



ARTDriveL

Lift Vector AC Drives

AVy xxx xxx . AC

AVy xxx xxx . AC4

AVy xxx xxx . BR

AVy xxx xxx . BR4

Instruction Manual

Thank you for choosing this 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.

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This manual is updated according to software version 3.3XX

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 sécurité



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 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 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.

Chapter 0 - Safety Precautions

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 vérifié que la machine ait été produite avec les mêmes 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 opérationnelles 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 Électrique et Risque de Brûlure :

Lors de l'utilisation d'instruments (par exemple oscilloscope) sur des systèmes en marche, le châssis de l'oscilloscope doit être relié à la terre et un amplificateur différentiel devrait être utilisé en entrée.

Les sondes et conducteurs doivent être choisis 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 zones à risques (présence de vapeurs ou de poussières inflammables), peut provoquer des incendies ou des explosions. Les drives doivent être installés loin des zones dangereuses, et équipés de moteurs appropriés.



Warning

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'opération. L'installation électrique et l'ouverture des drives devrait être exécuté uniquement par du personnel qualifié. De mauvaises installations de moteurs ou de drives peuvent provoquer des dommages matériels ou blesser des personnes. On doit suivre les instructions données dans ce manuel et observer les règles 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 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 sous 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 delta /star transformer is avoided.

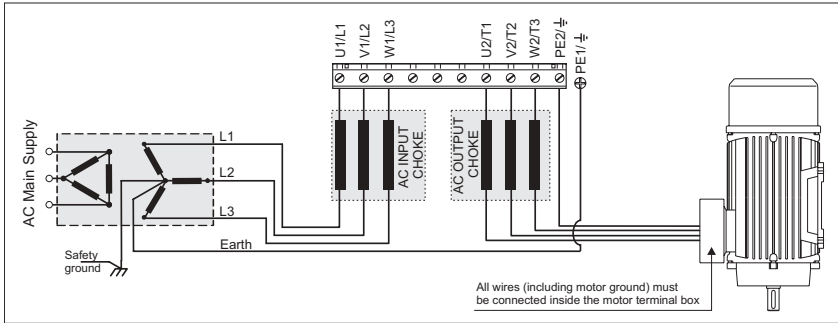
- 1 The drives are designed to be powered from standard three phase lines that are electrically symmetrical with respect to ground (TN or TT network).
- 2 In case of supply with IT network, the use of wye/delta transformer is mandatory, with a secondary three phase wiring referred to ground.

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 recommandons d'utiliser un transformateur 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 châssis du moteur doit être mis à la terre à l'aide d'un connecteur de terre séparé 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 fermée par les normes CSA et UL et dimensionné pour l'épaisseur du câble correspondant. Le connecteur doit être fixé à l'aide d'un instrument de serrage spécifié 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 où la température 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 TROUBLE-SHOOTING 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 réinitialiser l'alarme automatiquement par une séquence externe, etc

Be sure to remove the desiccant 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).



Caution

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 capacitive 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).



Caution

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 k $\square$ /V) should be used for measuring the signal voltages.

Il ne faut pas exécuter 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 k $\square$ /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 interchangeably 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.

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

Space vector modulation keeps the noise level to a minimum.

- Output voltage up to 98% of input voltage
- Self tuning procedure for current, flux and speed regulators

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.

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 PC configuration tool

Drive features:

- Fault register storing the last 30 fault alarms with the associated lifetime.
- Overload control.
- 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.
- Adaptive speed regulation.
- Speed-related alarms
- 8 internal speed reference values (Preset speed)
- 2 internal ramps
- Fan control logic function (only for sizes AVy2040AC4 / BR4 up to AVy5550AC4 / BR4) allows to run internal inverter 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.

- Emergency Module Supplier control (EMS or MW22U) allows emergency lift manoeuvres (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.

1.1 Motors and Encoders

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.

1.1.1 Motors

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

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.

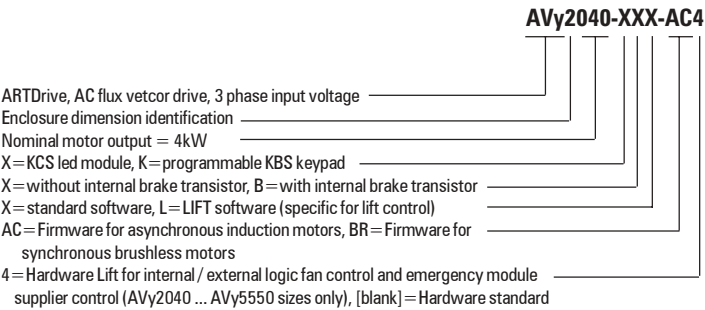
The devices should only be stored in dry rooms within the specified temperature ranges.

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

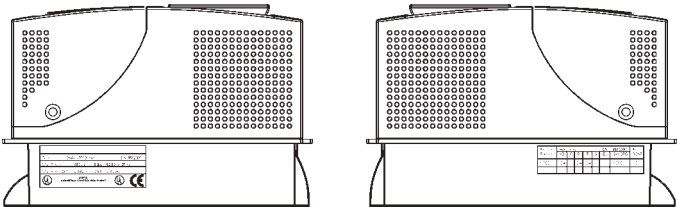
SIEI SPA	
Type:	AVy3150-KBL AC4 S/N 02006233
Inp:	230-480 Vac (Fctry Set=400) 50/60Hz 3Ph Zmin=1% 28,2A@400Vac 24,5A@480Vac With line choke
Out:	0-400Vac 0-500Hz 3Ph 20HP @ 460Vac/15kW@400Vac 33A@400V Cont. Serv. 26,9A@480V
LISTED INDUSTRIAL CONTROL EQUIPMENT 31KPF	
UL CE	

- 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					S/N BU	0162330 SW.CFG	Prod. CONF
	D	F	P	R	S			
1.000	0.A		0.A	0.A			1.000	D1

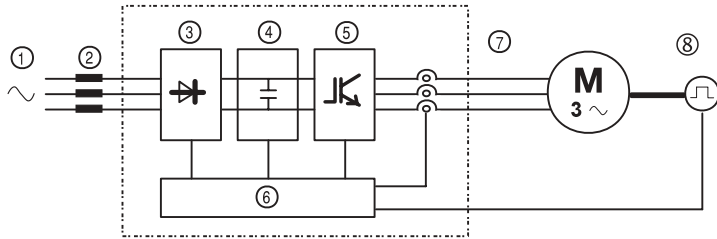
Figure 2.1.3.3: Nameplates position



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 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 ($U_{DC} = \sqrt{2} \times \text{Mains voltage } (U_{LN})$)

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/m ³ to 25 g/m ³ without moisture condensation or icing (Class 3K3 as per EN50178)
storage _____	5% to 95 %, 1 g/m ³ to 29 g/m ³ (Class 1K3 as per EN50178)
transport _____	95 % ³⁾ , 60 g/m ³ 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 following table. 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 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.

Table 2.3.2.1: AC Input/Output Specifications

Type			1007	1015	1022	1030	2040	2055	2075	3110	3150	4185	4220	4300	4370	5450	5550	6750	7900	71100	71320	81600
O U T P U T	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	10	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	15	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	22	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]	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 higher f _{sw}																			
I N P U T	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

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2.3.3 AC Input Current

NOTE!

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 3.3.2.1 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.

NOTE!

The connection of an external voltage to the output terminals of the Drive is not permitted! It is allowed to disconnect the motor from the Drive output, 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):

$$I_{CONT} = I_{2N} \times K_V \times K_T \times K_F \quad (\text{Values of derating factor are the listed on table 2.3.2.1})$$

with an overload capacity $I_{MAX} = 1.36 \times I_{CONT}$ for 60 seconds

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

Recommended motor outputs

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 $0,3 \times I_{2N}$. Magnetizing motor current must not be higher of I_{CONT} .

NOTE!

For service conditions with overload higher than 150%, the nominal current must be derated.

Table 2.3.3.1 shows nominal current values for typical service profiles (Ambient temperature = 40°C [104°F], standard switching frequency). For cycles with nominal current applied after the overload, the minimum duration is also specified.

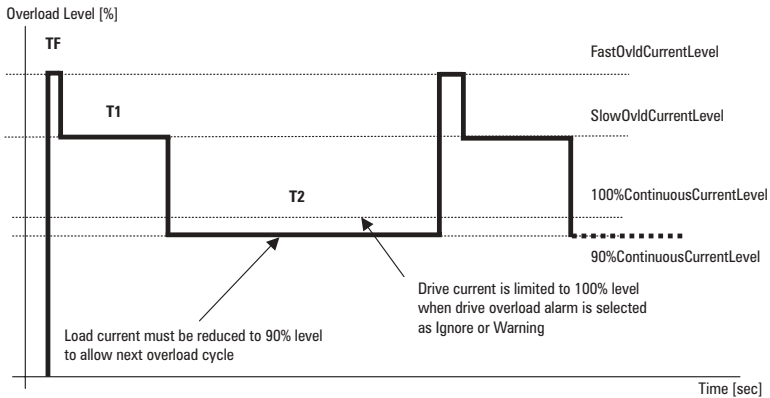
For cycles shorter than the minimum duration specified, the current following the overload should be reduced to a level lower than the nominal, so that the RMS average over the cycle does not exceed the continuous current, I_{CONT} .

Similar criteria apply for operation with additional derating factors.

Table 2.3.3.1: Overload capability

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]
1007	2.4	1.5	9	3.6	60	1.83	1	4.4	1.5	2
1015	4			6.0				7.3		
1022	5.6			8.4				10.2		
1030	7.5			11.3				13.7		
2040	9.6			14.4				17.6		
2055	12.6			18.9				23.1		
2075	17.7			26.6				32.4		
3110	24.8			37.2				45.4		
3150	33			49.5				60.4		
4185	39			58.5				71.4		
4220	47	1.36	60	63.9	300	1.83	0.5	86.0	1.36	
4300	63			85.7				115.3		
4370	79			107.4				144.6		
5450	93			126.5				170.2		
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				592.9		

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2.3.5 I/O and Encoder Specifications

I/O

Enable inputs _____ 0/15...30V 3.2...6.4 mA (5 mA @ 24 V)
 Analog inputs _____ Selectable 0... ± 10V 0.25mA max
 0...20 mA 10V max
 4...20 mA 10V max
 Max common mode voltage: 0...± 10V

Analog outputs _____ 0...± 10V 5 mA max per output
 Digital inputs _____ 0/15...30V 3.2...6.4 mA (5 mA @ 24 V)

Digital outputs _____ Supply + 15...35V
 Signals + 15...35V 40 mA max per output

Int. voltage supply

Load capacity + 5V, 160 mA Plug connector
 + 10V, 10 mA Terminal 7
 - 10V, 10 mA Terminal 8
 + 24V, 120 mA Terminal 19
 Tolerance + 10V ± 3 % ¹⁾
 - 10V ± 3 % ¹⁾
 + 24V + 20 ... 30V, not stabilized
¹⁾The tolerance between positive and negative amplitudes is ± 0.5%
 XE for digital encoder, PIN 7/9

Sinusoidal Encoder inputs

Voltage _____ 1 V pp
 Current 8.3 mA pp per channel (input resistance = 124 Ohms).
 Max. frequency 80 kHz
 Cable max. 500 feet (150 m), screened, 4 twisted pairs as shown in the table 4.4.2.1

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	80kHz* 60/FSS
0.125	1024	1024	1024	1024	1024	1024	
0.25	512	512	512	1024	1024	1024	
0.5	512	512	512	1024	1024	1024	
0.1	512	512	512	1024	1024	1024	
Mot.pole pairs (rpm@50Hz)	1(3000)	2(1500)	3(1000)	4(750)	5(600)	6(500)	(FSS=Full scale speed)
Mot.pole pairs (rpm@60Hz)	1(3600)	2(1800)	3(1200)	4(900)	5(720)	6(600)	

Digital Encoder inputs

Voltage _____ 5V
 Current _____ 10mA
 Type _____ standard and inverted signal
 Max. frequency _____ 150kHz

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	150kHz* 60/FSS
0.125	256	512	512	1024	1024	1024	
0.25	256	512	512	1024	1024	1024	
0.5	256	512	512	1024	1024	1024	
0.1	256	512	512	1024	1024	1024	
Mot.pole pairs (rpm@50Hz)	1(3000)	2(1500)	3(1000)	4(750)	5(600)	6(500)	(FSS=Full scale speed)
Mot.pole pairs (rpm@60Hz)	1(3600)	2(1800)	3(1200)	4(900)	5(720)	6(600)	

2.3.6 Accuracy

Table 2.3.6.1: Maximum Output Frequency

Regulation mode	Output frequency (Hz)					Resolution
	Maximum				Minimum (a)	
	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 Feedback Resolution

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/(256* 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/(256* ppr)] or SpdD ref res	Higher 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) [%]
Field oriented	>10000:1	Enc Sin	Enc Dig Fmode	Enc Dig Fpmode	SinCos/Res.	0.01
		300	100	300 (Spd>15rpm for ppr=1024)	N/A	
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	300	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)

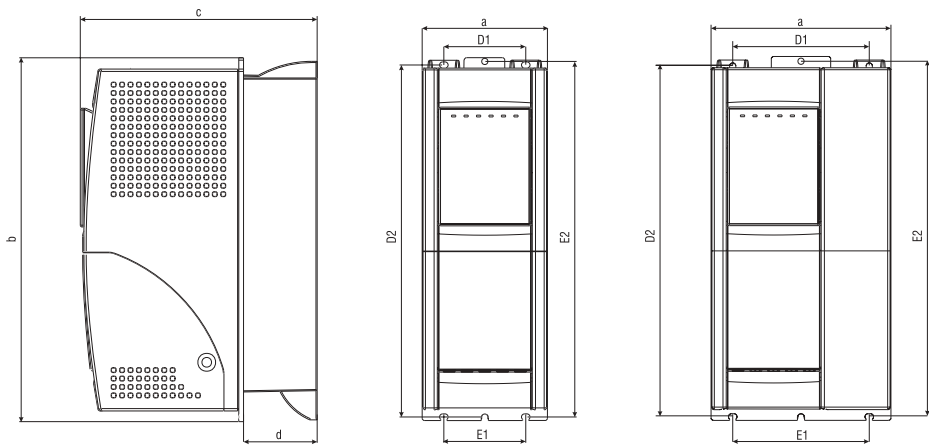


Figure 3.1.2: Mounting Methods (Mizes 1007 ... 3150)

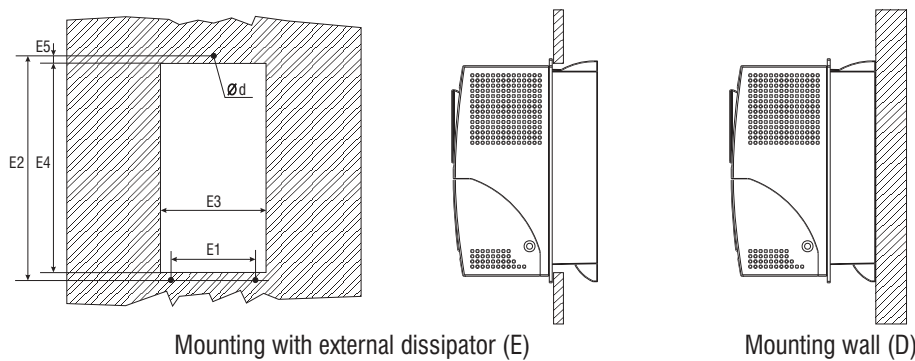


Table 3.1.1: Drive Dimensions and Weights (Sizes 1007 ... 3150)

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)	

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tad3100

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

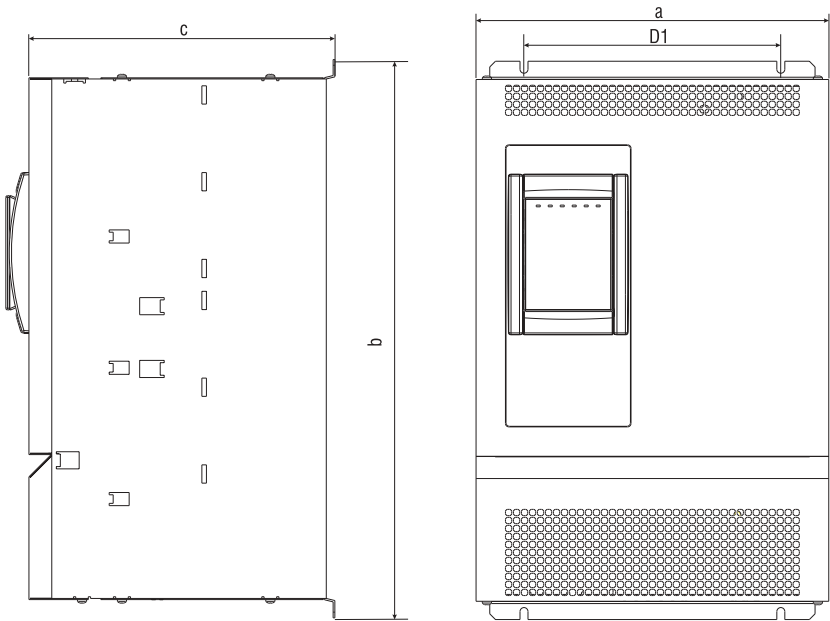


Figure 3.1.4: Mounting Methods (Sizes 4220 ... 81600)

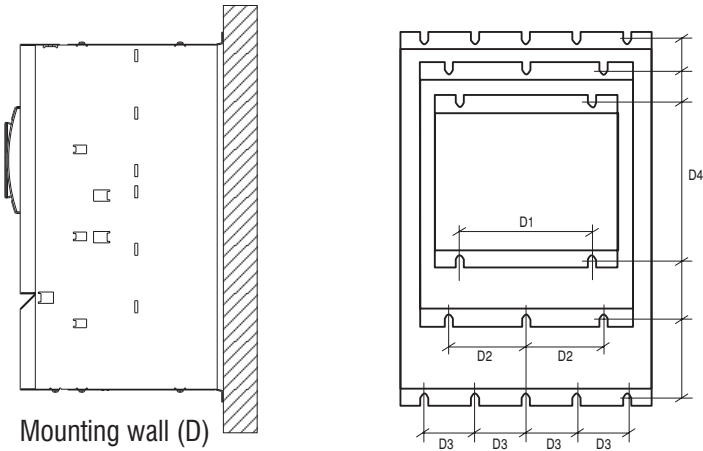
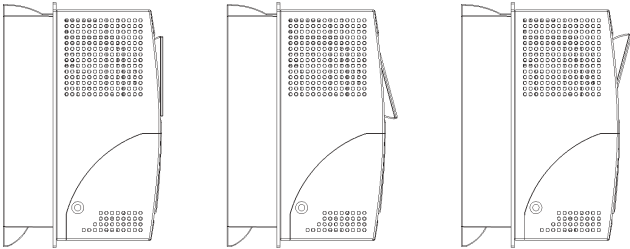


Table 3.1.2: Drive Dimensions and Weights (Sizes 4220 ... 81600)

Type	4185-4220	4300	4370	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

tad3105

Figure 3.1.5: Keypad Positioning



To allow a comfortable 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	658	582		80
4300	864	780		170
4370	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

1) f_{sw}=default; I₂=I_{2N}

tad10040

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 ²¹ (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 ... 4220	2x150 (2x 23.5)	2x150 (2x 23.5)
4300 ... 4370	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)

tad10050

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

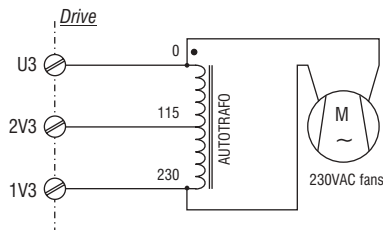


Figure 3.2.2: UL Type Fans Connections on AVy6750 and AVy81600 Sizes

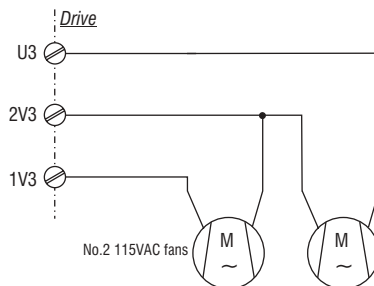
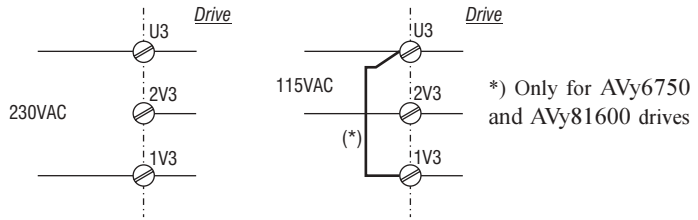


Figure 3.2.3: Example for External Connection



NOTE!

An internal fuse (2.5A 250VAC slo-blo) for AVy7900, AVy71100 and AVy71320 sizes is provided.

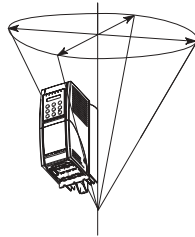
On AVy6750 and AVy81600 sizes the fuse must be mounted externally.

3.3 Installation Mounting Clearance

Note!

The dimensions and weights specified 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

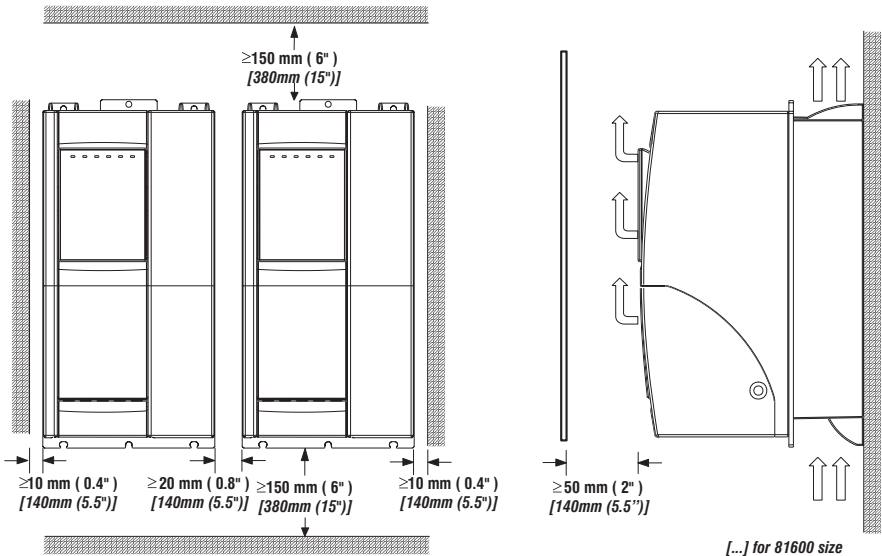


The maximum angle of inclination is 30°

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.

