Brushless Servodrive

SIEIDrive

XVy-EV

..... Start up guide

Specification and installation

GEFRAN

Thank you for choosing this Gefran 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@gefran.com.
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.
Gefran Spa has the right to modify products, data and dimensions without notice.
The data can only be used for the product description and they can not be understood as legally stated properties.

This manual is updated according to software version 4.40.

NOTE! Refer to the “Drive programmation with MDPlc” (inside the XVy tools cd-rom) to use the drive with the Plc function in the dedicated MDPlc development environment.

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.

Tables of Contents

Safety Symbol Legend - Precautions de securité

 *Warning*	**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.*
 *Caution*	**Indicates a procedure, condition, or statement that, if not strictly observed, could result in damage to or destruction of equipment.** *Indique et le mode d'utilisation, la procédure et la condition d'exploitation. Si ces consignes ne sont pas strictement respectées, il y a des risques de détérioration ou de destruction des appareils*
 *Attention*	**Indicates a procedure, condition, or statement that should be be strictly followed in order to optimize these applications.** *Indique le mode d'utilisation, la procédure et la condition d'exploitation. Ces consignes doivent être rigoureusement respectées pour optimiser ces applications..*
NOTE!	Indicates an essential or important procedure, condition, or statement. *Indique un mode d'utilisation, de procédure et de condition d'exploitation essentiels ou importants*

Chapter 0 - Safety Precautions

According to the EEC standards the SIEIDrive - XVy-EV 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 SIEIDrive - XVy-EV et leurs accessoires doivent être employés seulement après avoir verifié que la machine ait été produit avec les même dispositifs de sécurité demandés par la réglementation 89/392/EEC concernant le secteur de l'industrie.

Les systèmes provoquent des mouvements mécaniques. L'utilisateur est responsable de la sécurité concernant les mouvements mécaniques. Les dispositifs de sécurité prévues par l'usine et les limitations operationelles ne doivent être dépassés ou modifiés.

Warning

Electrical Shock and Burn Hazard:

When using instruments such as oscilloscopes to work on live equipment, the oscilloscope's chassis should be grounded and a differential amplifier input should be used. Care should be used in the selection of probes and leads and in the adjustment of the oscilloscope so that accurate readings may be made. See instrument manufacturer's instruction book for proper operation and adjustments to the instrument.

Décharge Èlectrique et Risque de Brúlure :

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

Les sondes et conducteurs doivent être choissis avec soin pour effectuer les meilleures mesures à l'aide d'un oscilloscope. Voir le manuel d'instruction pour une utilisation correcte des instruments.

Fire and Explosion Hazard:

Fires or explosions might result from mounting Drives in hazardous areas such as locations where flammable or combustible vapors or dusts are present. Drives should be installed away from hazardous areas, even if used with motors suitable for use in these locations.

Risque d'incendies et d'explosions:

L'utilisation des drives dans des zônes à risques (présence de vapeurs ou de poussières inflammables), peut provoquer des incendies ou des explosions. Les drives doivent être installés loin des zônes dangeureuses, et équipés de moteurs appropriés.

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

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

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

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

Always connect the Drive to the protective ground (PE) via the marked connection terminals (PE2) and the housing (PE1). Brushless 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 and doubled for redundancy.
Il faut toujours connecter le variateur à la terre (PE) par les des bornes (PE2) et le châssis (PE1). Le courant de dispersion vers la terre est supérieur à 3,5 mA sur les variateurs Brushless et 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 4.10 on Instruction manual .
Ne jamais ouvrir l'appareil lorsqu'il est suns tension. Le temps minimum d'attente avant de pouvoir travailler sur les bornes ou bien à l'intérieur de l'appareil est indiqué dans la section 4.10.

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.

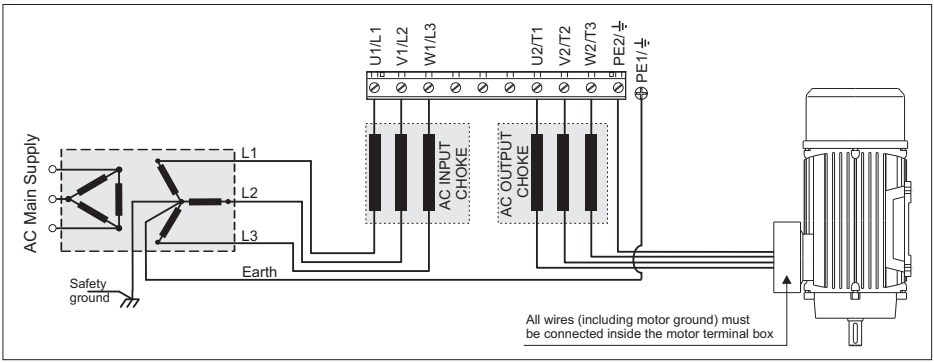
Do not connect power supply voltage that exceeds the standard specification voltage fluctuation permissible. If excessive voltage is applied to the Drive, damage to the internal components will result.
Ne pas raccorder de tension d'alimentation dépassant la fluctuation de tension permise par les normes.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

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

1. **Gefran 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.

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



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

Caution

The grounding connector shall be sized in accordance with the NEC or Canadian Electrical Code. The connection shall be made by a UL listed or CSA certified closed-loop terminal connector sized for the wire gauge involved. The connector is to be fixed using the crimp tool specified by the connector manufacturer.
Le raccordement devrait être fait par un connecteur certifié et mentionné à boucle fermé par les normes CSA et UL et dimensionné pour l'épaisseur du cable correspondant. Le connecteur doit être fixé a l'aide d'un instrument de serrage specifié par le producteur du connecteur.

Do not perform a megger test between the Drive terminals or on the control circuit terminals.
Ne pas exécuter un test megger entre les bornes du drive ou entre les bornes du circuit de contrôle.

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

If the Drive's Fault Alarm is activated, consult the 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 réiniliatiser l'alarme automatiquement par une séquence externe, etc

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

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


Caution

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

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

No voltage should be connected to the output of the drive (terminals U2, V2 W2). The parallel connection of several drives via the outputs and the direct connection of the inputs and outputs (bypass) are not permissible.
Aucune tension ne doit être appliquée sur la sortie du convertisseur (bornes U2, V2 et W2). Il n'est pas permis de raccorder la sortie de plusieurs convertisseurs en parallèle, ni d'effectuer une connexion directe de l'entrée avec la sortie du convertisseur (Bypass).

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

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 kΩ/V) should be used for measuring the signal voltages.
Il ne faut pas éxécuter de tests de rigidité diélectrique sur des parties du convertisseurs. Pour mesurer les tensions, des signaux, il faut utiliser des instruments de mesure appropriés (résistance interne minimale 10 kΩ/V).

NOTE!

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

NOTE!

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

Chapter 1 - Functions and General Features

SIEIDrive - XVy-EV represents a new concept in motion control technology; this very fast servodrive based on the DSP (digital signal processor) VECON™ is aimed at providing real-time control of servosystems and it is integrated with versatile and innovative power hardware.

SIEIDrive - XVy-EV is an IGBT servodrive particularly suitable for high bandwidth applications with brushless servomotors. Thanks to the innovative software installed on the flash eprom, it can be considered as a combination of a digital drive and a PLC using a special software tool called GF-eXpress.

SIEIDrive - XVy-EV features full-digital regulation with a 16KHz cycle, a 5KHz current loop bandwidth, a position loop with zero tracking failure, an analog interface, some dedicated digital interface and I/O expansion.

The drive position loop, (PI type) is based on two symmetrical register circuits, which store the desired and the actual information. The PID speed loop (a position loop derivative) and the PID2 acceleration control (a second position loop derivative) are added to increase the accuracy of the controlled axes, both in a feedback and in a feedforward condition.

The drive has the following features:

- Torque control
- Speed control
- Position control
- Electrical line shaft
- PID function.
- Brake control.
- Flux reduction.
- Motor-driven potentiometer
- Sequential position control (multi-position controller)
- Power interrupt management
- Linear motor control
- Plc functions with MDPlc dedicated software environment; standard languages according to IEC 61131
- “GF-eXpress” Windows ® configurator via Slink3 protocol
- 1 configurable main encoder / resolver input
- 1 configurable auxiliary encoder input / encoder repetition / simulation output
- 2 analog differential inputs (11 bits + sign)
- 2 analog outputs (11 bits + sign)
- 7 programmable digital inputs
- 6 programmable digital outputs
- 1 digital relay output 1A 250V
- RS485 asynchronous opto-isolated multi-drop serial port
- 2 fast synchronous serial ports for a master-slave communications between drives (Fast Link connectors)
- Fiber optical communication adapters

- Standard Fieldbus communication: CANopen and Modbus
- IP20 (NEMA 1) protection, book case, removable connectors, serial encoder interface brought out via 1/2 D-sub connectors, ground connection screws for shielded cables mounted on board.

Options (Maximum one expansion card per drive)

- **ENC-ADPT** card. Encoder connection adapter.
  Terminals 1 to 15 with point-to-point connection to the VGA-type connector.
- **EXP-ABS-EV** card. Expansion card for absolute encoder with SSI / EnDat (2) and Hyperface (3) protocols.
- **EXP-FO** card. Expansion card for a digital encoder output + 5V.
- **EXP-E** card. Expansion card for a digital encoder output + 5V… +15V / +24V
- **EXP-D8R4** card. Expansion card for digital I/Os, 8 inputs + 4 outputs.
- **EXP-D8-120** card. Expansion card for digital I/Os: 12 digital inputs, opto-isolated, 120V, 8 digital outputs, opto-isolated, 15…30V.
- **EXP-D14-A4F** card. Expansion card for digital I/Os, 8 inputs + 6 outputs, 2 analogue inputs ±10V or 0÷20mA or 4÷20mA, 2 analogue outputs ±10V, 1 input in opto-isolated frequency for encoder, channels: A/A-, with +5V or 15..24V, 150kHz max; B/B-, with +5V or 15..24V, 150kHz max; 0/0-, with +5V or 15..24V, 150kHz max; zero reset input (C/C-) with 15...30V. (1) .
- **EXP-D16** card. Expansion card for digital I/Os: 8 digital outputs, opto-isolated, 15…30V, 8 digital inputs, opto-isolated, 15…30V.
- **EXP-D20-A6** card. Expansion card for digital I/Os: 12 digital inputs, opto-isolated, 15…30V, 8 digital outputs, opto-isolated, 15…30V, 2 analogue inputs, ±10V / 0…20mA, 2 analogue outputs, ±10V, 2 analogue outputs, 0…20mA.
- **EXP-F2E** card. Expansion card for an opto-isolated encoder input, able to provide the repeat of the encoder data.
  Channels: A/A-, with +5V or 15..24V, 150kHz max; B/B-, with +5V or 15..24V, 150kHz max; C/C-, with +5V or 15..24V, 150kHz max; zero reset input (QC+ / QC- denied) with 15...30V (1)
- **EXP-FI** card. Opto-isolated encoder input expansion card. Channels: A/A-, with +5V or 15..24V, 150kHz max; B/B-, with +5V or 15..24V, 150kHz max; 0/0-, with +5V or 15..24V, 150kHz max; zero reset input (C/C-) with 15...30V. (1) .
- **EXP-FIO** card. Expansion card for an opto-isolated encoder input, able to provide the repeat of the encoder data. Channels: A/A-, with +5V or 15..24V, 150kHz max; B/B-, with +5V or 15..24V, 150kHz max; 0/0-, with +5V or 15..24V, 150kHz max. (1) .
- **EXP-FIH** card. Opto-isolated encoder input expansion card. Channels: A/A-, with 15..24V, 150kHz max; B/B-, with 15..24V, 150kHz max. (1) .

NOTE!

(1) If a supplementary type digital encoder is used (A, Anot, B, Bnot), the encoder missing signal is available.
(2) Single/multi-turn encoders are managed, with/without incremental tracks and limited number of bits.
(3) Only single-turn encoders with incremental tracks are managed

1.1 Motors and Encoders

The SIEIDrive - XVy-EV drives are designed for the field oriented regulation of brushless servomotors. A sinusoidal - digital - absolute encoder or resolver can be used to feedback a signal to the position / speed regulator (see chapter 4.4. for more details).

1.1.1 Motors

What motor data is required for connecting the drive?
Nameplate specifications

- Motor rated voltage
- Motor rated current
- Number of poles
- Motor rated speed
- Motor thermal protection type

Motor protection

Temperature-dependent contacts in the motor winding
Temperature-dependent contacts "Klixon" type can be connected directly to the drive via PIN2 and PIN 7 of the XE connectors. Klixon type of sensors must be selected in the **MOTOR DATA** menu, IPA 20004 = [1] NC Contact.

Thermistors
PTC thermistors according to DIN 44081 or 44082 fitted in the motor can be connected directly to the drive via PIN 2 and PIN 7 of the XE connector. PTC type of sensor must be selected in the **MOTOR DATA** menu , IPA 20004 = [0] PTC.

NOTE! The motor PTC interface circuit (or Klixon) has to be considered as treated as signal circuit. The connection cables to the motor PTC must be made of twisted pair shielded cable; the cable route should not be parallel to motor cables or it must be separated by at least 20 cm.

