analog Input 2 scale factor	**N/A**	**RWS**	**1**	**-16**	**16**	**PP**	**V-F-S-B**
5026	**An inp 2 filter** Time constant of the Analog Input 2 filter	**[sec]**	**RWS**	**0.0064**	**0.00**	**4.096**	**PP**	**V-F-S-B**
5027	**An inp 2 lo lim** Lower limit of the Analog Input 2 block output in count (see figure of Analog Input 1 above)	**[cnt]**	**RWS**	**-16384**	**-32768**	**32767**	**PP**	**V-F-S-B**
5028	**An inp 2 hi lim** Upper limit of the Analog Input 2 block output in count (see figure of Analog Input 1 above)	**[cnt]**	**RWS**	**16383**	**-32768**	**32767**	**PP**	**V-F-S-B**
	AI 2 offs tune / Start? Refer to “AI 1 offs tune” description above							
	AI 2 gain tune / Start? Refer to “AI 1 gain tune” description above							

Analog inputs / Std analog inps / Analog input 2 / An inp 2 mon

5029	**An inp 2 output** Analog Input 2 output count displaying	**[cnt]**	**R**	**0.00**	**-32768**	**32767**	**PV**	**V-F-S-B**
5030	**An inp 2 < thr** Display of threshold compensator state of Analog Input 2 (1 = the condition is true)	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
5021	**An inp 2 offset** Analog Input 2 offset count value displaying	**[cnt]**	**RWS**	**0**	**-16384**	**16383**	**PP**	**V-F-S-B**
5025	**An inp 2 gain** Analog Input 2 gain count value displaying	**N/A**	**RWS**	**1**	**-16**	**16**	**PP**	**V-F-S-B**

Analog inputs / Std analog inps / Analog input 3 / An inp 3 src

5051	**AI 3 sgn src** IPA 4000 NULL = Default It connects the selected signal to the selector of the multiplier input: if the signal is 0, multiply by +1, or if the signal is 1, multiply by –1. The multiplier allows to invert Analog Input 3 signal (refer to signals List 3 of Pick List manual)	**N/A**	**RWS**	**IPA 4000**		**List 3**	**PIN**	**V-F-S-B**
5052	**AI 3 alt sel src** IPA 4000 NULL = Default	**N/A**	**RWS**	**IPA 4000**		**List 3**	**PIN**	**V-F-S-B**

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
	It connects the selected signal to the selector of the alternative reference for An. Inp. 3 block (refer to signals List 3 of Pick List manual)							

Analog inputs / Std analog inps / Analog input 3 / An inp 3 cfg

5040	**An inp 3 type** 0 -10V ... +10V 1 0..20mA,0..10V 2 4..20mA For "An inp 3 type" description refer to "An inp 1 type" description above	**N/A**	**RWS**	**0**	**0**	**2**	**DP**	**V-F-S-B**
5042	**AI 3 alt value** Alternative reference value in count for Analog input 3	**[cnt]**	**RWS**	**0**	**32767**	**-32767**	**PV**	**V-F-S-B**
5043	**An inp 3 thr** Analog Input 3 threshold value in count	**[cnt]**	**RWS**	**3277**	**-16384**	**16383**	**PP**	**V-F-S-B**
5044	**An inp 3 scale** Analog Input 3 scale factor	**N/A**	**RWS**	**1**	**-16**	**16**	**PP**	**V-F-S-B**
5046	**An inp 3 filter** Time constant of the Analog Input 3 filter	**[sec]**	**RWS**	**0.0064**	**0.00**	**4.096**	**PP**	**V-F-S-B**
5047	**An inp 3 lo lim** Lower limit of the Analog Input 3 block output in count (see figure of Analog Input 1 above)	**[cnt]**	**RWS**	**-16384**	**-32768**	**32767**	**PP**	**V-F-S-B**
5048	**An inp 3 hi lim** Upper limit of the Analog Input 3 block output in count (see figure of Analog Input 1 above)	**[cnt]**	**RWS**	**16383**	**-32768**	**32767**	**PP**	**V-F-S-B**
AI 3 offs tune Refer to "AI 1 offs tune" description above								
AI 3 gain tune Refer to "AI 1 gain tune" description above								

Analog inputs / Std analog inps / Analog input 3 / An inp 3 mon

5049	**An inp 3 output** Analog Input 3 output count displaying	**[cnt]**	**R**	**0.00**	**-32768**	**32767**	**PV**	**V-F-S-B**
5050	**An inp 3 < thr** Display of threshold compensator state of Analog Input 3 (1 = the condition is true)	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
5041	**An inp 3 offset** Analog Input 3 offset count value displaying	**[cnt]**	**RWS**	**0**	**-16384**	**16383**	**PP**	**V-F-S-B**
5045	**An inp 3 gain** Analog Input 3 gain count value displaying	**-**	**RWS**	**1**	**-16**	**16**	**PP**	**V-F-S-B**

Analog inputs / Exp analog inps / Analog input 1X / An inp 1X src

5069	**AI 1X sgn src** IPA 4000 NULL = Default It connects the selected signal to the selector of the multiplier input: if the signal is 0, multiply by +1, or if the signal is 1, multiply by –1. The multiplier allows to invert Analog Input 1X signal. (refer to signals List 3 of Pick List manual)	**N/A**	**RWS**	**IPA 4000**		**List 3**	**PIN**	**V-F-S-B**

Analog inputs / Exp analog inps / Analog input 1X / An inp 1X cfg

5060	**An inp 1X type** 0 -10V ... +10V 1 0..20mA,0..10V 3 4..20mA For "An inp 1X type" description refer to "An inp 1 type" description above	**N/A**	**RWS**	**0**	**0**	**2**	**DP**	**V-F-S-B**

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
5062	**An inp 1X thr**	**[cnt]**	**RWS**	**3277**	**-16384**	**16383**	**PP**	**V-F-S-B**
	Analog Input 1X threshold value in count							
5063	**An inp 1X scale**	**N/A**	**RWS**	**1**	**-16**	**16**	**PP**	**V-F-S-B**
	Analog Input 1X scale factor							
5065	**An inp 1X lo lim**	**[cnt]**	**RWS**	**-16384**	**-32768**	**32767**	**PP**	**V-F-S-B**
	Lower limit of the Analog Input 1X block output in count (see figure of Analog Input 1 above)							
5066	**An inp 1X hi lim**	**[cnt]**	**RWS**	**16383**	**-32768**	**32767**	**PP**	**V-F-S-B**
	Upper limit of the Analog Input 1X block output in count (see figure of Analog Input 1 above)							
AI 1X offs tune								
	Refer to “AI 1 offs tune” description above							
AI 1X gain tune								
	Refer to “AI 1 offs gain” description above							

Analog inputs / Exp analog inps / Analog input 1X / An inp 1X mon

5067	**An inp 1X output**	**[cnt]**	**R**	**0.00**	**-32768**	**32767**	**PV**	**V-F-S-B**
	Analog Input 1X output count displaying							
5068	**An inp 1X < thr**	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
	Display of threshold compensator state of Analog Input 1X (1 = the condition is true)							
5061	**An inp 1X offset**	**[cnt]**	**RWS**	**0**	**-16384**	**16383**	**PP**	**V-F-S-B**
	Analog Input 1X offset count value displaying							
5064	**An inp 1X gain**	**[cnt]**	**RWS**	**0**	**-16384**	**16383**	**PP**	**V-F-S-B**
	Analog Input 1X gain count value displaying							

Analog inputs / Exp analog inps / Analog input 2X / An inp 2X src

5089	**AI 2X sgn src**	**N/A**	**RWS**	**IPA 4000**		**List 3**	**PIN**	**V-F-S-B**
	IPA 4000 NULL = Default It connects the selected signal to the selector of the multiplier input: if the signal is 0, multiply by +1, or if the signal is 1, multiply by –1. The multiplier allows to invert Analog Input 2X signal. (refer to signals List 3 of Pick List manual)							

Analog inputs / Exp analog inps / Analog input 2X / An inp 2X cfg

5080	**An inp 2X type**	**N/A**	**RWS**	**0**	**0**	**2**	**DP**	**V-F-S-B**
	0 -10V ... +10V 1 0..20mA,0..10V 2 4..20mA For “An inp 2X type” description refer to “An inp 1 type” description above							
5082	**An inp 2X thr**	**[cnt]**	**RWS**	**3277**	**-16384**	**16383**	**PP**	**V-F-S-B**
	Analog Input 2X threshold value in count							
5083	**An inp 2X scale**	**N/A**	**RWS**	**1**	**-16**	**16**	**PP**	**V-F-S-B**
	Analog Input 2X scale factor							
5085	**An inp 2X lo lim**	**[cnt]**	**RWS**	**-16384**	**-32768**	**32767**	**PP**	**V-F-S-B**
	Lower limit of the Analog Input 2X block output in count (see figure of Analog Input 1 above)							
5086	**An inp 2X hi lim**	**[cnt]**	**RWS**	**16383**	**-32768**	**32767**	**PP**	**V-F-S-B**
	Upper limit of the Analog Input 2X block output in count (see figure of Analog Input 1 above)							
AI 2X offs tune								
	Refer to “AI 1 offs tune” description above							
AI 2X gain tune								
	Refer to “AI 1 offs gain” description above							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
Analog inputs / Exp analog inps / Analog input 2X / An inp 2X mon								
5087	**An inp 2X output** Analog Input 2X output count displaying	**[cnt]**	**R**	**0.00**	**-32768**	**32767**	**PV**	**V-F-S-B**
5088	**An inp 2X < thr** Display of threshold compensator state of Analog Input 2X (1 = the condition is true)	**N/A**	**R**	**0.00**	**0.00**	**0.00**	**DV**	**V-F-S-B**
5081	**An inp 2X offset** Analog Input 2X offset count value displaying	**[cnt]**	**RWS**	**0**	**-16384**	**16383**	**PP**	**V-F-S-B**
5084	**An inp 2X gain** Analog Input 2X gain count value displaying	**[cnt]**	**RWS**	**0**	**-16384**	**16383**	**PP**	**V-F-S-B**
Analog inputs / Exp analog inps / Exp ana inp en								
3900	**Exp ana inp en** 0 Disabled 2 Enabled It enables Expanded Analog Inputs	**N/A**	**RWS**	**0**	**0**	**1**	**DV**	**V-F-S-B**

Analog inputs / Destinations

This read-only menu allows the user to see where the Analog inputs are connected. If more then one source is connected to an Analog Input, only one is shown. If no sources are connected the message “Not used” is displayed.

4500 **An inp 1 dst**
It displays the Analog Input 1 destination

4501 **An inp 2 dst**
It displays the Analog Input 2 destination

4502 **An inp 3 dst**
It displays the Analog Input 3 destination

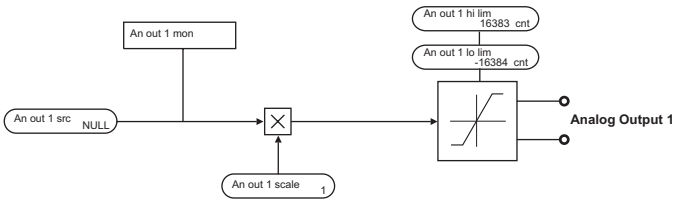
4503 **An inp 1X dst**
It displays the Analog Input 1X destination

4504 **An inp 2X dst**
It displays the Analog Input 2X destination

I/O CONFIG / Analog outputs

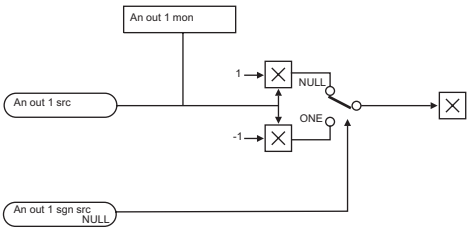
CALIBRATION TO +/-10 V OUTPUT
An out 1 mon (in counts) * An out 1 scale = An out 1 hi lim (in counts) = 10 V
An out 1 mon (in counts) * An out 1 scale = An out 1 lo lim (in counts) = -10 V

Software version 3.200



IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode

Software version 3.300



Drive has 2 standard (voltage outputs) and 4 expanded analog outputs (1x and 2x = volatge outputs, 3x and 4x=current outputs). Each Analog output block has the following structure.

Analog outputs / Std analog outs / Analog output 1 / An out 1 src

3570	**An out 1 src**	**N/A**	**RWS**	**IPA 4000**		**List 2**		**V-F-S-B**
	IPA 4000 NULL = Default It allows to connect the selected signal to the Analog output 1(refer to signals List 2 of Pick List manual)							
3575	**An out 1 sgn src**	**N/A**	**RWS**	**IPA 4000**		**List 2**		**V-F-S-B**
	It allows to select the sign of the signal connected on analog output. *(from software rel. 3.300)*							

Analog outputs / Std analog outs / Analog output 1 / An out 1 cfg

6012	**An out 1 scale**	**N/A**	**RWS**	**1**	**-10**	**10**	**PP**	**V-F-S-B**
	Scale or multiplicative factor of Analog output 1							
6010	**An out 1 hi lim**	**[cnt]**	**RWS**	**16383**	**0**	**32767**	**PP**	**V-F-S-B**
	Analog output 1 count value aimed at obtaining +10V. Value must be higher than zero							
6011	**An out 1 lo lim**	**[cnt]**	**RWS**	**-16384**	**-32768**	**0**	**PP**	**V-F-S-B**
	Analog output 1 count value aimed at obtaining -10V. Value must be higher than zero							

Analog outputs / Std analog outs / Analog output 1 / An out 1 mon

6013	**An out 1 mon**	**[cnt]**	**R**	**0**	**-32768**	**32767**	**PP**	**V-F-S-B**
	Analog output 1 count value displaying							

Analog outputs / Std analog outs / Analog output 2 / An out 2 src

3580	**An out 2 src**	**N/A**	**RWS**	**IPA 4000**		**List 2**		**V-F-S-B**
	IPA 4000 NULL = Default It allows to connect the selected signal to the Analog output 2 (refer to signals List 2 of Pick List manual)							
3576	**An out 2 sgn src**	**N/A**	**RWS**	**IPA 4000**		**List 2**		**V-F-S-B**
	It allows to select the sign of the signal connected on analog output. *(from software rel. 3.300)*							

Analog outputs / Std analog outs / Analog output 2 / An out 2 cfg

6017	**An out 2 scale**	**N/A**	**RWS**	**1**	**-10**	**10**	**PP**	**V-F-S-B**
	Scale or multiplicative factor of Analog output 2							
6015	**An out 2 hi lim**	**[cnt]**	**RWS**	**16383**	**0**	**32767**	**PP**	**V-F-S-B**
	Analog output 2 count value aimed at obtaining +10V. Value must be higher than zero							
6016	**An out 2 lo lim**	**[cnt]**	**RWS**	**-16384**	**-32768**	**0**	**PP**	**V-F-S-B**
	Analog output 2 count value aimed at obtaining -10V. Value must be higher than zero							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
Analog outputs / Std analog outs / Analog output 2 / An out 2 mon								
6018	**An out 2 mon** Analog output 2 count value displaying	**[cnt]**	**R**	**0.00**	**-32768**	**32676**	**PP**	**V-F-S-B**
Analog outputs / Exp analog outs / Analog output 1X / An out 1X src								
4090	**An out 1X src** IPA 4000 NULL = Default It allows to connect the selected signal to the Analog output 1X (refer to signals List 2 of Pick List manual)	**N/A**	**RWS**	**IPA 4000**		**List 2**		**V-F-S-B**
Analog outputs / Exp analog outs / Analog output 1X / An out 1X cfg								
6022	**An out 1X scale** Scale or multiplicative factor of Analog output 1X	**N/A**	**RWS**	**1**	**-10**	**10**	**PP**	**V-F-S-B**
6020	**An out 1X hi lim** Analog output 1X count value aimed at obtaining +10V. Value must be higher than zero	**[cnt]**	**RWS**	**16383**	**0**	**32767**	**PP**	**V-F-S-B**
6021	**An out 1X lo lim** Analog output 1X count value aimed at obtaining -10V. Value must be higher than zero	**[cnt]**	**RWS**	**-16384**	**-32768**	**0**	**PP**	**V-F-S-B**
Analog outputs / Exp analog outs / Analog output 1X / An out 1X mon								
6023	**An out 1X mon** Analog output 1X count value displaying	**[cnt]**	**R**	**0.00**	**-32768**	**32676**	**PP**	**V-F-S-B**
Analog outputs / Exp analog outs / Analog output 2X / An out 2X src								
4091	**An out 2X src** IPA 4000 NULL = Default It allows to connect the selected signal to the Analog output 2X (refer to signals List 2 of Pick List manual)	**N/A**	**RWS**	**IPA 4000**		**List 2**		**V-F-S-B**
Analog outputs / Exp analog outs / Analog output 2X / An out 2X cfg								
6027	**An out 2X scale** Scale or multiplicative factor of Analog output 2X	**N/A**	**RWS**	**1**	**-10**	**10**	**PP**	**V-F-S-B**
6025	**An out 2X hi lim** Analog output 2X count value aimed at obtaining +10V. Value must be higher than zero	**[cnt]**	**RWS**	**16383**	**0**	**32767**	**PP**	**V-F-S-B**
6026	**An out 2X lo lim** Analog output 2X count value aimed at obtaining -10V. Value must be higher than zero	**[cnt]**	**RWS**	**-16384**	**-32768**	**0**	**PP**	**V-F-S-B**
Analog outputs / Exp analog outs / Analog output 2X / An out 2X mon								
6028	**An out 2X mon** Analog output 2X count value displaying	**[cnt]**	**R**	**0.00**	**-32768**	**32676**	**PP**	**V-F-S-B**
Analog outputs / Exp analog outs / Analog output 3X / An out 3X src								
4092	**An out 3X src** IPA 4000 NULL = Default It allows to connect the selected signal to the Analog output 3X (refer to signals List 2 of Pick List manual)	**N/A**	**RWS**	**IPA 4000**		**List 2**		**V-F-S-B**
Analog outputs / Exp analog outs / Analog output 3X / An out 3X cfg								
6034	**An out 3X type** 0 0..20 mA 1 4..20 mA It allows to select the Analog output 3X type (EXP-D20A6 optional card is required)	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
6032	**An out 3X scale**	**N/A**	**RWS**	**1**	**-10**	**10**	**PP**	**V-F-S-B**
	Scale or multiplicative factor of Analog output 3X							
6030	**An out 3X hi lim**	**[cnt]**	**RWS**	**16383**	**0**	**32767**	**PP**	**V-F-S-B**
	Analog output 3X count value aimed at obtaining +10V. Value must be higher than zero							
6031	**An out 3X lo lim**	**[cnt]**	**RWS**	**-16384**	**-32768**	**0**	**PP**	**V-F-S-B**
	Analog output 3X count value aimed at obtaining -10V. Value must be higher than zero							