[illegible]

Chapter 4 - Wiring Procedure

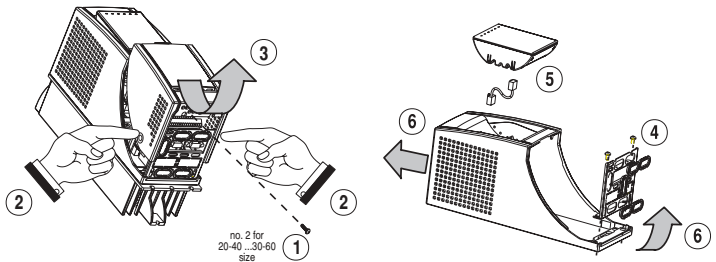
4.1 Accessing the Connectors

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:

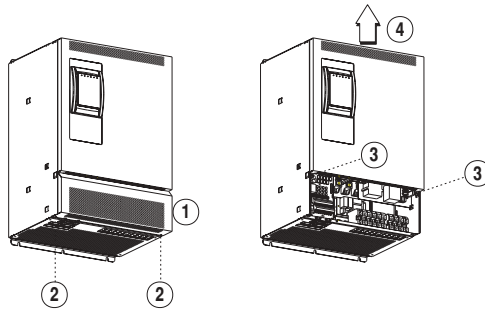
The terminal cover and cable entry plate of the device must be removed in order to fit the electrical connections:

- 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:

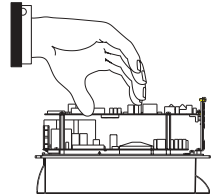
The terminal cover of the device must be removed in order to fit the electrical connections: unscrew the two screw (2) and remove the cover (1)

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



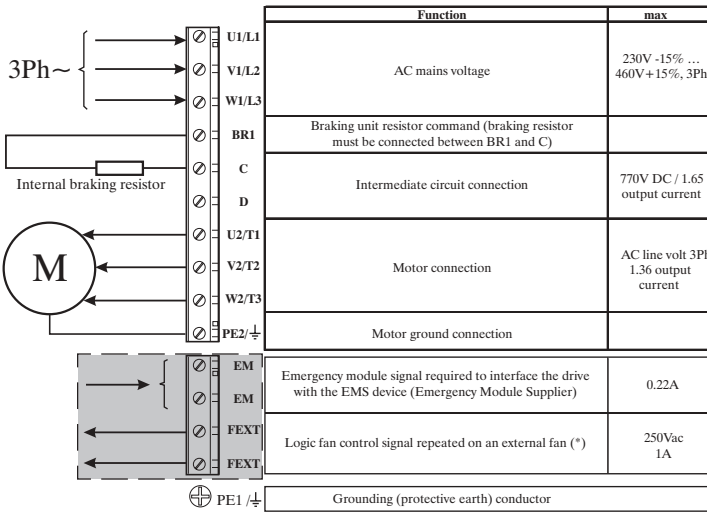
Caution

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

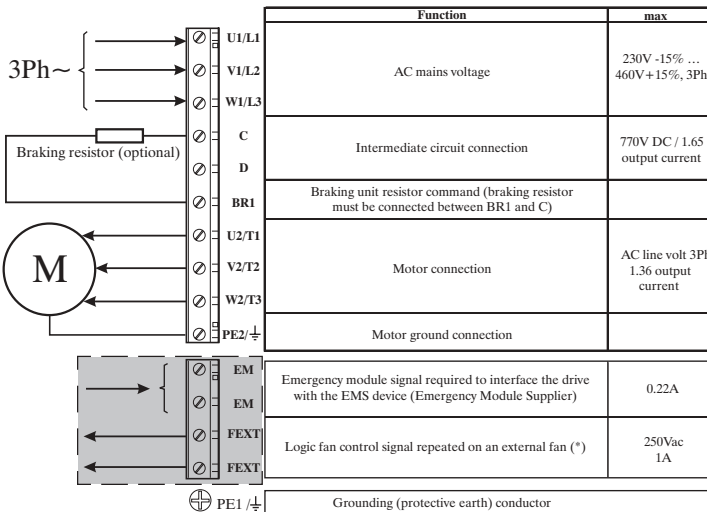
Table 4.2.1.1: Power Section Terminals from 1007 to 3150



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



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	4185-4220	4300	
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	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)	

radi4040L

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 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		Tightening torque [Nm]	
	[mm²]			AWG
	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 [mm²]	0.22	0.5	0.75	1	1.5
Max Length m [feet]	27 [88]	62 [203]	93 [305]	125 [410]	150 [492]

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4.3 Regulation Section

4.3.1 RV33-3 Regulation Card Switch & Jumpers

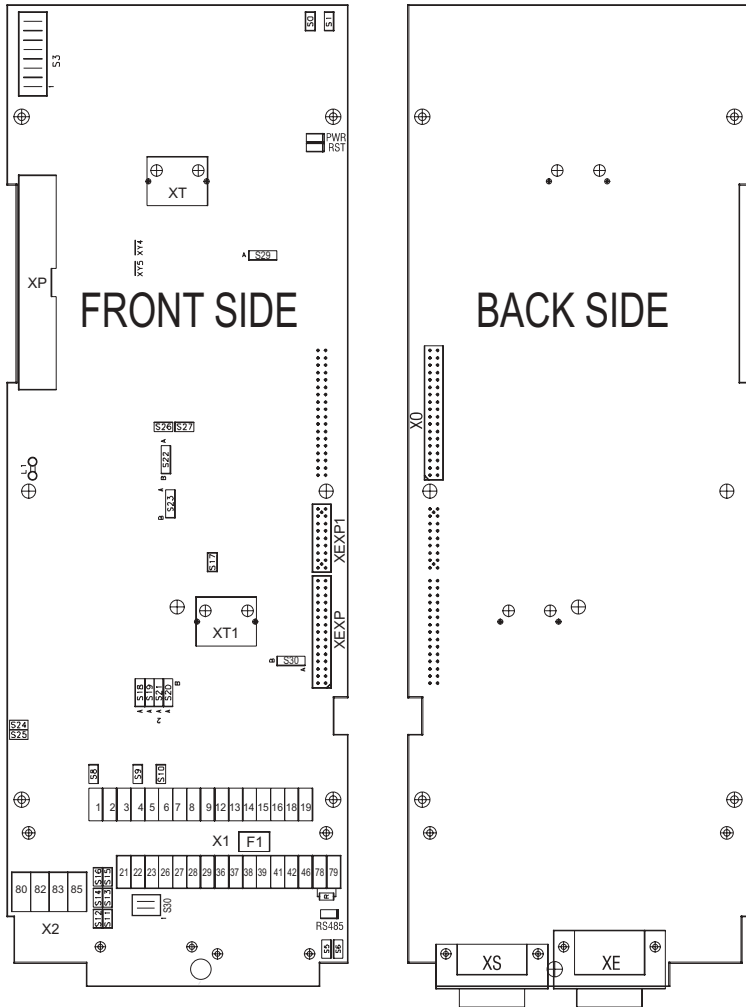


Table 4.3.1.1: LEDs & Test points on Regulation Card

Designation	Color	Function
RST	red	LED lit during the Hardware Reset
PWR	green	LED lit when the voltage +5V is present and at correct level
RS485	green	LED is lit when RS485 interface is supplied
XY4	(test point)	Phase current signal (U)
XY5	(test point)	Reference point

Table 4.3.1.2: Jumpers on Regulation Card RV33

Designation	Function	Factory setting
S0	The setting must not be changed	OFF
S1	The setting must not be changed	ON
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	B
S22 - S23	Analog input 3 enabling (alternative with SESC encoder) Pos. A= if SESC encoder is used Pos. B=analog input 3 enabled	B
S24	Jumper to disconnect 0 V (of 24 V) from ground ON=0 V connected to ground OFF=0 V disconnected from ground	ON
S25	Jumper to disconnect 0 V (regulation section) from ground ON=0 V connected to ground OFF=0 V disconnected from ground	ON
S26 - S27	Internal use	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 RV33-3	B

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(*) on multidrop connection the jumper must be ON only for the last drop of a serial line

Note!

See table 4.5.2 for more details on S11 ... S23 jumper settings.



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	2	Analog input 1	$\pm 10V$ $0.25mA$ (20mA when current loop input)
		Reference point: terminal 2.	
3	4	Analog input 2	
		Reference point: terminal 4.	
5	6	Analog input 3	
		Reference point: terminal 6.	
7		+10V	+10V/10mA
8		-10V	-10V/10mA
9		0V	-
12		Enable/ Digital input 0	+30V
13		Digital input 1	3.2mA @ 15V
14		Digital input 2	5mA @ 24V
15		Digital input 3	6.4mA @ 30V
16		COM D I/O	-
18		0 V 24	-
19		+24V OUT	+22...28V 120mA @ 24V

	21	Analog output 1	Programmable analog output; Default setting: NULL	$\pm 10V/5mA$
	22	0V	Internal 0V and reference point for terminals 21 and 23	-
	23	Analog output 2	Programmable analog output; Default setting: NULL	$\pm 10V/5mA$
	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
	37		Default setting: MLT SPD S1	3.2mA @ 15V
	38		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)	5mA @ 24V
	39		Default setting: FAULT RESET. Configurable as 1st encoder index qualifier "Digital input 7" parameter must be set as not used)	6.4mA @ 30V
	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	82	Digital output 0 Relay	250V AC 1 A
		Potential- free relay contact, programmable output, Default=DRIVE OK	
83	85	Digital output 1 Relay	250V AC 1 A
		Potential- free relay contact, programmable output, Default=BRAKE CONT MON	

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.

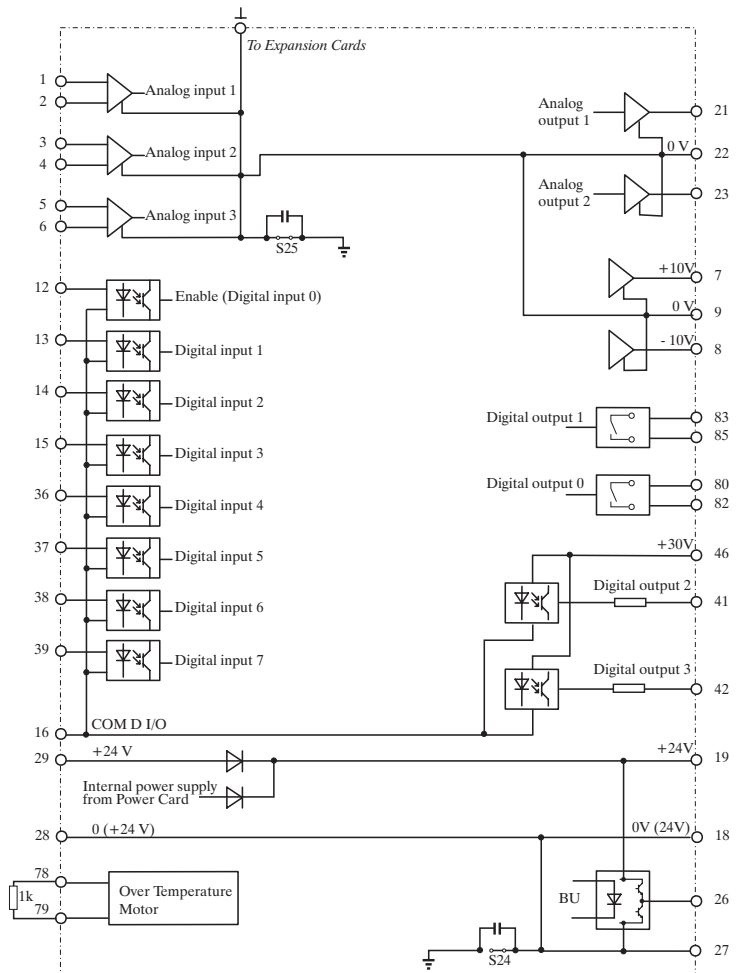
The digital inputs are optocoupled with the control circuit.

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 $\pm 10V$ 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: Potentials of the control section



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 (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)

Encoders are used to feed back a speed signal to the regulator. 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 (rotary encoders) may also be used. See section 2.3.6, “Accuracy”.

The encoder cable can be made of twisted pairs with a global shield, which connect to ground on the Drive side. Avoid connecting the shield on the motor side.

In particular cases where the cable length is more than 100 meters (328 feet), (high electromagnetic noise), it may useful to use a cable with a shield on each conductor pair, which can 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 [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]

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	ON (*)	-	-	-	-	-	-	-	-
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
SEExtern	ON	ON	ON	ON	ON	ON	-	-	-	-	-	-	-	-	-
DEHS	OFF	OFF	OFF	OFF	OFF	OFF	ON	B	B	B	B	-	-	-	-
DEExtern	OFF	OFF	OFF	OFF	OFF	OFF	-	-	-	-	-	-	-	-	-
SC	-	-	-	-	-	-	-	A	A	A	A	A	A	ON	ON
RES	-	-	-	-	-	-	-	-	-	-	-	OFF	OFF	OFF	OFF

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(*) If the encoder is not provided of the zero channel : S17=OFF

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
		B-	+8V	C+	C-	A+	A-	0V	B+	+5V	E+	E-	F+	F-	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	●	●	●	●	●	●	●	●		●	●	●	●	●

ai3160

Regulation card + Expansion card (EXP-RES)

Encoder type	Shielded cable	XFR CONNECTOR PIN (EXP-RES)													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
				Sin+	Sin-	Cos+	Cos-				Rot-				Rot+
RES	6 pole			●	●	●	●				●				●

Regulation card + Option card (APC100y with E-ABS)

Encoder type	Shielded cable	XE CONNECTOR PIN (RV33-1)													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
		B-		C+	C-	A+	A-	0V	B+	+5V	E+	E-	F+	F-	G+
SEExtern DEExtern	8 pole	●		●	●	●	●	●	●	●					
		TERMINALS application card (APC100y)													
		1	2	3	4	5	6	7							
		CK-	CK+	EQP	DT-	DT+	Gnd	0V							
	4 pole	●	●		●	●									

ai3160L

Note:

- In this case the cable must be split In two
- For EQP, Gnd and 0V terminals refers to card manuals

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
Channels _____ two-channel, differential
Power supply _____ + 5 V (Internal supply) *
Load capacity _____ > 8.3 mA pp per channel

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

Digital encoders (XE connector on Regulation card)

max. frequency _____ 150 KHz (select the appropriate number of pulses depending on required max. speed)
Number of pulses per revolution _____ min / max: see table 2.3.5.1.
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.
Power supply _____ + 5 V (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 are: 0=5.41 V, 1=5.68 V, 2=5.91 V, 3=6.18 V via **Std enc supply** parameter.

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

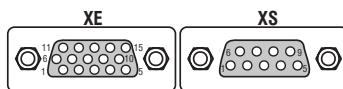
During the start up of the drive:

- 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 $\pm$ 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 at 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 what 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	Rotor- Output	O	6 Volts	50 mA rms max
Pin 11 ... 14	-	-	-	-	-
Pin 15	RES-ROTP	Rotor+ Output	O	6 Volts	50 mA rms max

ai3140ER

WARNING!
Note!

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

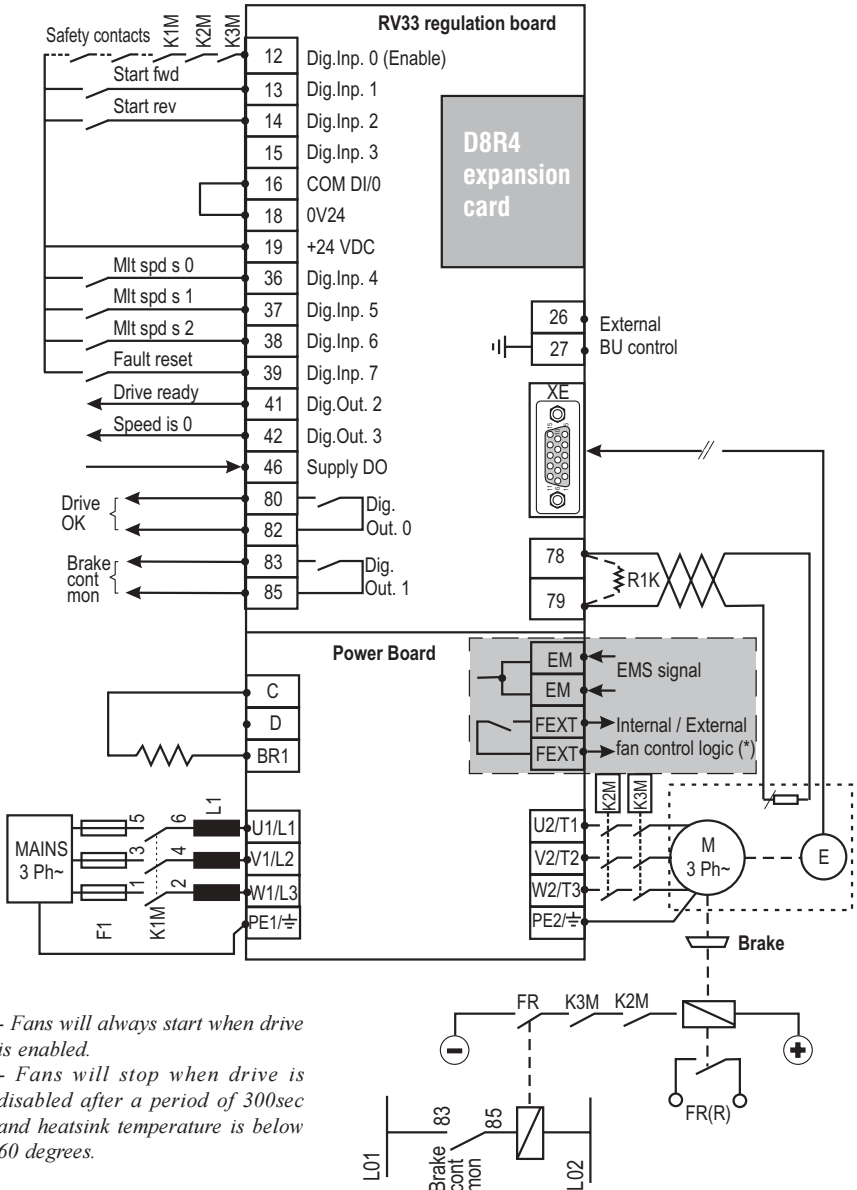
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NOTE! Jumper S2 and S3 on the EXP-RES optional board must be OFF.

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

4.6 Standard Connection Diagram

Figure 4.6.1: Standard Connection Diagram

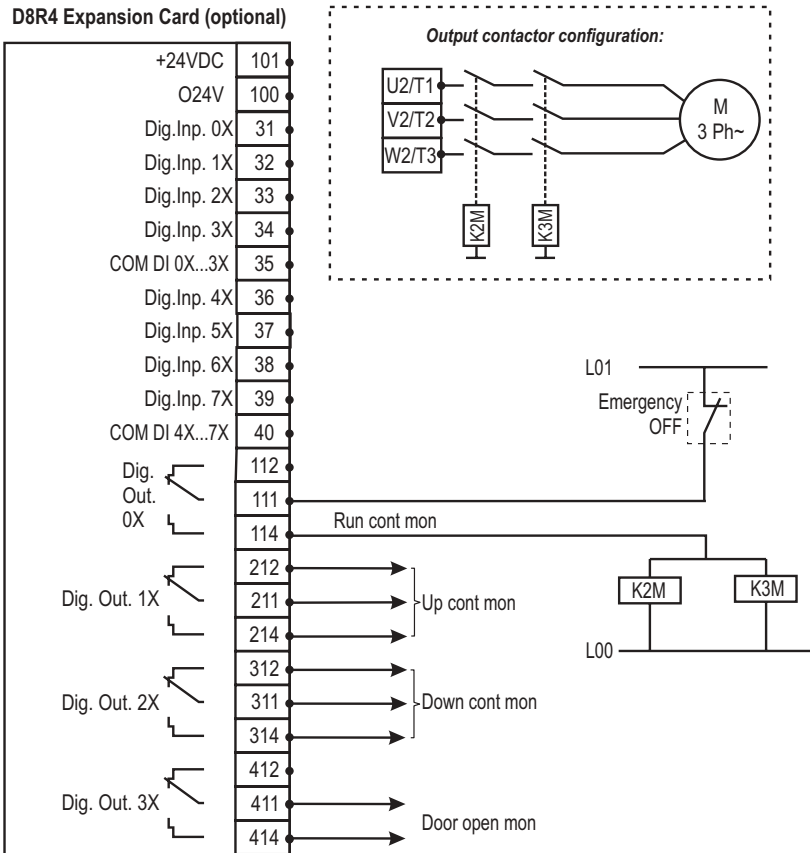


None!

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, no phase



Notes!

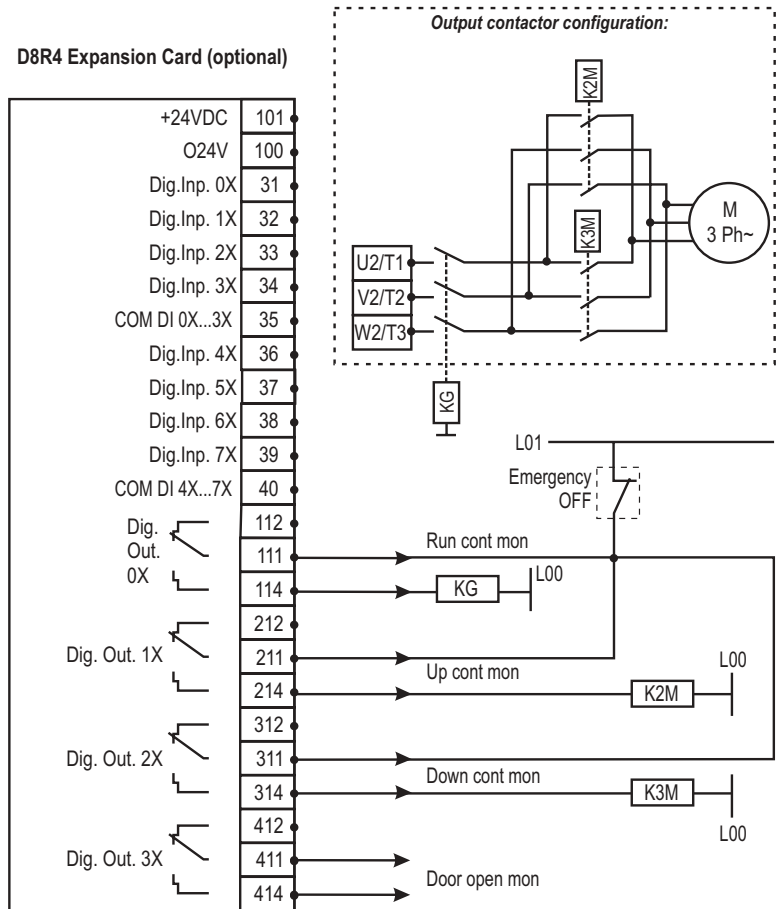
Sequence change must be used in FOC & BRS modes

Expansion board digital inputs and digital outputs must be enabled via software:

- I/O CONFIG \ Digital Inputs \ Exp dig inp en
- I/O CONFIG \ Digital Outputs \ Exp dig out en

Motor protection configuration as per figure 4.6.1.

Figure 4.6.3: Separate Output Contactors Management, with phase



NOTE!

Sequence change can be used in only in VF & SLS modes

Expansion board digital inputs and digital outputs must be enabled via software:

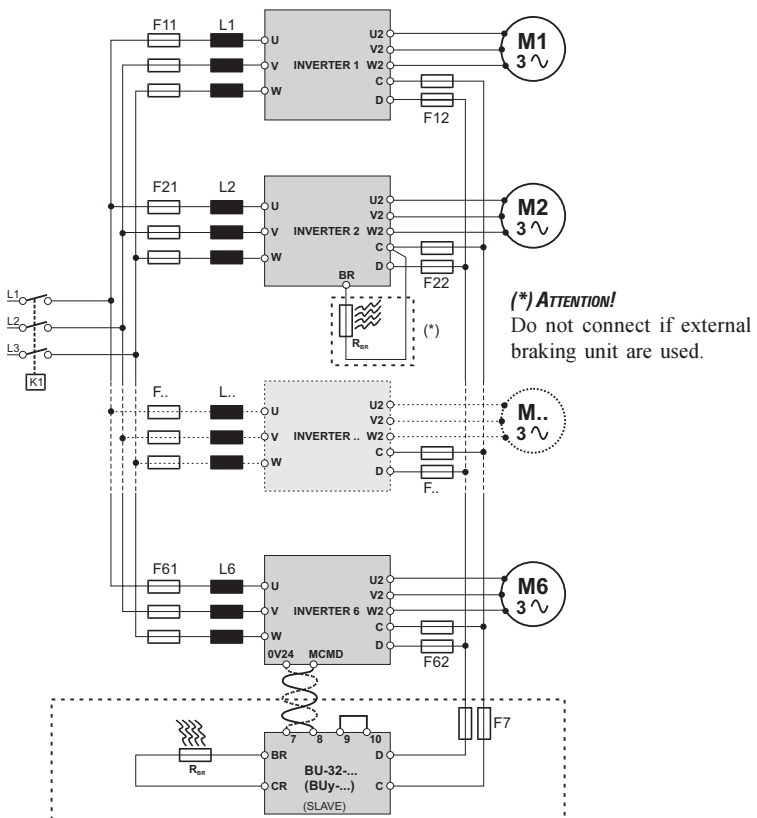
- I/O CONFIG \ Digital Inputs \ Exp dig inp en
- I/O CONFIG \ Digital Outputs \ Exp dig out en

4.6.2 Parallel Connection on the AC (Input) and DC (Intermediate Circuit) Side of Several Inverters

Features and Limits:

- 1 The inverters used have to be all the same size.
- 2 AC input chokes (see chapter 5.7.1) have to be the same (provided by the same supplier).
- 3 The mains power supply has to be simultaneous for all inverters, i.e. a single switch /line contactor has to be used.
- 4 Such connection is suitable for a maximum of 6 inverters.
- 5 If necessary dissipate braking energy; a single internal braking unit (with external resistor) has to be used or one (or several) external braking unit ("BU32-...", BUy-...") configured with the inverter or a BU as master (all the other connected BUs are configured as slaves).
- 6 Fast fuses (F12...F62) have to be fitted on the dc-link side (C and D terminals) of each inverters (see chapter 5.6.2).

Figure 4.6.4: Parallel Connection on the AC and DC Side of Several Inverters



4.7 Circuit Protection

4.7.1 External Fuses for the Power Section

The inverter must be fused on the AC Input side. Fuses, circuit breakers and slow protective switches can be used. Superfast semiconductor fuses provide a greater degree of protection.

Note!