Chapter 2 - Inspection Procedures, Components Identification and Standard Specifications

2.1 Delivery Inspection Procedures

2.1.1 General

A high degree of care is taken in packing the SIEIDrive - XVy-EV 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 .

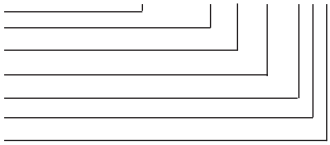
NOTE! A certain degree of moisture condensation is permissible if this arises from changes in temperature (see section 2.3.1, “Permissible Environmental Conditions”). This does not, however, apply when the devices are in operation. Always ensure that there is no moisture condensation in devices that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

2.1.2 Drive type designation

The main technical characteristic of the drive are showed in the product code and in the nameplate. I.e. product code:

Standard sizes

XVy-EV X XX XX-XXX

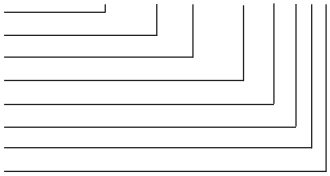


Drive Series XVy Evolution
Enclosure dimension identification
Rated current (A rms)
Maximum output current (A rms, see table 2.3.3.1)
K=Keypad, X=without keypad
B=Internal Brake Unit, X= without brake unit
Software version

Example: XVy-EV10306-KBX
Drive type XVy-EV, size 1, rated current 3 A rms, max output current 6 A rms, with keypad, internal braking unit, standard software.

Compact sizes (C/CP)

XVy-EV X XXX XXX-X-XXX

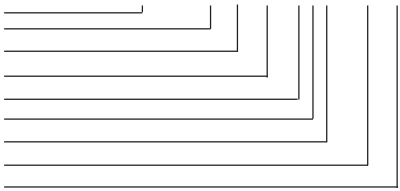


Drive Series XVy Evolution
Enclosure dimension identification
Rated current (A rms)
Maximum output current (A rms, see table 2.3.3.1)
C/CP=compact version
K=Keypad, X=without keypad
B=Internal Brake Unit, X= without brake unit
Software version

Example: XVy-EV9470650-C-KBX-IP00
Drive type XVy-EV, size 9, rated current 470 A rms, max output current 650 A rms, with keypad, internal braking unit, standard software, IP00 open housing.

Special version

XVy-EV X XX XX-XXX-EWHR



Drive Series XVy Evolution
Enclosure dimension identification
Rated current (A rms)
Maximum output current (A rms, see table 2.3.3.1)
K=Keypad, X=without keypad
B=Internal Brake Unit, X= without brake unit
Software version
Special version Water Cooled, High Temperature
R=With Internal Brake Resistor

Example: XVy-EV455110-KBX-EWH
Drive type XVy-EV, size 4, rated current 39 A rms, max output current 68 A rms, with keypad, internal braking unit, standard software, water cooled.

2.1.3 Nameplate

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

Figure 2.1.3.1: Identification nameplate

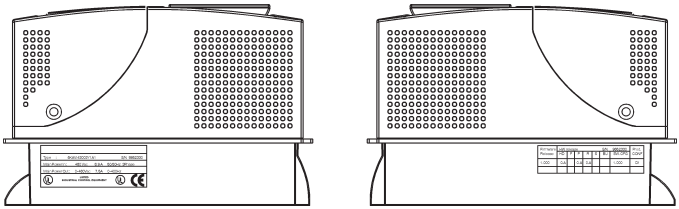
Type: XVy-EV 10306 -KBX AC servo S/N 02006233
Inp: 230-480 Vac (Fctry Set=400) 50/60Hz 3Ph
2.9A@230Vac 2.9A@480Vac With line choke
Out: 0-480Vac 0-450Hz 3Ph 1.5kW@480Vac 2Hp@480Vac
3A@230V Cont. Serv. 2.6A@480V
LISTED INDUSTRIAL CONTROL EQUIPMENT

Type: Drive model
S/N: Serial number
Main Power In: Power supply voltage, AC Input current, Frequency
Main Power Out: Output voltage, Output current, Output frequency

Figure 2.1.3.2: Firmware & Card revision level nameplate

Firmware Release	HW release					S/N 02006233		Prod. CONF
	D	F	P	R	S	BU	SW. CFG	
4.000	0.A		0.A	0.A			4.000	A1

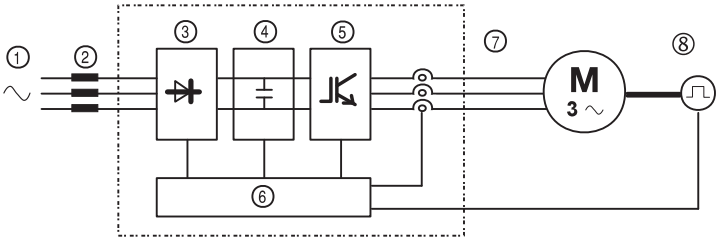
Figure 2.1.3.3: Nameplates position



2.2 Component identification

An SIEIDrive - XVy-EV 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 brushless servomotors.
In the XVy-EV ...-DC versions the rectifier bridge is not included: the drives are powered by DC on the intermediate circuit.

Figure 2.2.1: Basic Setup of drive



1 AC Input supply voltage (*)

2 AC Mains choke (*)
See section 4.7.1

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

4 DC intermediate circuit
With charging resistor and smoothing capacitor.
Direct voltage (U_{DC}) = $\sqrt{2}$ x Mains voltage (U_{LN})
In the XVy-EV ...-DC versions the DC voltage = 600 Vdc.
For speed and position feedback (see section 3.4.2).

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

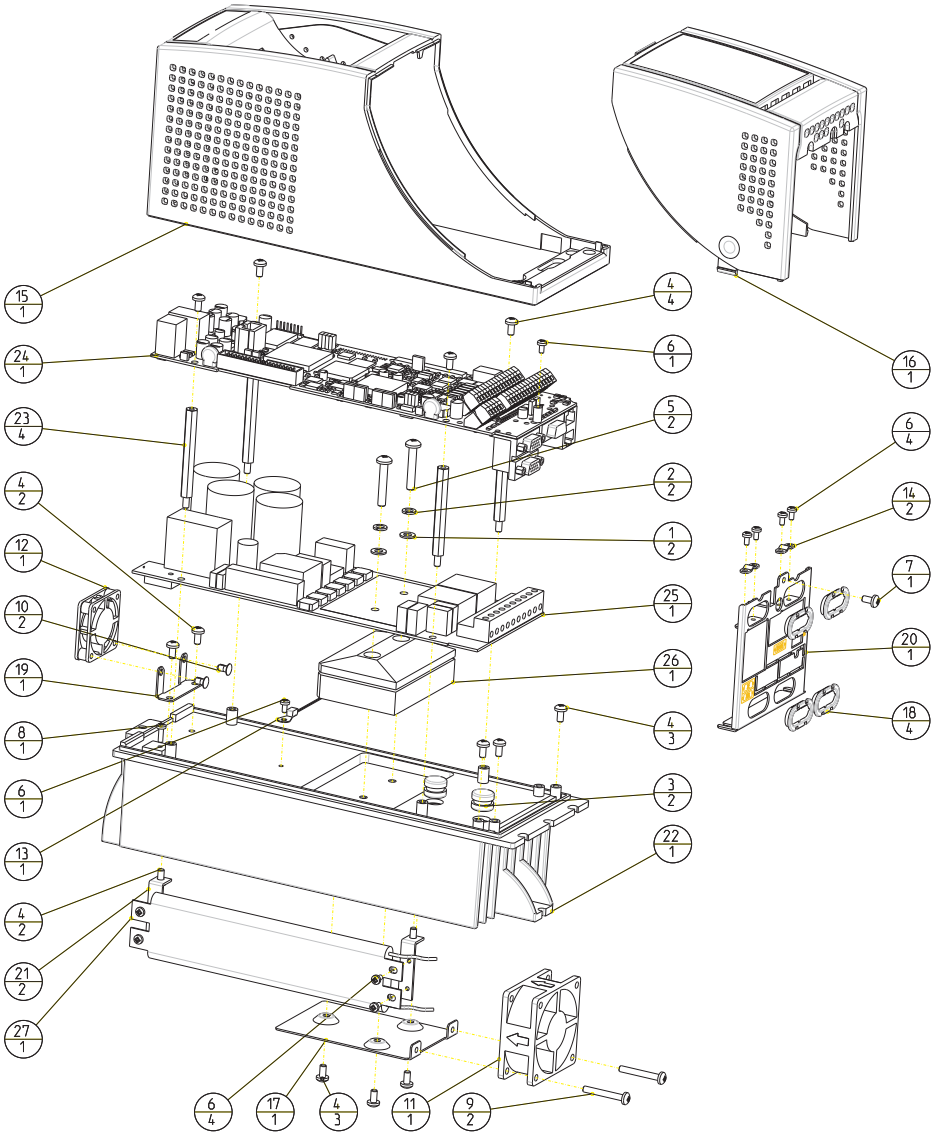
6 Configurable control section
Modules for open-loop and closed-loop control of the power section. This is used for processing control commands, reference values and actual values.

7 Output voltage
Three-phase, variable alternating voltage.

8 Feedback
For speed feedback (see section 3.4.2).

(*) not included in the XVy-EV ...-DC versions.

Figure 2.2.2: Drive view & components



6 — Ref.
4 — Q.ty

1. Piana M5
2. Grover M5
3. Fairlead
4. Flamboyanted screw
5. Screw

6...9. Flamboyanted screw
10. Button
11. Cooling fun for type 3-6 and higher
12. Cooling fan IGBT Bridge
13. NTC thermal sensor
14. Bracket
15. Top cover

16. Cover
17. Fan support
18. Plug
19. Fan support
20. Cable entry plate
21. Resistor square
22. Dissipator
23. Hexagonal bar

24. RXVy Regulation card
25. PV33 Power card
26. IGBT Bridge
27. Internal brake resistor

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
(*) T_A Ambient temperature [°C]	0 … +60 with derating
(*) T_A Ambient temperature [°F]	32 … +140 with derating Installation location
(*)Max input water temperature [°C]	30
(*)Max input water temperature [°F]	86
(*) Nominal Flow [L/min]	8
(*) Nominal Flow [Gal/min]	2,11
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 (NEMA 1), IP00 (XVy-EV....-IP00 models) IP54 (NEMA 12) for the cabinet with externally mounted heatsink (size type XVy-EV 10306-... to XVy-EV 32550-...)
Installation altitude	Max 2000 m (6562 feet) above sea level; Above 1000 m (3281 feet) 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 per EN50178 -20…+55°C (-4…+131°F), for devices with keypad
transport	-25…+70°C (-13…+158°F), class 2K3 per EN50178 -20…+60°C (-4…+140°F), for devices with keypad
Air humidity:	
operation	5 % to 85 %, 1 g/m³ to 25 g/m³ without moisture condensation or icing (Class 3K3 as per EN50178
storage	5% to 95 %, 1 g/m³ to 29 g/m³ (Class 1K3 as per EN50178)
transport	95 % [3], 60 g/m³ [4]
Air pressure:	
operation	[kPa] 86 to 106 (class 3K3 as per EN50178)
storage	[kPa] 86 to 106 (class 1K4 as per EN50178)
transport	[kPa] 70 to 106 (class 2K3 as per EN50178)

STANDARD

Climatic conditions	IEC 68-2 Part 2 and 3
Clearance and creepage	EN 50178, UL508C, UL840 degree of pollution 2
Vibration	IEC68-2 Part 6
Interference immunity	IEC801 Part 2,3 and 4
EMC compatibility	EN61800-3 (see "EMC Guidelines" instruction book)
Approvals	CE, UL, cUL

1) **Environment Temp** parameter, IPA 20051 = 40°C (104°)
Ambient temp = 0 ... 40°C (32°...104°F)
Over 40°C: - 2% reduction of the output rated current for each exceeding C°.
- remove front plate (better than class 3K3 as per EN50178)
2) **Environment Temp** parameter, IPA 20051 = 50°C (122°F)
Ambient temp = 0 ... 50°C (32°...122°F)
Current reduction to 80% of the output rated 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).
(*) XVy-EV ... -EWHR

Disposal of the Device

The 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 XVy-EV 32550-...) are recyclable: the material used is >ABS+PC< .

2.3.2 AC Input/Output Connection

The 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 4.7.1.
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. All drives are capable of operation at 480 Vac, therefore cannot be damaged by connection to lower voltages down to 208Vac. After connection, simply select in the menu the proper line voltage under “Drive Config”

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

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

XVy-EV ...-DC versions

In this version, the drive must be powered by a rectified DC supply of 600 Vdc.
The use of Gefran SM32 series power supplies is recommended for this, available with an output current from 185 to 2000A.
From size XVy-EV 43366, insertion of an AC mains inductance on the power supply input of the power supply unit is compulsory (for the type of inductance, consult the manual of the power supply unit), see figure 4.8.1.2.