Analog outputs / Exp analog outs / Analog output 3X / An out 3X mon

6033	**An out 3X mon**	**[cnt]**	**R**	**0.00**	**-32768**	**32676**	**PP**	**V-F-S-B**
	Analog output 3X count value displaying							

Analog outputs / Exp analog outs / Analog output 4X / An out 4X src

4093	**An out 4X src**	**N/A**	**RWS**	**IPA 4000**		**List 2**		**V-F-S-B**
	IPA 4000 NULL = Default It allows to connect the selected signal to the Analog output 4X (refer to signals List 2 of Pick List manual)							

Analog outputs / Exp analog outs / Analog output 4X / An out 4X cfg

6039	**An out 4x type**	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
	0 0..20 mA 1 4..20 mA It allows to select the Analog output 4X type (EXP-D20A6 optional card is required)							
6037	**An out 4X scale**	**N/A**	**RWS**	**1**	**-10**	**10**	**PP**	**V-F-S-B**
	Scale or multiplicative factor of Analog output 4X							
6035	**An out 4X hi lim**	**[cnt]**	**RWS**	**16383**	**0**	**32767**	**PP**	**V-F-S-B**
	Analog output 4X count value aimed at obtaining +10V. Value must be higher than zero							
6036	**An out 4X lo lim**	**[cnt]**	**RWS**	**-16384**	**-32768**	**0**	**PP**	**V-F-S-B**
	Analog output 4X count value aimed at obtaining -10V. Value must be higher than zero							

Analog outputs / Exp analog outs / Analog output 4X / An out 4X mon

6038	**An out 4X mon**	**[cnt]**	**R**	**0.00**	**-32768**	**32676**	**PP**	**V-F-S-B**
	Analog output 4X count value displaying							

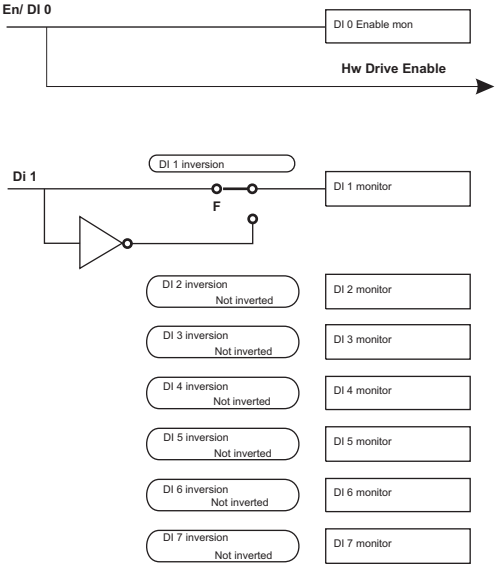
Analog outputs / Exp analog outs / Exp ana out en

3901	**Exp ana out en**	**N/A**	**RWS**	**0**	**0**	**1**	**DV**	**V-F-S-B**
	0 Disabled 1 Enabled It enables the expanded analog outputs							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode

I/O CONFIG / Digital inputs

Digital Input Block function allows to invert the signal on the terminal strip.
For example, if the potential available on the terminal strip is +24V, and the inversion is disabled (not inverted) the input state is 1 (ONE), standard configuration; if the inversion is enabled (inversion) the input state is 0 (NULL). The Drive ENABLE is set on the "Digital input 0"; such condition can not be changed as it is performed via the hardware.
Its function, anyway, can be combined with a command signal in the sources of the other Blocks. "DI 0 Enable mon" signal (Digital input 0 signal) is available in the "List 3".



I/O CONFIG / Digital inputs / Std digital inps / Std dig inp cfg

4011	**DI 1 inversion**	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
	0 Not inverted							
	1 Inverted							
4012	**DI 2 inversion**	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
	0 Not inverted							
	1 Inverted							
4013	**DI 3 inversion**	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
	0 Not inverted							
	1 Inverted							
4014	**DI 4 inversion**	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
	0 Not inverted							
	1 Inverted							
4015	**DI 5 inversion**	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
	0 Not inverted							
	1 Inverted							
4016	**DI 6 inversion**	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
	0 Not inverted							
	1 Inverted							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
4017	**DI 7 inversion**	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
	0 Not inverted							
	1 Inverted							
I/O CONFIG / Digital inputs / Std digital inps / Std dig inp mon								
4020	**DI 0 Enable mon**	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
	Enable terminal displaying							
4021	**DI 1 monitor**	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
	Digital Input 1 terminal displaying							
4022	**DI 2 monitor**	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
	Digital Input 2 terminal displaying							
4023	**DI 3 monitor**	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
	Digital Input 3 terminal displaying							
4024	**DI 4 monitor**	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
	Digital Input 4 terminal displaying							
4025	**DI 5 monitor**	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
	Digital Input 5 terminal displaying							
4026	**DI 6 monitor**	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
	Digital Input 6 terminal displaying							
Digital Input 6 terminal displaying								
4027	**DI 7 monitor**	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
	Digital Input 7 terminal displaying							
4028	**DI 7654321E**	**N/A**	**R**	**0**	**0**	**-**	**DP**	**V-F-S-B**
	Standard digital inputs displaying. Under each number the logical state of each single input is displayed.							
I/O CONFIG / Digital inputs / Exp digital inps / Exp dig inp cfg								
4030	**DI 0X inversion**	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
	0 Not inverted							
	1 Inverted							
4031	**DI 1X inversion**	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
	0 Not inverted							
	1 Inverted							
4032	**DI 2X inversion**	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
	0 Not inverted							
	1 Inverted							
4033	**DI 3X inversion**	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
	0 Not inverted							
	1 Inverted							
4034	**DI 4X inversion**	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
	0 Not inverted							
	1 Inverted							
4035	**DI 5X inversion**	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
	0 Not inverted							
	1 Inverted							
4036	**DI 6X inversion**	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
	0 Not inverted							
	1 Inverted							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
4037	**DI 7X inversion** 0 Not inverted 1 Inverted	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
4038	**DI 8X inversion** 0 Not inverted 1 Inverted	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
4039	**DI 9X inversion** 0 Not inverted 1 Inverted	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
4040	**DI 10X inversion** 0 Not inverted 1 Inverted	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
4041	**DI 11X inversion** 0 Not inverted 1 Inverted	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
I/O CONFIG / Digital inputs / Exp digital inps / Exp dig inp mon								
4045	**DI 0X monitor** Digital Input 0X terminal displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
4046	**DI 1X monitor** Digital Input 1X terminal displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
4047	**DI 2X monitor** Digital Input 2X terminal displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
4048	**DI 3X monitor** Digital Input 3X terminal displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
4049	**DI 4X monitor** Digital Input 4X terminal displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
4050	**DI 5X monitor** Digital Input 5X terminal displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
4051	**DI 6X monitor** Digital Input 6X terminal displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
4052	**DI 7X monitor** Digital Input 7X terminal displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
4053	**DI 8X monitor** Digital Input 8X terminal displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
4054	**DI 9X monitor** Digital Input 9X terminal displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
4055	**DI 10X monitor** Digital Input 10X terminal displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
4056	**DI 11X monitor** Digital Input 11X terminal displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
4057	**DIX BA9876543210** Expanded digital inputs displaying. Under each number the logical state of each single input is displayed.	**N/A**	**R**	**0**	**0**	**-**	**DV**	**V-F-S-B**

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
I/O CONFIG / Digital inputs / Exp dig inp en								
3902	**Exp dig inp en** 0 Disabled 1 Enabled It enables the expanded digital inputs	**N/A**	**RWS**	**0**	**0**	**1**	**DV**	**V-F-S-B**

I/O CONFIG / Digital inputs / Destinations

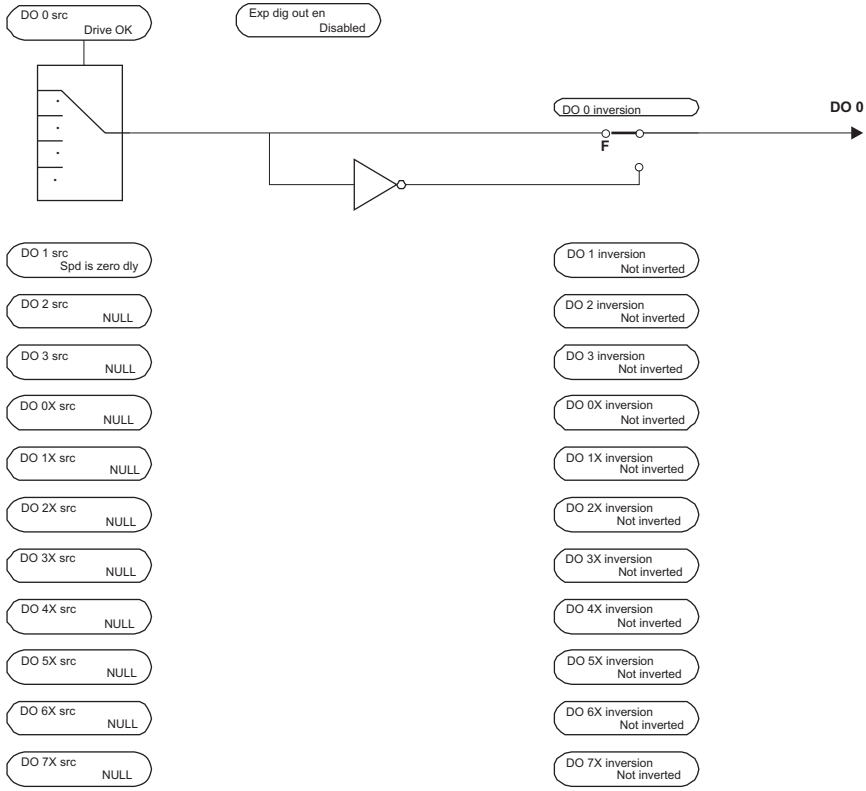
This read-only menu allows the user to see where the Digital inputs are connected. If more then one source is connected to the Digital Input, only first one is shown. If no sources are connected the message “Not used” is displayed.

4505	**DI 0 Enable dst** It displays the Digital Input 0 (Enable) destination
4506	**DI 1 dst** It displays the Digital Input 1 destination
4507	**DI 2 dst** It displays the Digital Input 2 destination
4508	**DI 3 dst** It displays the Digital Input 3 destination
4509	**DI 4 dst** It displays the Digital Input 4 destination
4510	**DI 5 dst** It displays the Digital Input 5 destination
4511	**DI 6 dst** It displays the Digital Input 6 destination
4512	**DI 7 dst** It displays the Digital Input 7 destination
4513	**DI 0X dst** It displays the Digital Input 0X destination
4514	**DI 1X dst** It displays the Digital Input 1X destination
4515	**DI 2X dst** It displays the Digital Input 2X destination
4516	**DI 3X dst** It displays the Digital Input 3X destination
4517	**DI 4X dst** It displays the Digital Input 4X destination
4518	**DI 5X dst** It displays the Digital Input 5X destination
4519	**DI 6X dst** It displays the Digital Input 6X destination
4520	**DI 7X dst** It displays the Digital Input 7X destination
4521	**DI 8X dst** It displays the Digital Input 8X destination
4522	**DI 9X dst** It displays the Digital Input 9X destination
4523	**DI 10X dst** It displays the Digital Input 10X destination
4524	**DI 11X dst** It displays the Digital Input 11X destination

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode

I/O CONFIG / Digital outputs

The blocks of the digital outputs allow to turn an internal signal into a signal available on the terminal strip.



I/O CONFIG / Digital outputs / Std digital outs / Std dig out src

4065 DO 0 src **N/A** **RWS** **IPA 9097List 1** **PIN** **V-F-S-B**

IPA 9097 Drive OK = Default

It allows to connect the selected signal to the Digital output 0 and it can also defines the conditions that the relay contacts will close. For example:

Drive OK The contact closes when the drive is powered up with no failure alarms.

Drive Ready The contact closes when the following conditions are fulfilled:

- The drive is powered up
- There are no failure alarms present
- The drive is enabled. The enable operation is defined by parameters [En/disable mode] & [Commands sel]
- The magnetizing procedure has been completed (Drive is ready to deliver torque)

NOTE! The contact opens immediately on a drive failure, or when the drive is disabled.