If the terminals of the DC Link circuit (C and D) are connected with external devices, semiconductor fuses must always be fitted on the AC input side. This, for example, is the case with:

- connected external braking units (BU...)
- coupled DC Link circuits of several inverters
- connected external capacitors

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 (SIEI 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	GRD3/50 (F4D21) or Z22GR40	A70P40	FWP40	(S7G52)
3150	10000	GRD3/50 (F4D21) or Z22GR50 (F4M15)	A70P40	FWP40	(S7G52)
4185 ... 81600	10000	For these types an external reactor is mandatory if the AC input impedance 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		A70P10	FWP10	(S7G49)
1022	50000	GRD2/16 (F4D14) or Z14GR16 (F4M05)	A70P20	FWP20	(S7G48)
1030	50000		A70P20	FWP20	(S7G48)
2040	50000	GRD2/20 (F4D15) or Z14GR20 (F4M07)	A70P20	FWP20	(S7G48)
2055	50000	GRD2/25 (F4D16) or Z14GR25 (F4M09)	A70P25	FWP25	(S7G51)
2075	50000	GRD3/35 (F4D20) or Z22GR40	A70P35	FWP35	(S7G86)
3110	50000	GRD3/50 (F4D21) or Z22GR40	A70P40	FWP40	(S7G52)
3150	50000	GRD3/50 (F4D21) or Z22GR50 (F4M15)	A70P40	FWP40	(S7G52)
4185 ... 4220	25000	GRD3/50 (F4D21) or Z22GR50	A70P50	FWP50	(S7G53)
4300	25000	S00üf1/80/80A/660V or Z22gR80	A70P80	FWP80	(S7G55)
4370	25000	S00üf1/80/100A/660V or M00üf01/100A/660V (F4G18)	A70P100	FWP100	(S7G54)
5450	25000	S00üf1/80/160A/660V or M00üf01/160A/660V (F4E15)	A70P175	FWP175	(S7G57)
5550	25000	S00üf1/110/250A/660V or M1üf1/250A/660V (F4G28)	A70P300	FWP300	(S7G60)
6750	25000				
7900	25000				
71100	25000				
71320	25000	S2üf1/110/400A/660V or M2üf1/400A/660V (F4G34)	A70P400	FWP400	(S7G62)
81600	25000				

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Fuse manufacturers: Type GRD2... (E27), GRD3... (E33), M... (blade fuses),

Z14... 14 x 51 mm, Z22... 22 x 58 mm, S...

A70P...

FWP...

Jean Müller, Eltville

Gould Shawmut

Bussmann

Note!

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

4.7.2 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	SIEI code	Fuses type		SIEI code
1007	Z14GR6	F4M01	A70P10	FWP10A14F	S7G49
1015	Z14GR10	F4M03	A70P10	FWP10A14F	S7G49
1022					
1030	Z14GR16	F4M05	A70P20-1	FWP20A14F	S7G48
2040					
2055	Z14GR20	F4M07	A70P20-1	FWP20A14F	S7G48
2075	Z14GR32	F4M11	A70P30-1	FWP30A14F	S7I50
3110	Z14GR40	F4M13	A70P40-4	FWP40B	S7G52
3150	Z22GR63	F4M17	A70P60-4	FWP60B	S7I34
4185 - 4220	S00üF1/80/80A/660V	F4M19	A70P80	FWP80	S7G54
4300	S00üF1/80/100A/660V	F4G18	A70P100	FWP100	S7G55
4370	S00üF1/80/125A/660V	F4G20	A70P150	FWP150	S7G56
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...
A70P...
FWP...

Jean Müller, Eltville
Gould Shawmut
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
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 recommended 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 impedance 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	SIEI 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 - 4220	LR3-022	S7FF4
4300	LR3-030	S7FF3
4370	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 2.3.2.1 in section 2.3.2, “AC Input/Output Connection”.

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 maintain 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	SIEI code
1007	LU3-003	S7FG2
1015		
1022		
1030		
2040	LU3-005	S7FG3
2055		
2075	LU3-011	S7FG4
3110		
3150	LU3-015	S7FM2
4185 - 4220	LU3-022	S7FH3
4300	LU3-030	S7FH4
4370	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, grounding, 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 SIEI drives.

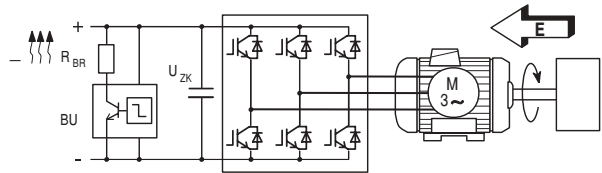
NOTE!

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...) 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

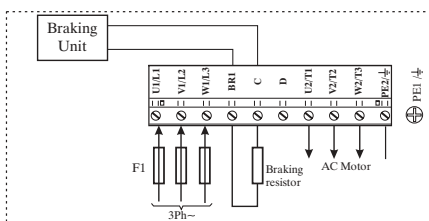
The braking resistors can be subject to unforeseen overloads due to possible failures. The resistors have to be protected using thermal protection devices. Such devices do not have to interrupt the circuit where the resistor is inserted but their auxiliary contact must interrupt the power supply of the drive power section.

In case the resistor foresees the presence 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 - 4220	MRI/T4000 15R4	4	15.4	150
4300	MRI/T4000 11R6	4	11.6	150
4370	MRI/T4000 11R6	4	11.6	150
5450	MRI/T8000 7R7	8	7.7	220
5550	MRI/T8000 7R7	8	7.7	220

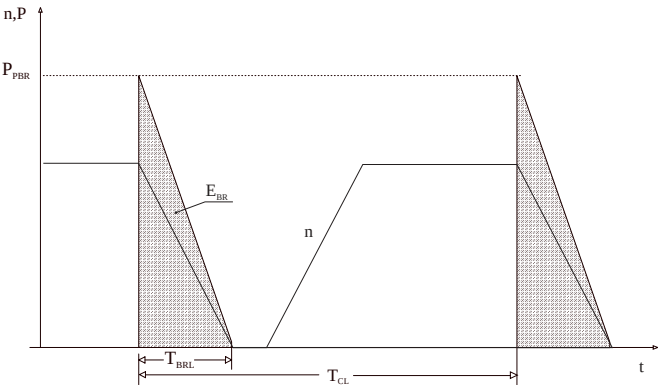
TADL0250

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



T_{CL} Minimum cycle time in condition of limit operating cycle (braking power = 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

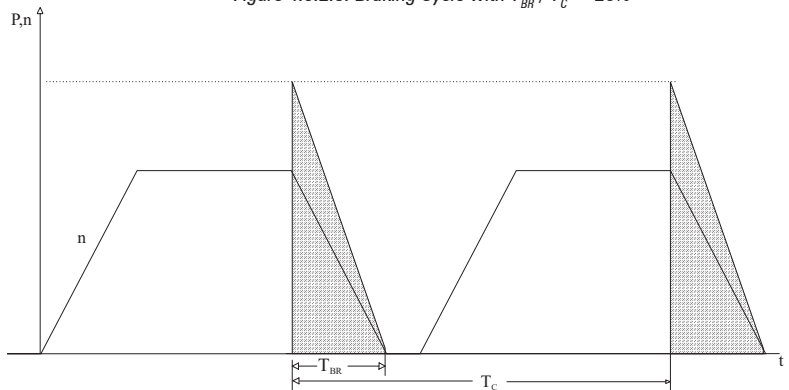
MRI = resistor type
900 = nominal power (900 W)
T= with safety thermostat
68R = resistor value (68 ohm)

Note!

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

Where: T_{BR} = Braking time, 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:

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 $P_{NBR} = 600$ [W]

Maximum energy $E_{BR} = 4 \times 600[W] \times 10[s] = 24000[J]$

Inverter mains supply = 460V

Voltage threshold: $V_{BR} = 780V$

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

It is necessary to consider the following relation:

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

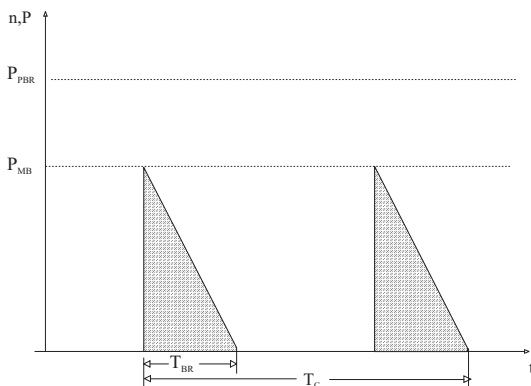
1) $P_{MB} \square 2 * E_{BR} / T_{BR}$ Where: P_{MB} is the average power of the cycle (see.fig. 4.9.2.4)

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

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

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

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 in table 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 recommended resistor pairing as for the table 4.9.2.1.

For non-standard pairing 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 / 480 Vac	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 - 4220	18	52	42	15
4300	37	78	23	10
4370	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 satisfied

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

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).

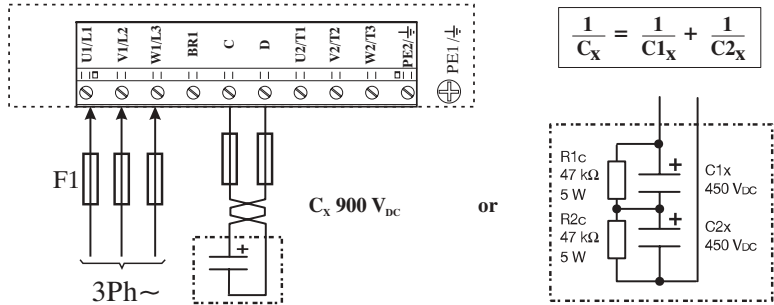
Table 4.10.1: DC Link Buffer Time

Inverter type	Internal capacitance C_{std} [μF]	Buffer time t_{Buff} (minimum value) with the internal capacitance at :			Maximum permissible external capacitance C_{ext} [μF]	Maximum power required by switched mode power supply P_{SMPS} [W]
		AC Input voltage = 230V [s]	AC Input voltage = 400V [s]	AC Input voltage = 460V [s]		
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 - 4220	1800	0.58	1.54	2.3	4500	70
4300	2200	0.62	1.88	2.8	4500	70
4370	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:

$$C_{\text{ext}} = \frac{2 \cdot P_{\text{SMPS}} \cdot t_{\text{Buff}} \cdot 10^6}{U_{\text{Buff}}^2 - U_{\text{min}}^2} - C_{\text{std}} \quad \text{fA018}$$

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

Calculation example

An AVy4220 drive is operated with an AC Input supply $U_{\text{LN}} = 400 \text{ V}$. 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		

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

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	58	60
1015	3.5		4370	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 - 4220	42	60	Tavy4250		

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.

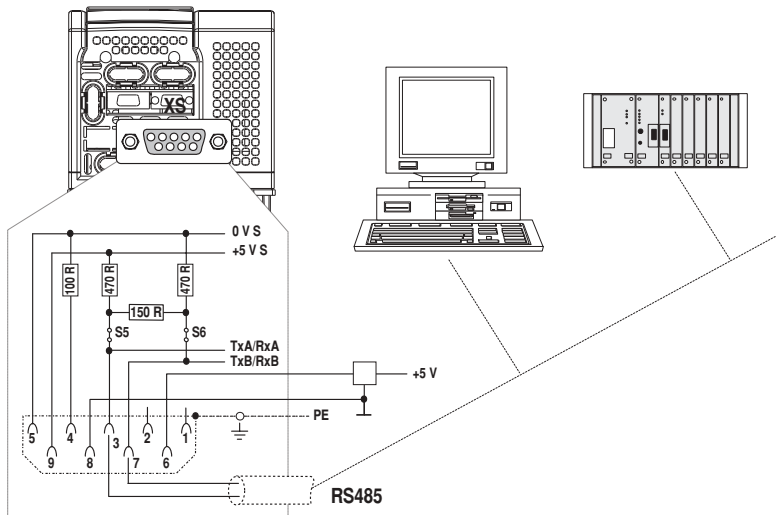
CONDITION

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.

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 transferred, their type and value range is given in the table contained in the Communication paragraph of the COMMUNICATION menu (RS 485), “Parameter lists”.

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.

A connection point to point can be done using “PCI-485” option interface, without jumper setting.
 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

NOTE!

The communication protocol can be chosen between Slink4, Modbus, Jbus or ISO 1745 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

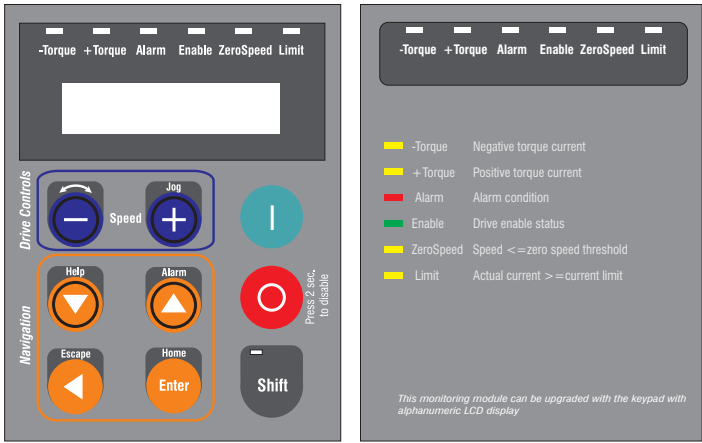
O = Output

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 increase/decrease speed and jog
- 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

us030g

Control Keys	Text reference	Function
	[START]	START key commands the drive to Enable and Start.
	[STOP]	STOP key commands to Stop and disable (<i>Command select</i> = 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 with 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 is not implemented.
	[Shift]	Shift button enables the keypad second functions (Rotation control, Jog, Help, Alarm, Escape, Home)

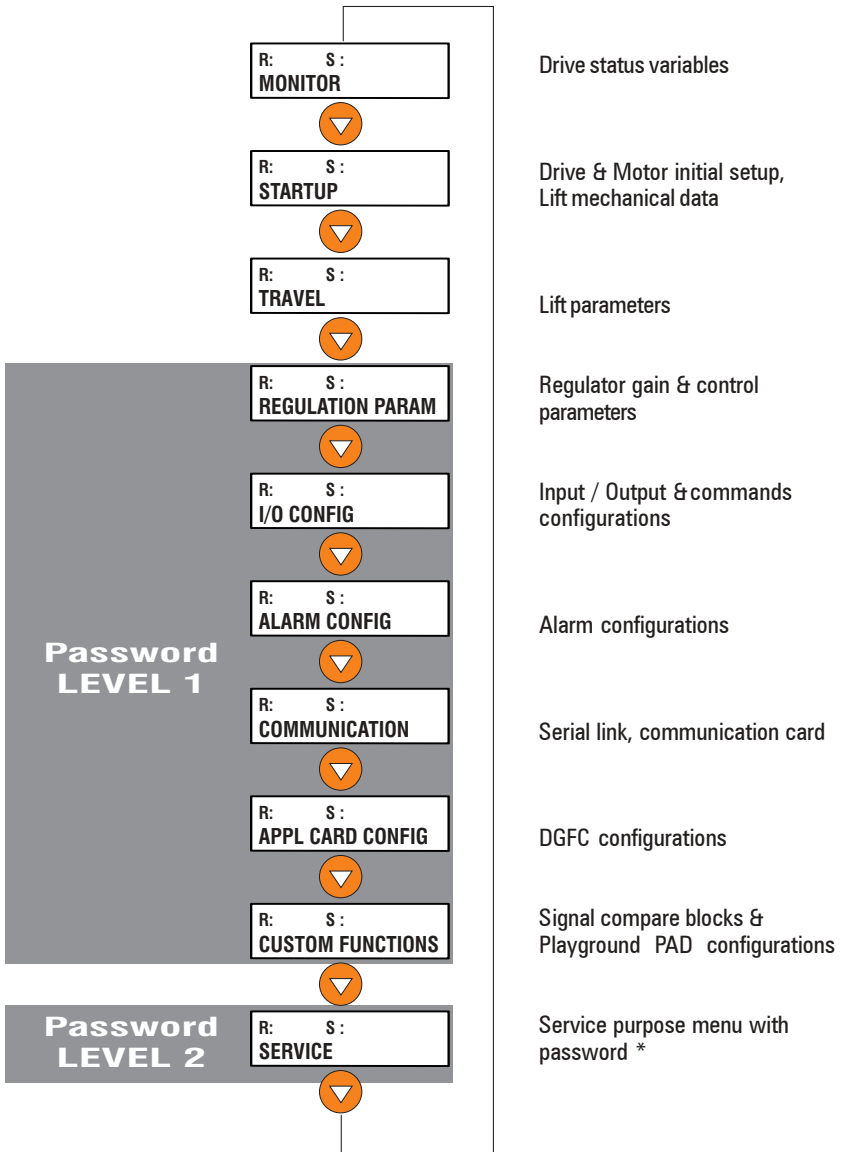
```

graph TD
    MM[MAIN MENU] -- "Enter" --> MON[R: MONITOR S: MONITOR]
    MON -- "Escape from MONITOR" --> MM
    MON -- "Scroll down" --> STARTUP[R: STARTUP S: STARTUP]
    STARTUP -- "Scroll up" --> MM
    STARTUP -- "Enter" --> STARTUP_CONFIG[STARTUP Startup config]
    STARTUP -- "Escape from STARTUP" --> MM
    STARTUP_CONFIG -- "Scroll down" --> STARTUP_REG[STARTUP Regulation mode]
    STARTUP_REG -- "Scroll up" --> STARTUP_CONFIG
    STARTUP_REG -- "Enter" --> STARTUP_SAVE[STARTUP Save config?]
    STARTUP_REG -- "Escape from STARTUP" --> MM
    STARTUP_SAVE -- "Enter" --> BUSY[Busy Please wait]
    BUSY -- "Enter for SAVE PARAMETERS" --> STARTUP_SAVE
    STARTUP_SAVE -- "Escape from STARTUP" --> MM
    MM -- "Scroll down" --> SERVICE[R: SERVICE S: SERVICE]
    SERVICE -- "Scroll up" --> MM

```

[illegible]

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 edit every recycle drive supply

Chapter 7 - Commissioning via Keypad

The ARTDrive Lift can operate with advanced Voltage /Frequency scalar 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 by recipes to another regulation mode.

7.1 Commissioning for AVy...AC / AC4 (Asynchronous 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; Field Oriented vector control selection.
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 and lift car is installed. It should cause limited shaft rotation. - “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
1	Open-loop - Sensorless vector mode (see chapter 7.1.2)	
	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
1	V/f control mode (see chapter 7.1.3)	
	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 and lift car is installed. It should cause limited shaft rotation. - “ 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	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 3.300).

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):

☐ AC Drive Lift ☐
☐ Startup... ☐

after 10 seconds

☐ R: 0 S: 0 ☐
☐ MONITOR ☐



☐ R: 0 S: 0 ☐
☐ STARTUP ☐

Enter

☐ STARTUP ☐
☐ Startup config ☐



☐ STARTUP ☐
☐ Regulation mode ☐

Enter

☐ Regulation mode ☐
☐ V/f control ☐

Enter

☐ Select new mode ☐
☐ V/f control ☐



☐ Select new mode ☐
☐ Field oriented ☐



Press **Enter** to confirm Regulation mode database selected. The drive will restart in the new regulation mode, this will take around 5 seconds:

☐ Restart ☐
☐ Please wait ☐

then

☐ R: 0 S: 0 ☐
☐ MONITOR ☐

2

Set Drive data

Scroll  and **Enter** **STARTUP** menu:

☐ R: 0	☐ S: 0	☐
☐ MONITOR		☐

☐ R: 0	☐ S: 0	☐
☐ STARTUP		☐

Enter

☐ STARTUP	☐
☐ Startup config	☐

Enter

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

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
 ☐

☐ Switching freq
 ☐

☐ 8 Khz
 ☐

☐ Spd ref/fbk res
 ☐

☐ 0.250 rpm
 ☐

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

☐ Spd ref/fbk res
 ☐

☐ 0.125 rpm
 ☐

Press  to confirm the selection.

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

☐ Busy
 ☐

☐ Please wait ...
 ☐

then

☐ SETUP MODE
 ☐

☐ Drive data
 ☐

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** +  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 data, 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 on rotation).

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

4

Autotune

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.

☐ SETUP MODE	☐
☐ Autotune	☐

Enter

Select the desired option (scroll ▲ or ▼):

☐ Complete still	☐
☐ Start?	☐

or

☐ Complete rot	☐
☐ Start?	☐

Enter

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.

☐ Complete still	☐
☐ Start?	☐

Enter

☐ Complete still	☐
☐ Press I Key	☐

press  to start

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

The Autotune procedure will start; 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 7, 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  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/s²
- Millimeters = mm/s, mm/s² and mm/s³.

☐ Gearbox ratio	☐
☐ 35.00	☐

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

☐ Pulley diameter	☐
☐ 500 mm	☐

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

☐ Full scale speed	☐
☐ 1460 rpm	☐

Press  to edit max speed (rated motor speed), press  to confirm .

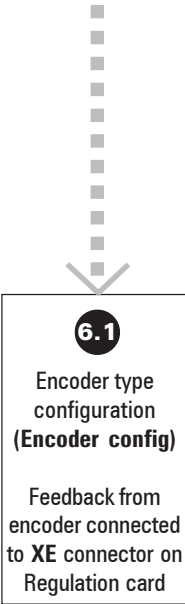
NOTE! It defines the 100% of the application speed referenced. The absolute speed handling range is $\pm 200\%$ Full scale speed.

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

☐ Busy	☐
☐ Please wait ...	☐

then

☐ Startup config	☐
☐ Mechanical data	☐



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

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

Scroll  to **Encoders config** menu:

☐ Startup config	☐
☐ Encoders config	☐



☐ Speed fbk sel	☐
☐ Std encoder	☐



☐ Std enc type	☐
☐ Digital	☐

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

☐ Std enc type	☐
☐ Sinusoidal	☐

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

☐ Std enc pulses	☐
☐ 1024 ppr	☐

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

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

6.2

Encoder type configuration (Encoder config)

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



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

Scroll  to **Encoders config** menu:

- ☐ Startup config ☐
- ☐ Encoders config ☐



- ☐ Speed fbk sel ☐
- ☐ Std encoder ☐



- ☐ Speed fbk sel ☐
- ☐ Std encoder ☐



- ☐ Speed fbk sel ☐
- ☐ Exp encoder ☐



- ☐ Speed fbk sel ☐
- ☐ Exp encoder ☐

Press  seven times.

- ☐ Exp enc pulses ☐
- ☐ 1024 ppr ☐

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

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

7.1.2 Sensorless vect

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

☐ 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 to confirm Regulation mode database selected. The drive will restart in the new regulation mode, this will take around 5 seconds:

☐ Restart	☐
☐ Please wait	☐

then

☐ R: 0	☐ S: 0	☐
☐ MONITOR		☐

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

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

☐ 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 to confirm.

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



☐ Ambient temp ☐
☐ 40° C ☐



☐ Switching freq ☐
☐ 8 KHz ☐



Press , the drive will show:



3

Set Motor data



☐ Busy	☐
☐ Please wait ...	☐

then

☐ SETUP MODE	☐
☐ Drive data	☐



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

☐ SETUP MODE	☐
☐ Motor data	☐



☐ Rated voltage	☐
☐ 380.00 V	☐

to edit motor voltage. To confirm the new value press , to cancel

edit press + or scroll to:

☐ Rated frequency	☐
☐ 50.00 Hz	☐

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



☐ Rated current	☐
☐ 43 A	☐

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

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	☐

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

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

☐ **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 refer to section 10, Troubleshooting.

4

Autotune



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.

☐ SETUP MODE	☐
☐ Autotune	☐



Select the desired option (scroll  or ):

☐ Complete still	☐
☐ Start?	☐

or

☐ Complete rot	☐
☐ Start?	☐



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.

☐ Complete still	☐
☐ Start?	☐



☐ Complete still	☐
☐ Press I Key	☐

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 7, 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 **Left Arrow** to exit from menu:

☐ Startup config	☐
☐ Load setup	☐

Scroll **Down Arrow** 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/s²
- Millimeters = mm/s, mm/s² and mm/s³.

☐ 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 (rated motor speed), press **Enter** to confirm.

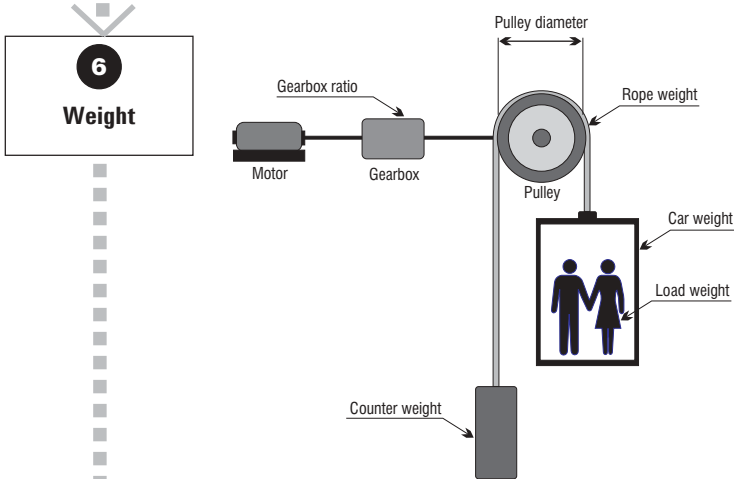
NOTE! It defines the 100% of the application speed referenced. The absolute speed handling range is $\pm 200\%$ Full scale speed.