Table 2.3.2.1: Input / Output Specifications

Type - XVy-EV		10306	10408	10612	20816	21020	21530	32040	32550	43566	43570	44590	45510	45511O	57014O	57014O	51001S0	51001S0	61252O	61252O	71902S0	71452S0	72304Z0	82804Z0	83504S0	94706S0-C	95606S0-CP
														OUTPUT													
Inverter Output for continuous service, IEC 146 class 1	[kVA]	2.1	3.1	4.2	5.5	7.6	10.3	14.1	20.1	22.9	27	36.7	45	47	55.4	55.4	67.2	67.2	86.6	86.6	110	110	159	194	242	326	388
P_N Output power for continuous service (recommended motor output), IEC 146 class 1:																											
@ U_{LN}=230Vac; f_{SW}=default	[kW]	0.75	1.1	1.5	2.2	3	4	5.5	7.5	9	11	18.5	22	23	22	30	30	30	37	37	55	55	75	90	100	125	160
@ U_{LN}=400Vac; f_{SW}=default	[kW]	1.5	2.2	3	4	5.5	7.5	11	15	18.5	22	30	37	39	45	45	55	55	75	75	90	110	132	160	200	250	315
@ U_{LN}=460Vac; f_{SW}=default	[Hp]	2	3	3	5	7.5	10	15	20	25	30	40	50	52	60	60	75	75	100	100	125	150	175	200	250	300	350
U_2 Max output voltage	[Vrms]	0.96 x U_{LN} (AC Input voltage)																									
f_2 Max output frequency	[Hz]	450											400	400	400	400	400	400	400	400	400	400	400	400	400	200	200
I_{2N} Continuous output current for continuous service, IEC 146 class 1:																											
@ U_{LN}=230~400Vac; f_{SW}=default	[Arms]	3	4.5	6	8	10.9	14.8	20.3	29	33	39	53	65	68	80	80	97	97	125	125	159	190	230	-	-	-	-
@ U_{LN}=400Vac; f_{SW}=default	[Arms]	3	4.5	6	8	10.9	14.8	20.3	29	33	39	53	65	68	80	80	97	97	125	125	159	190	230	280	350	470	560
@ U_{LN}=460Vac; f_{SW}=default	[Arms]	2.6	3.9	5.2	7	10.5	12.9	18.9	26.1	28.7	33.9	46.1	56.5	59	69.6	69.6	84.4	84.4	108.7	108.8	138.3	165.3	200	243.6	305	470	487.2
f_{SW} switching frequency (Default)	[kHz]	8									4			4			2			4			4		2		
f_{SW} switching frequency (Higher)	[kHz]	16									8			16			4			8			4		4		
Iovld (I x t)	[Arms]	See table 2.3.3.1																									
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)																								0.7	0.98
K_F for switching frequency		0.7 for higher f_{SW}																									
		IN PUT																									
U_{LN} AC Input voltage (1)	[Vrms]	230 V -15% ... 480 V +10%, 3Ph																								400 V -15% ... 480 V +10%, 3Ph	
F_{LN} AC Input frequency	[Hz]	50/60 Hz ±5%																									
I_{1N} AC Input current for continuous service, IEC 146 class 1 :																											
- Connection with 3-phase choke																											
@ 230Vac	[Arms]	2.9	4	5.5	7.0	9.5	14	18.2	25	33	39	55	69	72	84	84	98	98	122	122	158	192	231	n.a.	n.a.	n.a.	n.a.
@ 400Vac	[Arms]	3.3	4.5	6.2	7.9	10.7	15.8	20.4	28.2	35	44	62	77	80	94	94	110	110	137	137	177	216	242	309	362	520 (2)	600 (3)
@ 460Vac	[Arms]	2.9	3.9	5.4	6.5	9.3	13.8	17.8	24.5	39	37	53	66	69	82	82	96	96	120	120	153	188	210	268	316	468 (2)	540 (3)
- Connection without 3-phase choke		For these types an external inductance is mandatory																									
@ 230Vac	[Arms]	4.4	6.8	7.9	13.1	15.5	21.5	27.9	35.4																		
@ 400Vac	[Arms]	4.8	7.4	9	14.3	16.9	24.2	30.3	40																		
@ 460Vac	[Arms]	4.2	6.4	7.8	12.1	14.7	21	26.4	34.8																		
Max short circuit power without line reactor (2%line1%)	[kVA]	210	310	420	550	760	1030	1410	2010	2290	2700	3670	4500	4500	5540	5540	6720	6720	8660	8660	11100	13200	15900	19400	24200	32600	38800
Overvoltage threshold	[V]	820 V_{DC}																									
Undervoltage threshold	[V]	225 V_{DC} (for 230 V_{AC} mains), 372 V_{DC} (for 380 V_{AC} mains), 392 V_{DC} (for 400 V_{AC} mains) 406 V_{DC} (for 415 V_{AC} mains), 431 V_{DC} (for 440 V_{AC} mains), 450 V_{DC} (for 480 V_{AC} mains)																									
Braking IGBT Unit (standard drive)		Standard internal; Braking torque 150%								Option internal (with external resistor); Braking torque 150%			Standard internal: Braking torque 150%		Option internal (with external resistor): Braking torque 150%	Standard internal: Braking torque 150%	Option internal (with external resistor): Braking torque 150%	Standard internal: Braking torque 150%	External brake unit (optional)	Standard internal: Braking torque 150%	External braking unit (optional)						

(1) for DC versions: rectified voltage supply up to 700 V_{DC}); (2) 550A_{DC} @ 600V_{DC} for XVy-EV ...-DC version;
(3) 650A_{DC} @ 600V_{DC} for XVy-EV ...-DC version

2.3.3 Rated and overload currents

The XVy-EV drive manages two different overload algorithms which can be selected by the user through the IPA 18778 Overload

Control parameter according to the application:

- **I xT** algorithm dedicated to high-dynamics solutions where the overload can reach up to 200% of the rated current (default setting).

- **I^2xT** algorithm dedicated to applications where a limited overload is required for a longer period of time (limit = 136% In Class 1 for 60s every 300s).

The current rated and overload values change according to the type of selected algorithm as shown in tables 2.3.3.1 and 2.3.3.2 below.

I x T Algorithm

Table 2.3.3.1: Rated and overload currents with I x T algorithm

Type	Pot	fs<3Hz					3 Hz<fs<10 Hz	fs>10Hz				
		In		Iovld	Iovld duration	Recovery @ 90%In		In	Iovld	Iovld duration (2)		Recovery @ 90%In
		[Arms]		[Arms]	[s]	[s]		[Arms]	[Arms]	[s]		[s]
	[kW]	@ 0 Hz	@ 3 Hz							Thsink 5°C	Thsink 45°C	Thsink 5°C	Thsink 45°C
XVy-EV 10306	1,5	3.0	3.0	6,0	1	27	(1)	3,0	6,0	240	4	2400	40
XVy-EV 10408	2,2	4.5	4,5	9,0	1	27		4,5	9,0	240	4	2400	40
XVy-EV 10612	3,0	6.0	6,0	12,0	1	54		6,0	12,0	240	2	2400	20
XVy-EV 20816	4,0	8.0	8,0	16,0	0,9	54		8,0	16,0	240	1	2400	10
XVy-EV 21020	5,5	8.6	11	22	0,9	54		10,9	21,8	240	1	2400	10
XVy-EV 21530	7,5	12	15	30	0,5	54		15	30	240	1	2384	10
XVy-EV 32040	11	16	20,3	41	0,9	54		20	41	240	2	2400	20
XVy-EV 32550	15	21	29	58	0,9	108		29	58	240	2	2400	20
XVy-EV 43366	19	26	33	66	0,9	108		33	66	240	2	2400	20
XVy-EV 43570	22	31	39	71	0,9	108		39	71	240	2	1969	16
XVy-EV 44590	30	40	53	97	0,5	108		53	97	240	1	1992	8
XVy-EV 455110	37	50	65	118	0,5	108		65	118	240	1	1957	8
XVy-EV 455110 EWH/EWHR	39	52	68	124	0,5	108		68	124	240	1	1976	8.2
XVy-EV 570140	45	63	80	146	0,5	108		80	146	240	1	1980	8
XVy-EV 570140 EWH/EWHR	45	63	80	146	0,5	146		80	146	240	1	1980	8.3
XVy-EV 5100180	55	76	97	177	0,5	108		97	177	240	1	1979	8
XVy-EV 5100180 EWH/EWHR	55	76	97	177	0,5	108		97	177	240	1	1979	8.2
XVy-EV 6125230	75	99	125	228	1	108		125	228	240	1,5	1978	12
XVy-EV 6125230 EWH/EWHR	75	99	125	228	1	108		125	228	240	1,5	1978	12.4
XVy-EV 7145290	90	127	159	290	1	108		159	290	240	1,5	1977	12
XVy-EV 7190350	110	156	190	347	1	108		190	347	240	1,5	1983	12
XVy-EV 7230420	132	170	230	420	1	108		230	420	240	1	1983	8
XVy-EV 8280400	160	250	280	400	1	54		280	400	240	4	1029	17
XVy-EV 8350460	200	250	350	400	1	54		350	460	240	4	754	13
XVy-EV 9470650-C	250-C-IP20	420	470	560	1	54		470	650	4	4	15	15
XVy-EV 9560650-CP	315-C-IP20	500	560	560	1	54		560	650	4	4	6	6

(1) For frequencies between 3 to 10Hz all time duration values have to be calculated with a linear interpolation of values at 3 Hz and at 10 Hz.

(2) Minimum granted overload. For temperatures lower than 20°C (Tsink < 45°C) the maximum overload time is automatically increased.

The **I x T** algorythm depends on the output frequency and also on the ambient temperature, as specified in table 2.3.3.1.
For output frequencies from 0 to 3 Hz the **I x T** algorythm does not depend from ambient temperature and the recovery from overload conditions will be asymmetrical (the IxT integral charge and discharge operations are different), while from output frequencies higher than 10 Hz the overload duration times will be dependent from ambient temperature and the recovery from overload conditions will be symmetrical. (The IxT integral will have the same charge and discharge). For output frequencies between 3 and 10 Hz the overload and the recovery times of the IxT algorythm can be obtained with a linear interpolation between the 3 Hz and the 10 Hz values.

Definitions

T_{ovld}	is the lasting period of an overload on the I_{ovld} current (as mentioned in the table 2.3.3.1, column 4,9 and 10).
I_{mot}	is the instantaneous motor output current
I_n	is the drive nominal current at the drive output frequency (as stated in table 2.3.3.1, column 2 and 7)

Here follows an example that shows how to perform the selection of the drives.

The overload stated in the **Drive Ovld Fact** parameter, IPA 19607 (MONITOR menu) is calculated by the drive firmware as follows:

$$\textbf{Drive Ovld Fact} = \text{ovld \%} = \frac{\int (I_{mot} - I_n) \cdot dt}{(I_{ovld} - I_n) \cdot T_{ovld}} * 100$$

Example: considering the XVy-EV 10612 drive, it is possible to see that the I_n rated current (with 400Vrms main supply) = 6 A_{rms}, the I_{ovld} overload current = 12 A_{rms} and the T_{ovld} overload time = 2 seconds (if f > 10 Hz and the ambient temperature is 20°C).
See the table 2.3.3.1, column 2, 4, 13 line XVy-EV 10612.

Assuming that the I_{mot} output current = 10 A_{rms}, the time used by ovld% to reach 100% is:

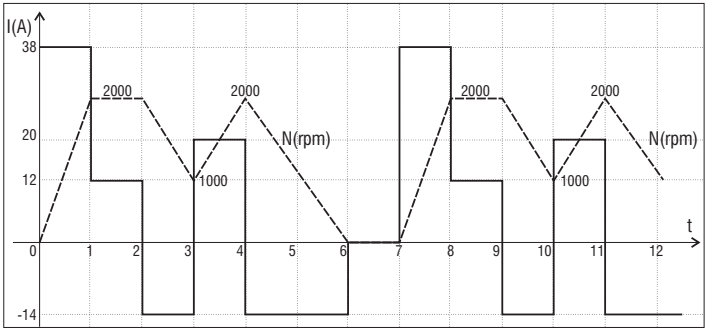
$$T = \frac{(I_{ovld} - I_n) * T_{ovld}}{(I_{mot} - I_n)} = 3 \text{ [sec]}$$

Now the current limit is reduced to I_n and the drive is in an overload condition.
Another overload is possible if ovld% is brought to zero by reducing the I_{mot} current.
For example, if I_{mot} = 5 A_{rms}, the current limit returns to its maximum value after:

$$T = \frac{(I_{ovld} - I_n) * T_{ovld}}{(I_{mot} - I_n)} = 12 \text{ [sec]}$$

and therefore it will be possible to perform a new overload.
Let us consider now the following load cycle to select the proper drive to use:

Time (sec)	0	1	2	3	4	5	6
Speed (rpm)	0	2000	2000	1000	2000	1000	0
Motor current (A)	38	12	-14	20	-14	-14	0



This cycle will be repeated continuously.

The average motor current value will be 16 A_{rms}.

The peak current is 38 A_{rms} and the peak duration is 1 second.

Assuming to use a XVy-EV 32040 with I_n=20.3 A_{rms} and I_{olvd}=40.6 A_{rms}, it is possible to calculate that during the acceleration phase ovld% increases up to 43.6%.
During the following 6 seconds the current is lower than In, therefore it is possible to consider the average current = 12.33 A_{rms} and ovld% ≅ 0%.

Looking these results we can say that the XVy-EV 32040 is suitable for this application.