(refer to signals List 1 of Pick List manual)

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
4066	**DO 1 src**	**N/A**	**RWS**	**IPA 7123**		**List 1**	**PIN**	**V-F-S-B**
	IPA 7123 BRAKE cont mon = Default It allows to connect the selected signal to the Digital output 2 (refer to signals List 1 of Pick List manual)							
4067	**DO 2 src**	**N/A**	**RWS**	**IPA 161**		**List 1**	**PIN**	**V-F-S-B**
	IPA 161 Drive ready = Default It allows to connect the selected signal to the Digital output 3 (refer to signals List 1 of Pick List manual)							
4068	**DO 3 src**	**N/A**	**RWS**	**IPA 3728**		**List 1**	**PIN**	**V-F-S-B**
	IPA 3728 Speed is zero = Default It allows to connect the selected signal to the Digital output 2 (refer to signals List 1 of Pick List manual)							
I/O CONFIG / Digital outputs / Std digital outs / Std dig out cfg								
4060	**DO 0 inversion** 0 Not inverted 1 Inverted	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
4061	**DO 1 inversion** 0 Not inverted 1 Inverted	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
4062	**DO 2 inversion** 0 Not inverted 1 Inverted	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
4063	**DO 3 inversion** 0 Not inverted 1 Inverted	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
I/O CONFIG / Digital outputs / Std digital outs / Std dig out mon								
4064	**DO 3210** The digital output logical state is displayed under each number	**N/A**	**RWS**	**0**	**0**	**-**	**DP**	**V-F-S-B**
I/O CONFIG / Digital outputs / Exp digital outs / Exp dig out src								
4080	**DO 0X src**	**N/A**	**RWS**	**IPA 7122**		**List 1**	**PIN**	**V-F-S-B**
	IPA 7122 RUN cont mon = Default It allows to connect the selected signal to the Digital output 0X (refer to signals List 1 of Pick List manual)							
4081	**DO 1X src**	**N/A**	**RWS**	**IPA 7120**		**List 1**	**PIN**	**V-F-S-B**
	IPA 7120 UP cont mon = Default It allows to connect the selected signal to the Digital output 1X (refer to signals List 1 of Pick List manual)							
4082	**DO 2X src**	**N/A**	**RWS**	**IPA 7121**		**List 1**	**PIN**	**V-F-S-B**
	IPA 7121 DOWN cont mon = Default It allows to connect the selected signal to the Digital output 2X (refer to signals List 1 of Pick List manual)							
4083	**DO 3X src**	**N/A**	**RWS**	**IPA 7139**		**List 1**	**PIN**	**V-F-S-B**
	IPA 7139 Door open mon = Default It allows to connect the selected signal to the Digital output 2X (refer to signals List 1 of Pick List manual)							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
4084	**DO 4X src** IPA 4000 NULL = Default It allows to connect the selected signal to the Digital output 4X (refer to signals List 1 of Pick List manual)	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**
4085	**DO 5X src** IPA 4000 NULL = Default It allows to connect the selected signal to the Digital output 5X (refer to signals List 1 of Pick List manual)	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**
4086	**DO 6X src** IPA 4000 NULL = Default It allows to connect the selected signal to the Digital output 6X (refer to signals List 1 of Pick List manual)	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**
4087	**DO 7X src** IPA 4000 NULL = Default It allows to connect the selected signal to the Digital output 7X (refer to signals List 1 of Pick List manual)	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**
I/O CONFIG / Digital outputs / Exp digital outs / Exp dig out cfg								
4070	**DO 0X inversion** 0 Not inverted 1 Inverted	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
4071	**DO 1X inversion** 0 Not inverted 1 Inverted	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
4072	**DO 2X inversion** 0 Not inverted 1 Inverted	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
4073	**DO 3X inversion** 0 Not inverted 1 Inverted	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
4074	**DO 4X inversion** 0 Not inverted 1 Inverted	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
4075	**DO 5X inversion** 0 Not inverted 1 Inverted	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
4076	**DO 6X inversion** 0 Not inverted 1 Inverted	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
4077	**DO 7X inversion** 0 Not inverted 1 Inverted	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
I/O CONFIG / Digital outputs / Exp digital outs / Exp dig out mon								
4078	**DOX 76543210** The digital output logical state (of expansion board) is displayed under each number.	**N/A**	**R**	**0**	**0**	**-**	**DP**	**V-F-S-B**

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode

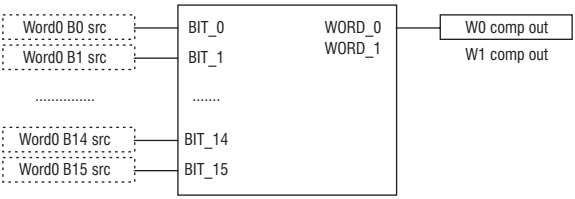
I/O CONFIG / Digital outputs / Exp dig out en

3903	**Exp dig out en**	**N/A**	**RWS**	**0**	**0**	**1**	**DV**	**V-F-S-B**

0 Disabled
1 Enabled
It enables the expanded digital outputs

I/O CONFIG / Bits->Word

The Word Composing Block, “Bits->Word”, is useful to communicate, for example, between Drive and APC card: it is possible to compose a word made of *Drive ready*, *Drive ok*, *Ref is zero*, *Speed is zero*, by communicating on a single word.
The Bits->Wordn Block has 16 inputs, where each of them can be connected to a signal; the output of the *Word compn* Block contains the packed input bits.
Two “Bits->Word” blocks are available.



I/O CONFIG / Bits->Word / Bits->Word0 src

2100	**Word0 B0 src**	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**

IPA 4000 NULL = Default
It allows to connect the Bit 0 signal selected to the Word 0
(refer to signals List 1 of Pick List manual)

2101	**Word0 B1 src**	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**

IPA 4000 NULL = Default
It allows to connect the Bit 1 signal selected to the Word 0
(refer to signals List 1 of Pick List manual)

2102	**Word0 B2 src**	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**

IPA 4000 NULL = Default
It allows to connect the Bit 2 signal selected to the Word 0
(refer to signals List 1 of Pick List manual)

2103	**Word0 B3 src**	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**

IPA 4000 NULL = Default
It allows to connect the Bit 3 signal selected to the Word 0
(refer to signals List 1 of Pick List manual)

2104	**Word0 B4 src**	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**

IPA 4000 NULL = Default
It allows to connect the Bit 4 signal selected to the Word 0
(refer to signals List 1 of Pick List manual)

2105	**Word0 B5 src**	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**

IPA 4000 NULL = Default
It allows to connect the Bit 5 signal selected to the Word 0
(refer to signals List 1 of Pick List manual)

2106	**Word0 B6 src**	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**

IPA 4000 NULL = Default
It allows to connect the Bit 6 signal selected to the Word 0
(refer to signals List 1 of Pick List manual)

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
2107	**Word0 B7 src**	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**
	IPA 4000 NULL = Default It allows to connect the Bit 7 signal selected to the Word 0 (refer to signals List 1 of Pick List manual)							
2108	**Word0 B8 src**	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**
	IPA 4000 NULL = Default It allows to connect the Bit 8 signal selected to the Word 0 (refer to signals List 1 of Pick List manual)							
2109	**Word0 B9 src**	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**
	IPA 4000 NULL = Default It allows to connect the Bit 9 signal selected to the Word 0 (refer to signals List 1 of Pick List manual)							
2110	**Word0 B10 src**	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**
	IPA 4000 NULL = Default It allows to connect the Bit 10 signal selected to the Word 0 (refer to signals List 1 of Pick List manual)							
2111	**Word0 B11 src**	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**
	IPA 4000 NULL = Default It allows to connect the Bit 11 signal selected to the Word 0 (refer to signals List 1 of Pick List manual)							
2112	**Word0 B12 src**	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**
	IPA 4000 NULL = Default It allows to connect the Bit 12 signal selected to the Word 0 (refer to signals List 1 of Pick List manual)							
2113	**Word0 B13 src**	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**
	IPA 4000 NULL = Default It allows to connect the Bit 13 signal selected to the Word 0 (refer to signals List 1 of Pick List manual)							
2114	**Word0 B14 src**	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**
	IPA 4000 NULL = Default It allows to connect the Bit 14 signal selected to the Word 0 (refer to signals List 1 of Pick List manual)							
2115	**Word0 B15 src**	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**
	IPA 4000 NULL = Default It allows to connect the Bit 15 signal selected to the Word 0 (refer to signals List 1 of Pick List manual)							
I/O CONFIG / Bits->Word / Bits->Word0 mon								
2116	**W0 comp out**	**N/A**	**R**	**0**	**0**	**-**	**DV**	**V-F-S-B**
	Monitor for the hexadecimal output value of “Word 0”							
I/O CONFIG / Bits->Word / Bits->Word1 src								
9340	**Word1 B0 src**	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**
	IPA 4000 NULL = Default It allows to connect the Bit 0 signal selected to the Word 1 (refer to signals List 1 of Pick List manual)							
9341	**Word1 B1 src**	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**
	IPA 4000 NULL = Default It allows to connect the Bit 1 signal selected to the Word 1 (refer to signals List 1 of Pick List manual)							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
9342	**Word1 B2 src** IPA 4000 NULL = Default It allows to connect the Bit 2 signal selected to the Word 1 (refer to signals List 1 of Pick List manual)	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**
9343	**Word1 B3 src** IPA 4000 NULL = Default It allows to connect the Bit 3 signal selected to the Word 1 (refer to signals List 1 of Pick List manual)	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**
9344	**Word1 B4 src** IPA 4000 NULL = Default It allows to connect the Bit 4 signal selected to the Word 1 (refer to signals List 1 of Pick List manual)	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**
9345	**Word1 B5 src** IPA 4000 NULL = Default It allows to connect the Bit 5 signal selected to the Word 1 (refer to signals List 1 of Pick List manual)	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**
9346	**Word1 B6 src** IPA 4000 NULL = Default It allows to connect the Bit 5 signal selected to the Word 1 (refer to signals List 1 of Pick List manual)	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**
9347	**Word1 B7 src** IPA 4000 NULL = Default It allows to connect the Bit 7 signal selected to the Word 1 (refer to signals List 1 of Pick List manual)	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**
9348	**Word1 B8 src** IPA 4000 NULL = Default It allows to connect the Bit 8 signal selected to the Word 1 (refer to signals List 1 of Pick List manual)	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**
9349	**Word1 B9 src** IPA 4000 NULL = Default It allows to connect the Bit 9 signal selected to the Word 1 (refer to signals List 1 of Pick List manual)	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**
9350	**Word1 B10 src** IPA 4000 NULL = Default It allows to connect the Bit 10 signal selected to the Word 1 (refer to signals List 1 of Pick List manual)	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**
9351	**Word1 B11 src** IPA 4000 NULL = Default It allows to connect the Bit 11 signal selected to the Word 1 (refer to signals List 1 of Pick List manual)	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**
9352	**Word1 B12 src** IPA 4000 NULL = Default It allows to connect the Bit 12 signal selected to the Word 1 (refer to signals List 1 of Pick List manual)	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**
9353	**Word1 B13 src** IPA 4000 NULL = Default It allows to connect the Bit 13 signal selected to the Word 1 (refer to signals List 1 of Pick List manual)	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**

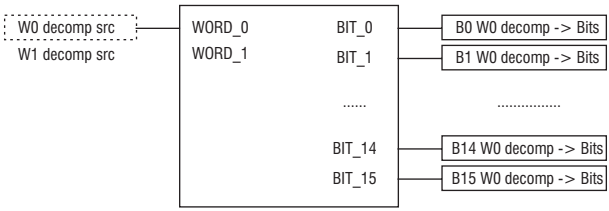
IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
9354	**Word1 B14 src**	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**
	IPA 4000 NULL = Default It allows to connect the Bit 14 signal selected to the Word 1 (refer to signals List 1 of Pick List manual)							
9355	**Word1 B15 src**	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**
	IPA 4000 NULL = Default It allows to connect the Bit 15 signal selected to the Word 1 (refer to signals List 1 of Pick List manual)							

I/O CONFIG / Bits->Word / Bits->Word1 mon

9356	**W1 comp out**	**N/A**	**R**	**0**	**0**	**-**	**DV**	**V-F-S-B**
	Monitor for the hexadecimal output value of “Word 1”							

I/O CONFIG / Word->Bits

The Word Decomposing Block, “Word->Bits”, allows to set some signals on a digital word; each signal composing the word, on the Block input, can be combined with an output channel.
It is useful to communicate, for example, between APC card and Drive.
The “Wordn->Bits” block has an input word and 16 Bx Wn decomp output bits.
Two “Word->Bits” blocks are available.



I/O CONFIG / Word->Bits / Word0->Bits src

2120	**W0 decomp src**	**N/A**	**RWS**	**IPA 2121**		**List 26**	**PIN**	**V-F-S-B**
	IPA 2121 W0 decomp inp = Default It allows to connect the word that will be input to decomposing block (refer to signals List 26 of Pick List manual)							

I/O CONFIG / Word->Bits / Word0->Bits cfg

2121	**W0 decomp inp**	**N/A**	**RWS**	**0X0000**	**-**	**-**	**DV**	**V-F-S-B**
	It allows to set the “W0 decomp inp” value							

I/O CONFIG / Word->Bits / Word0->Bits mon

2122	**W0 decomp mon**	**N/A**	**R**	**0**	**0**	**-**	**DP**	**V-F-S-B**
	Monitor of the hexadecimal input value of the Word 0 decomposed							
2123	**B0 W0 decomp**	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
	Bit 0 of Word 0 decomposed displaying							
2124	**B1 W0 decomp**	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
	Bit 1 of Word 0 decomposed displaying							
2125	**B2 W0 decomp**	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
	Bit 2 of Word 0 decomposed displaying							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
2126	**B3 W0 decomp** Bit 3 of Word 0 decomposed displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
2127	**B4 W0 decomp** Bit 4 of Word 0 decomposed displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
2128	**B5 W0 decomp** Bit 5 of Word 0 decomposed displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
2129	**B6 W0 decomp** Bit 6 of Word 0 decomposed displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
2130	**B7 W0 decomp** Bit 7 of Word 0 decomposed displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
2131	**B8 W0 decomp** Bit 8 of Word 0 decomposed displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
2132	**B9 W0 decomp** Bit 9 of Word 0 decomposed displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
2133	**B10 W0 decomp** Bit 10 of Word 0 decomposed displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
2134	**B11 W0 decomp** Bit 11 of Word 0 decomposed displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
2135	**B12 W0 decomp** Bit 12 of Word 0 decomposed displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
2136	**B13 W0 decomp** Bit 13 of Word 0 decomposed displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
2137	**B14 W0 decomp** Bit 14 of Word 0 decomposed displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
2138	**B15 W0 decomp** Bit 15 of Word 0 decomposed displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
I/O CONFIG / Word->Bits / Word1->Bits src								
9361	**W1 decomp src** IPA 9360 W1 decomp inp = Default It allows to connect the word that will be input to decomposing block (refer to signals List 27 of Pick List manual)	**N/A**	**RWS**	**IPA 9360**		**List 27**	**PIN**	**V-F-S-B**
I/O CONFIG / Word->Bits / Word1->Bits cfg								
9360	**W1 decomp inp** It allows to set the “W1 decomp inp” value	**N/A**	**RWS**	**0X0000**	**-**	**-**	**DV**	**V-F-S-B**
I/O CONFIG / Word->Bits / Word1->Bits mon								
9362	**W1 decomp mon** Monitor of the hexadecimal input value of the Word 1 decomposed	**N/A**	**R**	**0**	**0**	**-**	**DP**	**V-F-S-B**
9363	**B0 W1 decomp** Bit 0 of Word 1 decomposed displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
9364	**B1 W1 decomp** Bit 1 of Word 1 decomposed displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
9365	**B2 W1 decomp** Bit 2 of Word 1 decomposed displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
9366	**B3 W1 decomp** Bit 3 of Word 1 decomposed displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
9367	**B4 W1 decomp** Bit 4 of Word 1 decomposed displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
9368	**B5 W1 decomp** Bit 5 of Word 1 decomposed displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
9369	**B6 W1 decomp** Bit 6 of Word 1 decomposed displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
9370	**B7 W1 decomp** Bit 7 of Word 1 decomposed displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
9371	**B8 W1 decomp** Bit 8 of Word 1 decomposed displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
9372	**B9 W1 decomp** Bit 9 of Word 1 decomposed displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
9373	**B10 W1 decomp** Bit 10 of Word 1 decomposed displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
9374	**B11 W1 decomp** Bit 11 of Word 1 decomposed displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
9375	**B12 W1 decomp** Bit 12 of Word 1 decomposed displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
9376	**B13 W1 decomp** Bit 13 of Word 1 decomposed displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
9377	**B14 W1 decomp** Bit 14 of Word 1 decomposed displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
9378	**B15 W1 decomp** Bit 15 of Word 1 decomposed displaying	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**

SAVE PARAMETERS

AVyL drive allows two different commands to save the parameters modified in the regulation mode selected:
- by STARTUP menu, “Save Config?” command
- by all other menus, “SAVE PARAMETERS” command

Any changes made in STARTUP menu require “Save Config?” command, which saves all entire regulation mode selected.
It is recommended every time the user made any changes into STARTUP menu.
“SAVE PARAMETERS” command saves all the changes made out of STARTUP menu only.
When on the keypad display appears blinking message “Use Save Config”, use “Save Config?” command

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode

ALARM CONFIG

The access to ALARM CONFIG menu is allowed by Level 1 password: 12345. It must to be set in the SERVICE menu.
In the ALARM CONFIG menu it is possible to configure Drive alarms behavior through the following functions:

- Activity — It allows to set the action to be performed after the alarm intervention as:

0	Only msg alarmq	Actions: Message
1	Ignore	Actions: none
2	Warning	Actions: Message – Status
3	Disable drive	Actions: Message – Commands for SM – Status
4	Stop	Actions: Message – Commands for SM – Status
5	Fast stop	Actions: Message – Commands for SM – Status
6	Curr limstop	Actions: Message – Commands for SM – Status

Actions meaning:

Message	It means that the message has been sent to the “Alarm List”and to the “Alarm log list”.
Commands for SM	State Machine commands : A change in the drive state has been forced (alarm intervention).
Status	The active alarm signal is immediately set; it is reset when the alarm is not more present and the state machine is not in an alarm condition.