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

- | | |
|---|--------------------------|
| ☐ Busy | ☐ |
| ☐ Please wait ... | ☐ |

then

- | | |
|---|--------------------------|
| ☐ Startup config | ☐ |
| ☐ Mechanical data | ☐ |



Scroll  to Weights menu:

- | | |
|---|--------------------------|
| ☐ Startup config | ☐ |
| ☐ Mechanical data | ☐ |

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

- | | |
|--|--------------------------|
| ☐ Counter weight | ☐ |
| ☐ 0 Kg | ☐ |

Press  and the value of Counter weight (car weight to achieve balance

system) parameter, press **Enter** to confirm.

▼
□ **Load weight** □
□ **0 Kg** □

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

▼
□ **Rope weight** □
□ **0 Kg** □

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

▼
□ **Motor inertia** □
□ **0.00 Kg*m²** □

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

▼
□ **Gearbox inertia** □
□ **0.00 Kg*m²** □

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:

□ **Startup config** □
□ **BU protection** □

Enter

7

Braking unit setting
[BU protection]

☐ BU control	☐
☐ Internal	☐

▼

☐ BU resistance	☐
☐ 15.40 ohm	☐

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 resistance, a time reverse characteristic is defined. This requires definition of resistor power in continuous service, **BU res cont pwr**.

NOTE! Refer to chapter 9.2 for details on BU protection

▼

☐ BU res cont pwr	☐
☐ 4.00 kW	☐

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

Press **◀** to exit from Encoder Config menu.

☐ Startup config	☐
☐ BU protection	☐

◀

☐ Busy	☐
☐ Please wait ...	☐

to

☐ 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:

☐ STARTUP	☐
☐ Save config?	☐

◀

☐ R:	☐ S:	☐
☐ STARTUP		☐

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”

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

+00000000 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:

9

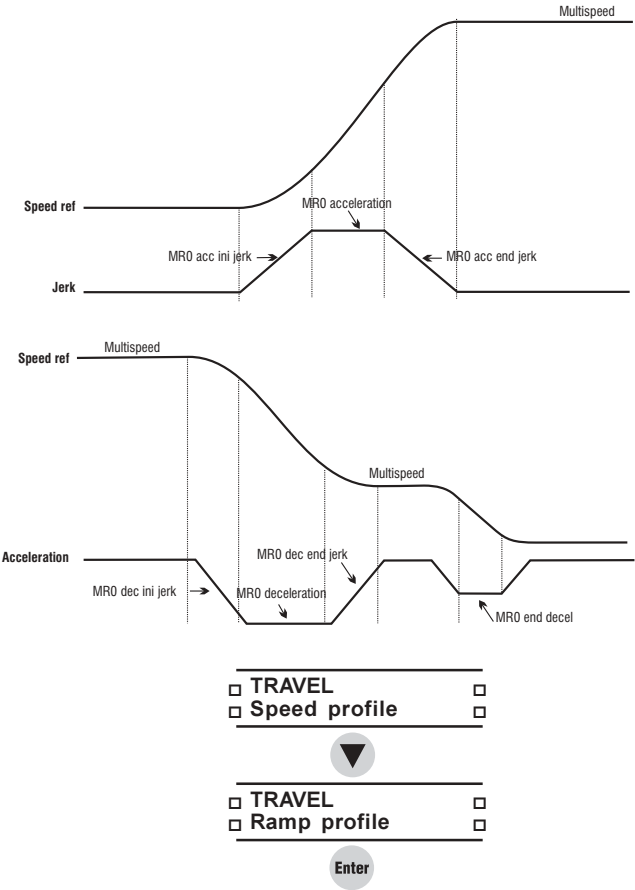
Ramp setting
[Ramp profile]

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

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Press  to exit from Speed profile menu.

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



☐ 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 is a real motor parameters measurement: - “Curr Reg autotune” can be used when motor is coupled to gearbox and lift car is installed. It should 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	Motor protection	Motor overload control enabling
9	Set braking unit parameters	Braking Unit parameters: Braking unit type (internal / external), Braking unit resistance, Braking unit power
10	Save configuration made in startup menu	Use “Save Config ?” to save all the changes made in the Startup menu.
11	Set speed profile	A binary combination of three digital input allows to select up to 8 different speed setpoints
12	Set ramp profile	Accelerations jerk and decelerations jerk can be set in the ramp profile
13	Encoder phasing	
14	Save all the parameters	

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

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

1
 Set drive
 parameters
 (Drive data)

R: S:	□
MONITOR	□



R: 0 S: 0	□
STARTUP	□



STARTUP	□
Startup config	□



Startup config	□
Enter setup mode	□

, wait few seconds:

SETUP MODE	□
Drive data	□



SETUP MODE	□
Drive data	□



Mains voltage	□
400 V	□



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

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

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



Ambient temp	□
40° C	□



Switching freq	□
8 KHz	□



☐ Spd ref/fbk res ☐
☐ 0.250 rpm ☐

Enter

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

I.e.: 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 ☐



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.



2

Set motor
parameters
(Motor data)

☐ **Rated speed** ☐
☐ **2000.00 rpm** ☐

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

Rated speed = Synchronization speed - slip

☐ **Pole pairs** ☐
☐ **4** ☐

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

☐ **Torque Constant** ☐
☐ **2.480 Nm/A** ☐

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]

☐ **EMF constant** ☐
☐ **1.430 V*s** ☐

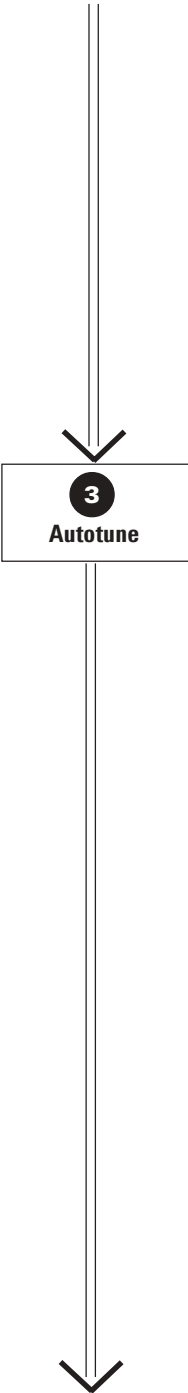
Press **Enter** to edit motor back EMF constant from motor type plate (*).

Press **Enter** to confirm.

☐ **Stator resist** ☐
☐ **0.135 ohm** ☐

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

☐ **LsS inductance** ☐
☐ **0.00237 H** ☐



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

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

Press **Left Arrow** to exit from **Motor data**; for few 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 **Down Arrow** to perform Current Regulator Autotune procedure.

WARNING ! This operation may cause limited shaft rotation.

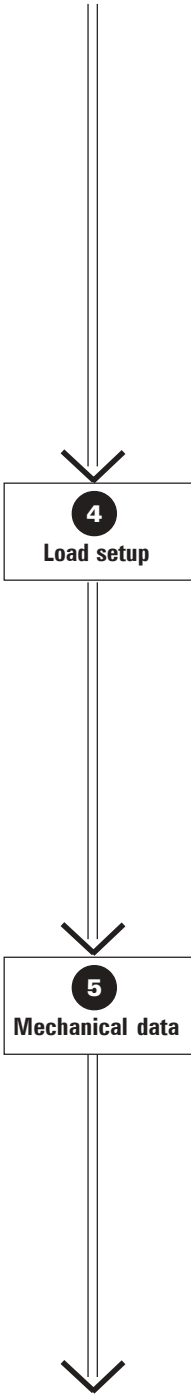
☐ SETUP MODE	☐
☐ Autotune	☐
Down Arrow	
☐ CurrReg	☐
☐ Start?	☐
Enter	

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 **I Key** to start the Autotune procedure.

NOTE! Autotune procedure can take different minutes to be completed. Autotune can be aborted at any time by pressing **Stop Button**.



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).

Press  and wait few seconds

☐ Load setup?	☐
☐ Yes->Ent	☐ No->Esc



☐ Busy	☐
☐ Please wait ...	☐

then

☐ Load setup?	☐
☐ Yes->Ent	☐ No->Esc

Press  to exit from menu:

☐ Startup config	☐
☐ Load setup	☐

Scroll  till:

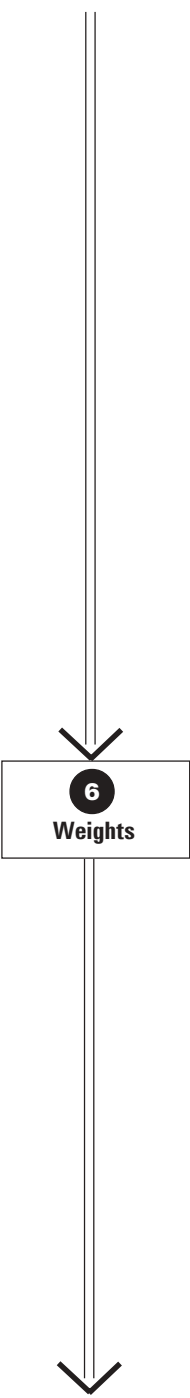
☐ Startup config	☐
☐ Mechanical data	☐

Press  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/s²
- Millimeters = mm/s, mm/s² and mm/s³.



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	☐

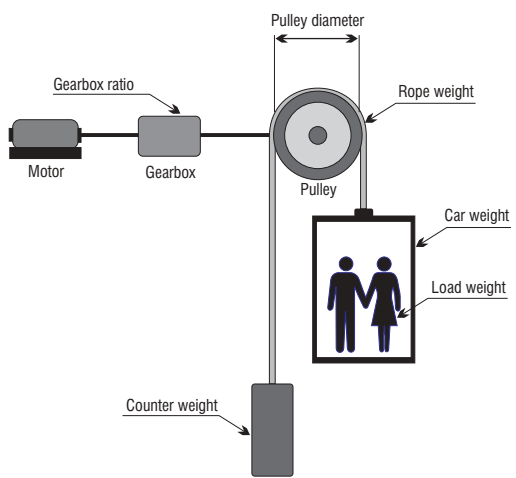
to **Full scale speed** parameter

☐ Full scale speed	☐
☐ 2000 rpm	☐

Press **Enter** and edit the value of max speed (motor rated speed), press **Enter** to confirm. Press to exit from **Mechanical data** menu.

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.



□	Load weight	□
□	0 Kg	□

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



□	Rope weight	□
□	0 Kg	□

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



□	Motor inertia	□
□	0.00 Kg*m ²	□

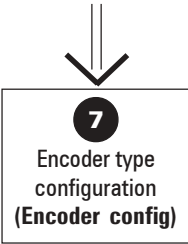
Press **Enter** and edit the value of Motor inertia (if it is not available, leave to default), press **Enter** to confirm.



□	Gearbox inertia	□
□	0.00 Kg*m ²	□

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, ex. pulley inertia, etc...



Press to exit from **Weight menu**.

Press 2 times.

☐ Startup config	☐
☐ Encoders config	☐

☐ Speed fbk sel	☐
☐ Std encoder	☐

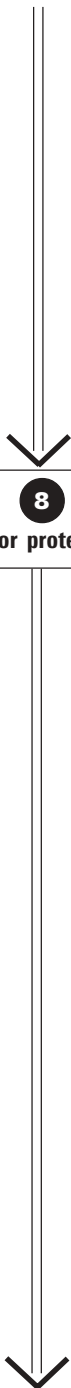


☐ Std enc type	☐
☐ Sinusoidal Hall	☐

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

<i>Parameter</i>	<i>Description</i>
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 (XE connector).
Hiperface	Absolute encoder with Hiperface protocol (XE connector).

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



☐ Std enc type ☐
☐ SinusoidalSinCos ☐



☐ Std enc pulses ☐
☐ 1024 ppr ☐

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 **Left Arrow** to exit from Encoder Config menu.

Press **Left Arrow** 2 times.

☐ Startup config ☐
☐ Motor protection ☐



☐ Motor OL control ☐
☐ Disabled ☐

Press **Enter** to enable the motor overload control.



☐ Service factor ☐
☐ 1.00 ☐

Press **Enter** to edit the motor max current and rated current ratio.



☐ Motor OL factor ☐
☐ 2.00 ☐

Press **Enter** to edit the motor overload value.



☐ Motor OL time ☐
☐ 30.00 s ☐

Press **Enter** to edit the overload duration value before alarm intervention.

Press **Left Arrow** to exit from Motor protection menu.



9

Braking unit setting
[BU protection]

Follow the points below to set the BU resistance parameters:

☐ Startup config ☐
☐ BU protection ☐

Enter

☐ BU control ☐
☐ Internal ☐



☐ BU resistance ☐
☐ 15.40 ohm ☐

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 resistance, a time reverse characteristic is defined. This requires definition of resistor power in continuous service, *BU res cont pwr*.

Note! Refer to chapter 9.2 for details on BU protection



☐ BU res cont pwr ☐
☐ 4.00 kW ☐

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

Press **Left Arrow** to exit from Encoder Config menu.

Press **Left Arrow** 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 **Left Arrow** to exit from STARTUP menu:

☐ R: 0 S: 0 ☐
☐ STARTUP ☐

10

Save configuration

11

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 ☐
☐ +00000000 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:

Mlt spd sel 2 src	Mlt spd sel 1 src	Mlt 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

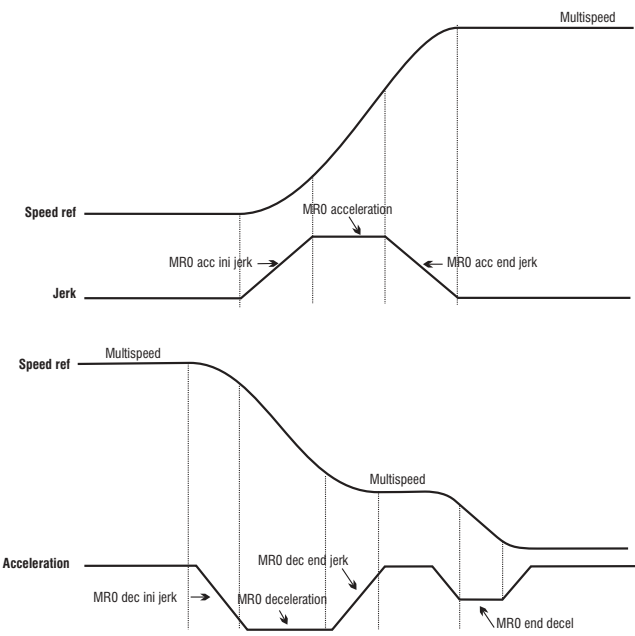
TAV31011

12

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

MR0 acceleration

500 rpm/s

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

▼

□ MR0 acc end jerk	□
□ 1000 rpm/s ²	□

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

▼

□ MR0 dec ini jerk	□
□ 1000 rpm/s ²	□

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/s ²	□

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	□

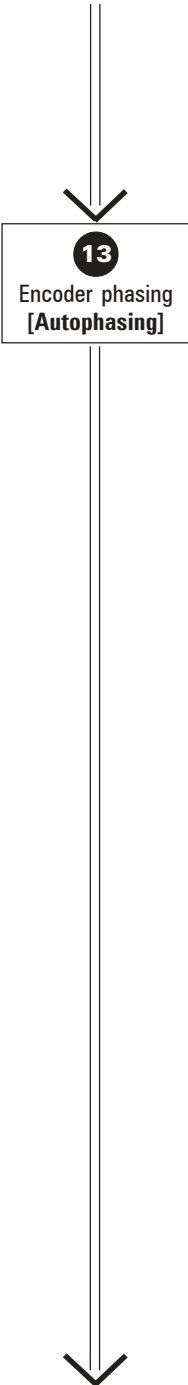
Press **Enter** to execute the procedure:

□ 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.

▲

☐ 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

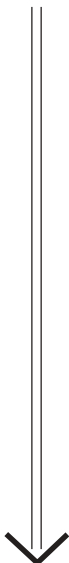
Press ▼ five times.

☐ REGULATION PARAM	☐
☐ Flux config	☐

Press **Enter** and ▼ .

☐ Flux config	☐
☐ Magnetiz config	☐

Enter



14

Save all changes

☐ Autophasing	☐
☐ Start ?	☐

Switch on the output contactors, open the brake and press **Enter**.

☐ Autophasing	☐
☐ 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	☐

Press **Enter** to save the changes.

Chapter 8 - Lift Sequencies

Figure 8.1: Standard Sequence Commands

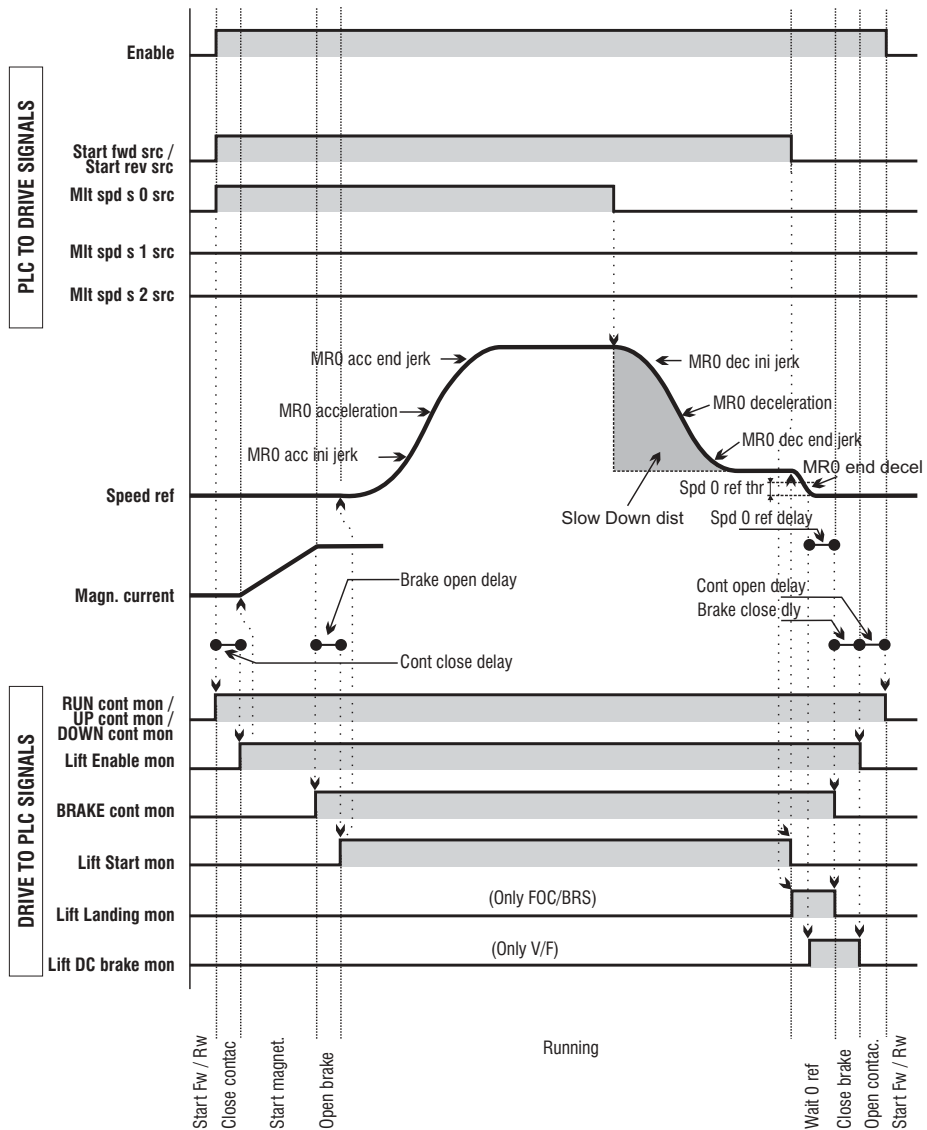


Figure 8.2: Detail Starting

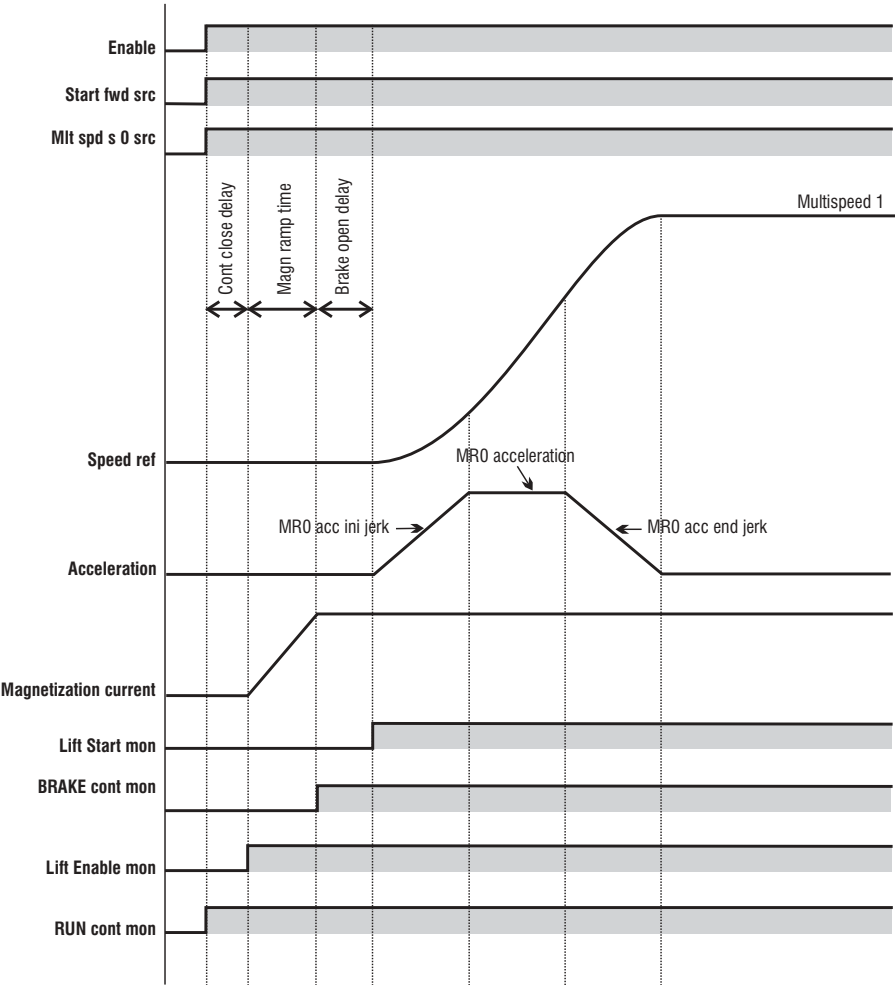


Figure 8.3: Detail Stopping

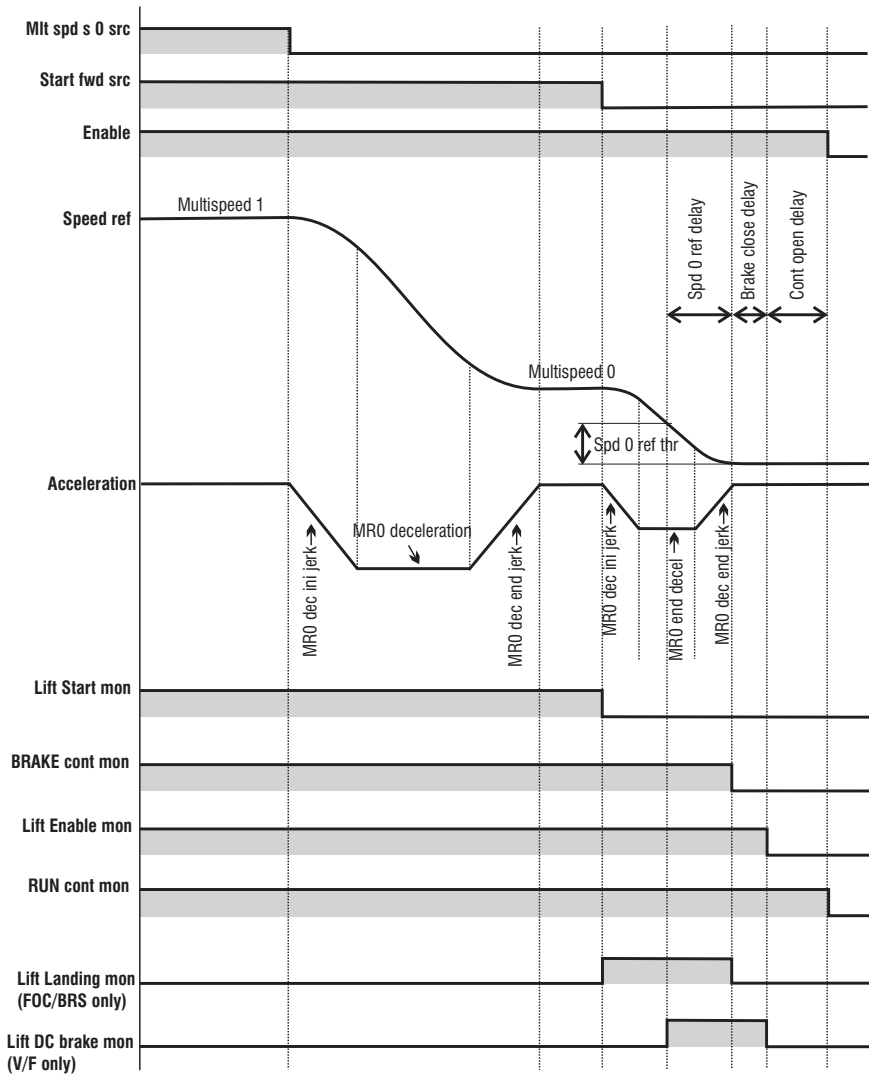
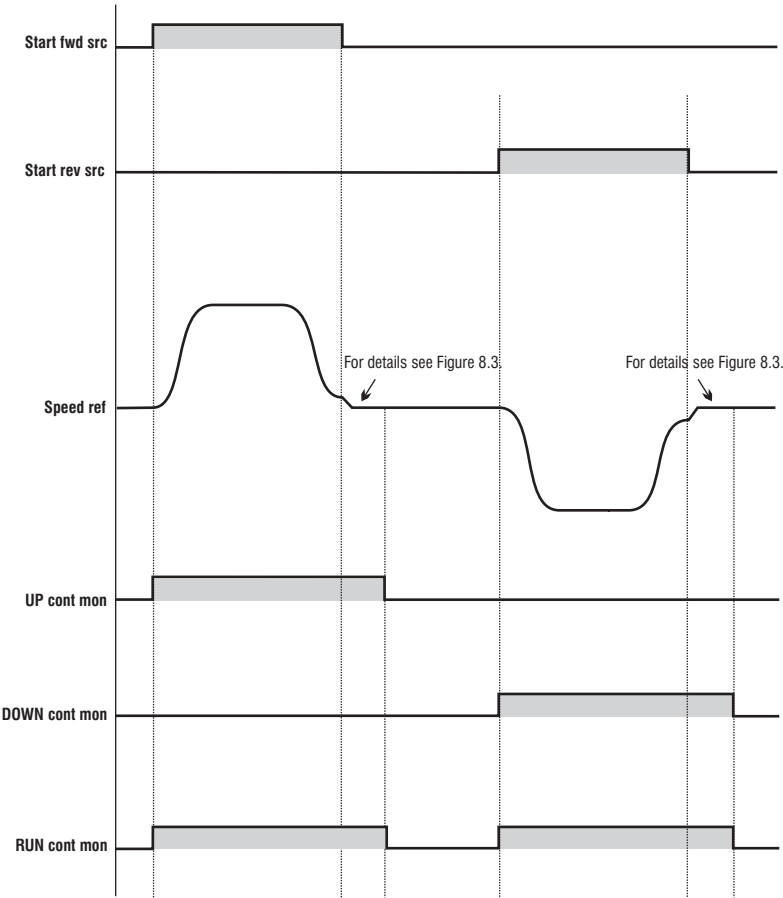