I²T Algorithm

Table 2.3.3.2: Rated and overload currents with I² x T algorithm

Type	Pot	fout = 0 Hz			0 Hz<fout<f1	fout>F1			F1	T slow ovld	T fast ovld
		In	I slow ovld	I fast ovld		In	I slow ovld	I fast ovld			
	[kW]	[Arms]	[Arms]	[Arms]		[Arms]	[Arms]	[Arms]	[Hz]	[s]	[s]
XVy-EV 10306	1,5	3,0	4,1	5,5	For frequencies between 0 Hz to F1 all currents have to be calculated with a linear interpolation of values at 0 Hz and at F1.	4,0	5,4	7,3	3	60	0,5
XVy-EV 10408	2,2	4,5	6,1	8,2		5,6	7,6	10,2	3	60	0,5
XVy-EV 10612	3,0	6,0	8,2	11,0		7,5	10,2	13,7	3	60	0,5
XVy-EV 20816	4,0	8,0	10,9	14,6		9,6	13,1	17,6	3	60	0,5
XVy-EV 21020	5,5	8,8	12,0	16,1		12,6	17,1	23,1	3	60	0,5
XVy-EV 21530	7,5	12,4	16,9	22,7		17,7	24,1	32,4	3	60	0,5
XVy-EV 32040	11,0	17,4	23,6	31,8		24,8	33,7	45,4	3	60	0,5
XVy-EV 32550	15,0	23,1	31,4	42,3		33,0	44,9	60,4	3	60	0,5
XVy-EV 43366	18,5	27,3	37,1	50,0		39,0	53,0	71,4	3	60	0,5
XVy-EV 43570	22,0	32,9	44,7	60,2		47,0	63,9	86,0	7	60	0,5
XVy-EV 44590	30,0	44,1	60,0	80,7		63,0	85,7	115,3	7	60	0,5
XVy-EV 455110	37,0	55,3	75,2	101,2		79,0	107,4	144,6	7	60	0,5
XVy-EV 455110 EWH/EWHR	37,0	55,3	75,2	101,2		79,0	107,4	144,6	7	60	0,5
XVy-EV 570140	45,0	65,1	88,5	119,1		93,0	126,5	170,2	3	60	0,5
XVy-EV 570140 EWH/EWHR	45,0	65,1	88,5	119,1		93,0	126,5	170,2	3	60	0,5
XVy-EV 5100180	55,0	79,8	108,5	146,0		114,0	155,0	208,6	3	60	0,5
XVy-EV 5100180 EWH/EWHR	55,0	79,8	108,5	146,0		114,0	155,0	208,6	3	60	0,5
XVy-EV 6125230	75,0	99,4	135,2	181,9		142,0	193,1	259,9	3	60	0,5
XVy-EV 6125230 EWH/EWHR	75,0	99,4	135,2	181,9		142,0	193,1	259,9	3	60	0,5
XVy-EV 7145290	90,0	129,5	176,1	237,0		185,0	251,6	338,6	3	60	0,5
XVy-EV 7190350	110,0	147,0	199,9	269,0		210,0	285,6	384,3	3	60	0,5
XVy-EV 7230420	132,0	175,0	238,0	320,3		250,0	340,0	457,5	3	60	0,5
XVy-EV 8280400	160,0	226,8	308,4	415,0		324,0	440,6	592,9	3	60	0,5
XVy-EV 8350460	200,0	280,0	380,8	512,4		400,0	544,0	732,0	3	60	0,5
XVy-EV 9470650-C	250-C-IP20	339,5	461,7	621,3		485,0	659,6	887,6	3	60	0,5
XVy-EV 9560650-CP	315-C-IP20	406,0	471,0	743,0		580,0	672,8	1061,4	3	60	0,5

The **I^2xT** algorithm depends on the output frequency.
At 0Hz frequency, the rated current reduction factor is 0.7 … 0.9 according to sizes, as shown in table 2.3.3.2.

For output frequencies ranging from **0Hz** to **F1**, the overload times should be calculated using a linear interpolation of 0Hz and F1 values.
F1 is the frequency shown in the table for each drive size.

The rated and overload currents and the corresponding overload and recovery times do not depend on the room temperature.

The I^2xT algorithm manages two drive overload levels:
1. **Slow overload** (136% In for 60s every 300s)
2. **Fast overload** (183% In for 0.5s every 60s)

The **slow overload** is calculated based on the following formula:

$$f_{\text{sl-ov\%}} = \frac{\int (I_{mot}^{\ 2} - I_n^{\ 2})\, dt}{(I_{\text{sl-ov}}^{\ 2} - I_n^{\ 2})T_{ovld}} \cdot 100$$

and appears in the IPA 19697 **Drive Ovld Fact** parameter (MONITOR menu).

The **fast overload** is calculated based on the formula:

$$f_{\text{fs-ov\%}} = \frac{\int (I_{mot}^{\ 2} - (1.36\, I_n)^2)\cdot\, dt}{(I_{\text{fs-ov}}^{\ 2} - (1.36\, I_n)^2)\cdot\, T_{ovld}} \cdot 100$$

Current limit management

When the drive delivers a current higher than the In value shown in table 2.3.3.2, ***fsl-ov%*** increases up to 100%.
At that point, the drive limits the maximum current which can be delivered to I_n value.
fsl-ov% reaches 100% in 60s if the current delivered by the drive is 136% of I_n.
The drive can also deliver a maximum current of 183% of I_n. In this case, when the output current exceeds the 136% threshold, the ***ffs-ov%*** value is increased until 100% is reached in 0.5s; after that, the maximum current is limited to 136% of I_n.

- *Example of overload time calculation with slow overload:*

Refer to the XVy-EV10612 size for 400Vac mains operation.
Table 2.3.3.2 shows that, at frequencies higher than **F1**, the drive is able to deliver a rated current of 7.5Arms, with a maximum of 13.73Arms for 0.5s (fast overload) or 10.20Arms for 60s (slow overload).

Assuming that the drive delivers a current I_m = 9A ($I_n < I_m < 136\% I_n$), only the ***fsl-ov%*** value is increased. .

The maximum overload time **Tsl** is:

$$T_{sl} = \frac{(I_{sl\text{-}ov}{}^2 - I_n{}^2) \cdot T_{sl\text{-}ov}}{(I_{mot}{}^2 - I_n{}^2)} = [s]$$

$$T_{sl} = \frac{(10.20^2 - 7.5^2) \cdot 60}{(9^2 - 7.5^2)} = 118.85 \text{ s}$$

When the $\mathbf{T_{ovl}}$ time has elapsed, the **Drive Ovld Fact** parameter has reached 100% and the maximum current is decreased to the rated one = 7.5Arms.
The drive will be able to deliver the maximum current of 183%In again only when **Drive Ovld Fact** returns to 0%.

The time required for $\boldsymbol{f}$***sl-ov%*** discharge depends on the current delivered by the drive (should be lower than $\mathbf{I_n}$).
Assuming that $\mathbf{I_{mot}}$ = 3Arms, the recovery time will be:

$$T_{rec} = \frac{(I_{sl\text{-}ov}{}^2 - I_n{}^2) \cdot T_{sl\text{-}ov}}{(I_n{}^2 - I_{mot}{}^2)}$$

$$T_{rec} = \frac{(10.20^2 - 7.5^2) \cdot 60}{(7.5^2 - 3^2)} = 60.68 \text{ s}$$

- *Example of overload time calculation in case of fast overload:*

Refer to the XVy-EV10612 size for 400Vac mains operation.

Table 2.3.3.2 shows that, at frequencies higher than **F1**, the drive is able to deliver a rated current of 7.5Arms, with a maximum of 13.73Arms for 0.5s (fast overload) or 10.20Arms for 60s (slow overload).

Assuming that the drive delivers a current
$\mathbf{I_m}$ = 12A **(136%$\mathbf{I_n}$ < $\mathbf{I_m}$ < 183%$\mathbf{I_n}$)**
the values of $\boldsymbol{f}$***sl-ov%*** and $\boldsymbol{f}$***fs-ov%*** are both increased.

The maximum overload time $\mathbf{T_{fs}}$ is:

$$T_{fs} = \frac{(I_{fs\text{-}ov}{}^2 - I_{sl\text{-}ov}{}^2) \cdot T_{fs\text{-}ov}}{(I_{mot}{}^2 - I_{sl\text{-}ov}{}^2)}$$

$$T_{fs} = \frac{(13.73^2 - 10.20^2) \cdot 0.5}{(12^2 - 10.20^2)} = 1.06 \text{ s}$$

At the same time, the $\boldsymbol{f}$**sl-ov%** value is also increased to reach the value

$\boldsymbol{f}$**sl-ov% = ($\mathbf{I_{mot}}^2$-$\mathbf{I_n}^2$) · $\mathbf{T_{fs}}$ =** $(12^2\text{-}75^2) \cdot 1.06 = 93$ count = 3.24%

[Max f**sl-ov% =($I_{sl\text{-}ov}^2 - I_n^2$) · $T_{sl\text{-}ov}$ =**(10.2²-7.5²)·60= 2867.4 count = 100%**]**

Now, the current limit is lowered to 136% I_n.
This current value can be kept for:

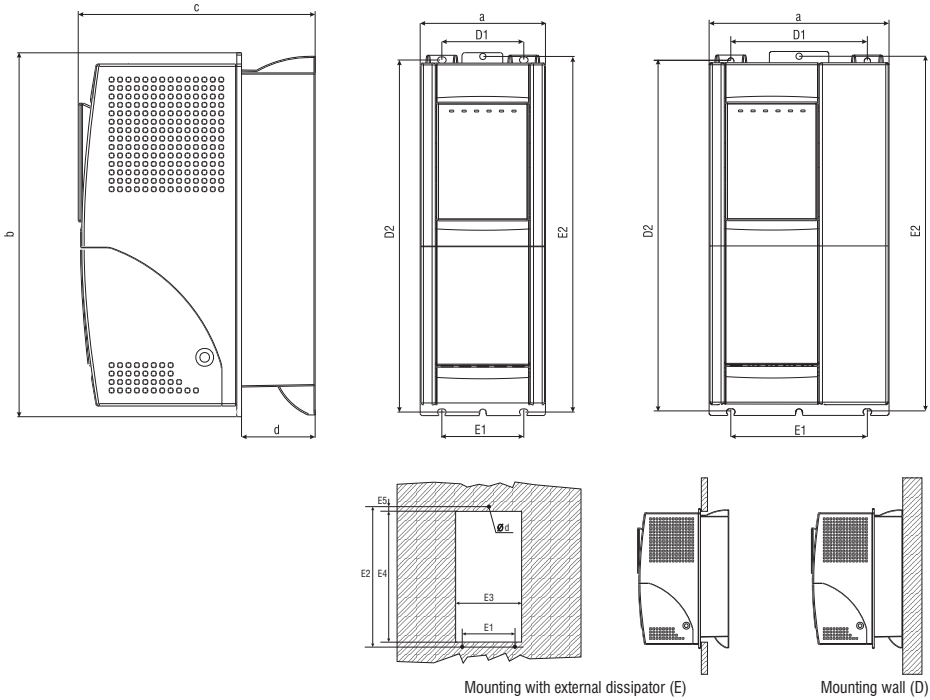
$$T_{sl\text{-}ov} = \frac{(I_{sl\text{-}ov}^2 - I_n^2) \cdot T_{sl\text{-}ov} - f_{sl\text{-}ov^*}}{(I_{mot}^2 - I_n^2)}$$

$$T_{sl\text{-}ov} = \frac{(10.20^2 - 7.5^2) \cdot 60 - 93}{(10.20^2 - 7.5^2)} = 52.98 \text{ s}$$

Chapter 3 - Installation Guidelines

3.1 Mechanical Specification

Figure 3.1.1: Drive Dimensions, XVy-EV 10306 ... XVy-EV 32550 sizes



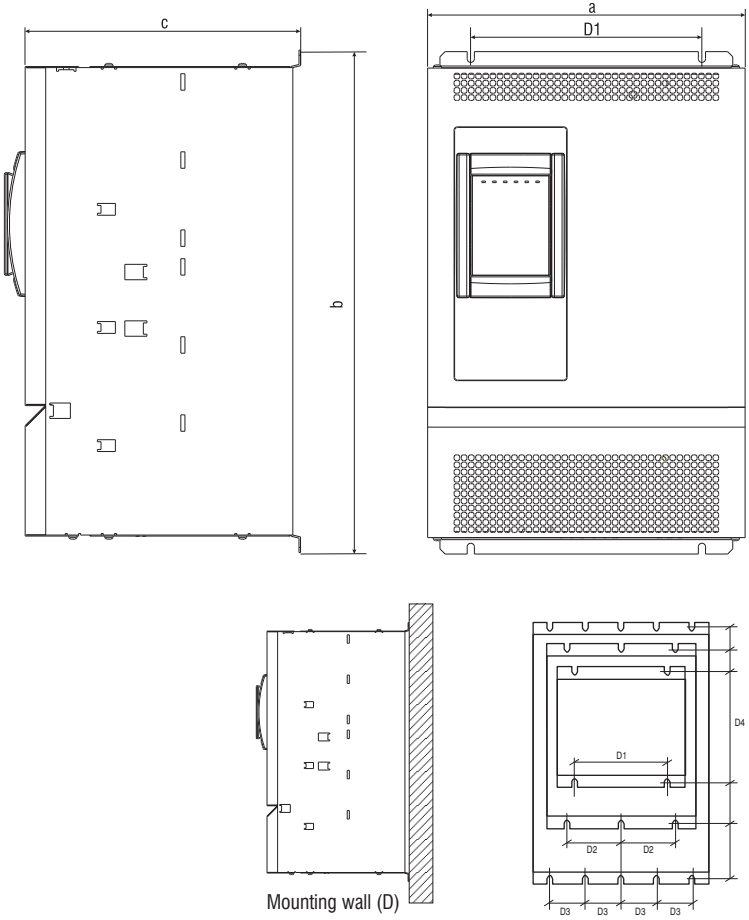
Mounting with external dissipator (E)