- Restart — It allows to enable the automatic start after the alarm cause has been removed.
  0 Off
  1 On
- Restart Time — It allows to set a period of time, within which the alarm state has to be removed, in order to perform an automatic start.
- Hold Off Time — It allows to set a period of time, in which a specific alarm condition has to remain active (it has to persist) in order to be considered an alarm situation.
  It is possible to set a millisecond period of time, in which the Drive does not recognize the alarm state. Therefore, the alarm is recognized only if it persists for a period longer than the set “Hold off time”

ALARM CONFIG / Fault reset

9076	**Fault reset src**	**N/A**	**RWS**	**IPA 4027**		**List 3**	**PIN**	**V-F-S-B**

IPA 4027 DI 7 monitor = Default
By using the “Fault reset src” source, it is possible to select the origin of the “reset” command signal, for example a command via the terminal strip through a digital Input
(refer to signals List 3 of Pick List manual)

ALARM CONFIG / Undervoltage

It trips when the voltage on the drive DC link is lower than the minimum threshold according to the Mains voltage setting

9050	**UV restart**	**N/A**	**RWS**	**1**	**0**	**1**	**DP**	**V-F-S-B**

0 off
1 on
Undervoltage restart

9051	**UV restart time**	**[ms]**	**RWS**	**1000**	**0**	**30000**	**PP**	**V-F-S-B**

Undervoltage restart time

396	**UV select src**	**N/A**	**RWSZ**	**IPA 4001**		**List 3**	**PIN**	**V-F-S-B**

Source to disable Undervoltage alarm through digital input.
To be used exclusivelly with Emergency Module Supply. Main power supply must be off !

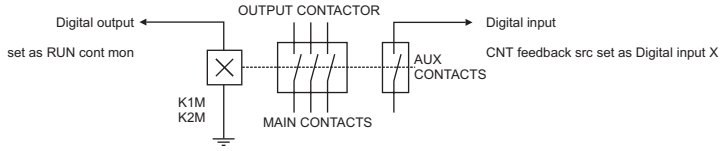
IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
ALARM CONFIG / Overvoltage								
	It trips when the voltage on the drive DC link is higher than the maximum threshold according to the Mains voltage setting							
9052	**OV restart** 0 off 1 on Overvoltage restart	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
9053	**OV restart time** Overvoltage restart time	**[ms]**	**RWS**	**1000**	**0**	**30000**	**PP**	**V-F-S-B**
ALARM CONFIG / IGBT desaturat								
	It trips when the IGBT instantaneous overcurrent is detected by gate desaturation sensing circuit							
9046	**DS restart** 0 off 1 on IGBT desaturation restart	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
9047	**DS restart time** IGBT desaturation restart time	**[ms]**	**RWS**	**1000**	**0**	**30000**	**PP**	**V-F-S-B**
ALARM CONFIG / Inst overcurrent								
	It trips when the IGBT instantaneous overcurrent is detected by output current sensor							
9063	**IOC restart** 0 off 1 on Instantaneous overcurrent restart	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
9064	**IOC restart time** Instantaneous overcurrent restart time	**[ms]**	**RWS**	**1000**	**0**	**30000**	**PP**	**V-F-S-B**
ALARM CONFIG / Ground fault								
	It trips when the output phase discharge to ground							
9640	**GF activity** 1 Ignore 2 Warning 3 Disable drive 4 Stop 5 Fast stop 6 Curr limstp Ground fault activity	**N/A**	**RWS**	**2**	**1**	**6**	**DP**	**V-F-S-B**
9641	**GF threshold** Ground fault threshold	**[A]**	**RWS**	**D.Size**	**Calc**	**D.Size**	**PP**	**V-F-S-B**
ALARM CONFIG / External fault								
	It trips when the External fault input is active							
9075	**EF src** IPA 4000 NULL = Default It allows to connect the External fault input terminal strip (refer to signals List 3 of Pick List manual)	**N/A**	**RWS**	**IPA 4023**		**List 3**	**PIN**	**V-F-S-B**
9060	**EF activity** 1 Ignore 2 Warning	**N/A**	**RWS**	**3**	**2**	**6**	**DP**	**V-F-S-B**

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
	3 Disable drive 4 Stop 5 Fast stop 6 Curr limstp External fault activity							
9061	**EF restart** 0 off 1 on External fault restart	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
9062	**EF restart time** External fault restart time	**[ms]**	**RWS**	**1000**	**0**	**30000**	**PP**	**V-F-S-B**
9600	**EF hold off** External fault hold off	**[ms]**	**RWS**	**0**	**0**	**30000**	**PP**	**V-F-S-B**
	ALARM CONFIG / Motor OT							
	Motor Over-Temperature indicated via thermal contact or PTC thermistor on 78-79 drive regulation board terminals							
9065	**MOT activity** 2 Warning 3 Disable drive 4 Stop 5 Fast stop 6 Curr limstp Motor Over-Temperature activity	**N/A**	**RWS**	**2**	**2**	**6**	**DP**	**V-F-S-B**
9066	**MOT restart** 0 off 1 on Motor Over-Temperature restart	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
9067	**MOT restart time** Motor Over-Temperature restart time	**[ms]**	**RWS**	**1000**	**0**	**30000**	**PP**	**V-F-S-B**
9603	**MOT hold off** Motor Over-Temperature hold off	**[ms]**	**RWS**	**1000**	**0**	**30000**	**PP**	**V-F-S-B**
	ALARM CONFIG / Heatsink S OT							
	Heatsink Sensor Over-Temperature (detected by a sensor)							
9054	**HTS activity** 2 Warning 3 Disable drive 4 Stop 5 Fast stop 6 Curr limstp Heatsink Sensor Over-Temperature activity	**N/A**	**RWS**	**3**	**2**	**6**	**DP**	**V-F-S-B**
9055	**HTS restart** 0 off 1 on Heatsink Sensor Over-Temperature restart	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
9056	**HTS restart time** Heatsink Sensor Over-Temperature restart time	**[ms]**	**RWS**	**1000**	**0**	**30000**	**PP**	**V-F-S-B**
9604	**HTS hold off** Heatsink Sensor Over-Temperature hold off	**[ms]**	**RWS**	**1000**	**0**	**30000**	**PP**	**V-F-S-B**

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
ALARM CONFIG / Regulation S OT								
	Regulation card Sensor Over-Temperature							
9057	**RGS activity**	**N/A**	**RWS**	**3**	**2**	**6**	**DP**	**V-F-S-B**
	2 Warning							
	3 Disable drive							
	4 Stop							
	5 Fast stop							
	6 Curr limstp							
	Regulation card Sensor Over-Temperature activity							
9058	**RGS restart**	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
	0 off							
	1 on							
	Regulation card Sensor Over-Temperature restart							
9059	**RGS restart time**	**[ms]**	**RWS**	**1000**	**0**	**30000**	**PP**	**V-F-S-B**
	Regulation card Sensor Over-Temperature restart time							
9605	**RGS hold off**	**[ms]**	**RWS**	**10000**	**0**	**30000**	**PP**	**V-F-S-B**
	Regulation card Sensor Over-Temperature hold off							
ALARM CONFIG / Intake air S OT								
	Intake air Sensor Over-Temperature (only for model AVyL 4185 and over)							
9087	**IAS activity**	**N/A**	**RWS**	**3**	**2**	**6**	**DP**	**V-F-S-B**
	2 Warning							
	3 Disable drive							
	4 Stop							
	5 Fast stop							
	6 Curr limstp							
	Intake air Sensor Over-Temperature activity							
9088	**IAS restart**	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
	0 off							
	1 on							
	Intake air Sensor Over-Temperature restart							
9089	**IAS restart time**	**[ms]**	**RWS**	**1000**	**0**	**30000**	**PP**	**V-F-S-B**
	Intake air Sensor Over-Temperature restart time							
9606	**IAS hold off**	**[ms]**	**RWS**	**10000**	**0**	**30000**	**PP**	**V-F-S-B**
	Intake air Sensor Over-Temperature hold off							

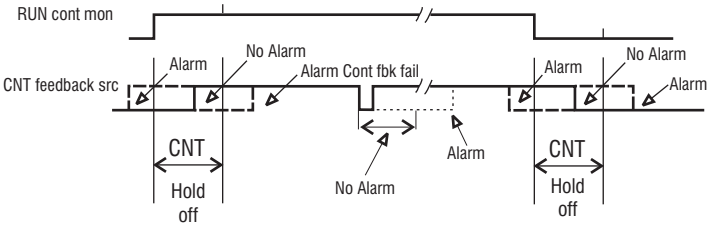
ALARM CONFIG / Contact feedback

It trips when the contact feedback signal is not detected .
Can be used to monitor the status of output contactor and give alarm if command and feedback don't match.



7141	**CNT feedback src**	**N/A**	**RWS**	**IPA 7122**		**List 3**	**PIN**	**V-F-S-B**
	IPA 7122 RUN cont mon = Default							
	It allows to select the origin of Contact feedback signal							
	(refer to signals List 3 of Pick List manual)							

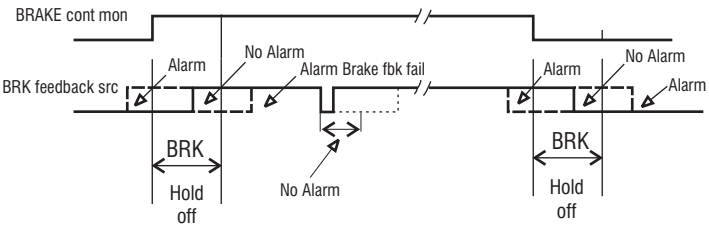
IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
9068	**CNT activity**	**N/A**	**RWS**	**3**	**1**	**6**	**DP**	**V-F-S-B**
	1 Ignore							
	2 Warning							
	3 Disable drive							
	4 Stop							
	5 Fast stop							
	6 Curr limstp							
	Contact feedback alarm activity							
7135	**CNT hold off**	**[ms]**	**RWS**	**1000**	**0**	**30000**	**PP**	**V-F-S-B**
	Contact feedback hold off							



ALARM CONFIG / Brake feedback

It trips when the brake feedback signal is not detected

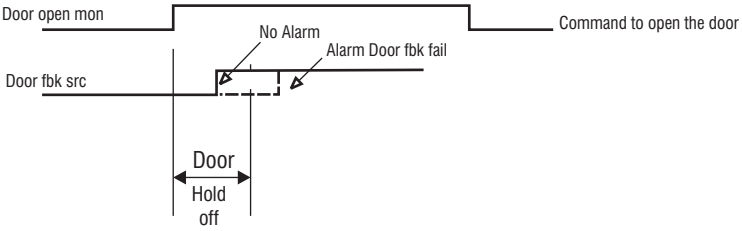
7142	**BRK feedback src**	**N/A**	**RWS**	**IPA 7123**		**List 3**	**PIN**	**V-F-S-B**
	IPA 7123 BRAKE cont mon = Default							
	It allows to select the origin of Brake feedback signal (refer to signals List 3 of Pick List manual)							
9086	**BRK activity**	**N/A**	**RWS**	**3**	**1**	**6**	**DP**	**V-F-S-B**
	1 Ignore							
	2 Warning							
	3 Disable drive							
	4 Stop							
	5 Fast stop							
	6 Curr limstp							
	Brake feedback alarm activity							
7136	**BRK hold off**	**[ms]**	**RWS**	**1000**	**0**	**30000**	**PP**	**V-F-S-B**
	Brake feedback hold off							



NOTE! During brake active state eventual alarms are latched and are reported only in brake idle state, see IPA 7145.

7145	**BRK RUN hold off**	**N/A**	**RNS**	**1**	**0**	**1**	**DP**	**V-F-S-B**
	Brake feedback holdoff configuration.							
	0 Off brake feedback trip is reported immediately							
	1 On eventual brake feedback trip is reported at the end of run. This allows the car to arrive at floor in case of faulty brake status switch.							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
ALARM CONFIG / Brake feedback / Door feedback								
7144	**Door fbk src** IPA 7139 Door open mon = Default. (Refer to signals List 3 of Pick List manual) Source to provide Feedback to check status of the command provided through the input.	**N/A**	**RWS**	**IPA 7139**		**List 3**	**PIN**	**V-F-S-B**
9099	**Door activity** 1 Ignore 2 Warning 3 Disable drive 4 Stop 5 Fast stop 6 Curr limstp Door feedback alarm activity. (from software rel. 3.300)	**N/A**	**RWS**	**3**	**1**	**6**	**DP**	**V-F-S-B**
7137	**Door hold off** Alarm hold off time: during this time mismatch in command and feedback is ignored.	**[ms]**	**RWS**	**200**	**0.00**	**65535**	**PP**	**V-F-S-B**



ALARM CONFIG / Comm card fault								
It trips when LAN communication is interrupted (LAN communication between drive and Field Bus optional card)								
9074	**CCF activity** 2 Warning 3 Disable drive 4 Stop 5 Fast stop 6 Curr limstp Comm card fault activity	**N/A**	**RWS**	**3**	**2**	**6**	**DP**	**V-F-S-B**
4200	**CCF restart** 0 off 1 on Comm card fault restart	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
4201	**CCF restart time** Comm card fault restart time	**[ms]**	**RWS**	**1000**	**0**	**30000**	**PP**	**V-F-S-B**
ALARM CONFIG / Appl card fault								
	It trips when optional coprocessor communication is interrupted (coprocessor communication between drive and APC 100 optional card)							
9049	**ACF activity** 2 Warning 3 Disable drive 4 Stop 5 Fast stop 6 Curr limstp Appl card fault activity	**N/A**	**RWS**	**3**	**2**	**6**	**DP**	**V-F-S-B**

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
ALARM CONFIG / Drive overload								
	It trips when Drive overload accumulator exceeded trip threshold							
9040	**DOL activity** 1 Ignore 2 Warning 3 Disable drive 4 Stop 5 Fast stop 6 Curr limstp Drive overload activity	**N/A**	**RWS**	**1**	**1**	**6**	**DP**	**V-F-S-B**
ALARM CONFIG / Motor overload								
	It trips when Motor overload accumulator exceeded trip threshold							
9041	**MOL activity** 1 Ignore 2 Warning 3 Disable drive 4 Stop 5 Fast stop 6 Curr limstp	**N/A**	**RWS**	**2**	**1**	**6**	**DP**	**V-F-S-B**
ALARM CONFIG / BU overload								
	It trips when Brake resistor overload accumulator exceeded trip threshold							
9071	**BUOL activity** 2 Warning 3 Disable drive 4 Stop 5 Fast stop 6 Curr limstp Braking Unit overload activity	**N/A**	**RWS**	**3**	**1**	**6**	**DP**	**V-F-S-B**
ALARM CONFIG / Overspeed								
	It trips when the speed of the motor exceeded speed limit threshold							
9220	**OS activity** 2 Warning 3 Disable drive 4 Stop 5 Fast stop 6 Curr limstp Overspeed activity	**N/A**	**RWS**	**3**	**1**	**6**	**DP**	**V-F-S-B**
9221	**OS threshold** Overspeed threshold	**[rmp]**	**RWS**	**Calc**	**0.00**	**8192**	**PP**	**V-F-S-B**
9608	**OS hold off** Overspeed hold off	**[ms]**	**RWS**	**0**	**0**	**30000**	**PP**	**V-F-S-B**
ALARM CONFIG / Spd fbk loss								
	It trips when the speed feedback is not detected or encoder supply failed							
9042	**SFL activity** 1 Ignore 2 Warning 3 Disable drive 4 Stop 5 Fast stop 6 Curr limstp Spd fbk loss activity	**N/A**	**RWS**	**3**	**1**	**6**	**DP**	**V-F-S-B**

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
ALARM CONFIG / UV repetitive								
	It trips when more than a programmable number, with “UVR attempts” parameter, of Undervoltage faults are detected in 4 minutes (time programmable with “UVR delay” parameter)							
9043	**UVR attempts**	**N/A**	**RWS**	**5**	**1**	**1000**	**PP**	**V-F-S-B**
	It determines the number of Undervoltage faults accepted							
9044	**UVR delay**	**[sec]**	**RWS**	**240**	**1**	**262.14**	**PP**	**V-F-S-B**
	It determines the time window of “UVR attempts” parameter							
ALARM CONFIG / Hw fault								
It trips when the communication between drive regulation card and one of its option cards in not detected								
4202	**Hw fault mon**	**N/A**	**R**	**0**	**0**	**0**	**DP**	**V-F-S-B**
	0 communication OK							
	1 communication failed							

ALARM CONFIG / Alarm status

The alarm state can be reported via three Words. Each bit determines an alarm state. It is therefore possible to determine the state of 48 alarms. Each single bit can be controlled if the corresponding bit of a specific mask is set with 1, otherwise their setting is always 0.
When an alarm becomes active, the word corresponding bit is set with 1. Its setting remains equal to 1 till the alarm becomes inactive and the “State Machine or Sequencer” is not in an alarm condition (see the previous paragraphs).
If the state of a single alarm has to be controlled via an output, then only the mask needed bit has to be set with 1.
If the state of several alarms has to be controlled via an output, then the mask corresponding bits have to be set with 1.
The alarms have to be controlled by the Word itself.