Figure 8.4: Relation between Direction Commands and Contactor Control Signals



Chapter 9 - Parameter

9.1 Parameter Legend

Access mode parameter

R read only

W write type

S saved in flash

Z accessible with drive disabled

Parameter value

D.Size value determined by drive size

Calc value calculated in function of other parameter

DrvVer value dependent on drive fw version

Motr value dependent on motor

List X signal list

Parameter number

Parameter name

Parameter unit of measure

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
TRAVEL								Main menu
TRAVEL / DC braking								2 nd level
1836	DCbrake cmd src IPA 7125 Lift DC Brake mon = Default It allows to select the origin of the signal to command DC braking function (refer to signals List 3 of Pick List manual)	N/A	RWS	IPA 7125		List 3	PIN	V-F-S-B

The Pick List manual is available (pdf format) on the supplied "CONF 99" cd-rom.

Validity DB

The reading keys are:

- F** Field oriented
- S** Sensorless
- V** V/f
- A** Autotuning (Setup mode)
- B** Brushless

Point type

AB

A can to be

- > **F** float type
- > **P** float type
- > **D** digital type (Integer with 16 bits)

B can to be

- > **P** parameter
- > **V** variable
- > **K** constant

PIN The parameter type is enumerative.
It has, therefore, a list of possible values (for example it is a source)

9.2 Parameter Description

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 0 OFF 1 ON	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 % Accumulated timer counts of the motor I2t	[%]	R	0.00	0.00	0.00	PV	V-F-S-B
1781	BU OL accum % Accumulated timer counts of the Scale Unit (Braking Unit) I2t	[%]	R	0.00	0.00	0.00	PV	V-F-S-B
1540	Drv OL accum % Accumulated timer counts of the Drive I2t. Counting starts from 50%.	[%]	R	0.00	0.00	0.00	PV	V-F-S-B
3222	Norm Std enc spd Encoder speed of standard feedback (connector "XE" on RV33 regulation board)	[rpm]	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, selected 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. State Sequencer status 1 Magnetization running 2 Magnetization completed, Stop 3 Start	N/A	R	0.00	0.00	- - -	DV	V-F-S-B

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

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
110	Software type Software type factory use	N/A	R	DrvVer	0	0	DV	V-F-S-B
111	Software status Software state factory use	N/A	R	DrvVer	0	0	DV	V-F-S-B
99	Life time Drive life time accumulated with power on	[hrs]	R	0.00	0.00	0.00	PV	V-F-S-B
98	Sys time-ddmmyy 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)	[h/m/s]	R	0.00	0.00	0.00	PV	V-F-S-B

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 informations 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 2.3.2.1. 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						
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			
	3	0.500 rpm	->	8192 rpm	maximum process speed			
	4	1.000 rpm	->	16384 rpm	maximum process speed			
	5	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							
	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).							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
700	Rated speed 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	[rpm]	RW	D.Size	Calc	Calc	FK	V-F-S-B
710	Rated power Motor rated power Note! For a motor nameplate rated in Hp, set Rated power kW = motor Hp rating * 0.736	[kW]	RW	D.Size	Calc	Calc	FK	V-F-S
720	Cosfi Motor rated power factor	-	RW	D.Size	Calc	Calc	FK	V-F-S
730	Efficiency Motor Efficiency (if not available, leave the default data)	-	RW	D.Size	Calc	Calc	FK	V-F-S

Load default mot

It selects and loads the motor standard parameters:

0 Standard 400V

1 Standard 460V

Note! By selecting one of the two factors, 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 Motor rated voltage	[V]	RW	D.Size	Calc	Calc	FK	V-F-S-B
690	Rated current 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).	[A]	RW	D.Size	Calc	Calc	FK	V-F-S-B
700	Rated speed Motor Synchronous speed	[rpm]	RW	D.Size	Calc	Calc	FK	V-F-S-B
930	Pole pairs Must be intereger number.	[-]	RW	4.0	0.0	0.0	FK	B
990	Torque constant Motor torque costant [Nm / A]; current is rms value	[Nm/A]	RW	D.Size	0.0	0.0	FK	B
775	EMF constant If the number is unknown, set the parameter to zero: the drive will automatically calculate an approximate value.	[V.s]	RW	D.Size	0.0	0.0	FK	B
970	Stator resistance Motor stator resistance value.	[ohm]	RW	D.Size	0.0	0.0	FK	B
775	LsS inductance Motor inductance value Note! If "EMF costant", "Stator resistance" and "LsInductance" values are unknown, set them to zero before running the current self-tuning procedure.	[H]	RW	D.Size	0.0	0.0	FK	B

Load default mot

It selects and loads the motor standard parameters:

0 Set 0

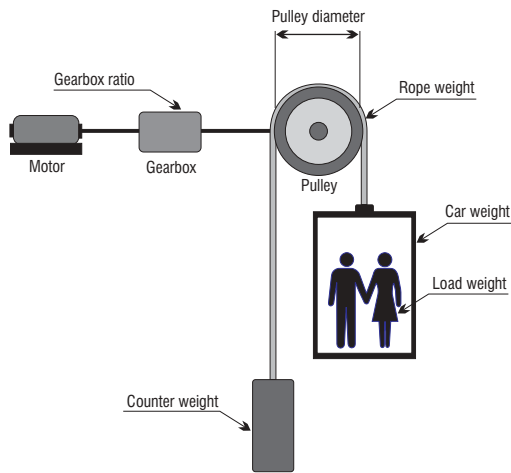
1 Set 1

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.

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
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							
	“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	50	FK	V-F-S-B
	IGBT dead time limit							
2800	Measured DTS	[ohm]	RW	Calc	0	100	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	0.55	7.501	FK	V-F-S
	Value of resistance detected on the rotor of the motor							
2830	Measured Rr2	[ohm]	RW	Calc	0.55	43.99	FK	V-F-S
	Value of resistance 2 detected on the rotor of the motor							
2840	Measured P1 flux	-	RW	Calc	0.00	1.000	FK	V-F-S
	P1 coefficient of the Flux curve measured							
2850	Measured P2 flux	-	RW	Calc	3	18	FK	V-F-S
	P2 coefficient of the Flux curve measured							
2860	Measured P3 flux	-	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	-	FK	V-F-S
	Value of the rated magnetizing current							
2880	Measured Im Max	[A]	RW	Calc	0.00	-	FK	V-F-S
	Value of the maximum magnetizing current							
2890	Measured Flux Nom	[Wb]	RW	Calc	0.00	-	FK	V-F-S
	Value of the rated Flux							
2900	Measured Flux Max	[Wb]	RW	Calc	0.00	-	FK	V-F-S
	Value of the maximumFlux							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
STARTUP / Startup config / Load setup								
Load setup								
<u>Load setup</u> command is required to load all SETUP MODE settings into the regulation mode selected. Entering this parameter, on the display will appear: 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.								
STARTUP / Startup config / Mechanical data								
1015	Travel units sel	-	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	-	RWZ	35	1	100	FK	V-F-S-B
Ratio between motor shaft speed and pulley speed								
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.								
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)								

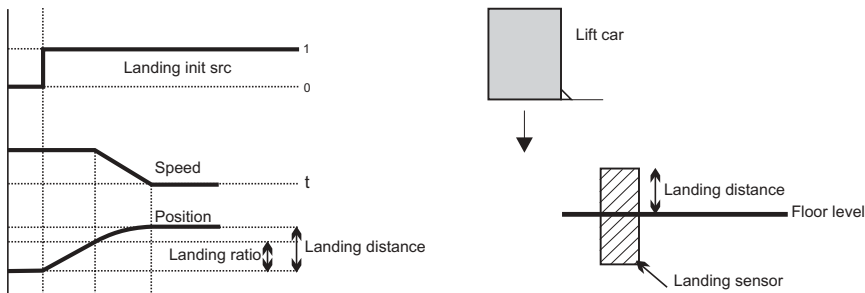
IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
1012	Gearbox inertia	[kgm ²]	RWZ	0.000	0.000	0.000	FK	V-F-S-B
Inertia of the gearbox, refer to manufacturer (if it is not available, leave to default). Can be added here the inertia of all mechanical parts at slow side of gearbox (ex. pulley, etc...)								



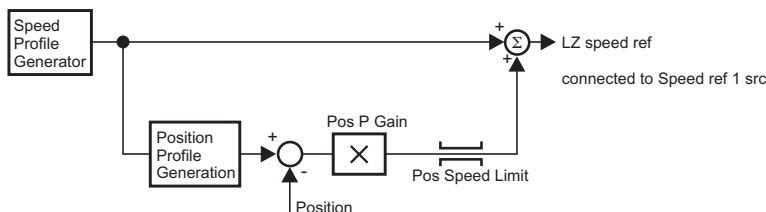
STARTUP / Startup config / Landing zone								
9411	Landing control	-	RWZ	0	0	1	DP	F-B
0 Disabled 1 Enabled Enable/Disable of accurate position control in landing zone								
9419	Landing init src	-	RWSZ	IPA 7124	List 3	PIN	F-B	
IPA 7124 Lift Landing mon = Default It allows to select the signal to 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	6	DK	V-F-B
	Encoder type connected to the standard input. Default: 1 for Avy ... AC/AC4, 3 for Avy ... BR/BR4						
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.					
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 absolute position information through SSI serial interface for initial synchronisation (requires APC card)					

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
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	Hiperface	absolute encoder with Hyperface protocol (<i>from software rel. 3.300</i>)						
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								
Power supply voltage of the standard Encoder input. Increase 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								
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 cannot be used for speed feedback. It can be used only for setting speed reference.								
1900	Exp enc pulses	[ppr]	RWZ	1024	Calc	Calc	FK	V-F-B
Encoder pulses per revolution (ppr) value of the expanded input.								
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)								

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
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. It is possible to switch the default, to control from another source, for example, a SBI word or DGFC word (refer to signals List 39 of Pick List manual)							

Note! Digital input 7 (terminal 39) is dedicated to the use of the "Index Qualifier" (home position switch) when Index storing is enabled.

Note! Terminals 91-92 are dedicated to the use of the "Index Qualifier", if it used APC100y (DGFC) card.

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

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

indexstornar

indexstorpar

1936	Motor pp/sens pp	-	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	-	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 through the "Calc Inertia" parameter or specifying parameters in Weights menu.

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 are set in this parameter.

2049	Bandwidth	[rad/s]	RWZ	50	1	300	FK	F-S-B
------	-----------	---------	-----	----	---	-----	----	-------

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

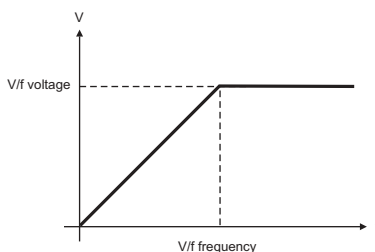
STARTUP / Startup config / V/f config

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.

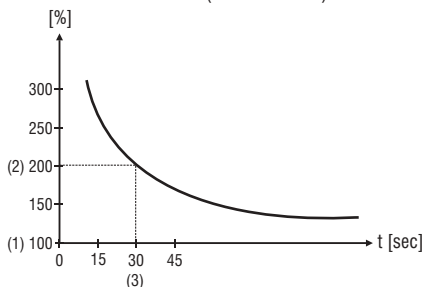
3430	V/f frequency	[Hz]	RWZ	Motr	5	Calc	FK	V
------	---------------	------	-----	------	---	------	----	---

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.



IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
STARTUP / Startup config / Motor protection								
1612	Motor OL control	-	RW	0	0	1	DK	V-F-S-B
	0 Disabled							
	1 Enabled							
	Enable / disable motor current limit control and overload I2t protection function (<i>from software rel. 3.300</i>).							
	I2t function is similar to the protection of the motor by the thermal relay. It states the I2t typical behavior. When it gets active, it is possible to generate an alarm condition or reduce eventual overload current to nominal current of the motor							
1611	Service factor	-	RW	1	0.5	1.5	FK	V-F-S-B
	Service factor. Some motors have a motor current (Ic) higher than the rated one (In). The service factor makes reference to the Ic/In ratio.							
1610	Motor OL factor	-	RW	2	1.2	5	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. The integrator state is given by:							
	Mot OL accum % It gives the percentage state of the Rms current integration.							
	100 % = I2t alarm level. It is available as a digital signal in the pick-list selections.							
	Mot OL trip It states that the trip condition of I2t has been reached. Possible or non-possible overload. The intervention time depends on the value of the motor current as follows:							

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



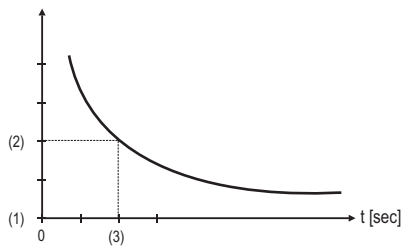
- (1) Rated current • Service factor = 100%
 (2) Motor OL factor
 (3) Motor OL time

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 (Internal-External).

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.							

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

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 maintained.

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	3	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)						
	Note!	Appropriate firmware is required using the drive in Brushless mode						

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
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STARTUP / Import recipe

The drive can work with different regulation modes: V/f control, Field oriented and Sensorless. Each functioning mode has an independent parameter set. The use of the Recipe is an easy, uniform and fast method to transfer different parameters set.

Note! Before switching to a new different mode (for example V/f to Field oriented) without losing the data, it is required to save the settings by Save config? command.

Prior to use data from previous regulation in the menu regulation mode parameter value of interested parameter group (recipe) must be exported by Export recipe command and then imported by Import recipe command in the new regulation mode.

Select recipe:

0	I/O config	Input and Output configuration parameters
1	Travel	Travel configuration
2	Torque functions	Torque settings
3	Appl card & comm	option cards and communication protocols parameters

STARTUP / Export recipe

Select recipe:

0	I/O config	Input and Output configuration parameters
1	Travel	Travel configuration
2	Torque functions	Torque settings
3	Appl card & comm	option cards and communication protocols parameters

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 "Use Save Config" message blinking, use "Save Config?" command

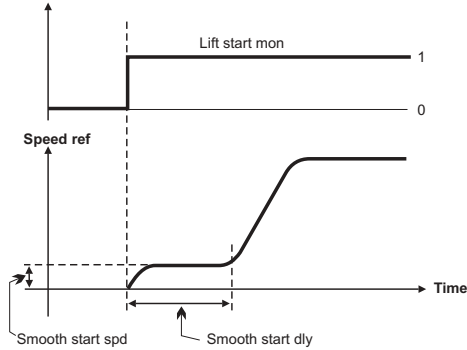
IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
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TRAVEL

TRAVEL / Speed profile

The parameters unit is defined by IPA 1015 into “STARTUP / Startup config / Mechanical data” menu.

7110	Smooth start spd	[rpm]	RWS	0	Calc	Calc	PP	V-F-S-B
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NOTE! “Smooth start dly” can be set in TRAVEL / Lift sequence menu.

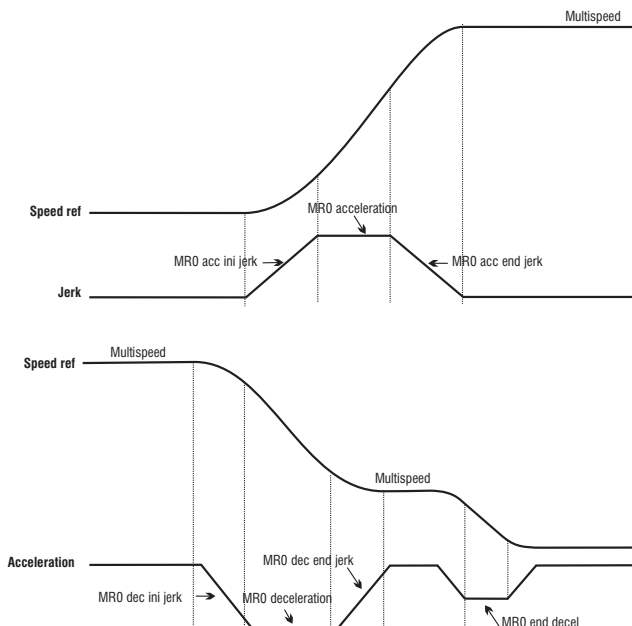
7060	Multi speed 0 Speed 0 value	[rpm]	RWS	0	Calc	Calc	PV	V-F-S-B
7061	Multi speed 1 Speed 1 value	[rpm]	RWS	0	Calc	Calc	PP	V-F-S-B
7062	Multi speed 2 Speed 2 value	[rpm]	RWS	0	Calc	Calc	PP	V-F-S-B
7063	Multi speed 3 Speed 3 value	[rpm]	RWS	0	Calc	Calc	PP	V-F-S-B
7064	Multi speed 4 Speed 4 value	[rpm]	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 are defined by IPA 1015 into “STARTUP / Startup config / Mechanical data” menu.

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

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
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8046	MR0 acc ini jerk Acceleration initial jerk, set 0	[rpm/s ²] RWS	1000	0.349	750*100	PP	V-F-S-B
8040	MR0 acceleration Acceleration ramp, set 0	[rpm/s] RWS	500	1	1.5*106 PP	V-F-S-B	
8041	MR0 acc end jerk Acceleration end jerk, set 0	[rpm/s ²] RWS	1000	0.349	750*106 PP	V-F-S-B	
8047	MR0 dec ini jerk Deceleration initial jerk, set 0	[rpm/s ²] RWS	1000	0.349	750*106 PP	V-F-S-B	
8042	MR0 deceleration Deceleration ramp, set 0	[rpm/s] RWS	500	1	1.5*106 PP	V-F-S-B	
8043	MR0 dec end jerk Deceleration end jerk, set 0	[rpm/s ²] RWS	1000	0.349	750*106 PP	V-F-S-B	
8044	MR0 end decel Final deceleration slope corresponding to removal of START command.	[rpm/s] RWS	1000	1	1.5*106 PP	V-F-S-B	
8056	MR1 acc ini jerk Acceleration initial jerk, set 1	[rpm/s ²] RWS	1000	0.349	750*106 PP	V-F-S-B	
8050	MR1 acceleration Acceleration ramp, set 1	[rpm/s] RWS	500	1	1.5*106 PP	V-F-S-B	
8051	MR1 acc end jerk Acceleration end jerk, set 1	[rpm/s ²] RWS	1000	0.349	750*106 PP	V-F-S-B	
8057	MR1 dec ini jerk Deceleration initial jerk, set 1	[rpm/s ²] RWS	1000	0.349	750*106 PP	V-F-S-B	

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
8052	MR1 deceleration Deceleration ramp, set 1		[rpm/s] RWS	RWS	500	1	1.5*106PP	V-F-S-B
8053	MR1 dec end jerk Deceleration end jerk, set 1	[rpm/s ²]	RWS	1000	0.349	750*106 PP		V-F-S-B
8054	MR1 end decel Final deceleration slope corresponding to removal START command.	[rpm/s]	RWS	1000	1	1.5*106 PP		V-F-S-B
9421	SlowDown dist It allows to calculate the distance from running speed to approach speed.	[mm]	RW	0.00	0.00	0.00	FK	V-F-S-B

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 Output contactor close delay	[ms]	RWS	200	0.00	65535	PP	V-F-S-B
7101	Brake open delay See Chapter 8 - Lift Sequencies	[ms]	RWS	0.00	0.00	65535	PP	V-F-S-B
7102	Smooth start dly See IPA 7110 into “TRAVEL / Speed profile” menu.	[ms]	RWS	0.00	0.00	65535	PP	V-F-S-B
7103	Brake close dly See Chapter 8 - Lift Sequencies	[ms]	RWS	200	0.00	65535	PP	V-F-S-B
7104	Cont open delay Output contactors open delay. See Chapter 8 - Lift Sequencies	[ms]	RWS	200	0.00	65535	PP	V-F-S-B
7105	Seq start mode 0 Start fwd/rev 1 Enable It changes the way how contactor sequence start: “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 auxiliary contact of output contactors “Enable” selection allows to start contactor sequences only with Enable command. Start command can be permanently asserted	N/A	RWS	0	0	1	DP	V-F-S-B
7106	Seq start sel 0 Standard inp 1 Alternative inp	N/A	RWS	0	0	1	DP	V-F-S-B
7115	Start fwd src IPA 4021 DI 1 monitor = Default (refer to signals List 3 of Pick List manual)	-	RWS	IPA 4021		List 3	PIN	V-F-S-B
7116	Start rev src IPA 4022 DI 2 monitor = Default (refer to signals List 3 of Pick List manual)	-	RWS	IPA 4022		List 3	PIN	V-F-S-B
7117	Start alt src IPA 4000 NULL = Default	-	RWS	IPA 4000		List 3	PIN	V-F-S-B
7072	Mlt spd s 0 src DI 4 monitor = Default It allows to select the origin of the signals stating the input combination (Mlt spd s 0 - 1 - 2 sources; refer to signals List 3 of Pick List manual)	-	RWS	IPA 4024		List 3	PIN	V-F-S-B
7073	Mlt spd s 1 src DI 5 monitor = Default It allows to select the origin of the signals stating the input combination (Mlt spd s 0 - 1 - 2 sources; refer to signals List 3 of Pick List manual)	-	RWS	IPA 4025		List 3	PIN	V-F-S-B

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
7074	Mlt spd s 2 src DI 6 monitor = Default It allows to select the origin of the signals stating the input combination (Mlt spd s 0 - 1 - 2 sources; refer to signals List 3 of Pick List manual)	-	RWS	IPA 4025		List 3	PIN	V-F-S-B
	Mltl spd sel 2 src	Mltl spd sel 1 src		Mltl 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 Active selection displaying (Speed 0, Speed 1, etc.)	-	R	0	0	7	DP	V-F-S-B
7070	Mlt spd out mon It displays multispeed block output signal	[mm/s]	R	0.00	0.00	0.00	PV	V-F-S-B
8090	Mlt ramp sel src 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)	-	RWS	IPA 4000		List 3	PIN	V-F-S-B
	Multi Ramp sel src			Active set				
	0			MRO				
	1			MR1				
8078	Mlt ramp sel mon Displaying of the selected ramp set	-	R	0	0	3	DP	V-F-S-B
7143	Door open src IPA 4000 NULL = Default (refer to signals List 3 of Pick List manual) Source to Enable the function through the digital input.	-	RWS	IPA 4000		List 3	PIN	V-F-S-B
7138	Door open speed Door open speed threshold.	[mm/s]	RWS	50	Calc	Calc	PP	V-F-S-B



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.