Mounting wall (D)

XVy-EV Type		10306	10408	10612	20816	21020	21530	32040	32550
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)	3.6 (7.9)	3.7 (8.1)		4.95 (10.9)			8.6 (19)	

txv0020

Figure 3.1.2: Drive dimensions, XVy-EV 43570 ... XVy-EV 8280400 sizes



XVy-EV type		43366 43570	44590	455110	570140 5100180	6125230	7145290	7190350	7230420	8280400	8350460
Drive dimensions:											
a	mm (inch)	309 (12.1)			376 (14.7)	509 (20)	509 (20)		509 (20)	509 (20)	
b	mm (inch)	489 (19.2)			564 (22.2)	741 (29.2)	909 (35.8)		909 (35.8)	965 (38)	
c	mm (inch)	268 (10.5)	308 (12.1)			297.5 (11.7)	297.5 (11.7)		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)	100 (3.9)		100 (3.9)	100 (3.9)	
D4	mm (inch)	475 (18.7)			550 (21.6)	725 (28.5)	891 (35)		891 (35)	947 (37.3)	
Ø		M6									
Weight	**kg**	18	22	22.2	34	59	75.4	80.2	86.5	109	
	lbs	39.6	48.5	48.9	74.9	130	166.1	176.7	190.6	240.3	

txv0030

Figure 3.1.3: Drive dimensions, C and CP sizes

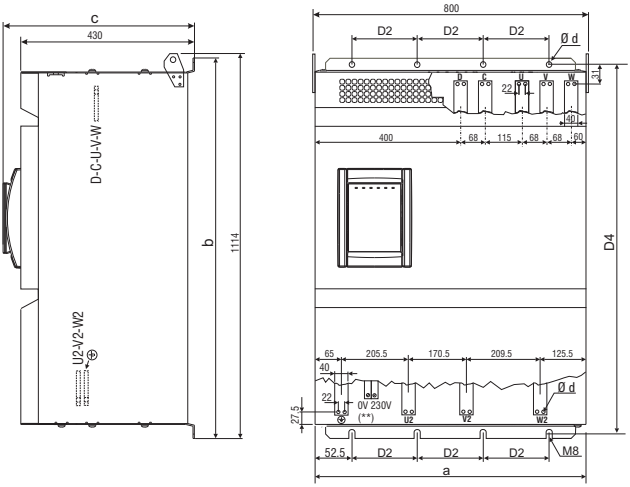
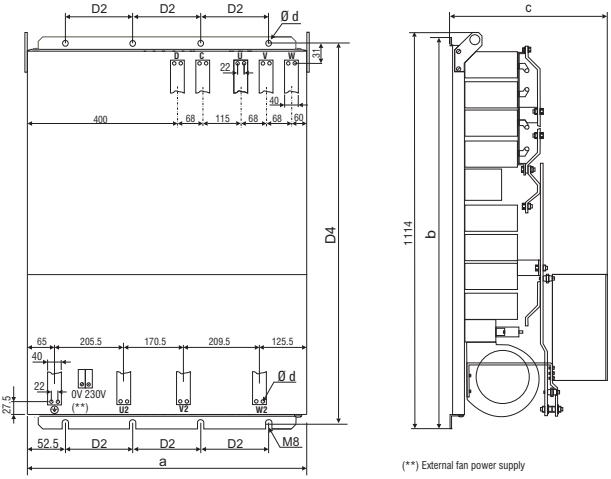


Figure 3.1.4: Drive dimensions, C and CP -IP00 sizes



XVy-EV type		9470650-C	9560650-CP
Drive dimensions:			
a	mm (inch)	776 (30.6)	776 (30.6)
b	mm (inch)	1091 (43)	1091 (43)
c	mm (inch)	450 (17.7)	450 (17.7)
D2	mm (inch)	225 (8.9)	225 (8.9)
D4	mm (inch)	947 (37.3)	947 (37.3)
Ø		M8	M8
Weight	**kg**	155	155
	lbs	341.7	341.7
			txv0034

Figure 3.1.5: Drive Dimensions, XVy-EV 455110 EWH/EWHR

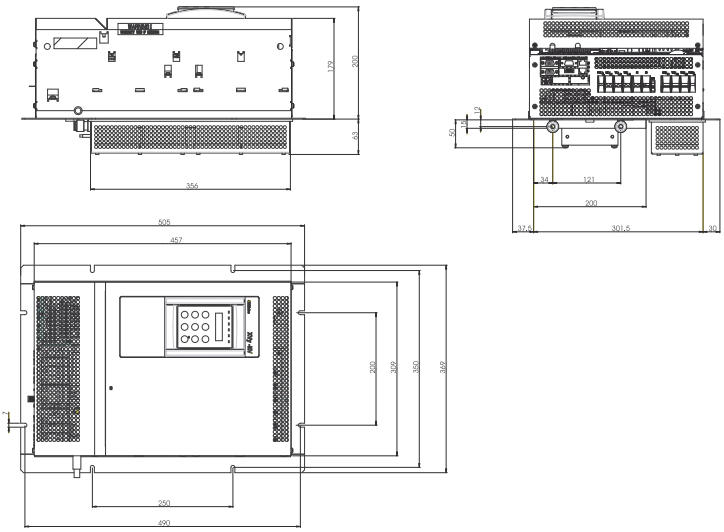
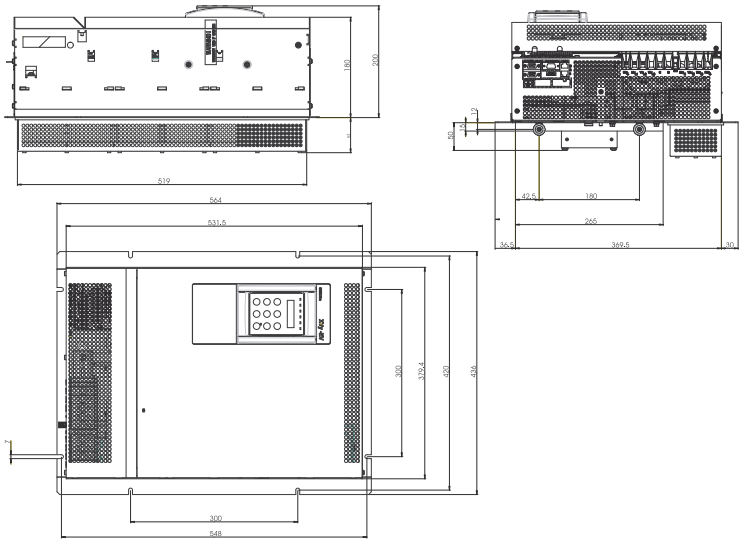


Figure 3.1.6: Drive Dimensions, XVy-EV 570140 ... 5125230 EWH/EWHR



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 [m³/h]	
	@U_{LN}=400Vac 1)	@U_{LN}=460Vac 1)	Internal fan	Heatsink fans
XVy-EV 10306	77.5	72.0	11	30
XVy-EV 10408	104.0	96.3	11	30
XVy-EV 10612	138.3	126.7	11	30
XVy-EV 20816	179.6	164.1	11	2x30
XVy-EV 21020	230	215.6	11	2x30
XVy-EV 21530	330	300.8	11	2x30
XVy-EV 32040	380	340	30	2x79
XVy-EV 32550	512	468	30	2x79
XVy-EV 43366	546	490	-	80
XVy-EV 43570	658	582	-	80
XVy-EV 44590	864	780	-	170
XVy-EV 455110	1100	1000	-	170
XVy-EV 570140	1250	1100	-	340
XVy-EV 5100180	1580	1390	-	340
XVy-EV 6125230	1950	1750	-	650
XVy-EV 7145290	2440	2200	-	975
XVy-EV 7190350	2850	2560	-	975
XVy-EV 7230420	3400	3050	-	975
XVy-EV 8280400	4400	3950	-	1820
XVy-EV 8350460	5400	4700	-	2000
XVy-EV 9470650-C	6400	5700	-	1710
XVy-EV 9470650-C-IP00	6400 max	5700 max	-	-
XVy-EV 9560650-CP	8000	7900	-	1710
XVy-EV 9560650-CP-IP00	8000 max	7900 max	-	-

txv0040

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

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

Table 3.2.2: Minimum cabinet opening suggested for the cooling

XVy-EV type	Minimum cooling opening [cm²] (sq.inch)	
	Control section	Heatsink
10306 … 10612	31 (4.8)	36 (5.6)
20816 … 21530	31 (4.8)	72 (11.1)
32040 … 32550	36 (5.6)	128 (19.8)
43366 … 43570		2x150 (2x 23.5)
44590 … 455110		2x200 (2x31)
570140 … 5100180		2x370 (2x57.35)
6125230 … 7230420		2x620 (2x96.1)
8280400 … 9560650		2x1600 (2 x 248)

txv0050

3.2.1 Cooling Fans Power Supply

Sizes XVy-EV 10306 to XVy-EV 5100180

Power supply (+24VAC) for these fans are provided from the internal drive power supply unit.

Sizes XVy-EV 6125230 to XVy-EV 9560650

Power supply for these fans is externally connected by the user. AC Input voltage is connected at the power terminal strip:

XVy-EV type	Drive fans	Fan power supply (values for 1 fan)
6125230		0,8A@115V/60Hz, 0,45A@230V/50Hz
7145290 ... 7230420		1,2A@115V/60Hz, 0,65A@230V/50Hz
8280400 ... 8350460		1,65A@115V/60Hz, 0,70A@230V/50Hz
9470650-C	2	1.03A/215W@1x230Vac,50/60Hz
9470650-C-IP00	2	1.03A/215W@1x230Vac,50/60Hz
9560650-CP	2	1.03A/215W@1x230Vac,50/60Hz
9560650-CP-IP00	2	1.03A/215W@1x230Vac,50/60Hz

txv0057

Figure 3.2.1: UL type fans connections

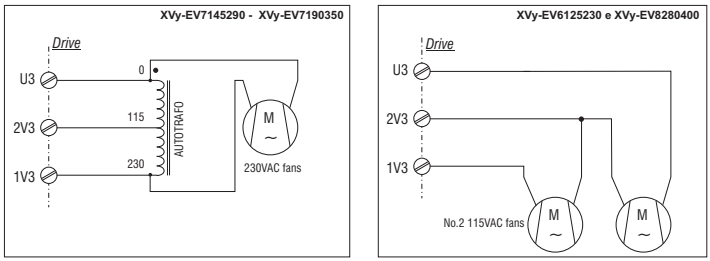
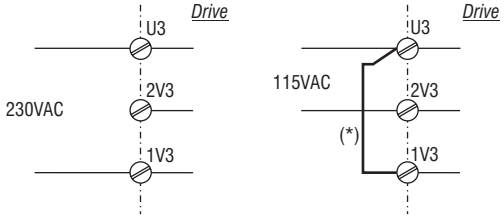


Figure 3.2.2: Example for external connection



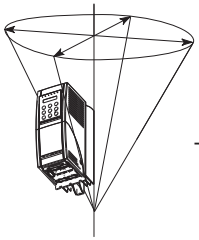
*) Only for XVy-EV6125230 and XVy-EV8280400 sizes

NOTE! An internal fuse (2.5A 250VAC slo-blo) for XVy-EV 7145290 and XVy-EV 7190350. sizes is provided.
On XVy-EV 6125230 and XVy-EV 8280400sizes the fuse must be mounted externally.

3.3 Installation Mounting Clearance

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

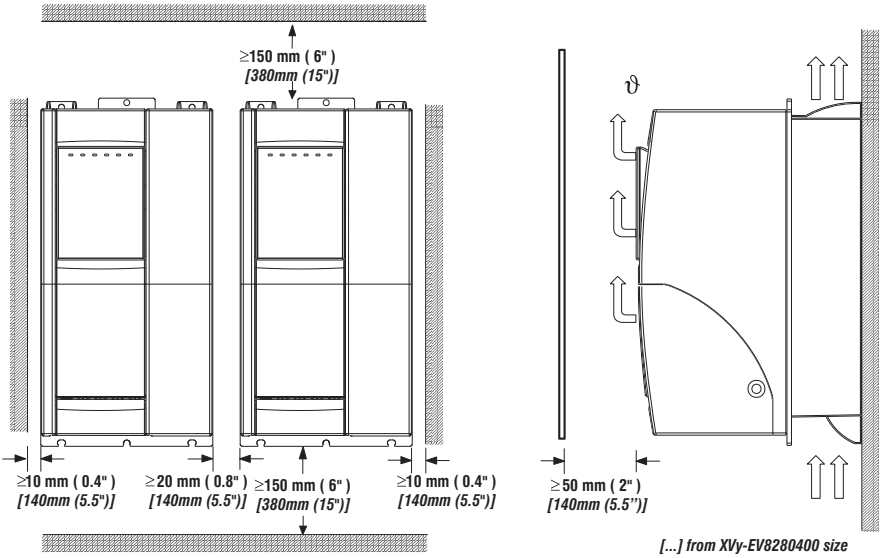
Figure 3.3.1: Max. Angle of Inclination



The maximum angle of inclination is 30°

NOTE! The drives must be mounted in such a way that the free flow of air is ensured. The clearance to the device must be at least 150 mm (6 inches). A space of at least 50 mm (2 inches) must be ensured at the front.
From XVy-EV 8280400 size the top and bottom clearance must be at least 380 mm (15 inches), on front and sides must be ensured a space of at least 140 mm (5.5 inches). Devices that generate a large amount of heat must not be mounted in the direct vicinity of the drive.