Ex: the state of the External fault alarm has to be read.
Mask W1 S1 = 0x0100 => 0000 0001 0000 0000
Mask W2 S1 = 0x0000 => 0000 0000 0000 0000
Mask W3 S1 = 0x0000 => 0000 0000 0000 0000
DO 0 src = Select ipa Alm W1 S1.

The state of the Undervoltage and Overvoltage alarm has to be read.
Mask W1 S1 = 0x0100 => 0000 0000 0000 0110
Mask W2 S1 = 0x0000 => 0000 0000 0000 0000
Mask W3 S1 = 0x0000 => 0000 0000 0000 0000
DO 0 src = Select ipa Alm W1 S1.

The state of the External fault and F_R_C alarm has to be read.
Mask W1 S1 = 0x0100 => 0000 0001 0000 0000
Mask W2 S1 = 0x0000 => 0000 0000 1000 0000
DO 0 src = Select ipa Alm W1 S1
DO 1 src = Select ipa Alm W2 S1

Alarm status / Alm status cfg								
9610	**Mask W1 S1**	**N/A**	**RWS**	**0XFFF**	**0**	**-1**	**DP**	**V-F-S-B**
9611	**Mask W2 S1**	**N/A**	**RWS**	**0XFFF**	**0**	**-1**	**DP**	**V-F-S-B**
9612	**Mask W3 S1**	**N/A**	**RWS**	**0XFFF**	**0**	**-1**	**DP**	**V-F-S-B**
9614	**Mask W1 S2**	**N/A**	**RWS**	**0XFFF**	**0**	**-1**	**DP**	**V-F-S-B**
9615	**Mask W2 S2**	**N/A**	**RWS**	**0XFFF**	**0**	**-1**	**DP**	**V-F-S-B**
9616	**Mask W3 S2**	**N/A**	**RWS**	**0XFFF**	**0**	**-1**	**DP**	**V-F-S-B**
Alarm status / Alm status mon								
9630	**Alm W1 S1**	**N/A**	**R**	**0**	**0**	**Calc**	**DP**	**V-F-S-B**
9631	**Alm W2 S1**	**N/A**	**R**	**0**	**0**	**Calc**	**DP**	**V-F-S-B**
9632	**Alm W3 S1**	**N/A**	**R**	**0**	**0**	**Calc**	**DP**	**V-F-S-B**
9634	**Alm W1 S2**	**N/A**	**R**	**0**	**0**	**Calc**	**DP**	**V-F-S-B**

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
9635	Alm W2 S2	N/A	R	0	0	Calc	DP	V-F-S-B
9636	Alm W3 S2	N/A	R	0	0	Calc	DP	V-F-S-B

ALARM NAME	BIT position in the alarm Word	Code in the alarm LIST	Drive activity after Alarm	HOLD OFF	Restart	Restart time	Acknowledgment request	Msg ad alarm	DigOut
Failure supply	1	21	Dis. drive	No	No	No	Yes	Yes	Yes
Undervoltage	2	22	Dis. drive	No	Yes. logic on n° times	Yes	Yes	Yes	Yes
Overvoltage	3	23	Dis. drive	No	Yes	Yes	Yes	Yes	Yes
IGBT desaturat	4	24	Dis. drive	No	Yes. logic on 2 alarms in 30 second	Yes	Yes	Yes	Yes
Inst overcurrent	5	25	Dis. drive	No	Yes. logic on 2 alarms in 30 second	Yes	Yes	Yes	Yes
Ground fault	6	26	Prog.	No	No	No	Yes	Yes	Yes
Curr fbk loss	7	27	Dis. drive	No	No	No	Yes	Yes	Yes
External fault	8	28	Prog.	Yes. Prog.	Yes	Yes. Prog.	Yes	Yes	Yes
Spd fbk loss	9	29	Prog.	No	No	No	Yes	Yes	Yes
Module OT	10	30	Dis. drive	Yes Fixed 10 msec	No	No	Yes	Yes	Yes
Heatsink OT	11	31	Dis. drive	Yes Fixed 1000 msec			Yes	Yes	Yes
Motor OT	12	32	Prog.	Yes. Prog.	Yes	Yes. Prog.	Yes	Yes	Yes
Heatsink S OT	13	33	Prog.	Yes. Prog.	Yes	Yes. Prog.	Yes	Yes	Yes
Regulation S OT	14	34	Prog.	Yes. Prog.	Yes	Yes. Prog.	Yes	Yes	Yes
Intake air S OT	15	35	Prog.	Yes. Prog.	Yes	Yes. Prog.	Yes	Yes	Yes
Cont fbk fail	16	36	Prog.	No	Yes	No	Yes	Yes	Yes
Comm card fault	17	37	Prog.	No	Yes	Yes. Prog.	Yes	Yes	Yes
Appl card fault	18	38	Dis. drive	No	No	No	Yes	Yes	Yes
Drive overload	19	39	Prog.	No	No	No	Yes	Yes	Yes
Motor overload	20	40	Prog.	No	No	No	Yes	Yes	Yes
BU overload	21	41	Prog.	No	No	No	Yes	Yes	Yes
Data lost	22	42	Dis. drive	No	No	No	Yes	Yes	Yes
Brake fbk fail	23	43	Prog.	No	No	No	Yes	Yes	Yes
Max time	24	44	Dis. drive	No	No	No	Yes	Yes	Yes
Sequencer	25	45	Dis. drive	No	No	No	Yes	Yes	No
Door fbk fail	26	46	Prog.	Yes	No	No	Yes	Yes	Yes
Overspeed	27	47	Prog.	Yes. Prog.	No	No	Yes	Yes	Yes
UV repetitive	28	48	Dis. drive	No	No	No	Yes	Yes	Yes
IOC repetitive	29	49	Dis. drive	No	No	No	Yes	Yes	Yes
IGBTdesat repet	30	50	Dis. drive	No	No	No	Yes	Yes	Yes
WatchDog user	31	51	Dis. drive	No	No	No	Yes	Yes	Yes
Hw fail	32	52	Dis. drive	No	No	No	Yes	Yes	Yes

Alarms status

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode

COMMUNICATION

The access to COMMUNICATION menu is allowed by Level 1 password: 12345. It must be set in the SERVICE menu.

RS485: The communication protocol can be chosen between Slink4, Modbus, Jbus or ISO 1745 through the "Protocol type" parameter. Each of these protocols allow a multipoint network. See the specific protocol manual for further details.
The Drive address can be defined via the "Slave address" parameter. Editing parameter 105, "Slave address", and saving the new value perform the address change. The new address becomes active after the Drive has been switched off and then back on. A temporary address change is also possible when using the Slink4 protocol with an Slink4 command.
When using the Slink4 protocol, the RS485 serial line operates in half-duplex, where the data cannot be transmitted and received simultaneously. It is sometimes possible during the transition from transmission to reception modes, the Master (PC or PLC) reaches the reception condition after the Drive has already started to send its data package. As a consequence, the package received by the master is not correct. In order to avoid such occurrences, the "Slave res time" parameter can be adjusted to delay the drive response so the Master has sample mode switching time. This situation does not occur with the Modbus and Jbus protocols as the synchronization pause between messages is specified by the protocol and is guaranteed.

SBI: The communication with the SBI Field Bus option cards (Serial Bus Interface) is performed via two channels:

· Synchronous or Process channel (PDC Process Data Channel) for a cyclical value interchange.
· Asynchronous or Configuration channel for a low priority access to all the Drive parameters.

As for the data exchange modes between the SBI card and the Network see the SBI card documentation.
The process data exchange between the Drive and the SBI has the following structure:

- the interface is made of six writing Words and six reading Words.
- the source Drive parameter has to be defined for the six Words: "Drv -> SBI word" transmitting the data from the Drive to the SBI.
- Six Words move the data from the SBI to the Drive: "SBI -> Drv word"

For more information to see the following documents for related information on SBI:

SBI-PDP 33	Interface card Profibus- DP instruction manual
SBI-DN 33	DeviceNet card instruction manual
SBI-COP	CANopen card instruction manual

COMMUNICATION / RS485

105	**Slave address**	**N/A**	**RWS**	**1**	**0**	**255**	**DK**	**V-F-S-B**
	It define the drive slave address							
106	**Slave res time**	**N/A**	**RWS**	**1**	**0**	**255**	**DK**	**V-F-S-B**
	It define the drive slave address time							
104	**Protocol type**	**N/A**	**RWS**	**0**	**0**	**2**	**DK**	**V-F-S-B**
	0 Slink 4							
	1 Modbus							
	2 Jbus							
	3 ISO 1745							
	4 Hiperface protocol (Used to communicate with Stegmann absolute encoders)							
	It defines the drive communication protocol type							

COMMUNICATION / SBI config

8999	**SBI enable**	**N/A**	**RWS**	**0**	**0**	**1**	**DK**	**V-F-S-B**
	0 Disabled							
	1 Enabled							
	It allows to enable SBI Field Bus option cards							
	(SAVE PARAMETERS command and drive recycle power are required)							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
COMMUNICATION / SBI monitor								
8998	**Last SBI error** It defines the last found error: 0 = OK (no error) 1 = Hardware fault 2 = Bus Loss	**N/A**	**R**	**0**	**0**	**2**	**DP**	**V-F-S-B**
COMMUNICATION / Drv->SBI word								
COMMUNICATION / Drv->SBI word / Drv->SBI W src								
9010	**Drv SBI W0 src** IPA 9020 Int Drv SBI W0 = Default It allows to select the origin of Word 0 to be transmitted from Drive to SBI card (refer to signals List 40 of Pick List manual)	**N/A**	**RWS**	**IPA 9020**		**List 40**	**PIN**	**V-F-S-B**
9011	**Drv SBI W1 src** IPA 9021 Int Drv SBI W1 = Default It allows to select the origin of Word 1 to be transmitted from Drive to SBI card (refer to signals List 40 of Pick List manual)	**N/A**	**RWS**	**IPA 9021**		**List 40**	**PIN**	**V-F-S-B**
9012	**Drv SBI W2 src** IPA 9022 Int Drv SBI W2 = Default It allows to select the origin of Word 2 to be transmitted from Drive to SBI card (refer to signals List 40 of Pick List manual)	**N/A**	**RWS**	**IPA 9022**		**List 40**	**PIN**	**V-F-S-B**
9013	**Drv SBI W3 src** IPA 9023 Int Drv SBI W3 = Default It allows to select the origin of Word 3 to be transmitted from Drive to SBI card (refer to signals List 40 of Pick List manual)	**N/A**	**RWS**	**IPA 9023**		**List 40**	**PIN**	**V-F-S-B**
9014	**Drv SBI W4 src** IPA 9024 Int Drv SBI W4 = Default It allows to select the origin of Word 4 to be transmitted from Drive to SBI card (refer to signals List 40 of Pick List manual)	**N/A**	**RWS**	**IPA 9024**		**List 40**	**PIN**	**V-F-S-B**
9015	**Drv SBI W5 src** IPA 9025 Int Drv SBI W5 = Default It allows to select the origin of Word 5 to be transmitted from Drive to SBI card (refer to signals List 40 of Pick List manual)	**N/A**	**RWS**	**IPA 9025**		**List 40**	**PIN**	**V-F-S-B**
COMMUNICATION / Drv->SBI word / Drv->SBI W cfg								
9020	**Int Drv SBI W0** Internal Word 0 value configuration (default connected to Drv SBI W0 src)	**N/A**	**RWS**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
9021	**Int Drv SBI W1** Internal Word 1 value configuration (default connected to Drv SBI W1 src)	**N/A**	**RWS**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
9022	**Int Drv SBI W2** Internal Word 2 value configuration (default connected to Drv SBI W2 src)	**N/A**	**RWS**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
9023	**Int Drv SBI W3** Internal Word 3 value configuration (default connected to Drv SBI W3 src)	**N/A**	**RWS**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
9024	**Int Drv SBI W4** Internal Word 4 value configuration (default connected to Drv SBI W4 src)	**N/A**	**RWS**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
9025	**Int Drv SBI W5** Internal Word 5 value configuration (default connected to Drv SBI W5 src)	**N/A**	**RWS**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
COMMUNICATION / Drv->SBI word / Drv->SBI W mon								
9030	**Drv SBI W0 mon** Word 0 monitor of the PDC channel on the Drive output	**N/A**	**R**	**0.00**	**-**	**-**	**PP**	**V-F-S-B**
9031	**Drv SBI W1 mon** Word 1 monitor of the PDC channel on the Drive output	**N/A**	**R**	**0.00**	**-**	**-**	**PP**	**V-F-S-B**
9032	**Drv SBI W2 mon** Word 2 monitor of the PDC channel on the Drive output	**N/A**	**R**	**0.00**	**-**	**-**	**PP**	**V-F-S-B**
9033	**Drv SBI W3 mon** Word 3 monitor of the PDC channel on the Drive output	**N/A**	**R**	**0.00**	**-**	**-**	**PP**	**V-F-S-B**
9034	**Drv SBI W4 mon** Word 4 monitor of the PDC channel on the Drive output	**N/A**	**R**	**0.00**	**-**	**-**	**PP**	**V-F-S-B**
9035	**Drv SBI W5 mon** Word 5 monitor of the PDC channel on the Drive output	**N/A**	**R**	**0.00**	**-**	**-**	**PP**	**V-F-S-B**
COMMUNICATION / SBI->Drv word								
COMMUNICATION / SBI->Drv word / SBI->Drv W mon								
9000	**SBI Drv W0 mon** Word 0 monitor of the PDC channel on the Drive input	**N/A**	**R**	**0.00**	**-**	**-**	**PP**	**V-F-S-B**
9001	**SBI Drv W1 mon** Word 1 monitor of the PDC channel on the Drive input	**N/A**	**R**	**0.00**	**-**	**-**	**PP**	**V-F-S-B**
9002	**SBI Drv W2 mon** Word 2 monitor of the PDC channel on the Drive input	**N/A**	**R**	**0.00**	**-**	**-**	**PP**	**V-F-S-B**
9003	**SBI Drv W3 mon** Word 3 monitor of the PDC channel on the Drive input	**N/A**	**R**	**0.00**	**-**	**-**	**PP**	**V-F-S-B**
9004	**SBI Drv W4 mon** Word 4 monitor of the PDC channel on the Drive input	**N/A**	**R**	**0.00**	**-**	**-**	**PP**	**V-F-S-B**
9005	**SBI Drv W5 mon** Word 5 monitor of the PDC channel on the Drive input	**N/A**	**R**	**0.00**	**-**	**-**	**PP**	**V-F-S-B**

SAVE PARAMETERS

AVyL drive allows two different commands to save the parameters modified in the regulation mode selected:
- by STARTUP menu, “Save Config?” command
- by all other menus, “SAVE PARAMETERS” command

Any changes made in STARTUP menu require “Save Config?” command, which saves all entire regulation mode selected.
It is recommended every time the user made any changes into STARTUP menu.
“SAVE PARAMETERS” command saves all the changes made out of STARTUP menu only.
When on the keypad display appears blinking message “Use Save Config”, use “Save Config?” command

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode

APPL CARD CONFIG

The access to APPL CARD CONFIG menu is allowed by Level 1 password: 12345. It must to be set in the SERVICE menu.
APC option card is used for advanced lift applications.
The communication between the Drive and the APC is performed via two channels for each direction.