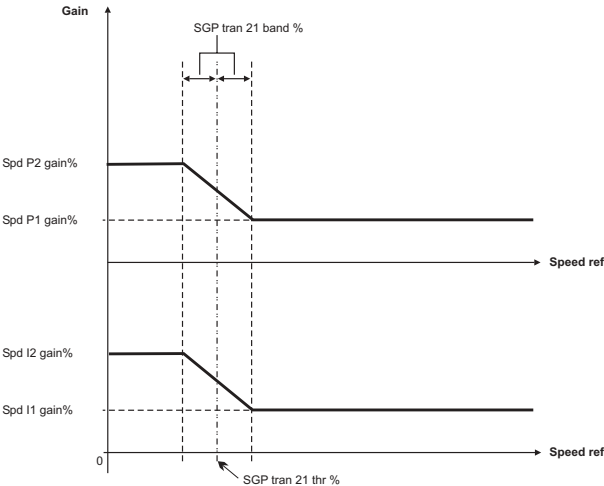
IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
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TRAVEL / Speed reg gains

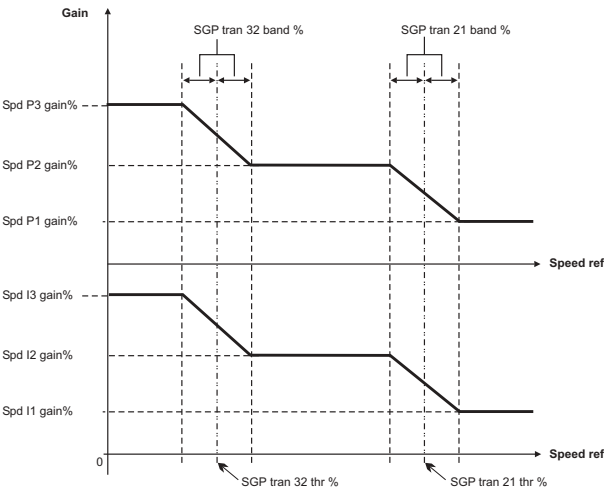
Allows to change speed regulation gain according to speed reference. Typically at low speed high gain are required to have good starting behaviour. At high speed lower gains are preferred to suppress eventual vibrations due to mechanical imperfections. In case that values above 100% are required to achieve 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):

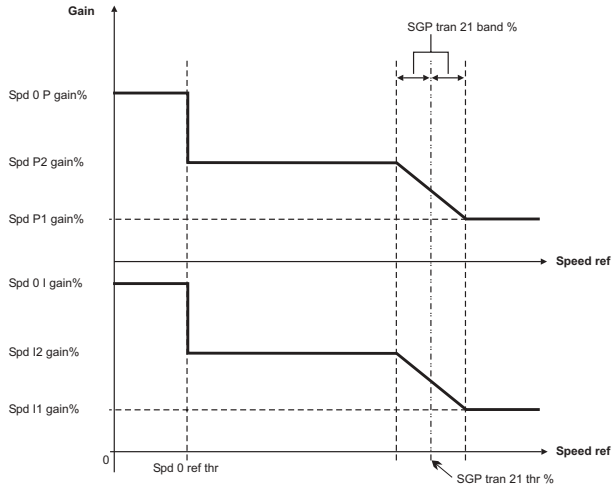


Possible configuration (Spd 0 enable = Disable, also parameters 32 are set):

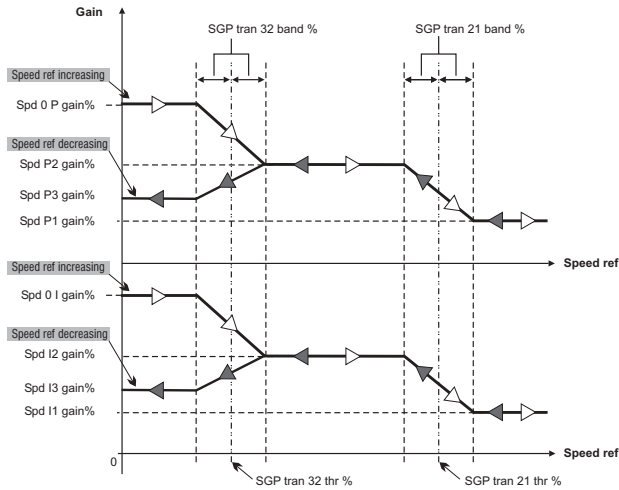


IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
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Possible configuration (Spd 0 enable =Enable as spd 0, only parameters 21 are set):

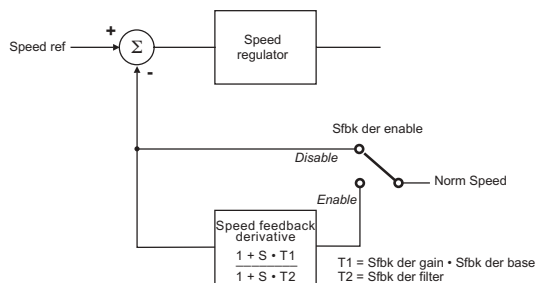


Possible configuration (Spd 0 enable =Enable as start, also parameters 32 are set):



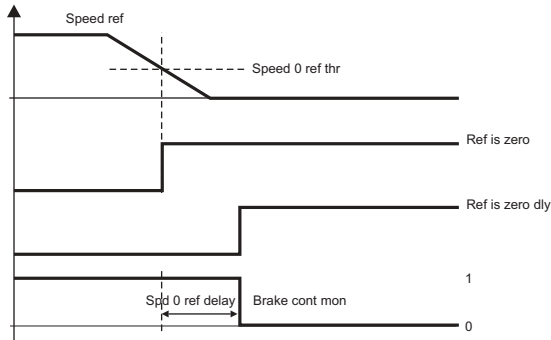
3700	SpdP1 gain %	[%]	RWS	10	0	100	PP	F-S-B
Proportional speed 1 gain regulator at high speed								
3701	SpdI1 gain %	[%]	RWS	10	0	100	PP	F-S-B
Integral speed 1 gain regulator at high speed								
3702	SpdP2 gain %	[%]	RWS	10	0	100	PP	F-S-B
Proportional speed 2 gain regulator at medium speed								
3703	SpdI2 gain %	[%]	RWS	10	0	100	PP	F-S-B
Integral speed 2 gain regulator at medium speed								

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
3704	SpdP3 gain % Proportional speed 3 gain regulator at low speed	[%]	RWS	10	0	100	PP	F-S-B
3705	SpdI3 gain % Integral speed 3 gain regulator at low speed	[%]	RWS	10	0	100	PP	F-S-B
3720	Spd 0 enable Apart from gain adaptive function gains, 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).	N/A	RWS	0	0	1	DP	F-S-B
3722	Spd 0 P gain %	[%]	RWS	Calc	0	100	PP	F-S-B
3723	Spd 0 I gain %	[%]	RWS	Calc	0	100	PP	F-S-B
2530	Sfbk der enable Speed feedback derivative function enable / disable. 0 Disable 1 Enable	N/A	RWSZ	0	0	1	DV	F-S-B



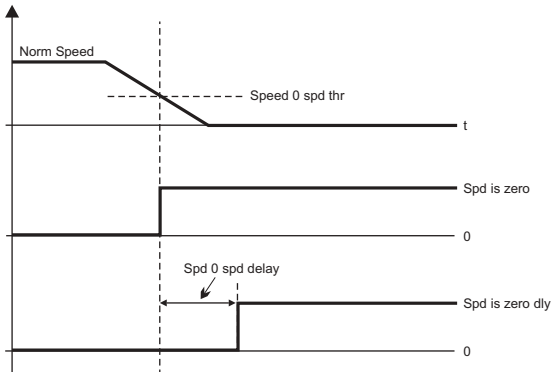
2540	Sfbk der gain Speed feedback derivative gain.	[%]	RWS	0	-100	100	PV	F-S-B
2550	Sfbk der base Base feedback derivative gain.	[ms]	RWS	10000	0	10000	FK	F-S-B
2560	Sfbk der filter Speed feedback derivative filter	[ms]	RWS	5	0	1000	PP	F-S-B
2380	Prop filter Filter on the proportional part of torque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

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
TRAVEL / Speed threshold								
3726	Spd 0 ref thr Speed 0 reference threshold	[rpm]	RWS	30	0	0	PP	V-F-S-B
3727	Spd 0 ref delay Speed 0 reference delay	[ms]	RWS	500	0	30000	PP	V-F-S-B



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 digital relay output (83-85 terminals).

3724	Spd 0 speed thr Speed 0 speed threshold.	[rpm]	RWS	30	0	0	PP	V-F-S-B
3725	Spd 0 spd delay Speed 0 speed delay	[ms]	RWS	500	0	30000	PP	V-F-S-B



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

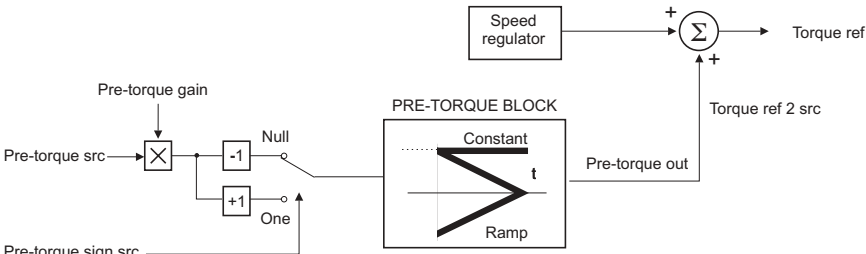
3706	SGP tran21 h thr See “Possible/Default configuration” figures on “TRAVEL / Speed reg gains” menu.	[%]	RWS	15	0	100	PP	F-S-B
3707	SGP tran32 l thr See “Possible/Default configuration” figures on “TRAVEL / Speed reg gains” menu.	[%]	RWS	0	0	100	PP	F-S-B
3708	SGP tran21 band See “Possible/Default configuration”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

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
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TRAVEL / Pre-torque

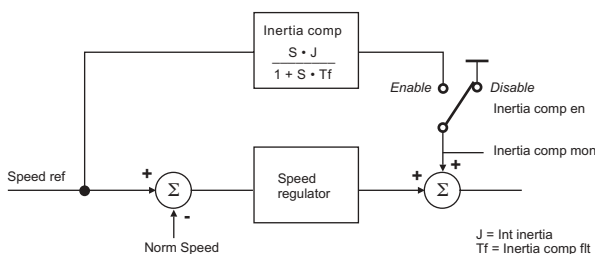
Pre torque function helps to ensure smooth starting without initial jerk. This is achieved by setting the torque prior to open the brake to a value that corresponds to the load. Pre torque value applied to the motor as well as direction of applied torque can be provided by mounting load cell on the lift 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.								
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	-	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	-	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).								

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
TRAVEL / Inertia comp								
2580	Inertia comp en	-	RWS	0	0	1	DV	F-S-B
	0 Disabled							
	1 Enabled							
	It enables inertia compensation function							
2054	Int Inertia	[kgm2]	RWS	0	0	Calc	PV	F-S-B
	Internal value of the moment of Inertia. It avoids speed overshoot at the end of ramp. 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.							

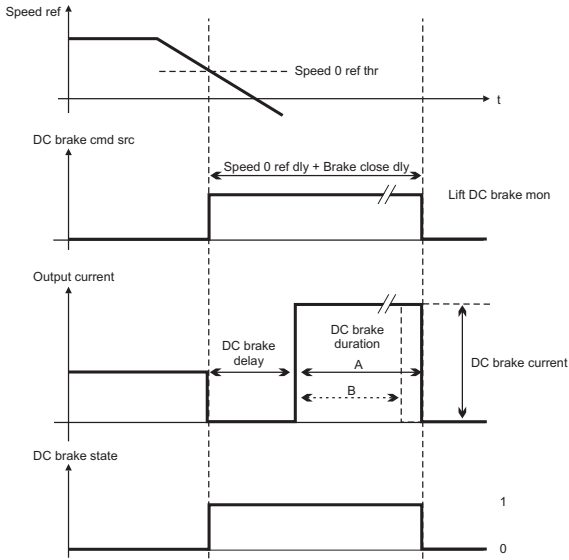


Note! “Inertia comp mon” signals is available in the pick-lists of the analog outputs.

TRAVEL / DC braking								
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 controlled 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 fonction.							

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.

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

TRAVEL / Ramp function

8031	Ramp out enable	N/A	WSZ	1	0	1	DP	V-F-S-B
	0 Disabled							
	1 Enabled							
	Ramp function enabling							
8021	Ramp shape	N/A	RWS	1	0	1	DV	V-F-S-B
	0 Linear							
	1 S-Shaped							
	Ramp selection. Linear or S-shaped ramp							

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	N/A	RWS	IPA 7130	List 7	PIN	V-F-S-B
	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)						
7036	Ramp ref 2 src	N/A	RWS	IPA 7031	List 8	PIN	V-F-S-B
	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)						
7029	Ramp ref 3 src	N/A	RWS	IPA 7038	List 45	PIN	V-F-S-B
	IPA 7038 Int ramp ref 3 = Default It select the origin of the signal of Ramp ref 3						

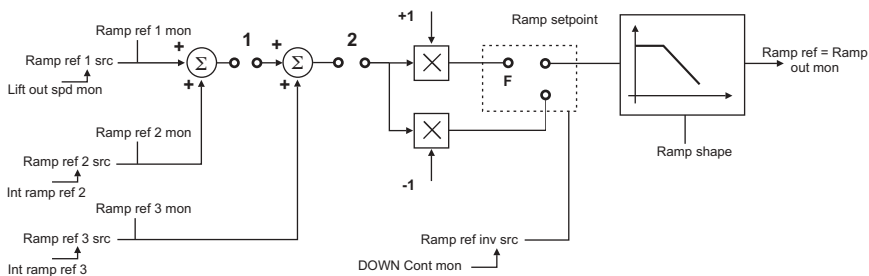
IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
7037	Ramp ref inv src IPA 7121 DOWN Count mon = Default It connects the selected signal to the selector of the multiplier input:if the signal is 0, multiply by +1, or if the signal is 1, multiply by -1. The multiplier allows to invert Ramp 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



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.

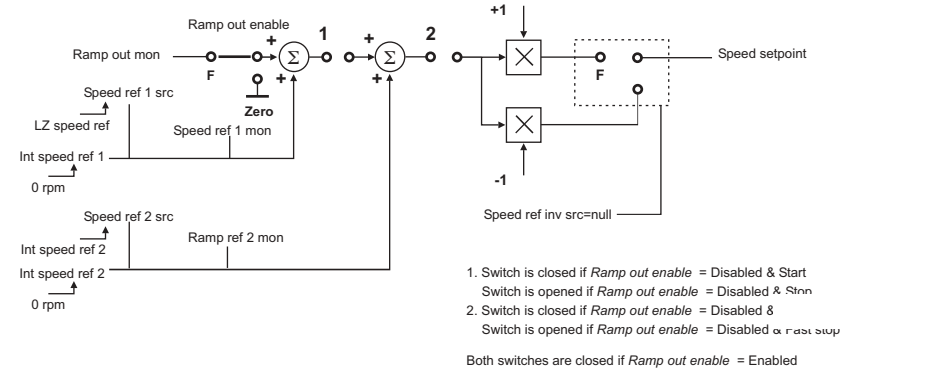
TRAVEL / Speed setpoint / Speed ref src

7050	Speed ref 1 src IPA 7040 Int speed ref 1 = Default It select the origin of the signal of Speed ref 1 in V/t, SLS. LZ speed ref (IPA 9408) in FOC, BRS (refer to signals List 9 of Pick List manual)List 9)	N/A	RWS	IPA 7040		List 9	PIN	V-F-S-B
7051	Speed ref 2 src 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).	N/A	RWS	IPA 7041		List 10	PIN	V-F-S-B

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
7053	Speedref inv 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 Speed reference signal (refer to signals List 3 of Pick List manual)	N/A	RWS	IPA 4000		List 3	PIN	V-F-S-B

TRAVEL / Speed setpoint / Speed ref cfg								
7040	Int speed ref 1 Value of the Int speed ref 1 variable	[rpm]	RWS	0	Calc	Calc	PV	V-F-S-B
7041	Int speed ref 2 Value of the Int speed ref 2 variable	[rpm]	RWS	0	Calc	Calc	PV	V-F-S-B

TRAVEL / Speed setpoint / Speed ref mon								
8022	Ramp out mon Displaying of Ramp output signal	[rpm]	R	0.00	0.00	0.00	PV	V-F-S-B
7045	Speed ref 1 mon Displaying of the Speed ref 1 signal	[rpm]	R	0.00	0.00	0.00	PP	V-F-S-B
7046	Speed ref 2 mon Displaying of the Speed ref 2 signal	[rpm]	R	0.00	0.00	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 “Use Save Config” message blinking, use “Save Config?” command								

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
REGULATION PARAM								
Most of the parameter 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 / Spd regulator								
REGULATION PARAM / Spd regulator / Percent values								
3700	SpdP1 gain % Proportional speed 1 gain regulator at high speed	[%]	RWS	Calc	0.00	00	PP	F-S-B
3701	SpdI1 gain % Integral speed 1 gain regulator at high speed	[%]	RWS	Calc	0.00	00	PP	F-S-B
REGULATION PARAM / Spd regulator / Base values								
2075	SpdP base value Basic value of the speed Proportional gain	[A/rpm]	RWS	Calc	0.00	0.00	FK	F-S-B
2077	SpdI base value Basic value of the speed Integral gain	[A/rpm]	RWS	Calc	0.00	Calc	FK	F-S-B
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 / 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

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
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
REGULATION PARAM / Vlt regulator / Base values								
2039	VltP base value Basic value of the proportional gain of voltage loop	[A/V]	RWS	Calc	0.00	0.00	FK	F-S-B
2041	VltI base value Basic value of the integral gain of voltage loop	[A/V/s]	RWS	Calc	0.00	0.00	FK	F-S-B
REGULATION PARAM / 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 / V/f reg param								
3400	Voltage boost Torque boost at low resolution. It allows to increase the output voltage at zero Hz.	[%]	RWS	Calc	0.00	0.00	PV	V
3531	Slip comp It acts as a limit on the amount of speed correction obtained from encoder feedback. In general parameter must be increased to about 1/3 - 1/2 of rated motor speed. Low values of Slip comp parameter may cause instability.	[rpm]	RWS	Calc	0.00	Calc	PV	V
3541	Slip comp filter Slip compensation filter.	[sec]	RWS	1	Calc	10	PP	V
3411	Encoder feedback 0 Disabled 1 Enabled Enabling encoder feedback in the V/f regulation mode	N/A	RWS	0	0	1	...	V
3412	Slip P gain 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.	[%]	RWS	1	0	100	PP	V
3413	Slip I gain 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.	[%]	RWS	1	0	100	PP	V
3585	Antioscill gain It allows to damp the current oscillations between the motor and the DC link, which could be developed in the middle range of the rated speed	[%]	RWS	0	0	100	PP	V
3520	V/f Ilim P gain Proportional gain of the pseudo current loop regulator in V/f mode	[rpm_A]	RWS	Calc	Calc	Calc	PP	V

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. 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 / 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.								
1220	Tcurr lim -	[A]	RWS	Calc	0.00	Calc	PV	V-F-S-B
Negative current limit or Generator (Negative power) limit.								

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
REGULATION PARAM / Torque config / Torque curr lim / Trq curr lim mon								
1250	Inuse Tcurr lim+ Monitor of the positive current limit in use	[A]	R	0.00	0.00	0.00	PV	V-F-S-B
1260	Inuse Tcurr lim- Monitor for the negative current limit in use	[A]	R	0.00	0.00	0.00	PV	V-F-S-B
2445	Tcurr lim state Current limit state 0 Not-reached 1 Reached	NA	R	0	0	1	DV	V-F-S-B

REGULATION PARAM / Flux config

This Function allows the user to control the maximum value of the Flux current.

The function 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. This is possible, obviously, only if the motor/drive combination is in a position to supply a sufficient magnetizing current.

REGULATION PARAM / Flux config / Flux max limit / Flux max lim src

1121	Flux level src 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)	N/A	RWS	IPA 1120	List 24	PIN	F-S-B
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REGULATION PARAM / Flux config / Flux max limit / Flux max lim cfg

1120	Int flx maxlim It allows to set an alternative signal to connect to Flux level src	[%]	RWS	0.00	0.00	0.00	PV	F-S-B
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REGULATION PARAM / Flux config / Flux max limit / Flux max lim mon

1150	Inuse flx maxlim Monitor of flux limit value in use	[%]	R	0.00	0.00	0.00	PV	F-S-B
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REGULATION PARAM / Magnetiz config

1810	Magn ramp time Set of the ramp time of the magnetizing current	[sec]	RWS	D.Size	0.01	5	PP	F-S
1815	Lock flux pos 0 Off 1 At magnetization 2 At Spd = 0 3 At Magn & Spd = 0 4 At magn & Ref=0	N/A	RWSZ	0	0	1	DP	F-S-B
			No locking of flux position					
			Flux position is locked during magnetization					
			Flux position is locked when stop command has been issued and signal "Speed is zero delayed" becomes TRUE					
			Flux position is locked during magnetization or when stop command has been issued and signal "Speed is zero delayed" becomes TRUE					
			Flux position 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 undesired motor shaft rotation. It allows to lock the Flux position.

REGULATION PARAM / Magnetiz config / Autophasing

Autophasing / Start ?

Autophasing command to phase brushless motors. After pressing Start the Enable and Start command to drive.
(from software rel. 3.300).

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
REGULATION PARAM / 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 / 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 / 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
It allows to set an alternative signal to connect to Outvlt lim src								
REGULATION PARAM / 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 Hlgain	[%]	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 Mlgain	[%]	RWS	5	0	100	PP	S
Motor Integral Medium gain								
1094	SLS mot LPgain	[%]	RWS	1	0	100	PP	S
Motor Proportional Low gain								
1095	SLS mot Llgain	[%]	RWS	0	0	100	PP	S
Motor Integral Low gain								
REGULATION PARAM / Sls SpdFbk gains / Regen gains								
1101	SLS regen HPgain	[%]	RWS	5	0	100	PP	S
Regen Proportional High gain								
1102	SLS regen Hlgain	[%]	RWS	5	0	100	PP	S
Regen Integral High gain								

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
1103	SLS regen MPgain Regen Proportional Medium gain	[%]	RWS	5	0	100	PP	S
1104	SLS regen Mlgain 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 Llgain 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 Transition band from High to Medium profile	[rpm]	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 is performed via 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.

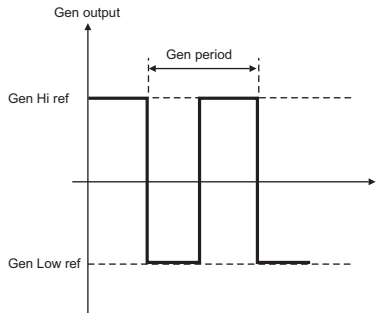
Using the Test generator function it is possible to carry out the manual tunings of Current regulator, Flux regulator Voltage regulator and Speed regulator.

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						

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
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
	Monitoring 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 “Use Save Config” message blinking, use “Save Config?” command

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
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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 procedures in this menu have default values set for lift application.

I/O CONFIG / Commands / Commands src

153	Term StrStp src 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)	N/A	RWS	IPA 4001	List 16	PIN	V-F-S-B
9210	Term Start src 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)	N/A	RWS	IPA 4000	List 16	PIN	V-F-S-B
9211	Term Stop src 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)	N/A	RWS	IPA 4000	List 16	PIN	V-F-S-B
156	Dig Enable src IPA 7128 Lift Enable src = Default It allows to select the signal to generate a digital Enable command (refer to signals List 17 of Pick List manual)	N/A	RWS	IPA 7128	List 17	PIN	V-F-S-B
157	Dig StrStp src 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)	N/A	RWS	IPA 7129	List 17	PIN	V-F-S-B
154	FastStop src IPA 4000 NULL = Default It allows to select the signal to generate the FastStop command (refer to signals List 18 of Pick List manual)	N/A	RWS	IPA 4000	List 18	PIN	V-F-S-B

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.							