Figure 3.3.2: Mounting Clearance



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

Chapter 4 - Wiring Procedure

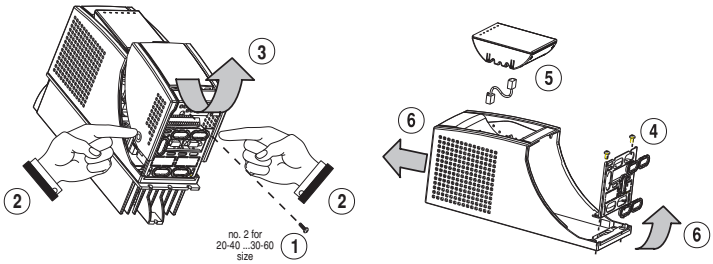
4.1 Accessing the Connectors (IP20 models)

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.

See figure 2.2.2 “Drive view & components” to identify the single part.

Figure 4.1.1: Removing the covers (XVy-EV 10306 to XVy-EV 32550 sizes)



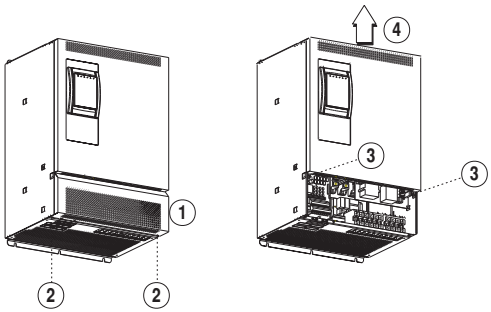
XVy-EV 10306 to XVy-EV 21530 sizes :
The terminal cover and cable entry plate of the device must be removed in order to fit the electrical connections:
- unscrew the screw (1), remove the cover of devices (2) by pressing on both sides as shown on the above figure (3).
- unscrew the two screws (4) to 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).

XVy-EV 32040 to XVy-EV 32550 sizes :
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.

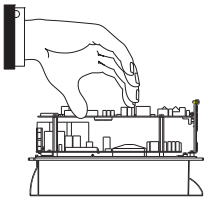
The top cover must be removed in order to mount the option card and change the internal jumper settings:
- remove the keypad and disconnect the connector (5)
- lift the top cover on the bottom side (over the connector level) and then push it to the top (6)

Figure 4.1.2: Removing the covers (XVy-EV 43570 to XVy-EV 9560650 sizes)

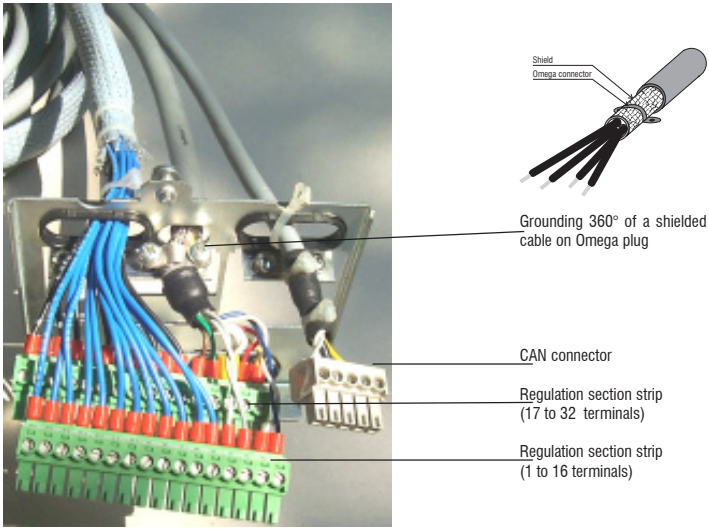


XVy-EV 43570 to XVy-EV 9560650 sizes :
The terminal cover of the device must be removed in order to fit the electrical connections: unscrew the two screw (2) and remove the cover (1)
The top cover must be removed in order to mount the option card and change the internal jumper settings: unscrew the two screw (3) and remove the top cover by moving it as indicated on figure (4).

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



4.1.2. Wiring Suggestion



4.2 Power Section

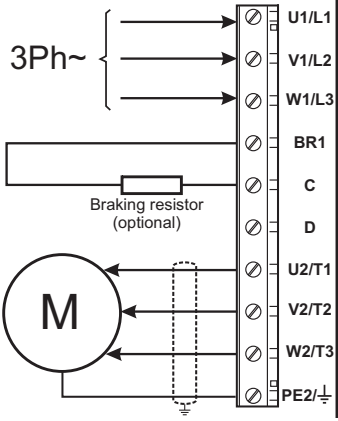
Caution

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 XVy-EV 10306 to XVy-EV 32550

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 XVy-EV 10306 up to XVy-EV 21530 sizes it is also possible to extract the removable connector.
All the power terminals are located on the power card PV33-...



Function	Max
AC mains voltage	230V -15%…480V +10%
Braking unit resistor command (braking resistor must be connected between BR1 and C)	
Intermediate circuit connection	770 Vdc (230...480 Vac) 1.65 x I_{2N}
Motor connection	AC line volt 3Ph, 1.36 I_{2N}
Motor ground connection	

Note!
EM and FEXT terminals are available on sizes 32040 ... 5100180 only.

EM
EM
FEXT
FEXT

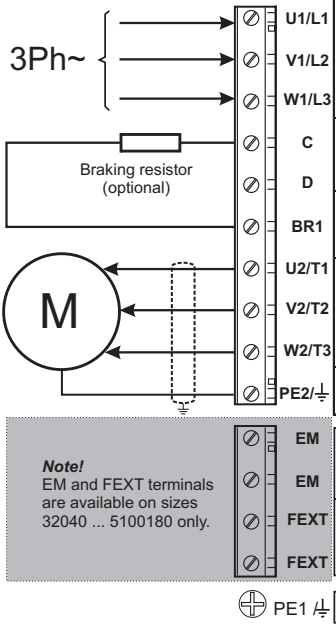
Reserved	-
Reserved	-

PE1

Grounding (protective earth) conductor	

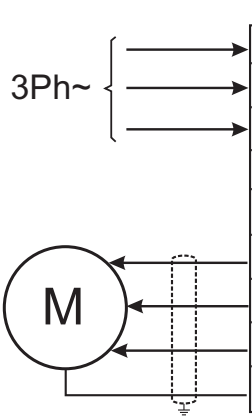
Table 4.2.1.2: Power Section Terminals from XVy-EV 43570 to XVy-EV 9560650

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



Function	Max
AC mains voltage Terminations not included in the XVy-EV ...-DC versions.	230V -15%…480V +10%
Intermediate circuit connection	770 Vdc (230...480 Vac) 1.65 x I_{2N}
Braking unit resistor command (braking resistor must be connected between BR1 and C) Available in XVy-EV 43570 ... 5100180 sizes	
Motor connection	AC line volt 3Ph, 1.36 I_{2N}
Motor ground connection	
Reserved	-
Reserved	-
Grounding (protective earth) conductor	

Table 4.2.1.3: Power Section Terminals XVy-EV ...-IP00 sizes



Function	Max
AC mains voltage	400V -15%…480V +10%
Intermediate circuit connection	770 Vdc (400...480 Vac) 1.65 x I_{2N}
Motor connection	AC line volt 3Ph, 1.36 I_{2N}
Grounding (protective earth) conductor, Motor ground connection	

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

Table 4.2.1.4: Maximum cable cross section for power terminals

Type	U1,V1,W1, U2,V2,W2,C,D terminals		Tightening torque	BR1 terminals		Tightening torque	PE1, PE2 terminals		Tightening torque
XVy-EV	AWG	mm^2	Nm	AWG	mm^2	Nm	AWG	mm^2	Nm
10306	14	2	0.5 … 0.6	14	2	0.5 … 0.6	14	2	0.5 … 0.6
10408	14	2	0.5 … 0.6	14	2	0.5 … 0.6	14	2	0.5 … 0.6
10612	14	2	0.5 … 0.6	14	2	0.5 … 0.6	14	2	0.5 … 0.6
20816	10	4	0.5 … 0.6	10	4	0.5 … 0.6	10	4	0.5 … 0.6
21020	10	4	0.5 … 0.6	10	4	0.5 … 0.6	10	4	0.5 … 0.6
21530	10	4	0.5 … 0.6	10	4	0.5 … 0.6	10	4	0.5 … 0.6
32040	8	8	1.2 … 1.5	8	8	1.2 … 1.5	8	8	1.2 … 1.5
32550	6	10	1.2 … 1.5	6	10	1.2 … 1.5	6	10	1.2 … 1.5
43366	6	16	2	10	6	0.9	6	16	2
43570	6	16	2	10	6	0.9	6	16	2
44590	4	25	3	8	10	1.6	6	16	3
455110	2	35	4	8	10	1.6	6	16	3
570140	2	35	4	6	16	3	6	16	3
5100180	1/0	50	4	6	16	3	2	50	4
6125230	2/0	70	12	nd	nd	nd	2	50	4
7145290	4/0	95	12	nd	nd	nd	2	50	4
7190350	(300)	150	10 … 30	nd	nd	nd	2	50	4
7230420	(350)	185	10 … 30	nd	nd	nd	2	50	4
8280400	4xAWG2	4x35	10 … 30	nd	nd	nd	2	50	4
8350460		150 *	10 … 30	nd	nd	nd	2	50	4
9470650-C	1/0 (500)	50…240	50	nd	nd	nd	1/0 (500)	50…240	50
9470650-C-IP00	1/0 (500)	50…240	50	nd	nd	nd	1/0 (500)	50…240	50
9470650-C-DC-IP00	1/0 (500)	50…240	50	nd	nd	nd	1/0 (500)	50…240	50
9560650-CP	1/0 (500)	50…240	50	nd	nd	nd	1/0 (500)	50…240	50
9560650-CP-IP00	1/0 (500)	50…240	50	nd	nd	nd	1/0 (500)	50…240	50
9560650-CP-DC-IP00	1/0 (500)	50…240	50	nd	nd	nd	1/0 (500)	50…240	50

txv0060

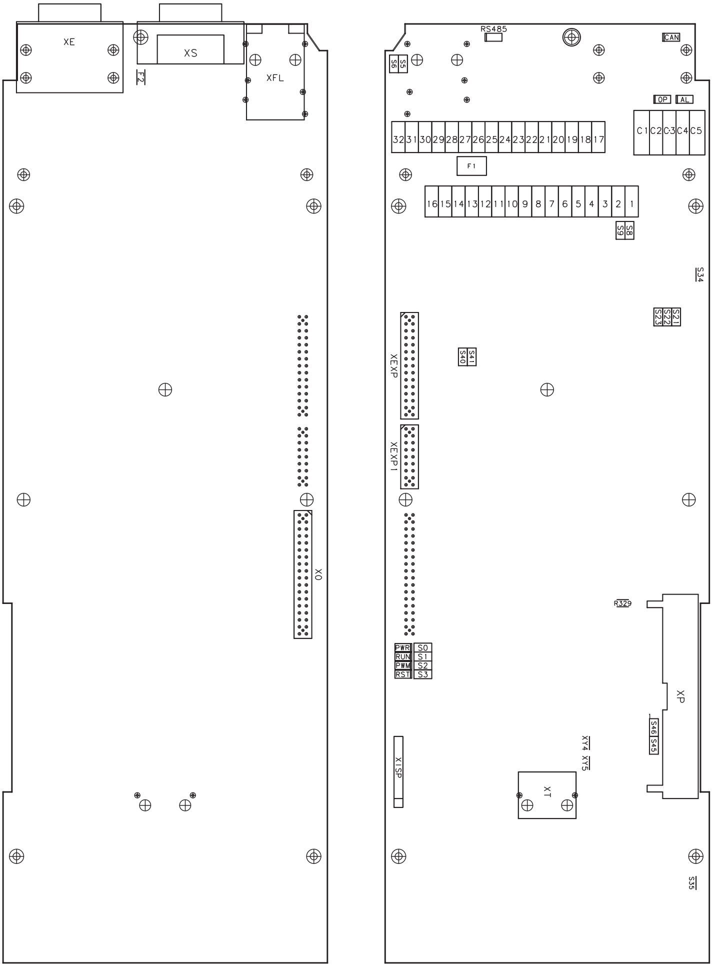
(…) = kcmils, *=copper bar

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 SIEIDrive - XVy-EV drive.