- from drive to APC: "Drv->DGFCS" writing to drive 5 Synchronous words
  "Drv->DGFCA" writing to drive 10 Asynchronous words
- from APC to drive: "DGFCS->Drv" reading from APC 5 Synchronous words
  "DGFCA->Drv" reading from APC 10 Asynchronous words

The Words move the data from the APC to the Drive can be found in the source selecting lists.
For more information following the instructions on DGFC-386y-1 card (APC100 card) manual

APPL CARD CONFIG / DGFC / DGFC config

4129	**DGFC enable**	**N/A**	**RWS**	**0**	**0**	**1**	**DK**	**V-F-S-B**

0 Disabled
1 Enabled
It allows to enable APC option cards
(SAVE PARAMETERS command and drive recycle power are required)

APPL CARD CONFIG / DGFC / DGFC sync Ch

APPL CARD CONFIG / DGFC / Drv->DGFCS W src

4100	**Drv DGFC-S W0src**	**N/A**	**RWS**	**IPA 4105**		**List 29**	**PIN**	**V-F-S-B**

IPA 4105 Int DrvDGFC-S W0 = Default
It allows to select the origin of Synchronous Word 0 to be transmitted from Drive to APC card (refer to signals List 29 of Pick List manual)

4101	**Drv DGFC-S W1src**	**N/A**	**RWS**	**IPA 4106**		**List 29**	**PIN**	**V-F-S-B**

IPA 4106 Int DrvDGFC-S W1 = Default
It allows to select the origin of Synchronous Word 1 to be transmitted from Drive to APC card (refer to signals List 29 of Pick List manual)

4102	**Drv DGFC-S W2src**	**N/A**	**RWS**	**IPA 4107**		**List 29**	**PIN**	**V-F-S-B**

IPA 4107 Int DrvDGFC-S W2 = Default
It allows to select the origin of Synchronous Word 2 to be transmitted from Drive to APC card (refer to signals List 29 of Pick List manual)

4103	**Drv DGFC-S W3src**	**N/A**	**RWS**	**IPA 4108**		**List 29**	**PIN**	**V-F-S-B**

IPA 4108 Int DrvDGFC-S W3 = Default
It allows to select the origin of Synchronous Word 3 to be transmitted from Drive to APC card (refer to signals List 29 of Pick List manual)

4104	**Drv DGFC-S W4src**	**N/A**	**RWS**	**IPA 4109**		**List 29**	**PIN**	**V-F-S-B**

IPA 4109 Int DrvDGFC-S W4 = Default
It allows to select the origin of Synchronous Word 4 to be transmitted from Drive to APC card (refer to signals List 29 of Pick List manual)

APPL CARD CONFIG / DGFC / Drv->DGFCS W cfg

4105	**Int DrvDGFC-S W0**	**N/A**	**RWS**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**

Internal Synchronous Word 0 value configuration (default connected to Drv DGFC-S W0src)

4106	**Int DrvDGFC-S W1**	**N/A**	**RWS**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**

Internal Synchronous Word 1 value configuration (default connected to Drv DGFC-S W1src)

4107	**Int DrvDGFC-S W2**	**N/A**	**RWS**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**

Internal Synchronous Word 2 value configuration (default connected to Drv DGFC-S W2src)

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
4108	**Int DrvDGFC-S W3**	**N/A**	**RWS**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
	Internal Synchronous Word 3 value configuration (default connected to Drv DGFC-S W3src)							
4109	**Int DrvDGFC-S W4**	**N/A**	**RWS**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
	Internal Synchronous Word 4 value configuration (default connected to Drv DGFC-S W4src)							
APPL CARD CONFIG / DGFC / Drv->DGFCS W mon								
4110	**Drv DGFC-S W0mon**	**N/A**	**R**	**0.00**	**-**	**-**	**PP**	**V-F-S-B**
	Synchronous Word 0 monitor (from Drive to DGFC)							
4111	**Drv DGFC-S W1mon**	**N/A**	**R**	**0.00**	**-**	**-**	**PP**	**V-F-S-B**
	Synchronous Word 1 monitor (from Drive to DGFC)							
4112	**Drv DGFC-S W2mon**	**N/A**	**R**	**0.00**	**-**	**-**	**PP**	**V-F-S-B**
	Synchronous Word 2 monitor (from Drive to DGFC)							
4113	**Drv DGFC-S W3mon**	**N/A**	**R**	**0.00**	**-**	**-**	**PP**	**V-F-S-B**
	Synchronous Word 3 monitor (from Drive to DGFC)							
4114	**Drv DGFC-S W4mon**	**N/A**	**R**	**0.00**	**-**	**-**	**PP**	**V-F-S-B**
	Synchronous Word 4 monitor (from Drive to DGFC)							
APPL CARD CONFIG / DGFC / DGFCS->Drv W mon								
4120	**DGFC-S Drv W0mon**	**N/A**	**R**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
	Synchronous Word 0 monitor (from DGFC to Drive)							
4121	**DGFC-S Drv W1mon**	**N/A**	**R**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
	Synchronous Word 1 monitor (from DGFC to Drive)							
4122	**DGFC-S Drv W2mon**	**N/A**	**R**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
	Synchronous Word 2 monitor (from DGFC to Drive)							
4123	**DGFC-S Drv W3mon**	**N/A**	**R**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
	Synchronous Word 3 monitor (from DGFC to Drive)							
4124	**DGFC-S Drv W4mon**	**N/A**	**R**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
	Synchronous Word 4 monitor (from DGFC to Drive)							
APPL CARD CONFIG / DGFC / DGFC async Ch								
APPL CARD CONFIG / DGFC / Drv->DGFCA W src								
4130	**Drv DGFC-A W0src**	**N/A**	**RWS**	**IPA 4140**		**List 30**	**PIN**	**V-F-S-B**
	IPA 4140 Int DrvDGFC-A W0 = Default It allows to select the origin of Asynchronous Word 0 to be transmitted from Drive to DGFC card (refer to signals List 30 of Pick List manual)							
4131	**Drv DGFC-A W1src**	**N/A**	**RWS**	**IPA 4141**		**List 30**	**PIN**	**V-F-S-B**
	IPA 4141 Int DrvDGFC-A W1 = Default It allows to select the origin of Asynchronous Word 1 to be transmitted from Drive to DGFC card (refer to signals List 30 of Pick List manual)							
4132	**Drv DGFC-A W2src**	**N/A**	**RWS**	**IPA 4142**		**List 30**	**PIN**	**V-F-S-B**
	IPA 4142 Int DrvDGFC-A W2 = Default It allows to select the origin of Asynchronous Word 2 to be transmitted from Drive to DGFC card (refer to signals List 30 of Pick List manual)							
4133	**Drv DGFC-A W3src**	**N/A**	**RWS**	**IPA 4143**		**List 30**	**PIN**	**V-F-S-B**
	IPA 4143 Int DrvDGFC-A W3 = Default It allows to select the origin of Asynchronous Word 3 to be transmitted from Drive to DGFC card (refer to signals List 30 of Pick List manual)							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
4134	**Drv DGFC-A W4src**	**N/A**	**RWS**	**IPA 4144**		**List 30**	**PIN**	**V-F-S-B**
	IPA 4144 Int DrvDGFC-A W4 = Default It allows to select the origin of Asynchronous Word 4 to be transmitted from Drive to DGFC card (refer to signals List 30 of Pick List manual)							
4135	**Drv DGFC-A W5src**	**N/A**	**RWS**	**IPA 4145**		**List 30**	**PIN**	**V-F-S-B**
	IPA 4145 Int DrvDGFC-A W5 = Default. It allows to select the origin of Asynchronous Word 5 to be transmitted from Drive to DGFC card (refer to signals List 30 of Pick List manual)							
4136	**Drv DGFC-A W6src**	**N/A**	**RWS**	**IPA 4146**		**List 30**	**PIN**	**V-F-S-B**
	IPA 4146 Int DrvDGFC-A W6 = Default It allows to select the origin of Asynchronous Word 6 to be transmitted from Drive to DGFC card (refer to signals List 30 of Pick List manual)							
4137	**Drv DGFC-A W7src**	**N/A**	**RWS**	**IPA 4147**		**List 30**	**PIN**	**V-F-S-B**
	IPA 4147 Int DrvDGFC-A W7 = Default It allows to select the origin of Asynchronous Word 7 to be transmitted from Drive to DGFC card (refer to signals List 30 of Pick List manual)							
4138	**Drv DGFC-A W8src**	**N/A**	**RWS**	**IPA 4148**		**List 30**	**PIN**	**V-F-S-B**
	IPA 4148 Int DrvDGFC-A W8 = Default It allows to select the origin of Asynchronous Word 8 to be transmitted from Drive to DGFC card (refer to signals List 30 of Pick List manual)							
4139	**Drv DGFC-A W9src**	**N/A**	**RWS**	**IPA 4149**		**List 30**	**PIN**	**V-F-S-B**
	IPA 4149 Int DrvDGFC-A W9 = Default It allows to select the origin of Asynchronous Word 9 to be transmitted from Drive to DGFC card (refer to signals List 30 of Pick List manual)							
APPL CARD CONFIG / DGFC / Drv->DGFCA W cfg								
4140	**Int DrvDGFC-A W0**	**N/A**	**RWS**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
	Internal Asynchronous Word 0 value configuration (default connected to Drv DGFC-A W0src)							
4141	**Int DrvDGFC-A W1**	**N/A**	**RWS**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
	Internal Asynchronous Word 1 value configuration (default connected to Drv DGFC-A W0src)							
4142	**Int DrvDGFC-A W2**	**N/A**	**RWS**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
	Internal Asynchronous Word 2 value configuration (default connected to Drv DGFC-A W0src)							
4143	**Int DrvDGFC-A W3**	**N/A**	**RWS**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
	Internal Asynchronous Word 3 value configuration (default connected to Drv DGFC-A W0src)							
4144	**Int DrvDGFC-A W4**	**N/A**	**RWS**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
	Internal Asynchronous Word 4 value configuration (default connected to Drv DGFC-A W0src)							
4145	**Int DrvDGFC-A W5**	**N/A**	**RWS**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
	Internal Asynchronous Word 5 value configuration (default connected to Drv DGFC-A W0src)							
4146	**Int DrvDGFC-A W6**	**N/A**	**RWS**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
	Internal Asynchronous Word 6 value configuration (default connected to Drv DGFC-A W0src)							
4147	**Int DrvDGFC-A W7**	**N/A**	**RWS**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
	Internal Asynchronous Word 7 value configuration (default connected to Drv DGFC-A W0src)							
4148	**Int DrvDGFC-A W8**	**N/A**	**RWS**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
	Internal Asynchronous Word 8 value configuration (default connected to Drv DGFC-A W0src)							
4149	**Int DrvDGFC-A W9**	**N/A**	**RWS**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
	Internal Asynchronous Word 9 value configuration (default connected to Drv DGFC-A W0src)							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
APPL CARD CONFIG / DGFC / Drv->DGFCA W mon								
4150	**Drv DGFC-A W0mon** Asynchronous Word 0 monitor (from Drive to DGFC)	**N/A**	**R**	**0.00**	**-**	**-**	**PP**	**V-F-S-B**
4151	**Drv DGFC-A W1mon** Asynchronous Word 1 monitor (from Drive to DGFC)	**N/A**	**R**	**0.00**	**-**	**-**	**PP**	**V-F-S-B**
4152	**Drv DGFC-A W2mon** Asynchronous Word 2 monitor (from Drive to DGFC)	**N/A**	**R**	**0.00**	**-**	**-**	**PP**	**V-F-S-B**
4153	**Drv DGFC-A W3mon** Asynchronous Word 3 monitor (from Drive to DGFC)	**N/A**	**R**	**0.00**	**-**	**-**	**PP**	**V-F-S-B**
4154	**Drv DGFC-A W4mon** Asynchronous Word 4 monitor (from Drive to DGFC)	**N/A**	**R**	**0.00**	**-**	**-**	**PP**	**V-F-S-B**
4155	**Drv DGFC-A W5mon** Asynchronous Word 5 monitor (from Drive to DGFC)	**N/A**	**R**	**0.00**	**-**	**-**	**PP**	**V-F-S-B**
4156	**Drv DGFC-A W6mon** Asynchronous Word 6 monitor (from Drive to DGFC)	**N/A**	**R**	**0.00**	**-**	**-**	**PP**	**V-F-S-B**
4157	**Drv DGFC-A W7mon** Asynchronous Word 7 monitor (from Drive to DGFC)	**N/A**	**R**	**0.00**	**-**	**-**	**PP**	**V-F-S-B**
4158	**Drv DGFC-A W8mon** Asynchronous Word 8 monitor (from Drive to DGFC)	**N/A**	**R**	**0.00**	**-**	**-**	**PP**	**V-F-S-B**
4159	**Drv DGFC-A W9mon** Asynchronous Word 9 monitor (from Drive to DGFC)	**N/A**	**R**	**0.00**	**-**	**-**	**PP**	**V-F-S-B**
APPL CARD CONFIG / DGFC / DGFCA->Drv W mon								
4160	**DGFC-A Drv W0mon** Asynchronous Word 0 monitor (from DGFC to Drive)	**N/A**	**R**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
4161	**DGFC-A Drv W1mon** Asynchronous Word 1 monitor (from DGFC to Drive)	**N/A**	**R**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
4162	**DGFC-A Drv W2mon** Asynchronous Word 2 monitor (from DGFC to Drive)	**N/A**	**R**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
4163	**DGFC-A Drv W3mon** Asynchronous Word 3 monitor (from DGFC to Drive)	**N/A**	**R**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
4164	**DGFC-A Drv W4mon** Asynchronous Word 4 monitor (from DGFC to Drive)	**N/A**	**R**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
4165	**DGFC-A Drv W5mon** Asynchronous Word 5 monitor (from DGFC to Drive)	**N/A**	**R**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
4166	**DGFC-A Drv W6mon** Asynchronous Word 6 monitor (from DGFC to Drive)	**N/A**	**R**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
4167	**DGFC-A Drv W7mon** Asynchronous Word 7 monitor (from DGFC to Drive)	**N/A**	**R**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
4168	**DGFC-A Drv W8mon** Asynchronous Word 8 monitor (from DGFC to Drive)	**N/A**	**R**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
4169	**DGFC-A Drv W9mon** Asynchronous Word 9 monitor (from DGFC to Drive)	**N/A**	**R**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode

SAVE PARAMETERS

AVyL drive allows two different commands to save the parameters modified in the regulation mode selected:
- by STARTUP menu, “Save Config?” command
- by all other menus, “SAVE PARAMETERS” command

Any changes made in STARTUP menu require “Save Config?” command, which saves all entire regulation mode selected.
It is recommended every time the user made any changes into STARTUP menu.
“SAVE PARAMETERS” command saves all the changes made out of STARTUP menu only.
When on the keypad display appears blinking message “Use Save Config”, use “Save Config?” command

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode

CUSTOM FUNCTIONS

The access to CUSTOM FUNCTIONS menu is allowed by Level 1 password: 12345. It must to be set in the SERVICE menu.

COMPARE: The Block supplies two signal Comparators, Compare 1 and Compare 2, with the same features. Each Comparator is in a position to compare two or three input signals (INP0, INP1, INP2).

Some comparisons allow to set via Cmp x window a window, in count, stating an acceptable range among the signals. Example:

-INP0 and INP1 have to be compared as "INP0 = INP1"

INP0 = +1000count
INP1 = +1000count
Window = 100count

In this case the equality is true for a maximum overall variation of INP1 between 1100 and 900 counts.