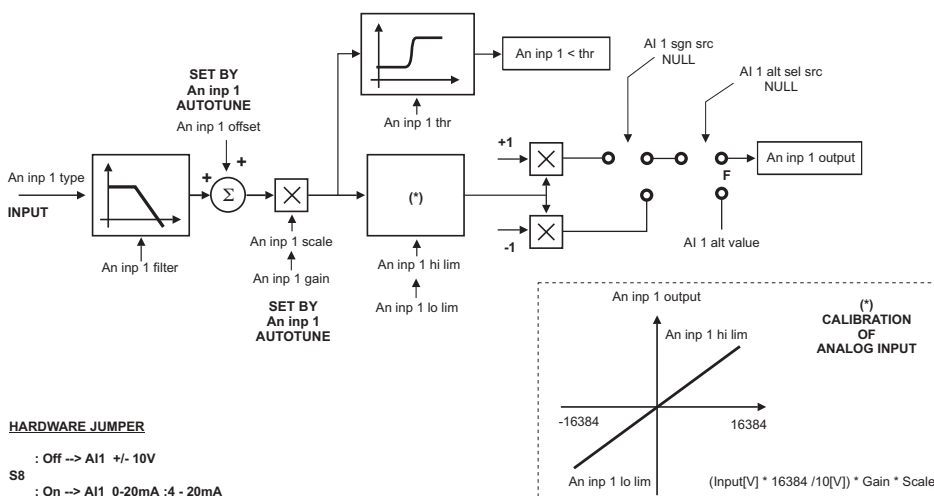
IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
4006	Spd 0 dis dly	[ms]	RWS	1000	16	10000	PP	V-F-S-B
Delay time between the zero speed and the disabling procedure								

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)							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
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 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	-	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	-	RWS	1	-16	16	PP	V-F-S-B
Analog Input 1 gain count value displaying								

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
Analog inputs / Std analog inps / Analog input 2 / An inp 2 src								
5031	AI 2 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 2 signal (refer to signals List 3 of Pick List manual)	N/A	RWS	IPA 4000		List 3	PIN	V-F-S-B
5032	AI 2 alt sel src 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)	N/A	RWS	IPA 4000		List 3	PIN	V-F-S-B
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	-	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	-	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,	N/A	RWS	IPA 4000		List 3	PIN	V-F-S-B

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 3 signal (refer to signals List 3 of Pick List manual)							
5052	AI 3 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. 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	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 3 type” description refer to “An inp 1 type” description above							
5042	AI 3 alt value	[cnt]	RWS	0	32767	-32767	PV	V-F-S-B
	Alternative reference value in count for Analog input 3							
5043	An inp 3 thr	[cnt]	RWS	3277	-16384	16383	PP	V-F-S-B
	Analog Input 3 threshold value in count							
5044	An inp 3 scale	-	RWS	1	-16	16	PP	V-F-S-B
	Analog Input 3 scale factor							
5046	An inp 3 filter	[sec]	RWS	0.0064	0.00	4.096	PP	V-F-S-B
	Time constant of the Analog Input 3 filter							
5047	An inp 3 lo lim	[cnt]	RWS	-16384	-32768	32767	PP	V-F-S-B
	Lower limit of the Analog Input 3 block output in count (see figure of Analog Input 1 above)							
5048	An inp 3 hi lim	[cnt]	RWS	16383	-32768	32767	PP	V-F-S-B
	Upper limit of the Analog Input 3 block output in count (see figure of Analog Input 1 above)							
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	[cnt]	R	0.00	-32768	32767	PV	V-F-S-B
	Analog Input 3 output count displaying							
5050	An inp 3 < thr	N/A	R	0	0	1	DV	V-F-S-B
	Display of threshold compensator state of Analog Input 3 (1 = the condition is true)							
5041	An inp 3 offset	[cnt]	RWS	0	-16384	16383	PP	V-F-S-B
	Analog Input 3 offset count value displaying							
5045	An inp 3 gain	-	RWS	1	-16	16	PP	V-F-S-B
	Analog Input 3 gain count value displaying							
Analog inputs / Exp analog inps / Analog input 1X / An inp 1X src								
5069	AI 1X 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 1X signal. (refer to signals List 3 of Pick List manual)							

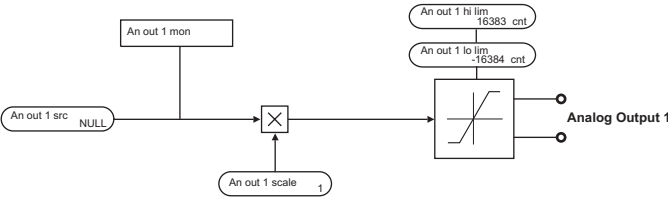
IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
Analog inputs / Exp analog inps / Analog input 1X / An inp 1X cfg								
5060	An inp 1X type 0 -10V ... +10V 1 0..20mA,0..10V 3 4..20mA For "An inp 1X type" description refer to "An inp 1 type" description above	N/A	RWS	0	0	2	DP	V-F-S-B
5062	An inp 1X thr Analog Input 1X threshold value in count	[cnt]	RWS	3277	-16384	16383	PP	V-F-S-B
5063	An inp 1X scale Analog Input 1X scale factor	-	RWS	1	-16	16	PP	V-F-S-B
5065	An inp 1X lo lim Lower limit of the Analog Input 1X block output in count (see figure of Analog Input 1 above)	[cnt]	RWS	-16384	-32768	32767	PP	V-F-S-B
5066	An inp 1X hi lim Upper limit of the Analog Input 1X block output in count (see figure of Analog Input 1 above)	[cnt]	RWS	16383	-32768	32767	PP	V-F-S-B
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 Analog Input 1X output count displaying	[cnt]	R	0.00	-32768	32767	PV	V-F-S-B
5068	An inp 1X < thr Display of threshold compensator state of Analog Input 1X (1 = the condition is true)	N/A	R	0	0	1	DV	V-F-S-B
5061	An inp 1X offset Analog Input 1X offset count value displaying	[cnt]	RWS	0	-16384	16383	PP	V-F-S-B
5064	An inp 1X gain Analog Input 1X gain count value displaying	[cnt]	RWS	0	-16384	16383	PP	V-F-S-B
Analog inputs / Exp analog inps / Analog input 2X / An inp 2X src								
5089	AI 2X 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 2X 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 2X / An inp 2X cfg								
5080	An inp 2X type 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	N/A	RWS	0	0	2	DP	V-F-S-B
5082	An inp 2X thr Analog Input 2X threshold value in count	[cnt]	RWS	3277	-16384	16383	PP	V-F-S-B
5083	An inp 2X scale Analog Input 2X scale factor	-	RWS	1	-16	16	PP	V-F-S-B
5085	An inp 2X lo lim Lower limit of the Analog Input 2X block output in count (see figure of Analog Input 1 above)	[cnt]	RWS	-16384	-32768	32767	PP	V-F-S-B

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
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								
Analog inputs / Exp analog inps / Analog input 2X / An inp 2X mon								
5087	An inp 2X output	[cnt]	R	0.00	-32768	32767	PV	V-F-S-B
Analog Input 2X output count displaying								
5088	An inp 2X < thr	N/A	R	0.00	0.00	0.00	DV	V-F-S-B
Display of threshold compensator state of Analog Input 2X (1 = the condition is true)								
5081	An inp 2X offset	[cnt]	RWS	0	-16384	16383	PP	V-F-S-B
Analog Input 2X offset count value displaying								
5084	An inp 2X gain	[cnt]	RWS	0	-16384	16383	PP	V-F-S-B
Analog Input 2X gain count value displaying								
Analog inputs / Exp analog inps / Exp ana inp en								
3900	Exp ana inp en	N/A	RWS	0	0	1	DV	V-F-S-B
0 Disabled								
2 Enabled								
It enables Expanded Analog Inputs								
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								

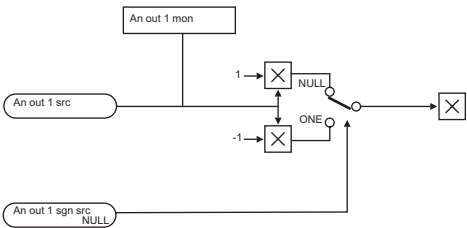
I/O CONFIG / Analog outputs

CALIBRATION TO +/-10 V OUTPUT
 $\text{An out 1 mon (in counts)} * \text{An out 1 scale} = \text{An out 1 hi lim (in counts)} = 10 \text{ V}$
 $\text{An out 1 mon (in counts)} * \text{An out 1 scale} = \text{An out 1 lo lim (in counts)} = -10 \text{ V}$

Software version 3.200



Software version 3.300



Drive has 2 standard (voltage outputs) and 4 expanded analog outputs (1x and 2x = voltage 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	-	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							

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
Analog outputs / Std analog outs / Analog output 2 / An out 2 src								
3580	An out 2 src 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)	N/A	RWS	IPA 4000		List 2		V-F-S-B
3576	An out 2 sgn src It allows to select the sign of the signal connected on analog output. <i>(from software rel. 3.300)</i>	N/A	RWS	IPA 4000		List 2		V-F-S-B
Analog outputs / Std analog outs / Analog output 2 / An out 2 cfg								
6017	An out 2 scale Scale or multiplicative factor of Analog output 2	-	RWS	1	-10	10	PP	V-F-S-B
6015	An out 2 hi lim Analog output 2 count value aimed at obtaining +10V. Value must be higher than zero	[cnt]	RWS	16383	0	32767	PP	V-F-S-B
6016	An out 2 lo lim Analog output 2 count value aimed at obtaining -10V. Value must be higher than zero	[cnt]	RWS	-16384	-32768	0	PP	V-F-S-B
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	-	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	-	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

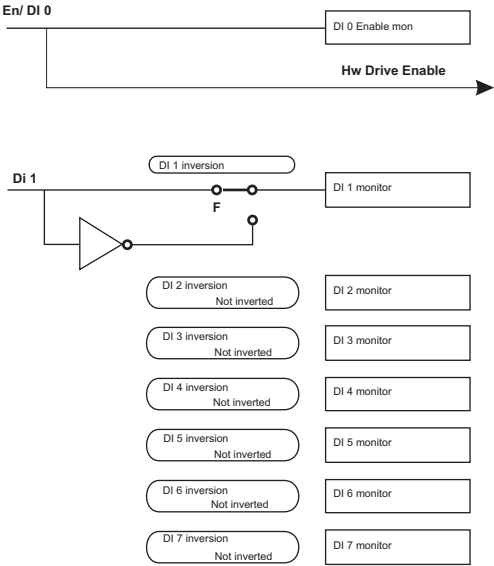
IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
6026	An out 2X lo lim	[cnt]	RWS	-16384	-32768	0	PP	V-F-S-B
Analog output 2X count value aimed at obtaining -10V. Value must be higher than zero								
Analog outputs / Exp analog outs / Analog output 2X / An out 2X mon								
6028	An out 2X mon	[cnt]	R	0.00	-32768	32676	PP	V-F-S-B
Analog output 2X count value displaying								
Analog outputs / Exp analog outs / Analog output 3X / An out 3X src								
4092	An out 3X 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 3X (refer to signals List 2 of Pick List manual)								
Analog outputs / Exp analog outs / Analog output 3X / An out 3X cfg								
6034	An out 3X 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 3X type (EXP-D20A6 optional card is required)								
6032	An out 3X scale	-	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	-	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								

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
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
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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 0 Not inverted 1 Inverted	N/A	RWS	0	0	1	DP	V-F-S-B
4012	DI 2 inversion 0 Not inverted 1 Inverted	N/A	RWS	0	0	1	DP	V-F-S-B
4013	DI 3 inversion 0 Not inverted 1 Inverted	N/A	RWS	0	0	1	DP	V-F-S-B
4014	DI 4 inversion 0 Not inverted 1 Inverted	N/A	RWS	0	0	1	DP	V-F-S-B
4015	DI 5 inversion 0 Not inverted 1 Inverted	N/A	RWS	0	0	1	DP	V-F-S-B
4016	DI 6 inversion 0 Not inverted 1 Inverted	N/A	RWS	0	0	1	DP	V-F-S-B

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							

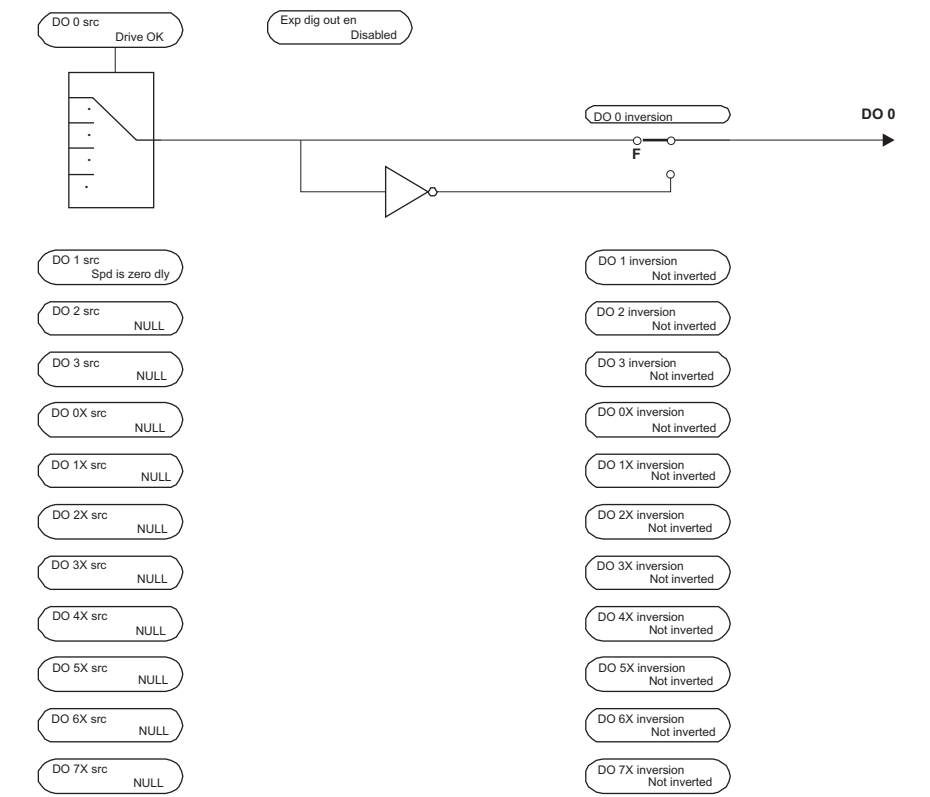
IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
4037	DI 7X inversion 0 Not inverted 1 Inverted	N/A	RWS	0	0	1	DP	V-F-S-B
4038	DI 8X inversion 0 Not inverted 1 Inverted	N/A	RWS	0	0	1	DP	V-F-S-B
4039	DI 9X inversion 0 Not inverted 1 Inverted	N/A	RWS	0	0	1	DP	V-F-S-B
4040	DI 10X inversion 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	N/A	RWS	0	0	1	DV	V-F-S-B
	0 Disabled							
	1 Enabled							
	It enables the expanded digital inputs							
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 an Analog Input, only 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
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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 9097	List 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 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)	N/A	RWS	IPA 7123			List 1	PIN V-F-S-B
4067	DO 2 src 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)	N/A	RWS	IPA 161			List 1	PIN V-F-S-B
4068	DO 3 src 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)	N/A	RWS	IPA 3728			List 1	PIN V-F-S-B
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 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)	N/A	RWS	IPA 7122			List 1	PIN V-F-S-B
4081	DO 1X src 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)	N/A	RWS	IPA 7120			List 1	PIN V-F-S-B
4082	DO 2X src 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)	N/A	RWS	IPA 7121			List 1	PIN V-F-S-B
4083	DO 3X src 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)	N/A	RWS	IPA 7139			List 1	PIN V-F-S-B

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	N/A	R	0	0	-	DP	V-F-S-B

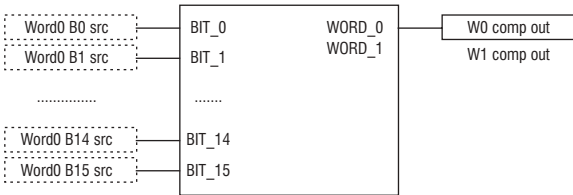
IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
I/O CONFIG / Digital outputs / Exp dig out en								
3903	Exp dig out en	N/A	RWS	0	0	1	DV	V-F-S-B
	0 Disabled							
	1 Enabled							
	It enables the expanded digital outputs							

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 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)	N/A	RWS	IPA 4000	List 1	PIN	V-F-S-B
2101	Word0 B1 src 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)	N/A	RWS	IPA 4000	List 1	PIN	V-F-S-B
2102	Word0 B2 src 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)	N/A	RWS	IPA 4000	List 1	PIN	V-F-S-B
2103	Word0 B3 src 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)	N/A	RWS	IPA 4000	List 1	PIN	V-F-S-B
2104	Word0 B4 src 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)	N/A	RWS	IPA 4000	List 1	PIN	V-F-S-B
2105	Word0 B5 src 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)	N/A	RWS	IPA 4000	List 1	PIN	V-F-S-B
2106	Word0 B6 src 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)	N/A	RWS	IPA 4000	List 1	PIN	V-F-S-B

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
2107	Word0 B7 src 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)	N/A	RWS	IPA 4000		List 1	PIN	V-F-S-B
2108	Word0 B8 src 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)	N/A	RWS	IPA 4000		List 1	PIN	V-F-S-B
2109	Word0 B9 src 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)	N/A	RWS	IPA 4000		List 1	PIN	V-F-S-B
2110	Word0 B10 src 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)	N/A	RWS	IPA 4000		List 1	PIN	V-F-S-B
2111	Word0 B11 src 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)	N/A	RWS	IPA 4000		List 1	PIN	V-F-S-B
2112	Word0 B12 src 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)	N/A	RWS	IPA 4000		List 1	PIN	V-F-S-B
2113	Word0 B13 src 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)	N/A	RWS	IPA 4000		List 1	PIN	V-F-S-B
2114	Word0 B14 src 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)	N/A	RWS	IPA 4000		List 1	PIN	V-F-S-B
2115	Word0 B15 src 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)	N/A	RWS	IPA 4000		List 1	PIN	V-F-S-B
I/O CONFIG / Bits->Word / Bits->Word0 mon								
2116	W0 comp out Monitor for the hexadecimal output value of "Word 0"	N/A	R	0	0	-	DV	V-F-S-B
I/O CONFIG / Bits->Word / Bits->Word1 src								
9340	Word1 B0 src 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)	N/A	RWS	IPA 4000		List 1	PIN	V-F-S-B
9341	Word1 B1 src 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)	N/A	RWS	IPA 4000		List 1	PIN	V-F-S-B

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 6 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 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)	N/A	RWS	IPA 4000		List 1	PIN	V-F-S-B
9355	Word1 B15 src 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)	N/A	RWS	IPA 4000		List 1	PIN	V-F-S-B

I/O CONFIG / Bits->Word / Bits->Word1 mon

9356	W1 comp out Monitor for the hexadecimal output value of “Word 1”	N/A	R	0	0	-	DV	V-F-S-B
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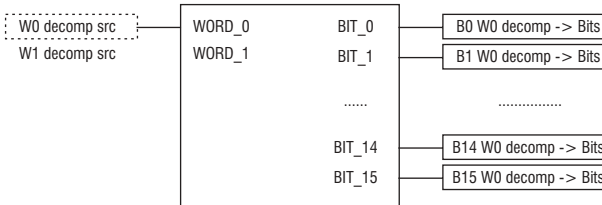
I/O CONFIG / Word->Bits

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 IPA 2121 W0 decomp inp = Default It allows to connect the Word that must be decomposing to input block (refer to signals List 26 of Pick List manual)	N/A	RWS	IPA 2121		List 26	PIN	V-F-S-B
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I/O CONFIG / Word->Bits / Word0->Bits cfg

2121	W0 decomp inp It allows to set the “W0 decomp inp” value	N/A	RWS	0X0000	-	-	DV	V-F-S-B
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I/O CONFIG / Word->Bits / Word0->Bits mon

2122	W0 decomp mon Monitor of the hexadecimal input value of the Word 0 decomposed	N/A	R	0	0	-	DP	V-F-S-B
2123	B0 W0 decomp Bit 0 of Word 0 decomposed displaying	N/A	R	0	0	1	DV	V-F-S-B
2124	B1 W0 decomp Bit 1 of Word 0 decomposed displaying	N/A	R	0	0	1	DV	V-F-S-B
2125	B2 W0 decomp Bit 2 of Word 0 decomposed displaying	N/A	R	0	0	1	DV	V-F-S-B

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 must be decomposing to input block (refer to signals List 27 of Pick List manual)	N/A	RWS	IPA 9360	List 27	PIN	V-F-S-B
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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
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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 “Use Save Config” message blinking, use “Save Config?” command

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
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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 I ist” and to the alarm config 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 for the given based on 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							

ALARM CONFIG / Overvoltage

It trips when the voltage on the drive DC link is higher than the maximum threshold for the given Mains voltage setting

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
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	7.652	PP	V-F-S-B

ALARM CONFIG / External fault

It trips when the External fault input is active

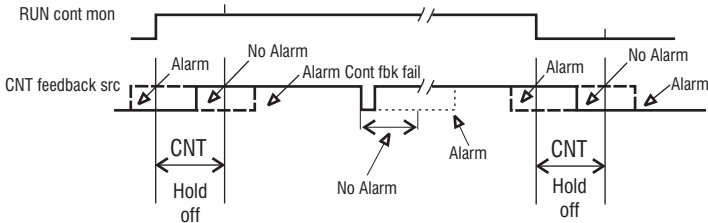
9075	EF src IPA 4000 NULL = Default It allows to connect the External fault input terminal strip (refer to signals List 3 of Pick List manual)	N/A	RWS	IPA 4023		List 3	PIN	V-F-S-B
9060	EF activity 1 Ignore 2 Warning 3 Disable drive 4 Stop 5 Fast stop 6 Curr limstp External fault activity	N/A	RWS	3	2	6	DP	V-F-S-B

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
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 4220 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.								
<pre>graph LR DO[Digital output set as RUN cont mon] --- COIL((X)) COIL --- RELAY[K1M K2M] RELAY --- MC[MAIN CONTACTS] MC --- OCO[OUTPUT CONTACTOR] OCO --- AC[AUX CONTACTS] AC --- DI[Digital input CNT feedback src set as Digital input X]</pre>								
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							



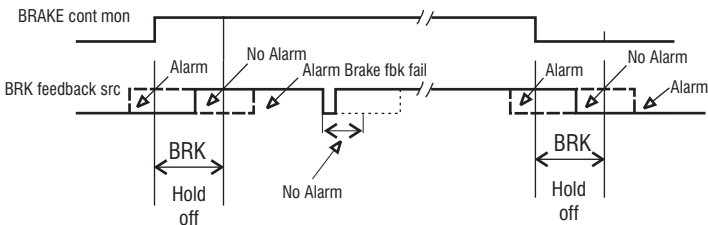
ALARM CONFIG / Brake feedback

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							



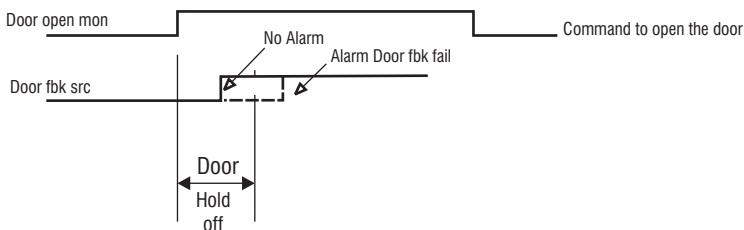
NOTE! During brake active state eventual alarms are latched and are reported only in brake idle state

ALARM CONFIG / Brake feedback / Door feedback

7144	Door fbk src	-	RWS	IPA 7139	List 3	PIN	V-F-S-B
	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.						

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
9099	Door 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							
	Door feedback alarm activity. (from software rel. 3.300)							

7137	Door hold off	[ms]	RWS	200	0.00	65535	PP	V-F-S-B
	Alarm hold off time: during this time mismatch in command and feedback are ignored.							