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

4.3 Regulation Section

4.3.1 R-XVy-EV Regulation Card



LEDs & Test points on Regulation Card

Designation	Color	Function
RST	red	LED lit during the Hardware Reset
PWM	green	LED lit during IGBT modulation
RUN	green	CPU status
PWR	green	LED lit when the voltage +5V is present and at correct level
RS485	green	LED is lit when RS485 interface is supplied
CAN	green	LED is lit when CAN interface is supplied
AL	red	LED is lit during the “Field bus failure” alarm or when the integrated CanOpen interface is not ready to communicate with the master
OP	green	LED is lit when the connection reaches the “Operational” phase
XY4	(test point)	Phase current signal (U)
XY5	(test point)	Reference point

Figure 4.3.1: Connectors Location

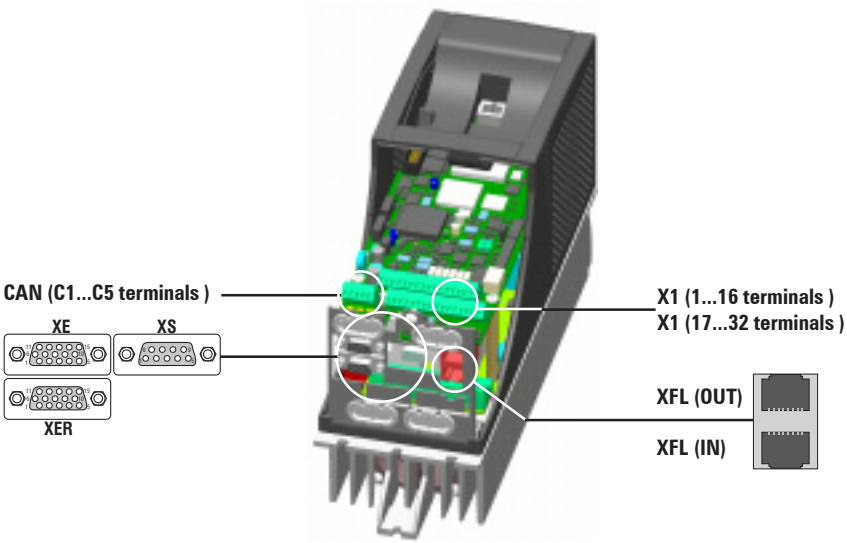


Table 4.3.1.1: Jumpers on Regulation Card

Designation	Function	Factory setting
S0	Service only ! (Test and software loading: bootstrap-loader)	OFF
S1	Service only ! (Test and software loading: monitor mode)	OFF
S2	Service only ! (Test and software loading: boot-sector protection)	OFF
S3	Service only ! (Test and software loading: manual reset)	OFF
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 0 (terminals 1 and 2) ON = 0..20 mA / 4..20 mA OFF = 0..10V / -10..+10 V	OFF
S9	Adaptation to the input signal of analog input 1 (terminals 3 and 4) ON = 0..20 mA / 4..20 mA OFF = 0..10V / -10..+10 V	OFF
S21-S22-S23	Hall sensor settings ON = Hall sensors OFF = No Hall sensors	OFF
S45-S46	INTERNAL USE - Do not modify factory setting	OFF

txv0070

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

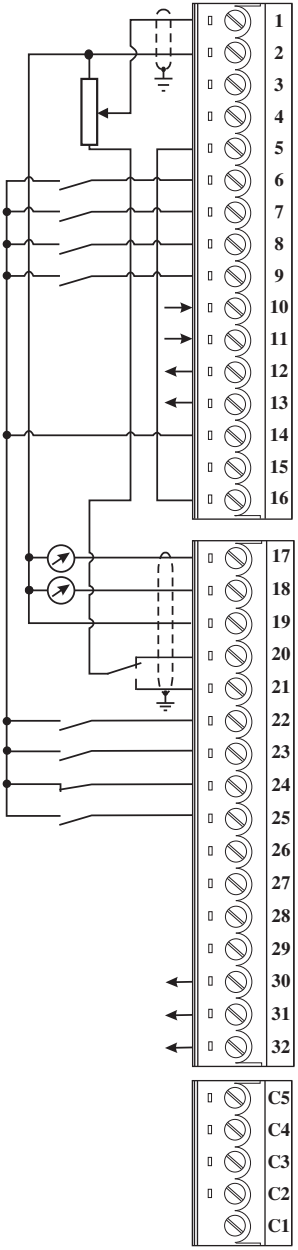
NOTE! See chapter 4.4.3, Feedback drive connection for more details on S21 ... S23 jumper settings .

Caution

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 on Regulation Card



Strip X1	Function	max
Analog input 0	Programmable/configurable analog differential input. Signal: terminal 1. Reference point: terminal 2. Default setting: [3] Speed Ref 1*.	±10V 0.20mA
Analog input 1	Programmable/configurable analog differential input. Signal: terminal 3. Reference point: terminal 4. Default setting: none	
COM-DI	Reference point for Digital inputs, terminals 6, 7, 8 , 9, 22, 23, 24 and 25.	
Digital input 0	Drive enable; 0V or open: inverter disabled; +15…+30V: Drive enabled	+30V 3.2mA @ 15V 5mA @ 24V 6.4mA @ 30V
Digital input 1	Programmable digital input, default setting: "[4] Start / Stop"	
Digital input 2	Programmable digital input, default setting: "[8] Ramp In = 0"	
Digital input 3	Programmable digital input, default setting: "[9] Reverse"	
Supply-DO	Supply input for digital outputs, terminals 12, 13, 26, 27, 28, 29	+30V/40mA
COM-DO	Reference point for digital outputs, terminals: 12 and 13	-
Digital output 0	Programmable digital output, default setting: "[3] Speed Reached"	+30V/25mA
Digital output 1	Programmable digital output, default setting: "Speed 0 thr"	
+24V OUT	+24V DC supply output. Reference point: terminal 16	+24 V ±10% 120mA
+24V IN	+24V DC supply input	+24 V ±10% 1A
0 V (+24V)	Reference point for +24 V_{DC} I/O	-
Analog output 0	Programmable analog output, default setting: "[1] Actual speed"	±10V/5mA
Analog output 1	Programmable analog output, default setting: "[2] Motor current"	
0V	Analog output reference point	-
+10V	Reference voltage +10V, reference point: terminal 19	+10V/10mA
- 10V	Reference voltage - 10V, reference point: terminal 19	-10V/10mA
Digital input 4	Programmable digital input, default setting: "[10[End Run Reverse"	+30V 3.2mA @ 15V 5mA @ 24V 6.4mA @ 30V
Digital input 5	Programmable digital input, default setting: "[11] End Run Forward"	
Digital input 6	Programmable digital input, default setting: "[3] External fault"	
Digital input 7	Programmable digital input, default setting: "[2] Drive reset"	
Digital output 2	Programmable digital output, default setting: none	+30V/25mA
Digital output 3		
Digital output 4		
Digital output 5		
Relay-NO	"Drive OK" N.O. contact	250 V AC 1A AC11
Relay-NC	"Drive OK" N.C. contact	
Relay-COM	"Drive OK" common contact	

V+	CAN external positive supply (dedicated for supply of transceiver and optocouplers)
H	CAN_H bus line (dominant high)
SH	CAN_H shield
L	CAN_L bus line (dominant low)
V-	External supply reference

Caution

The + 24Vdc voltage used for external power for the control card must be stabilised, with a tolerance of ±10%; maximum absorption 1A.
Power supplies obtained from a single rectifier and capacitor filter are not sufficient.

Maximum Cable Sizes for control terminals

Table 4.3.2.2: Maximum permissible cable cross-section on the plug-in terminals of the regulator section

Terminals	Maximum Permissible Cable Cross-Section [mm^2]		AWG	Tightening torque [Nm]
	flexible	multi-core		
1 ... 29	0.14 ... 1.5	0.14 ... 1.5	28 ... 16	0.4
30 ... 32	0.14 ... 1.5	0.14 ... 1.5	28 ... 16	0.4

txv0065

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 4.3.2.3: Maximum Control Cable Lengths

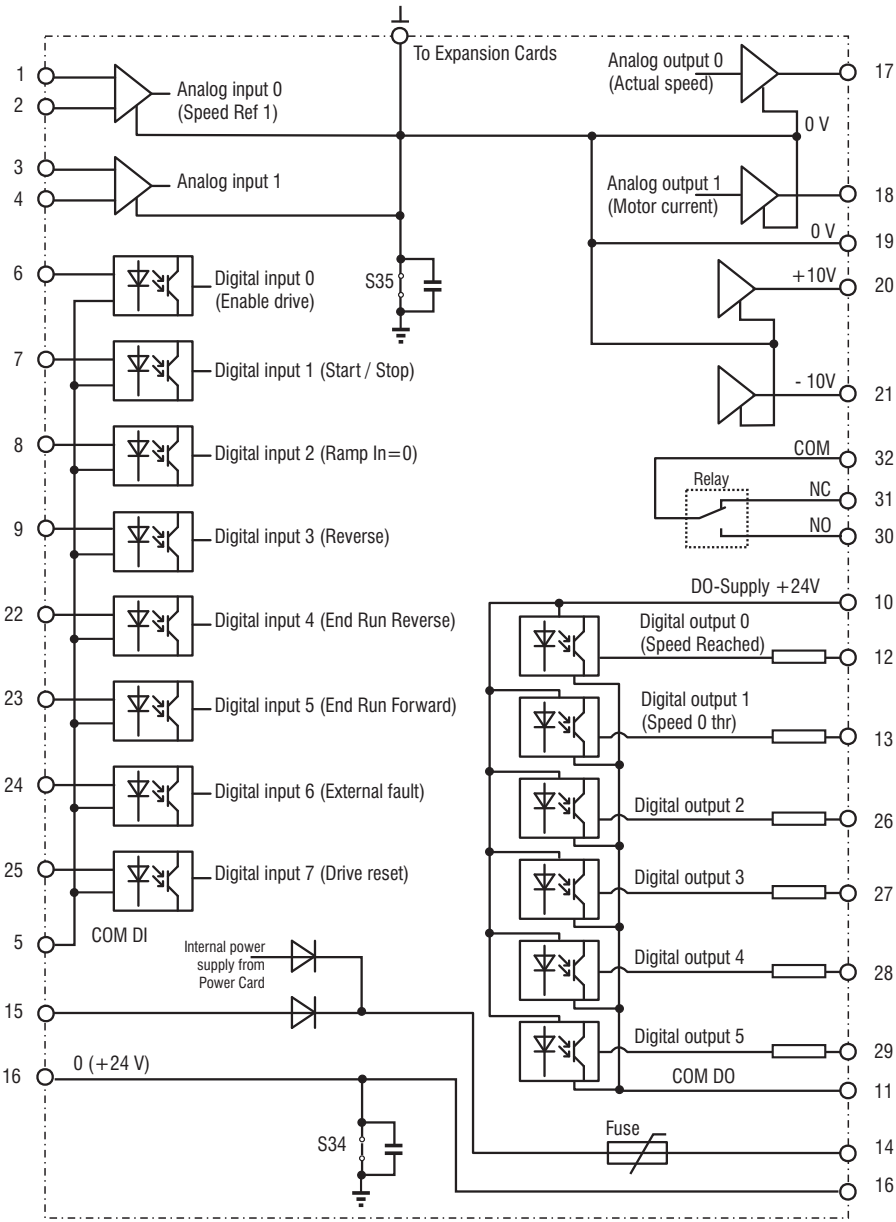
Cable section	[mm^2]	0.22	0.5	0.75	1	1.5
Max. length	m [feet]	27 [88]	62 [203]	93 [305]	125 [410]	150 [492]

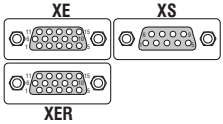
txv0055

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 4.3.2.1.
The analog inputs are designed as differential amplifiers.
The digital inputs are optocoupled with the control circuit. The digital inputs have terminal 5 as reference point.
The analog outputs are not designed as differential amplifiers and have a common reference point (terminal 19).
The analog outputs and the ±10V reference point have same potential (terminal 19).
The digital outputs are optocoupled with the control circuit. Terminals 12 to 13 and 26 to 29 have terminal 11 as a common reference point and terminal 10 as common supply.

Figure 4.3.2.1: Potentials of the control section





4.4 Feedback Devices

The XVy-EV can control various feedback devices connector to the XE - XER terminals (15-pin high-density connectors fitted on drive) or to the expansion card EXP-ABS-XVy (optional), see table 4.4.1.
Can be used up to three feedback devices at the same time if the incremental signals of absolute encoders are not connected to XE.
In this last case can be used the DE , SSi / EnDat and Hiperface feedback devices only.
See chapter 4.4.3 for more details on connection.