Possible variations:

None none

I0 = = I1	INP0-window ≤ INP1 ≤ INP0+window
I0 != I1	INP1 lower INP0-window or INP1 higher INP0+window
I0 < I1	INP0 lower INP1
I0 > I1	INP0 higher INP1
I0 < I1 > I2	INP0<INP1<INP2 (INP1 included between..)
|I0| == |I1|	INP0| -window ≤ |INP1| ≤ |INP0| +window
|I0| != |I1|	INP1| lower |INP0| -window,or |INP1| higher |INP0| +window
|I0| < |I1|	INP0| lower |INP1|
|I0| > |I1|	INP0| higher |INP1|
|I0| < |I1| < |I2|	INP0| <|INP1| <|INP2| (|INP1|
I0 AND I1 AND I2	AND logic between I0, I1 and I2
I0 OR I1 OR I2	OR logic between I0, I1 and I2
I0 XOR I1	XOR logic between I0 and I1

CUSTOM FUNCTIONS / Compare / Compare 1

CUSTOM FUNCTIONS / Compare / Compare 1 / Compare 1 src

6049	**Cmp 1 inp 0 src**	**N/A**	**RWS**	**IPA 6041**		**List 5**	**PIN**	**V-F-S-B**

IPA 6041 Cmp 1 inp 0 = Default

It allows to select the origin of the input signal 0 to be compared of the Compare 1 block (refer to signals List 5 of Pick List manual)

6050	**Cmp 1 inp 1 src**	**N/A**	**RWS**	**IPA 6042**		**List 5**	**PIN**	**V-F-S-B**

IPA 6042 Cmp 1 inp 1 = Default

It allows to select the origin of the input signal 1 to be compared of the Compare 1 block (refer to signals List 5 of Pick List manual)

6051	**Cmp 1 inp 2 src**	**N/A**	**RWS**	**IPA 6043**		**List 5**	**PIN**	**V-F-S-B**

IPA 6043 Cmp 1 inp 2 = Default

It allows to select the origin of the input signal 2 to be compared of the Compare 1 block (refer to signals List 5 of Pick List manual)

CUSTOM FUNCTIONS / Compare / Compare 1 / Compare 1 cfg

6041	**Cmp 1 inp 0**	**N/A**	**RWS**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**

Value of the internal input signal 0, default connected to Cmp 1 inp 0 src

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
6042	**Cmp 1 inp 1**	**N/A**	**RWS**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
	Value of the internal input signal 1, default connected to Cmp 1 inp 1 src							
6043	**Cmp 1 inp 2**	**N/A**	**RWS**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
	Value of the internal input signal 2, default connected to Cmp 1 inp 2 src							
6044	**Cmp 1 function**	**N/A**	**RWS**	**0**	**0**	**10**	**DP**	**V-F-S-B**
	0 None							
	1 I0 == I1							
	2 I0 != I1							
	3 I0 < I1							
	4 I0 > I1							
	5 I0 < I1 < I2							
	6 |I0| == |I1|							
	7 |I0| != |I1|							
	8 |I0| < |I1|							
	9 |I0| > |I1|							
	10 |I0| < |I1| < |I2|							
	11 I0 AND I1 AND I2							
	12 I0 OR I1 AND I2							
	13 I0 XOR I1							
6045	**Cmp 1 window**	**[cnt]**	**RWS**	**0.00**	**0.00**	**-**	**PP**	**V-F-S-B**
	It allows to set a window stating an acceptable range among the signals of the Compare 1 block							
6046	**Cmp 1 delay**	**[sec]**	**RWS**	**0.00**	**0.00**	**30**	**PP**	**V-F-S-B**
	It allows to set a delay in seconds on the comparison transition in the Compare 1 block							
6047	**Cmp 1 inversion**	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
	0 Not inverted							
	1 Inverted							
	It allows to invert the Compare 1 block output signal							

CUSTOM FUNCTIONS / Compare / Compare 1 / Compare 1 mon

6048	**Compare 1 output**	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
	It allows to monitor the state of Compare 1 block output signal							
	0 = FALSE							
	1 = TRUE							

CUSTOM FUNCTIONS / Compare / Compare 2

CUSTOM FUNCTIONS / Compare / Compare 2 / Compare 2 src

6064	**Cmp 2 inp 0 src**	**N/A**	**RWS**	**IPA 6056**		**List 6**	**PIN**	**V-F-S-B**
	IPA 6056 Cmp 2 inp 0 = Default							
	It allows to select the origin of the input signal 0 to be compared of the Compare 2 block (refer to signals List 6 of Pick List manual)							
6065	**Cmp 2 inp 1 src**	**N/A**	**RWS**	**IPA 6057**		**List 6**	**PIN**	**V-F-S-B**
	IPA 6057 Cmp 2 inp 1 = Default							
	It allows to select the origin of the input signal 1 to be compared of the Compare 2 block (refer to signals List 6 of Pick List manual)							
6066	**Cmp 2 inp 2 src**	**N/A**	**RWS**	**IPA 6058**		**List 6**	**PIN**	**V-F-S-B**
	IPA 6058 Cmp 2 inp 2 = Default							
	It allows to select the origin of the input signal 2 to be compared of the Compare 2 block (refer to signals List 6 of Pick List manual)							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
CUSTOM FUNCTIONS / Compare / Compare 2 / Compare 2 cfg								
6056	**Cmp 2 inp 0** Value of the internal input signal 0, default connected to Cmp 2 inp 0 src	**N/A**	**RWS**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
6057	**Cmp 2 inp 1** Value of the internal input signal 1, default connected to Cmp 2 inp 1 src	**N/A**	**RWS**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
6058	**Cmp 2 inp 2** Value of the internal input signal 2, default connected to Cmp 2 inp 2 src	**N/A**	**RWS**	**0.00**	**-**	**-**	**PV**	**V-F-S-B**
6059	**Cmp 2 function** 0 None 1 I0 == I1 2 I0 != I1 3 I0 < I1 4 I0 > I1 5 I0 < I1 < I2 6 |I0| == |I1| 7 |I0| != |I1| 8 |I0| < |I1| 9 |I0| > |I1| 10 |I0|< |I1| <|I2| 11 I0 AND I1 AND I2 12 I0 OR I1 AND I2 13 I0 XOR I1	**N/A**	**RWS**	**0**	**0**	**10**	**DP**	**V-F-S-B**
6060	**Cmp 2 window** It allows to set a window stating an acceptable range among the signals of the Compare 2 block	**[cnt]**	**RWS**	**0.00**	**0.00**	**-**	**PP**	**V-F-S-B**
6061	**Cmp 2 delay** It allows to set a delay in seconds on the comparison transition in the Compare 2 block	**[sec]**	**RWS**	**0.00**	**0.00**	**30**	**PP**	**V-F-S-B**
6062	**Cmp 2 inversion** 0 Not inverted 1 Inverted It allows to invert the Compare 2 block output signal	**N/A**	**RWS**	**0**	**0**	**1**	**DP**	**V-F-S-B**
CUSTOM FUNCTIONS / Compare / Compare 2 / Compare 2 mon								
6063	**Compare 2 output** It allows to monitor the state of Compare 2 block output signal 0 = FALSE 1 = TRUE	**N/A**	**R**	**0**	**0**	**1**	**DV**	**V-F-S-B**
CUSTOM FUNCTIONS / Pad parameters								
The use variables, “Pads”, are used for the data exchange with the option cards								
CUSTOM FUNCTIONS / Pad parameters / Pad param word								
9100	**Pad 0** Analog Pad 0	**N/A**	**RWS**	**0**	**-**	**-**	**PV**	**V-F-S-B**
9101	**Pad 1** Analog Pad 1	**N/A**	**RWS**	**0**	**-**	**-**	**PV**	**V-F-S-B**
9102	**Pad 2** Analog Pad 2	**N/A**	**RWS**	**0**	**-**	**-**	**PV**	**V-F-S-B**
9103	**Pad 3** Analog Pad 3	**N/A**	**RWS**	**0**	**-**	**-**	**PV**	**V-F-S-B**

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
9104	**Pad 4** Analog Pad 4	**N/A**	**RWS**	**0**	**-**	**-**	**PV**	**V-F-S-B**
9105	**Pad 5** Analog Pad 5	**N/A**	**RWS**	**0**	**-**	**-**	**PV**	**V-F-S-B**
9106	**Pad 6** Analog Pad 6	**N/A**	**RWS**	**0**	**-**	**-**	**PV**	**V-F-S-B**
9107	**Pad 7** Analog Pad 7	**N/A**	**RWS**	**0**	**-**	**-**	**PV**	**V-F-S-B**
9108	**Pad 8** Analog Pad 8	**N/A**	**RWS**	**0**	**-**	**-**	**PV**	**V-F-S-B**
9109	**Pad 9** Analog Pad 9	**N/A**	**RWS**	**0**	**-**	**-**	**PV**	**V-F-S-B**
9110	**Pad 10** Analog Pad 10	**N/A**	**RWS**	**0**	**-**	**-**	**PV**	**V-F-S-B**
9111	**Pad 11** Analog Pad 11	**N/A**	**RWS**	**0**	**-**	**-**	**PV**	**V-F-S-B**
9112	**Pad 12** Analog Pad 12	**N/A**	**RWS**	**0**	**-**	**-**	**PV**	**V-F-S-B**
9113	**Pad 13** Analog Pad 13	**N/A**	**RWS**	**0**	**-**	**-**	**PV**	**V-F-S-B**
9114	**Pad 14** Analog Pad 14	**N/A**	**RWS**	**0**	**-**	**-**	**PV**	**V-F-S-B**
9115	**Pad 15** Analog Pad 15	**N/A**	**RWS**	**0**	**-**	**-**	**PV**	**V-F-S-B**
CUSTOM FUNCTIONS / Pad parameters / Pad param bit								
9116	**Dig pad 0** Digital Pad 1	**N/A**	**RWS**	**0**	**0**	**1**	**DV**	**V-F-S-B**
9117	**Dig pad 1** Digital Pad 2	**N/A**	**RWS**	**0**	**0**	**1**	**DV**	**V-F-S-B**
9118	**Dig pad 2** Digital Pad 3	**N/A**	**RWS**	**0**	**0**	**1**	**DV**	**V-F-S-B**
9119	**Dig pad 3** Digital Pad 3	**N/A**	**RWS**	**0**	**0**	**1**	**DV**	**V-F-S-B**
9120	**Dig pad 4** Digital Pad 4	**N/A**	**RWS**	**0**	**0**	**1**	**DV**	**V-F-S-B**
9121	**Dig pad 5** Digital Pad 5	**N/A**	**RWS**	**0**	**0**	**1**	**DV**	**V-F-S-B**
9122	**Dig pad 6** Digital Pad 6	**N/A**	**RWS**	**0**	**0**	**1**	**DV**	**V-F-S-B**
9123	**Dig pad 7** Digital Pad 7	**N/A**	**RWS**	**0**	**0**	**1**	**DV**	**V-F-S-B**
9124	**Dig pad 8** Digital Pad 8	**N/A**	**RWS**	**0**	**0**	**1**	**DV**	**V-F-S-B**
9125	**Dig pad 9** Digital Pad 9	**N/A**	**RWS**	**0**	**0**	**1**	**DV**	**V-F-S-B**

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
9126	**Dig pad 10** Digital Pad 10	**N/A**	**RWS**	**0**	**0**	**1**	**DV**	**V-F-S-B**
9127	**Dig pad 11** Digital Pad 11	**N/A**	**RWS**	**0**	**0**	**1**	**DV**	**V-F-S-B**
9128	**Dig pad 12** Digital Pad 12	**N/A**	**RWS**	**0**	**0**	**1**	**DV**	**V-F-S-B**
9129	**Dig pad 13** Digital Pad 13	**N/A**	**RWS**	**0**	**0**	**1**	**DV**	**V-F-S-B**
9130	**Dig pad 14** Digital Pad 14	**N/A**	**RWS**	**0**	**0**	**1**	**DV**	**V-F-S-B**
9131	**Dig pad 15** Digital Pad 15	**N/A**	**RWS**	**0**	**0**	**1**	**DV**	**V-F-S-B**

CUSTOM FUNCTIONS / Connect

This block function connects signals to programmable block area, using drive parameters that are accessible through the “Conf99” PC program or drive keypad menu.
Connect A, connects up to 7 analog input signals
Connect B, connects up to 7 digital signals inputs

CUSTOM FUNCTIONS / Connect/ Connect A

6070	**ConnectA inp 0 src** IPA 4000 NULL = Default	**N/A**	**RWS**	**IPA 4000**	**List 2**	**PIN**	**V-F-S-B**
6071	**ConnectA inp 1 src** IPA 4000 NULL = Default	**N/A**	**RWS**	**IPA 4000**	**List 2**	**PIN**	**V-F-S-B**
6072	**ConnectA inp 2 src** IPA 4000 NULL = Default	**N/A**	**RWS**	**IPA 4000**	**List 2**	**PIN**	**V-F-S-B**
6073	**ConnectA inp 3 src** IPA 4000 NULL = Default	**N/A**	**RWS**	**IPA 4000**	**List 2**	**PIN**	**V-F-S-B**
6074	**ConnectA inp 4 src** IPA 4000 NULL = Default	**N/A**	**RWS**	**IPA 4000**	**List 2**	**PIN**	**V-F-S-B**
6075	**ConnectA inp 5 src** IPA 4000 NULL = Default	**N/A**	**RWS**	**IPA 4000**	**List 2**	**PIN**	**V-F-S-B**
6076	**ConnectA inp 6 src** IPA 4000 NULL = Default	**N/A**	**RWS**	**IPA 4000**	**List 2**	**PIN**	**V-F-S-B**
6077	**ConnectA inp 7 src** IPA 4000 NULL = Default	**N/A**	**RWS**	**IPA 4000**	**List 2**	**PIN**	**V-F-S-B**

CUSTOM FUNCTIONS / Connect/ Connect B

6078	**ConnectB inp 0 src** IPA 4000 NULL = Default	**N/A**	**RWS**	**IPA 4000**	**List 1**	**PIN**	**V-F-S-B**
6079	**ConnectB inp 1 src** IPA 4000 NULL = Default	**N/A**	**RWS**	**IPA 4000**	**List 1**	**PIN**	**V-F-S-B**
6080	**ConnectB inp 2 src** IPA 4000 NULL = Default	**N/A**	**RWS**	**IPA 4000**	**List 1**	**PIN**	**V-F-S-B**
6081	**ConnectB inp 3 src** IPA 4000 NULL = Default	**N/A**	**RWS**	**IPA 4000**	**List 1**	**PIN**	**V-F-S-B**

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
6082	**ConnectB inp 4 src** IPA 4000 NULL = Default	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**
6083	**ConnectB inp 5 src** IPA 4000 NULL = Default	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**
6084	**ConnectB inp 6 src** IPA 4000 NULL = Default	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**
6085	**ConnectB inp 7 src** IPA 4000 NULL = Default	**N/A**	**RWS**	**IPA 4000**		**List 1**	**PIN**	**V-F-S-B**

SAVE PARAMETERS

AVyL drive allows two different commands to save the parameters modified in the regulation mode selected:
- by STARTUP menu, “Save Config?” command
- by all other menus, “SAVE PARAMETERS” command

Any changes made in STARTUP menu require “Save Config?” command, which saves all entire regulation mode selected.
It is recommended every time the user made any changes into STARTUP menu.
“SAVE PARAMETERS” command saves all the changes made out of STARTUP menu only.
When on the keypad display appears blinking message “Use Save Config”, use “Save Config?” command

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode

SERVICE

SERVICE menu allows the setting of the password to enable Level 1 drive menus: 12345.
To have the access of Level 1 drive menus, edit 12345 password into “Insert Password” parameter and confirm it using “Enter” button.
NOTE! Level 1 password must be edit every recycle drive supply
SERVICE menu allows also the setting of the password to enable Level 2 drive menu: ask Level 2 password to the technical support.
To have the access of Level 2 drive menus:

1_ edit 12345 password into “Insert Password” parameter and confirm it using “Enter” button
2_ check the password through “Check password” parameter using “Enter” button

Chapter 10 - Troubleshooting

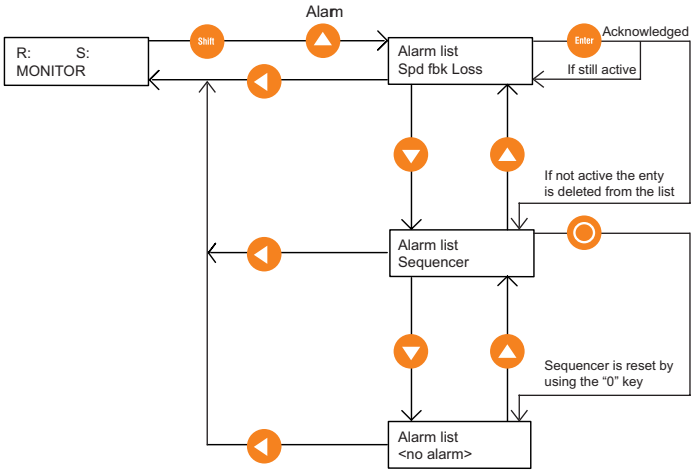
When the red “Alarm” LED blinks, it is indicating one (or more) alarm conditions.

Figure 10.1: Led Status and Keypad

Alarm led is lighted

In case an alarm occurs, this led is lighed up with an intermittent red colour.

See following steps to view alarm and reset it:



1) Press Shift + Alarm . The “Alarm list” will be displayed.

2) Press Enter one or more times untill “Sequencer” message appears, to acknowledge the alarms.

NOTE! If the alarm is still active, red LED will blink again. If it not active, red LED will stop.

3) Press [O] key to reset the Sequencer. The Alarm List shows all the occurred alarms, both if they are due to protections and to errors when limit values are exceeded.In order to disappear from the alarm list, alarm have to be acknowledged. The acknowledgement is possible only if the alarm is no longer active. The alarms are automatically acknowledged after two minutes.

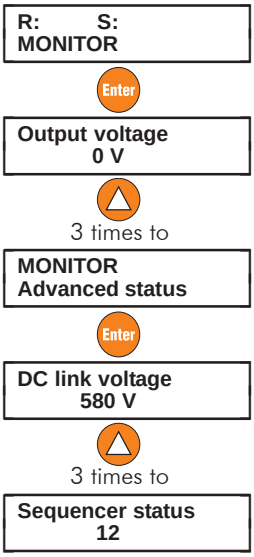
NOTE! Pressing Enter will acknowledge the alarm. Acknowledging the alarm

will only remove it from the active alarm list. If the alarm condition also resulted in a drive trip, the sequence will also need to be reset. This can be done by pressing the [O] key. The drive cannot be re-enabled or started after a trip condition unless the drive sequencer is reset.
The drive State Machine, controls the drive running and starting, accounting for protection & alarming, command sequence, and reset status.
The table below displays various operation states by Sequencer status number:

Sequencer status	State
1	Magnetization running
2	Magnetization completed, Stop
3	Start
4	Fast stop, Stop
5	Fast stop, Start
9	No alarm, drive is ready to accept all commands
10	Magnetization running and Start command already present
12	Alarm active
16	Alarm not active, waiting for reset

TAV3i020

To read the sequencer status of the State Machine, go to menu:



10.1 List of Regulation Alarm Events

Table 10.1.1 provides a description of regulation alarm events and information on how to configure the intended drive behaviour on their occurrence (where applicable).