ALARM CONFIG / Comm card fault

It trips when LAN communication is interrupted (LAN communication between drive and Field Bus optional card)

9074	CCF 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							
	Comm card fault activity							
4200	CCF restart	N/A	RWS	0	0	1	DP	V-F-S-B
	0 off							
	1 on							
	Comm card fault restart							
4201	CCF restart time	[ms]	RWS	1000	0	30000	PP	V-F-S-B
	Comm card fault restart time							

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	N/A	RWS	3	2	6	DP	V-F-S-B
	2 Warning							
	3 Disable drive							
	4 Stop							
	5 Fast stop							
	6 Curr limstp							
	Appl card fault activity							

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	N/A	RWS	1	1	6	DP	V-F-S-B
	1 Ignore							
	2 Warning							
	3 Disable drive							
	4 Stop							
	5 Fast stop							
	6 Curr limstp							
	Drive overload activity							
ALARM CONFIG / Motor overload								
It trips when Motor overload accumulator exceeded trip threshold								
9041	MOL activity	N/A	RWS	2	1	6	DP	V-F-S-B
	1 Ignore							
	2 Warning							
	3 Disable drive							
	4 Stop							
	5 Fast stop							
	6 Curr limstp							
ALARM CONFIG / BU overload								
It trips when Brake resistor overload accumulator exceeded trip threshold								
9071	BUOL activity	N/A	RWS	3	1	6	DP	V-F-S-B
	2 Warning							
	3 Disable drive							
	4 Stop							
	5 Fast stop							
	6 Curr limstp							
	Braking Unit overload activity							
ALARM CONFIG / Overspeed								
It trips when the speed of the motor exceeded speed limit threshold								
9220	OS activity	N/A	RWS	3	1	6	DP	V-F-S-B
	2 Warning							
	3 Disable drive							
	4 Stop							
	5 Fast stop							
	6 Curr limstp							
	Overspeed activity							
9221	OS threshold	[rmp]	RWS	Calc	0.00	8192	PP	V-F-S-B
	Overspeed threshold							
9608	OS hold off	[ms]	RWS	0	0	30000	PP	V-F-S-B
	Overspeed hold off							
ALARM CONFIG / Spd fbk loss								
It trips when the speed feedback is not detected or encoder supply failed								
9042	SFL 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							
	Spd fbk loss activity							

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	-	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 is 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 alarmq	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
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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

COMMUNICATION / RS485

105	Slave address It define the drive slave address	N/A	RWS	1	0	255	DK	V-F-S-B
106	Slave res time It define the drive slave address time	N/A	RWS	1	0	255	DK	V-F-S-B
104	Protocol type 0 Slink 4 1 Modbus 2 Jbus 3 ISO 1745 4 Hyperface protocol It defines the drive communication protocol type	N/A	RWS	0	0	2	DK	V-F-S-B

COMMUNICATION / SBI config

8999	SBI enable 0 Disabled 1 Enabled It allows to enable SBI Field Bus option cards (SAVE PARAMETERS command and drive recycle power are required)	N/A	RWS	0	0	1	DK	V-F-S-B
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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)	-	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)	-	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)	-	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)	-	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)	-	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)	-	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	-	R	0.00	-	-	PP	V-F-S-B
9031	Drv SBI W1 mon Word 1 monitor of the PDC channel on the Drive output	-	R	0.00	-	-	PP	V-F-S-B
9032	Drv SBI W2 mon Word 2 monitor of the PDC channel on the Drive output	-	R	0.00	-	-	PP	V-F-S-B
9033	Drv SBI W3 mon Word 3 monitor of the PDC channel on the Drive output	-	R	0.00	-	-	PP	V-F-S-B
9034	Drv SBI W4 mon Word 4 monitor of the PDC channel on the Drive output	-	R	0.00	-	-	PP	V-F-S-B
9035	Drv SBI W5 mon Word 5 monitor of the PDC channel on the Drive output	-	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	-	R	0.00	-	-	PP	V-F-S-B
9001	SBI Drv W1 mon Word 1 monitor of the PDC channel on the Drive input	-	R	0.00	-	-	PP	V-F-S-B
9002	SBI Drv W2 mon Word 2 monitor of the PDC channel on the Drive input	-	R	0.00	-	-	PP	V-F-S-B
9003	SBI Drv W3 mon Word 3 monitor of the PDC channel on the Drive input	-	R	0.00	-	-	PP	V-F-S-B
9004	SBI Drv W4 mon Word 4 monitor of the PDC channel on the Drive input	-	R	0.00	-	-	PP	V-F-S-B
9005	SBI Drv W5 mon Word 5 monitor of the PDC channel on the Drive input	-	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 "Use Save Config" message blinking, use "Save Config?" command

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
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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	-	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	-	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	-	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 Internal Synchronous Word 3 value configuration (default connected to Drv DGFC-S W3src)	-	RWS	0.00	-	-	PV	V-F-S-B
4109	Int DrvDGFC-S W4 Internal Synchronous Word 4 value configuration (default connected to Drv DGFC-S W4src)	-	RWS	0.00	-	-	PV	V-F-S-B
APPL CARD CONFIG / DGFC / Drv->DGFC S W mon								
4110	Drv DGFC-S W0mon Synchronous Word 0 monitor (from Drive to DGFC)	-	R	0.00	-	-	PP	V-F-S-B
4111	Drv DGFC-S W1mon Synchronous Word 1 monitor (from Drive to DGFC)	-	R	0.00	-	-	PP	V-F-S-B
4112	Drv DGFC-S W2mon Synchronous Word 2 monitor (from Drive to DGFC)	-	R	0.00	-	-	PP	V-F-S-B
4113	Drv DGFC-S W3mon Synchronous Word 3 monitor (from Drive to DGFC)	-	R	0.00	-	-	PP	V-F-S-B
4114	Drv DGFC-S W4mon Synchronous Word 4 monitor (from Drive to DGFC)	-	R	0.00	-	-	PP	V-F-S-B
APPL CARD CONFIG / DGFC / DGFC S->Drv W mon								
4120	DGFC-S Drv W0mon Synchronous Word 0 monitor (from DGFC to Drive)	-	R	0.00	-	-	PV	V-F-S-B
4121	DGFC-S Drv W1mon Synchronous Word 1 monitor (from DGFC to Drive)	-	R	0.00	-	-	PV	V-F-S-B
4122	DGFC-S Drv W2mon Synchronous Word 2 monitor (from DGFC to Drive)	-	R	0.00	-	-	PV	V-F-S-B
4123	DGFC-S Drv W3mon Synchronous Word 3 monitor (from DGFC to Drive)	-	R	0.00	-	-	PV	V-F-S-B
4124	DGFC-S Drv W4mon Synchronous Word 4 monitor (from DGFC to Drive)	-	R	0.00	-	-	PV	V-F-S-B
APPL CARD CONFIG / DGFC / DGFC async Ch								
APPL CARD CONFIG / DGFC / Drv->DGFC A W src								
4130	Drv DGFC-A W0src 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)	N/A	RWS	IPA 4140	List 30		PIN	V-F-S-B
4131	Drv DGFC-A W1src 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)	N/A	RWS	IPA 4141	List 30		PIN	V-F-S-B
4132	Drv DGFC-A W2src 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)	N/A	RWS	IPA 4142	List 30		PIN	V-F-S-B
4133	Drv DGFC-A W3src 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)	N/A	RWS	IPA 4143	List 30		PIN	V-F-S-B

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
4134	Drv DGFC-A W4src 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)	N/A	RWS	IPA 4144		List 30	PIN	V-F-S-B
4135	Drv DGFC-A W5src 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)	N/A	RWS	IPA 4145		List 30	PIN	V-F-S-B
4136	Drv DGFC-A W6src 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)	N/A	RWS	IPA 4146		List 30	PIN	V-F-S-B
4137	Drv DGFC-A W7src 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)	N/A	RWS	IPA 4147		List 30	PIN	V-F-S-B
4138	Drv DGFC-A W8src 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)	N/A	RWS	IPA 4148		List 30	PIN	V-F-S-B
4139	Drv DGFC-A W9src 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)	N/A	RWS	IPA 4149		List 30	PIN	V-F-S-B

APPL CARD CONFIG / DGFC / Drv->DGFC-A W cfg

4140	Int DrvDGFC-A W0 Internal Asynchronous Word 0 value configuration (default connected to Drv DGFC-A W0src)	-	RWS	0.00	-	-	PV	V-F-S-B
4141	Int DrvDGFC-A W1 Internal Asynchronous Word 1 value configuration (default connected to Drv DGFC-A W0src)	-	RWS	0.00	-	-	PV	V-F-S-B
4142	Int DrvDGFC-A W2 Internal Asynchronous Word 2 value configuration (default connected to Drv DGFC-A W0src)	-	RWS	0.00	-	-	PV	V-F-S-B
4143	Int DrvDGFC-A W3 Internal Asynchronous Word 3 value configuration (default connected to Drv DGFC-A W0src)	-	RWS	0.00	-	-	PV	V-F-S-B
4144	Int DrvDGFC-A W4 Internal Asynchronous Word 4 value configuration (default connected to Drv DGFC-A W0src)	-	RWS	0.00	-	-	PV	V-F-S-B
4145	Int DrvDGFC-A W5 Internal Asynchronous Word 5 value configuration (default connected to Drv DGFC-A W0src)	-	RWS	0.00	-	-	PV	V-F-S-B
4146	Int DrvDGFC-A W6 Internal Asynchronous Word 6 value configuration (default connected to Drv DGFC-A W0src)	-	RWS	0.00	-	-	PV	V-F-S-B
4147	Int DrvDGFC-A W7 Internal Asynchronous Word 7 value configuration (default connected to Drv DGFC-A W0src)	-	RWS	0.00	-	-	PV	V-F-S-B
4148	Int DrvDGFC-A W8 Internal Asynchronous Word 8 value configuration (default connected to Drv DGFC-A W0src)	-	RWS	0.00	-	-	PV	V-F-S-B
4149	Int DrvDGFC-A W9 Internal Asynchronous Word 9 value configuration (default connected to Drv DGFC-A W0src)	-	RWS	0.00	-	-	PV	V-F-S-B

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
APPL CARD CONFIG / DGFC / Drv->DGFC A W mon								
4150	Drv DGFC-A W0mon Asynchronous Word 0 monitor (from Drive to DGFC)	-	R	0.00	-	-	PP	V-F-S-B
4151	Drv DGFC-A W1mon Asynchronous Word 1 monitor (from Drive to DGFC)	-	R	0.00	-	-	PP	V-F-S-B
4152	Drv DGFC-A W2mon Asynchronous Word 2 monitor (from Drive to DGFC)	-	R	0.00	-	-	PP	V-F-S-B
4153	Drv DGFC-A W3mon Asynchronous Word 3 monitor (from Drive to DGFC)	-	R	0.00	-	-	PP	V-F-S-B
4154	Drv DGFC-A W4mon Asynchronous Word 4 monitor (from Drive to DGFC)	-	R	0.00	-	-	PP	V-F-S-B
4155	Drv DGFC-A W5mon Asynchronous Word 5 monitor (from Drive to DGFC)	-	R	0.00	-	-	PP	V-F-S-B
4156	Drv DGFC-A W6mon Asynchronous Word 6 monitor (from Drive to DGFC)	-	R	0.00	-	-	PP	V-F-S-B
4157	Drv DGFC-A W7mon Asynchronous Word 7 monitor (from Drive to DGFC)	-	R	0.00	-	-	PP	V-F-S-B
4158	Drv DGFC-A W8mon Asynchronous Word 8 monitor (from Drive to DGFC)	-	R	0.00	-	-	PP	V-F-S-B
4159	Drv DGFC-A W9mon Asynchronous Word 9 monitor (from Drive to DGFC)	-	R	0.00	-	-	PP	V-F-S-B
APPL CARD CONFIG / DGFC / DGFC A->Drv W mon								
4160	DGFC-A Drv W0mon Asynchronous Word 0 monitor (from DGFC to Drive)	-	R	0.00	-	-	PV	V-F-S-B
4161	DGFC-A Drv W1mon Asynchronous Word 1 monitor (from DGFC to Drive)	-	R	0.00	-	-	PV	V-F-S-B
4162	DGFC-A Drv W2mon Asynchronous Word 2 monitor (from DGFC to Drive)	-	R	0.00	-	-	PV	V-F-S-B
4163	DGFC-A Drv W3mon Asynchronous Word 3 monitor (from DGFC to Drive)	-	R	0.00	-	-	PV	V-F-S-B
4164	DGFC-A Drv W4mon Asynchronous Word 4 monitor (from DGFC to Drive)	-	R	0.00	-	-	PV	V-F-S-B
4165	DGFC-A Drv W5mon Asynchronous Word 5 monitor (from DGFC to Drive)	-	R	0.00	-	-	PV	V-F-S-B
4166	DGFC-A Drv W6mon Asynchronous Word 6 monitor (from DGFC to Drive)	-	R	0.00	-	-	PV	V-F-S-B
4167	DGFC-A Drv W7mon Asynchronous Word 7 monitor (from DGFC to Drive)	-	R	0.00	-	-	PV	V-F-S-B
4168	DGFC-A Drv W8mon Asynchronous Word 8 monitor (from DGFC to Drive)	-	R	0.00	-	-	PV	V-F-S-B
4169	DGFC-A Drv W9mon Asynchronous Word 9 monitor (from DGFC to Drive)	-	R	0.00	-	-	PV	V-F-S-B

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
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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 “Use Save Config” message blinking, use “Save Config?” command

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
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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
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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
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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
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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	-	RWS	0.00	-	-	PV	V-F-S-B
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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 Value of the internal input signal 1, default connected to Cmp 1 inp 1 src	-	RWS	0.00	-	-	PV	V-F-S-B
6043	Cmp 1 inp 2 Value of the internal input signal 2, default connected to Cmp 1 inp 2 src	-	RWS	0.00	-	-	PV	V-F-S-B
6044	Cmp 1 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 $I0 \text{ AND } I1 \text{ AND } I2$ 12 $I0 \text{ OR } I1 \text{ AND } I2$ 13 $I0 \text{ XOR } I1$	N/A	RWS	0	0	10	DP	V-F-S-B
6045	Cmp 1 window It allows to set a window stating an acceptable range among the signals of the Compare 1 block	[cnt]	RWS	0.00	0.00	-	PP	V-F-S-B
6046	Cmp 1 delay It allows to set a delay in seconds on the comparison transition in the Compare 1 block	[sec]	RWS	0.00	0.00	30	PP	V-F-S-B
6047	Cmp 1 inversion 0 Not inverted 1 Inverted It allows to invert the Compare 1 block output signal	N/A	RWS	0	0	1	DP	V-F-S-B
CUSTOM FUNCTIONS / Compare / Compare 1 / Compare 1 mon								
6048	Compare 1 output It allows to monitor the state of Compare 1 block output signal 0 = FALSE 1 = TRUE	N/A	R	0	0	1	DV	V-F-S-B
CUSTOM FUNCTIONS / Compare / Compare 2								
CUSTOM FUNCTIONS / Compare / Compare 2 / Compare 2 src								
6064	Cmp 2 inp 0 src 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)	N/A	RWS	IPA 6056		List 6	PIN	V-F-S-B
6065	Cmp 2 inp 1 src 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)	N/A	RWS	IPA 6057		List 6	PIN	V-F-S-B
6066	Cmp 2 inp 2 src 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)	N/A	RWS	IPA 6058		List 6	PIN	V-F-S-B

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	-	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	-	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	-	RWS	0.00	-	-	PV	V-F-S-B
6059	Cmp 2 function 0 None 1 IO == I1 2 IO != I1 3 IO < I1 4 IO > I1 5 IO < I1 < I2 6 IO == I1 7 IO != I1 8 IO < I1 9 IO > I1 10 IO < I1 < I2 11 IO AND I1 AND I2 12 IO OR I1 AND I2 13 IO 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	-	RWS	0	-	-	PV	V-F-S-B
9101	Pad 1 Analog Pad 1	-	RWS	0	-	-	PV	V-F-S-B
9102	Pad 2 Analog Pad 2	-	RWS	0	-	-	PV	V-F-S-B
9103	Pad 3 Analog Pad 3	-	RWS	0	-	-	PV	V-F-S-B

IPA	Description	[Unit]	Access	Default	Min	Max	Format	Reg. Mode
9104	Pad 4 Analog Pad 4	-	RWS	0	-	-	PV	V-F-S-B
9105	Pad 5 Analog Pad 5	-	RWS	0	-	-	PV	V-F-S-B
9106	Pad 6 Analog Pad 6	-	RWS	0	-	-	PV	V-F-S-B
9107	Pad 7 Analog Pad 7	-	RWS	0	-	-	PV	V-F-S-B
9108	Pad 8 Analog Pad 8	-	RWS	0	-	-	PV	V-F-S-B
9109	Pad 9 Analog Pad 9	-	RWS	0	-	-	PV	V-F-S-B
9110	Pad 10 Analog Pad 10	-	RWS	0	-	-	PV	V-F-S-B
9111	Pad 11 Analog Pad 11	-	RWS	0	-	-	PV	V-F-S-B
9112	Pad 12 Analog Pad 12	-	RWS	0	-	-	PV	V-F-S-B
9113	Pad 13 Analog Pad 13	-	RWS	0	-	-	PV	V-F-S-B
9114	Pad 14 Analog Pad 14	-	RWS	0	-	-	PV	V-F-S-B
9115	Pad 15 Analog Pad 15	-	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 toolbox 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 “Use Save Config” message blinking, 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.

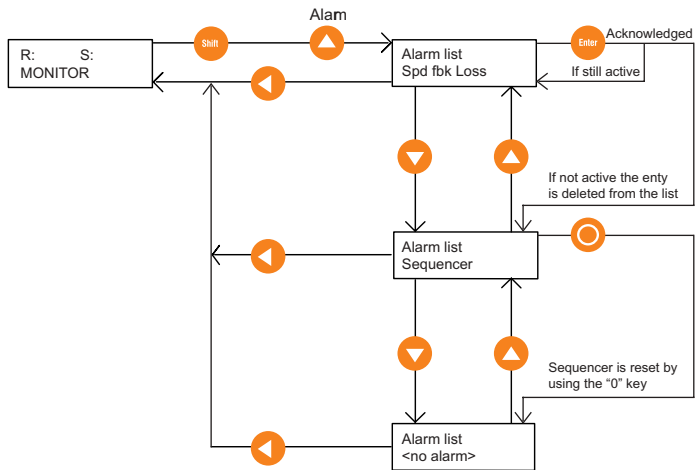
Figure 10.1: Led Status and Keypad



Alarm led is lighted

In case an alarm occurs, this led is lighted 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 [0] 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

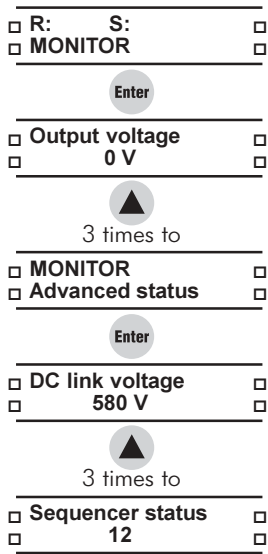
will only remove it from the active alarm list. If the alarm condition also resulted in a drive trip, the sequence will also need to be reset. This can be done by pressing the [O] key. The drive cannot be re-enabled or started after a trip condition unless the drive sequencer is reset. The drive State 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 (Cause of fault)	Drive activity After alarm	Hold off	Restart	Restart time	Code in the Alarm list	Bit posi- tion in AI.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 fit	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 at./30sec.	Yes	25	5
Ground fault	Output phase discharge to ground	Programm.	No	No	Yes	26	6
Curr fbk loss	A failure of current sensor feedback or power supply was detected	Disable drive	No	No	No	27	7
External fault	External fault input is active	Programm.	Programm.	Yes	Programm.	28	8
Spd fbk loss	A failure of the speed feedback sensor or power supply was detected	Programm.	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 25 Hp and over)	Disable drive	Constant, 1000 msec	No	No	31	11
Motor OT	Motor overtemperature was detected by thermal contact or PTC thermistor	Programm.	Programm.	Yes	Programm.	32	12
Heatsink S OT	Heatsink linear temperature sensor threshold was exceeded	Programm.	Programm.	Yes	Programm.	33	13
Regulat S OT	Regulation board linear temperature sensor threshold was exceeded	Programm.	Programm.	Yes	Programm.	34	14
Intake Air S OT	Cooling air intake linear temperature sensor threshold was exceeded (only for models 25Hp and over)	Programm.	Programm.	Yes	Programm.	35	15
Cont fbk fail	It attempts when the contact feedback signal is not detected	Programm.	No	Yes	No	36	16
Comm card fault	Fault of optional LAN communication board	Programm.	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	Programm.	No	No	No	39	19
Mot overload	Motor overload accumulator exceeded trip threshold	Programm.	No	No	No	40	20
BU overload	Braking resistor overload accumulator exceeded trip threshold	Programm.	No	No	No	41	21
Data lost	Data corrupted in non-volatile memory	Disable drive	No	No	No	42	22
Brake fbk fail	It attempts when the brake feedback signal is not detected	Programm.	No	No	No	43	23

Alarm name	Description (Cause of fault)	Drive activity After alarm	Hold off	Restart	Restart time	Code in the Alarm list	Bit posi- tion in Al.list
Max time	Software task time overrun was detected	Disable drive	No	No	No	44	24
Sequencer	Alarm event caused dive disable	Disable drive	No	No	No	45	25
Door fbk fail	It trips when the door feedback signal is not detected	Disable drive	Yes	No	No	46	26
Overspeed	Maximum speed threshold was exceeded while drive in RUN state	No	Yes	No	No	47	27
UV repetitive	More than a programmable number of UV fault were detected in 5 minutes	Disable drive. If n. of faults is set to max the Alarm is disabled.	No	No	No	48	28
IOC repetitive	More than 2 OC faults were detected in 30 sec.	Disable drive	No	No	No	49	29
IGBTdesat repet	More than 2 IGBT desat faults were	Disable drive	No	No	No detected in 30 sec.	50	30
WatchDog user	The drive failed to retrigger the communication watchdog within the specified time	Disable drive	No	No	No	51	31
Hw fail	Communication failure between Drive Regulation board and one of its options or I/O expansions.	Disable drive	No	No	No	52	32

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
- Data Base errors (DB errors)

Refer to the following paragraphs for descriptions.

10.2.1 Configuration Errors

Configuration errors can occur by entering incompatible or invalid parameter data.

The error indicates which parameters are causing the problem in the Setup Mode:

- Motor data
- Drive data
- Start Up parameter

The drive reports configuration error by the following example description:

Calc error: 606

Param: 0000

The “Calc error” number denotes the cause of invalid calculation. The error number reported by this process is set in part of the reply signal. The Calc error numbers is composed as follows:

Calc error = Offset + Error code

The Offset denotes the type 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 (for the Error code values lists see below).

For example, Calc error number **606** is a configuration error (600) caused by speed base value (6) out of range. The “Param” number is not meaningful.

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

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**

10.2.2 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

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	21	Process doesn't reply
1	SBI PROBLEM 0x01	22	Wrong record size
2	Generic error	23	Attribute read only
3	Attribute not exist	24	SBI PROBLEM 0x18
4	Limit High	25	Command not yet implemented
5	Limit Low	26	Command wrong
11	Division by zero	27	Read file error
12	Int Overflow	28	Header wrong
13	Int Undeflow	29	Reserved for internal use
14	Long Overflow	30	Parameter not exist
15	Long Underflow	31	Parameter read only
16	Domain Error	32	parameter "z" only
17	Indirection Error	48	SBI PROBLEM 0x30
18	Reached wrong eof		
19	Dbase not configured		
20	Value not valid		

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 N.	Error text	Description
0	No error	
1	Abort	the user entered Escape or 0 key, or removed enable permissive (term 12 low)
2	DB	access <IPA> an attempt to access the database at the specified index occurred during autotune procedure
3	No break point	failure in measuring inverter voltage distortion
4	Rs high lim	failure in measuring motor stator Resistance
5	Rs low lim	failure in measuring motor stator Resistance
6	DTL high lim	failure in computing compensation for the inverter voltage distortion
7	DTL low lim	failure in computing compensation for the inverter voltage distortion
8	DTS high lim	failure in computing compensation for the inverter voltage distortion
9	DTS low lim	failure in computing compensation for the inverter voltage distortion
10	LsS high lim	failure in calculating motor leakage inductance
11	LsS low lim	failure in calculating motor leakage inductance
12	ImNom not found	identification of rated magnetizing current failed
13	ImNom not found	identification of maximum magnetizing current failed
14	RrV low lim	Voltage limit exceeded during measurement for the calculation of motor rotor resistance
15	RrV high lim	Voltage limit exceeded during measurement for the calculation of motor rotor resistance
16	Rr high lim	failure in calculating motor rotor resistance
17	Rr low lim	failure in calculating motor rotor resistance
18	AI too high	value of analog input is too high for full scale autocalibration
19	AI too low	value of analog input is too low for full scale autocalibration
20	Rr2 high lim	failure in calculating motor rotor resistance
21	Rr2 low lim	failure in calculating motor rotor resistance
22	Drive disabled	Enable permissive (term 12) was found low when attempting to start autotune procedure
23	Rr timeout	timeout occurred during measurement for the calculation of motor rotor resistance
24	Rr2 timeout	timeout occurred during measurement for the calculation of motor rotor resistance
25	LsS timeout	timeout occurred during measurement for the calculation of motor leakage inductance
26	Drive enabled	Drive was found to be already enabled when attempting to initiate autotune procedure
27	Reserved	
28	Reserved	
29	Reserved	
30	Reserved	
31	Reserved	
32	Calc error	An error occurred when processing measurement data
33	Config error<errcode>	The specified Configurator error occurred during database configuration based on autotune data
34	Reserved	
35	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 market 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:

- 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).
- 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).
- 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.)
- 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.



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 SIEI SpA

05 - 03 - 2002

General manager

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



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 SIEI SpA

05.03.2002

General manager

Engineering manager

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AVy-BR4-W01_dec

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