Table 10.1.1 Regulation Alarm Events

Alarm name Description	Drive activity after alarm	Hold off	Restart	Restart time	Code in theAlarm list	Bit position in Alarm list
Failure supply One or more of the power supply circuits in the control section failed	Disable drive	No	No	NA	21	1
Undervoltage Voltage on the drive DC link is lower than the minimum threshold for the given Mains voltage setting.	Disable drive	No	Yes Logic is based on the number of attempts	Yes	22	2
Overvoltage Voltage on the drive DC link is higher than the maximum threshold for the given Mains voltage setting	Disable drive	No	Yes	Yes	23	3
IGBT desat flt IGBT instantaneous overcurrent was detected by gate desaturation sensing circuit	Disable drive	No	Yes No more than 2 attempts in 30 seconds	Yes	24	4
Inst Overcurrent IGBT instantaneous overcurrent was detected by output current sensor	Disable drive	No	Yes No more than 2 attempts /30sec.	Yes	25	5
Ground fault Output phase discharge to ground	Programmable	No	No	Yes	26	6
Curr fbk loss A failure of current sensor feeedback or power supply was detected	Disable drive	No	No	No	27	7
External fault External fault input is active	Programmable	Programmable	Yes	Programm.	28	8
Spd fbk loss A failure of the speed feedback sensor or power supply was detected	Programmable	No	No	No	29	9
Module OT IGBT overtemperature was detected by internal sensor (models 0.75 to 20 Hp only)	Disable drive	Constant, 10 msec	No	No	30	10
Heatsink OT Heatsink overtemperature was detected by thermal contact (only for models 18.5 kW and over)	Disable drive	Constant, 1000 msec	No	No	31	11
Motor OT Motor overtemperature was detected by thermal contact or PTC thermistor	Programmable	Programmable	Yes	Programm.	32	12
Heatsink S OT Heatsink linear temperature sensor threshold was exceeded	Programmable	Programmable	Yes	Programm.	33	13
Regulat S OT Regulation board linear temperature sensor threshold was exceeded	Programmable	Programmable	Yes	Programm.	34	14
Intake Air S OT Cooling air intake linear temperature sensor threshold was exceeded (only for models 18.5 kW and over)	Programmable	Programmable	Yes	Programm.	35	15
Cont fbk fail It trips when the contact feedback signal is not detected	Programmable	No	Yes	No	36	16
Comm card fault Fault of optional LAN communication board	Programmable	No	Yes	Programm.	37	17
Appl card fault Fault of optional application coprocessor board	Disable drive	No	No	No	38	18
Drv overload Drive overload accumulator exceeded trip threshold	Programmable	No	No	No	39	19

Alarm name Description	Drive activity after alarm	Hold off	Restart	Restart time	Code in theAlarm list	Bit position in Alarm list
Mot overload	Programmable	No	No	No	40	20
Motor overload accumulator exceeded trip threshold						
BU overload	Programmable	No	No	No	41	21
Braking resistor overload accumulator exceeded trip threshold						
Data lost	Disable drive	No	No	No	42	22
Data corrupted in non-volatile memory						
Brake fbk fail	Programmable	No	No	No	43	23
It trips when the brake feedback signal is not detected						
Max time	Disable drive	No	No	No	44	24
Software task time overrun was detected						
Sequencer	Disable drive	No	No	No	45	25
Alarm event caused drive disable						
Door fbk fail	Disable drive	Yes	No	No	46	26
It trips when the door feedback signal is not detected						
Overspeed	No	Yes	No	No	47	27
Maximum speed threshold was exceeded while drive in RUN state						
UV repetitive	Disable drive If n. of faults is set to max the Alarm is disabled.	No	No	No	48	28
More than a programmable number of UV fault were detected in 5 minutes						
IOC repetitive	Disable drive	No	No	No	49	29
More than 2 OC faults were detected in 30 sec.						
IGBTdesat repet	Disable drive	No	No	No	50	30
More than 2 IGBT desat faults were detected in 30 sec.						
WatchDog user	Disable drive	No	No	No	51	31
The drive failed to retrigger the communication watchdog within the specified time						
Hw fail	Disable drive	No	No	No	52	32
Communication failure between Drive Regulation board and one of its options or I/O expansions.						

10.2 List of Configuration and DataBase Error Alarm Events

Entering bad data or conflicting data into the drive configuration will cause user errors to be displayed.
These type of errors can be:
- Configuration errors
- Database errors (DB errors)

Refer to the following paragraphs for descriptions.

Drive size setting

NOTE! If the User changes the Drive size, the drive will display: Drv size: new size - old size. For example: ***Drive size: 0 - 1***

10.2.1 Configuration Errors

Configuration errors can occur by entering incompatible or invalid parameter data.
The drive reports configuration error by the following example description:

Calc error: Calc error number
Param: Param error number

The Calc error number denotes the cause of invalid calculation. The Calc error number is composed as follows:
Calc error number = Offset + Error code

The Offset denotes the type of error:

0	for specific errors
100	for errors originated by the database calculation (see DB error paragraph)
500	for errors due to floating point calculation (exception, divide by zero etc..)
600	for errors originated by the configuration calculations (range and so on).

The Error code denotes the origin cause of the error, see values list below.

Error code values lists

Error code values for Offset 0 :

0	no error
1	signal not managed in current configurator state
2	cannot stop regulation
3	recipe export error
4	recipe import error
5	error while loading selftune data
6	error while loading motor data
7	reserved

8 error while loading customer specific data
9 error while loading drive size data
10 error while writing file size.ini
11 error while apply database. The operation is refused because errors arised during group calculation.To reset the errors it is necessary re-enter the data, and confirm correctness
12 error while saving too changes

Error code values for Offset 100: See DB errors, section 10.2.3

Error code values for Offset 500 (500 + error code):

3 Integer overflow
4 Floating overflow
5 Floating underflow
7 Divide by zero
9 Undefined float
10 Conversion error
11 Floating point stack underflow
12 Floating point stack overflow

Error code values for Offset 600 (600 + error code):

0 no error
1 switching freq. error
2 mains voltage error
3 ambient temperature error
4 regulation mode error
5 take selection error
6 base speed error
7 drive size error

For example, Calc error number ***606*** is a configuration error (600) caused by speed base value (6) out of range.
The Param error number is not meaningful.

10.2.2 Database Errors (DB Errors)

DB errors are caused by a incorrect setting in a single parameter. This problem is originated in the database calculation. For example the most common are:
- DB error Limit HIGH
- DB error Limit LOW

The message DB error is displayed by the drive in this format:
DB ERR IPA: error code

Note !
See chapter 12 Parameter index

The IPA denotes the parameter number which caused the DB error calculation. The error code denotes the type error.
Example of message DB error displayed: ***DB ERR 3420: 5***
This means that the DB error is caused by IPA **3420** (V/f voltage) which is below the low limit; Error code 5 denotes the type error (for the DB error code values list see below). To find the low limit, which depends on drive configuration, it is possible to go to the V/f voltage parameter

on the keypad. Press the Shift key and then the Help key, the following will be displayed:

Max Value
Min Value
Def(ault) Value
Unit
Raw value
IPA
Description
(Access) mode

In most cases it is enough to set a new value which is within the limits.

DB error code list

0	No error
1	SBI PROBLEM 0x01
2	Generic error
3	Attribute not exist
4	Limit High
5	Limit Low
11	Division by zero
12	Int Overflow
13	Int Underflow
14	Long Overflow
15	Long Underflow
16	Domain Error
17	Indirection Error
18	Reached wrong eof
19	Dbase not configured
20	Value not valid
21	Process doesn't reply
22	Wrong record size
23	Attribute read only
24	SBI PROBLEM 0x18
25	Command not yet implemented
26	Command wrong
27	Read file error
28	Header wrong
29	Reserved for internal use
30	Parameter not exist
31	Parameter read only
32	Parameter "z" only
48	SBI PROBLEM 0x30

10.2.3 List of Error Codes for All Autotune Procedures

The different autotune procedures for Current regulator, Flux regulator, Speed regulator or Analog input calibration may generate error messages that are described in section 10.2.2 .

Table 10.2.3.1: Error Messages from Autotune Procedures

Error text	Description
No error	
Abort	The user entered Escape or O key, or removed enable permissive (term 12 low)
DB access <IPA>	An attempt to access the database at the speficied index occurred during autotune procedure
No break point	Failure in measuring inverter voltage distortion
Rs high lim	Failure in measuring motor stator Resistance
Rs low lim	Failure in measuring motor stator Resistance
DTL high lim	Failure in computing compensation for the inverter voltage distortion
DTL low lim	Failure in computing compensation for the inverter voltage distortion
DTS high lim	Failure in computing compensation for the inverter voltage distortion
DTS low lim	Failure in computing compensation for the inverter voltage distortion
LsS high lim	Failure in calculating motor leakage inductance
LsS low lim	Failure in calculating motor leakage inductance
ImNom not found	Identification of rated magnetizing current failed
ImNom not found	Identification of maximum magnetizing current failed
RrV low lim	Voltage limit exceeded during measurement for the calculation of motor rotor resistance
RrV high lim	Voltage limit exceeded during measurement for the calculation of motor rotor resistance
Rr high lim	Failure in calculating motor rotor resistance
Rr low lim	Failure in calculating motor rotor resistance
AI too high	Value of analog input is too high for full scale autocalibration
AI too low	Value of analog input is too low for full scale autocalibration
Rr2 high lim	Failure in calculating motor rotor resistance
Rr2 low lim	Failure in calculating motor rotor resistance
Drive disabled	Enable permissive (term 12) was found low when attempting to start autotune procedure
Rr timeout	Timeout occurred during measurement for the calculation of motor rotor resistance
Rr2 timeout	Timeout occurred during measurement for the calculation of motor rotor resistance
LsS timeout	Timeout occurred during measurement for the calculation of motor leakage inductance
Drive enabled	Drive was found to be already enabled when attempting to initiate autotune procedure
Calc error	An error occurred when processing measurement data
Config error<errcode>	The specified Configurator error occurred during database configuration based on autotune data
Cmd not supported	Command not supported in the current state

Chapter 11 - EMC Directive - Declaration of Conformity

EMC Directive

The possible Validity Fields of the EMC Directive (89/336) applied to PDS "CE marking" summarises the presumption of compliance with the Essential Requirements of the EMC Directive, which is formulated in the EC Declaration of Conformity Clauses numbers [.] refer to European Commission document "Guide to the Application of Directive 89/336/EEC" 1997 edition. ISBN 92-828-0762-2

	Validity Field	Description
Relates to PDS or CDM or BDM directly	**-1-** **Finished Product/ Complex component** **available to general public** [Clauses: 3.7, 6.2.1, 6.2.3.1 & 6.3.1] A PDS (or CDM/BDM) of the Unrestricted Distribution class	Placed on the market as a single commercial unit for distribution and final use. Free movement based on compliance with the EMC Directive **- EC Declaration of conformity required - CE marking required** **- PDS or CDM/BDM should comply with IEC 1800-3/EN 61800-3** The manufacturer of the PDS (or CDM/BDM) is responsible for the EMC behaviour of the PDS (or CDM/BDM), under specified conditions. EMC measures outside the item are described in an easy to understand fashion and could actually be implemented by a layman in the field of EMC. The EMC responsibility of the assembler of the final product is to follow the manufacturer's recommendations and guidelines. Note: The manufacturer of the PDS (or CDM/BDM) is not responsible for the resulting behaviour of any system or installation which includes the PDS, see Validity Fields 3 or 4.
	-2- **Finished Product/Complex component** **only for professional assemblers** [Clauses: 3.7, 6.2.1, 6.2.3.2 & 6.3.2] A PDS (or CDM/BDM) of the Restricted Distribution class sold to be included as part of a system or installation	Not placed on the marked as a single commercial unit for distribution and final use. Intended only for professional assemblers who have a level of technical competence to correctly install. **- No EC Declaration of conformity - No CE marking** **- PDS or CDM/BDM should comply with IEC 1800-3/EN 61800-3** The manufacturer of the PDS (or CDM/BDM) is responsible for the provision of installation guidelines that will assist the manufacturer of the apparatus, system or installation to achieve compliance. The resulting EMC behaviour is the responsibility of the manufacturer of the apparatus, system, or installation, for which its own standards may apply.
Relates to application of PDS or CDM or BDM	**-3-** **Installation** [Clause: 6.5] Several combined items of system, finished product or other components brought together at a given place. May include PDSs (CDM or BDM), possibly of different classes -Restricted or Unrestricted	Not intended to be placed on the market as a single functional unit (no free movement). Each system included is subject to the provisions of the EMC Directive. **- No EC Declaration of conformity - No CE marking** **- For the PDSs or CDM/BDMs themselves see Validity Fields 1 or 2** **- Responsibility of the manufacturer of the PDS may include commissioning** The resulting EMC behaviour is the responsibility of the manufacturer of the installation in co-operation with the user (e.g. by following an appropriate EMC plan). Essential protection requirements of EMC Directive apply regarding the neighbourhood of the installation.
	-4- **System** [Clause: 6.4] Ready to use finished item(s). May include PDSs (CDM or BDM), possibly of different classes - Restricted or Unrestricted	Has a direct function for the final user. Placed on the market for distribution as a single functional unit, or as units intended to be easily connected together. **- EC Declaration of conformity required - CE marking required for the system** **- For the PDSs or CDM/BDMs themselves see Validity Fields 1 or 2** The resulting EMC behaviour, under specified conditions is the responsibility of the manufacturer of the system by using a modular or system approach as appropriate. Note: The manufacturer of the system is not responsible for the resulting behaviour of any installation which includes the PDS, see Validity Field 3.

Examples of application in the different Validity Fields:

1 **BDM to be used anywhere:** (example in domestic premises, or BDM available from commercial distributors), sold without any knowledge of the purchaser or the application. The manufacture is responsible that sufficient EMC can be achieved even by any unknown customer or layman (snap-in, switch-on).

2 **CDM/BDM or PDS for general purpose**: to be incorporated in a machine or for industrial application This is sold as a subassembly to a professional assembler who incorporates it in a machine, system or installation. Conditions of use are specified in the manufacturer's documentation. Exchange of technical data allows optimization of the EMC solution.. (See restricted distribution definition).

3 **Installation:** It can consist of different commercial units (PDS, mechanics, process control etc.). The conditions of incorporation for the PDS (CDM or BDM) are specified at the time of the order, consequently an exchange of technical data between supplier and client is possible. The combination of the various items in the installation should be considered in order to ensure EMC. Harmonic compensation is an evident example of this, for both technical and economical reasons. (E.g. rolling mill, paper machine, crane, etc.)

4 **System:** Ready to use finished item which includes one or more PDSs (or CDMs/BDMs); e.g. household equipment, air conditioners, standard machine tools, standard pumping systems, etc.

GEFRAN SIEI

SIEI SpA

Declaration of EC-Conformity

Document No. ECC/SR/02005

The product(s)...

Type reference: **AVy2040÷5550-AC4**

Manufacturer: **SIEI SpA**
(Regolazione e Controllo)
I - 21040 Gerenzano (VA)

Description: **Adjustable speed vector controlled ac drive(s)**

... to which this declaration relates is in conformity with the following standard(s) or normative document(s)

Standard, Document:
- **EN 60529**
- **EN 50178**
- **IEC 664, IEC 664-1**

and complies with the provisions of the following EC-Directive(s):

- **73/23/EEC** modified by **93/68/EEC** and named **Low Voltage Directive.**

CE marking from*: 2002. (* For Low Voltage Directive only)

Date of issue

05-03-2002

SIEI SpA

General manager

Massimo Furlan

Engineering manager

This declaration confirms compliance with the named directives but is not a guarantee of any performances.
The safety related recommendations of the delivered product documentation have to be observed.

AVy-AC4-W01_dec

GEFRAN SIEI

SIEI SpA

Declaration of EC-Conformity

Document No. ECC/SR/02006

The product(s)...

Type reference: **AVy2040÷5550-BR4**

Manufacturer: **SIEI SpA**
(Regolazione e Controllo)
I - 21040 Gerenzano (VA)

Description: **Adjustable speed vector controlled ac drive(s)**

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Date of issue

05.03.2002

SIEI SpA

General manager

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AVy-BR4-W01_dec

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