Table 4.4.1: Feedback devices

Feedback devices		XE connector on XVy Drive	XER connector on expansion card EXP-ABS-EV	Note
DEHS	5V digital incremental encoder with A/Aneg,B/Bneg,C/Cneg and three Hall sensor digital position signals)	X		(1), (2)
SESC	Sinusoidal incremental encoder with A/Aneg,B/Bneg,C/Cneg and two sin/cos traces for absolute position (1Vpp).	X		(1), (3)
SEHS	Sinusoidal incremental encoder with A/Aneg,B/Bneg,C/Cneg and three Hall sensor digital position signals (1Vpp).	X		(1), (2)
RES	Resolver	X		(3)
HS	Three Hall effect sensors digital position signals single-ended	X		(2)
SC	Segnali assoluti SinCos due tracce.	X		(3)
SE	sinusoidal incremental encoder (1Vpp)	X		(1)
DE	5V digital incremental encoder.	X		(1)
SSI	absolute encoder with SSI protocol		X	(4), (1)
EnDat	absolute encoder with EnDat protocol		X	(4), (1)
Hiperface	absolute encoder with Hiperface protocol		X	(4), (1)

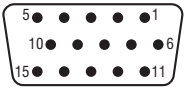
txv3420

(1) Digital or sinusoid encoder plugged into the XE connector on the drive or XE1 on card EXP-ABS-XVy (see **SERVICE / ENCODER / XE ENC INC MEAS** menu)
(2) Three Hall effect sensors connected to XE connectors (see **Service / Encoder / XE HALL TRACKS** menu)
(3) Sin/cos signals, with resolver excitation (see **SERVICE / ENCODER / XE ENC ABS MEAS** menu)
(4) Absolute encoder serial link plugged into the XE1 connector on the EXP-ABS-XVy card (see **SERVICE / ENCODER / EXP ENC ABS1** menu.

The encoder/resolver should be coupled to the motor shaft with a backlash free connection.
The encoder/resolver cable must be made of shielded twisted pairs with an overall shield, with all shieds connected to ground on both sides. Some types of sinusoidal encoders may require installation with galvanic isolation from the motor frame and shaft.

4.4.1 XE Connector Assignments

The connection with the drive is through a 15 pole high density sub-D connector (VGA type female). 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 of the connector, but not grounded at the motor end.
Please note that for resolver feedback it is mandatory to use a twisted pair cable with shields on each pair and an overall shield.



Back View of VGA
D-sub connector (solder side)

Table 4.4.1.1: XE Connector Assignments

Assignment		Function	I=Input O=Output
1	B–	Incremental Encoder B-	I
2	Klixon	Klixon contact	I
3	Z+	Zero channel Z (+)	I
4	Z–	Zero channel Z (–)	I
5	A+	Incremental Encoder A (+)	I
6	A–	Incremental Encoder A (–)	I
7	0VE	Encoder Supply 0V reference	O
8	B+	Incremental Encoder B(+)	I
9	+5VE	Encoder Supply	O
10	SIN+ / H1	Sin / resolver input (+) / Hall 1 input	I
11	SIN– / H2	Sin / resolver (–) / Hall 2 input	I
12	COS+ / H3	Cos / resolver (+) / Hall 3 input	I
13	COS–	Cos / resolver (–)	I
14	EXC+	Resolver excitation (+)	O
15	EXC–	Resolver excitation (–)	O

txv0090

4.4.2 XER Encoder Connector Assignments (for auxiliary encoders)

A +5V auxiliary incremental digital encoder can be plugged into the XER connector (controller card) or an expansion card (e.g. EXP-D14A4F, EXP-F2E, EXPFI, EXP-FO, EXP-FIH, etc.)
The connection with the drive is through a 15 pole high density sub-D connector (VGA type female).

Table 4.4.2.1: XER Connector Assignments

Assignment		Function	I=Input O=Output
1	B–	Digital incremental channel B (–) Input / Repetition	I / O
2			
3	Z+	Zero pulse (+) channel Input / Repetition	I / O
4	Z–	Zero pulse (–) channel Input / Repetition	I / O
5	A+	Digital incremental channel A (+) Input / Repetition	I / O
6	A–	Digital incremental channel A (–) Input / Repetition	I / O
7	0VR	Encoder Supply 0V reference	O
8	B+	Incremental channel B(+) Input / Repetition	I / O
9	+5VR	Encoder supply	O
10 … 15			

txv0100

4.4.3 Feedback /Drive Connections

The XVy-EV drive can handle several feedback devices (see paragraph 4.4) selectable through the setting of jumpers on the regulation board. The jumper setting will be as follows:

Table 4.4.3.1: Resolver/Encoder jumpers settings

Encoder	Jumpers settings		
	S21	S22	S23
DE / DEHS	ON	ON	ON
SE / SEHS	ON	ON	ON
SESC / SC	OFF	OFF	OFF
HS	ON	ON	ON
RES	OFF	OFF	OFF
SSI / ENDAT / Hiperface	OFF	OFF	OFF

txv0110

In the following paragraphs are specified the connections between XVy-EV drives and the feedback sensors installed on standard motors.

4.4.3.1 Resolver Connections (RES)

The following table shows the connections between the XVy-EV drives and the signal connector on servomotors by Gefran (see chapter 12 for more details on cable).

SBM Motors 19 Poles connector	SHJ Motors 10 Poles connector	Function	XVy drive 15 Pole XE connector	Cable section [mm^2]
A				
B (SHIELD)	F (SHIELD)	Cable shield	SHIELD to connector body	
C	B	Resolver Cos+	12	(2 x 0.25) + sfr
D	G	Resolver Cos-	13	
E	C	Resolver Sin-	11	(2 x 0.25) + sfr
F	H	Resolver Sin+	10	
G				
H				
J				
K				
L				
M				
N				
P				
R				
S (Klixon)	I (Klixon)	Klixon contact	7	(2 x 0.25) + sfr
T (Klixon)	J (Klixon)	Klixon contact	2	
U	A	Resolver Excitation+	14	(2 x 0.25) + sfr
V	E	Resolver Excitation-	15	

txv0240

For resolver cable use twisted pair shielded cable; the pairs should be the signal wires cos+/cos-,sin+/sin-, exc+/ exc-, motor temperature sensor wires. All the shields must be connected together to cable shield pin of resolver connector on the motor side and to connector body on drive side.

4.4.3.2 Sinusoidal Encoder SinCos Connections (SESC)

The following table shows the connections between the XVy-EV drives and the signal connector on servomotors by Gefran (see chapter 12 for more details on cable).

SBM Motors 19 Poles connector	SHJ Motors 19 Poles connector	Function	XVy drive 15 Pole XE connector	Cable section [mm^2]
A	12	Encoder supply 0VDC reference	7	0.5
B (SHIELD)	19 (SHIELD)	Cable shield	SHIELD to connector body	
C	15	Cos+ input	12	2 x 0.14
D	11	Cos- Input	13	
E	14	Sin- Input	11	2 x 0.14
F	10	Sin+ Input	10	
G				
H	4	Incremental Encoder B+	8	(2 x 0.14) + sfr
J	8	Incremental Encoder B-	1	
K	7	Incremental Encoder A-	6	(2 x 0.14) + sfr
L	3	Incremental Encoder A+	5	
M	5	Zero Channel Z+	3	(2 x 0.14) + sfr
N	9	Zero Channel Z-	4	
P	2	Encoder supply +5VDC	9	0.5
R				
S (Klixon)	17 (Klixon	Klixon contact	7	n.c.
T (Klixon)	18 (Klixon)	Klixon contact	2	0.25
U				
V				

txv0220

For encoder cable use twisted pair shielded cable; the pairs should be the signal wires A+/A-,B+/B-,Z+/Z-,cos+/cos-,sin+/sin-, motor temperature sensor wires, encoder supply wires. All the shields must be connected together to cable shield pin of encoder connector on the motor side and to connector body on drive side.

4.4.3.3 Digital Encoder with Hall Effect Sensors Connections (DEHS)

The following table shows the connections between the SIEIDrive - XVy-EV drives and the signal connector on servomotors by Gefran (see chapter 12 for more details on cable).

SBM Motors 19 Poles connector	SHJ Motors 19 Poles connector	Function	XVy drive 15 Pole XE connector	Cable section [mm^2]
A	6	Encoder supply 0VDC reference	7	0.5
B (SHIELD)	7 (SHIELD)	Cable shield	SHIELD to connector body	
C	5	Hall 3 input	12	2 x 0.14
D				
E	4	Hall 2 Input	11	1 x 0.25
F				
G	3	Hall 1 Input	10	2 x 0.14
H	13	Incremental Encoder B+	8	(2 x 0.14) + sfr
J	1	Incremental Encoder B-	1	
K	11	Incremental Encoder A+	5	(2 x 0.14) + sfr
L	10	Incremental Encoder A-	6	
M	14	Zero Channel Z+	3	(2 x 0.14) + sfr
N	9	Zero Channel Z-	4	
P	12	Encoder supply +5VDC	9	0.5
R				
S (Klixon)	15	Klixon contact	7	n.c.
T (Klixon)	16	Klixon contact	2	0.25
U				
V				

txv0230

For encoder cable use twisted pair shielded cable; the pairs should be the signal wires A+/A-, B+/B-, Z+/Z-, motor temperature sensor wires, encoder supply wires. All the shields must be connected together to cable shield

pin of encoder connector on the motor side and to connector body on drive side.

4.4.3.4 Absolute Encoder Connections (SSi / EnDat /Hiperface protocols)

EXP-ABS-EV expansion board has to be connected:

- to **XVy-EV drive** though the cable supplied with the board (**XE2** connector on EXP-ABS-EV, **XE** connector on XVY-EV drive).
- to the encoder signals connector (**XE1** connector on EXP-ABS-EV). Please refer to the following table:

Pin	Signal	Description
1	B- (Sine-)	Incremental encoder B- signal
2	KLIXON	Klixon contact (referred to GND)
3	Reserved	
4	Reserved	
5	A+ (Cosine+)	Incremental encoder A+ signal
6	A- (Cosine-)	Incremental encoder A- signal
7	GND	Ground of encoder supply voltage
8	B+ (Sine+)	Incremental encoder B+ signal
9	ALIM	Encoder supply voltage
10	EQP / SENSE-	Equipotential [1] signal or SENSE- [2] signal (only for monitoring)
11	CLK+	Encoder CLOCK+ signal (ENDAT or SSI only)
12	CLK-	Encoder CLOCK- signal (ENDAT or SSI only)
13	DT+	Encoder DATA+ signal
14	DT-	Encoder DATA- signal
15	SENSE+	SENSE+ [2] signal (only for monitoring)

t0010g

For encoder cable use twisted pair shielded cable; the pairs should be the signal wires A+/A-, B+/B-, clock+/clock-, data+/data-, motor temperature sensor wires, encoder supply wires. All the shields must be connected together to cable shield pin of encoder connector on the motor side and to connector body on drive side.

4.4.3.5 Encoder /Resolver Specifications (XE connector)

Sinusoidal encoders

max. frequency _____ 200 kHz (select the appropriate number of pulses depending on required max. speed)

Number of pulses per revolution __ min 1, max 65535

Channels _____ three-channel, differential, TTL 5V compatible. An encoder loss detection is possible via firmware setting.

Power supply _____ + 5 V (Internal supply) *

Load capacity _____ > 8.3 mA pp per channel

Suggested cable _____ see chapter 12.

Digital encoders

max. frequency _____ 250 kHz (select the appropriate number of pulses depending on required max. speed)

Number of pulses per revolution __ min 1, max 65535

Channels _____ three-channel, differential. An encoder loss detection is possible via firmware setting.

Power supply _____ + 5 V (Internal supply) *

Load capacity	> 4.5 mA / 6.8 ... 10 mA per channel
Suggested cable	see chapter 12

* Via keypad (030 - **ENCODER PARAM** menu) 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=5.2V, 1=5.6V, 2=6.1V, 3=6.5V via **XE Enc Supply** (IPA 20012) or **XER Enc Supply** (IPA 20019). parameter.

Absolute Encoder

Absolute trace frequency	500 kHz (on the EXP-ABS-EV expansion card)
Incremental trace max. frequency	200 kHz
Max encoder resolution	29 bit (17 bit/rev.* 12 bit rev.). Note: from the fw 2.41 version.
Interface electrical level	differential RS-485
Interface signals	clock and data (bidirectional)
Clock synchronous period	2μs
Encoder supply	+5V(TTL) /+15V(HTL) +5V / +15V...+24V with external supply
max absorption of encoder supply	250 mA max
Suggested cable	see chapter 12

Resolver interface

Resolver excitation	sinusoidal
Resolver excitation voltage	6V rms
Resolver excitation current	50mA rms max
Resolver excitation frequency	8kHz
Resolver input	differential
Resolver input impedence	4kΩ
Resolver transformation ratio	1:1 - 1:2 - 1:3
Suggested cable	see chapter 12

4.4.3.6 Encoder Simulation / Repetition, Auxiliary Encoder Input (XER/EXP Connector)

Digital encoder input

max. frequency	400 kHz (select the appropriate number of pulses depending on required max. speed)
Number of pulses per revolution	min 1, max 65535
Channels	three-channel, differential. Encoder loss detection is not possible.
Power supply	+ 5 V (Internal supply) *
Load capacity	> 4.5 mA / 6.8 ... 10 mA per channel
Suggested cable	see chapter 12

* Via keypad (030 - **ENCODER PARAM** menu) 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=5.2V, 1=5.6V, 2=6.1V, 3=6.5V via **XE Enc Supply** (IPA 20012) or **XER Enc Supply** (IPA 20019). parameter.

On the regulation board there is available an incremental encoder output, with TTL Line Driver levels, that can be used as simulation of the 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, or to repeat the signals of the motor encoder. The encoder output signals are available on the XER connector (see table 4.4.2.1):

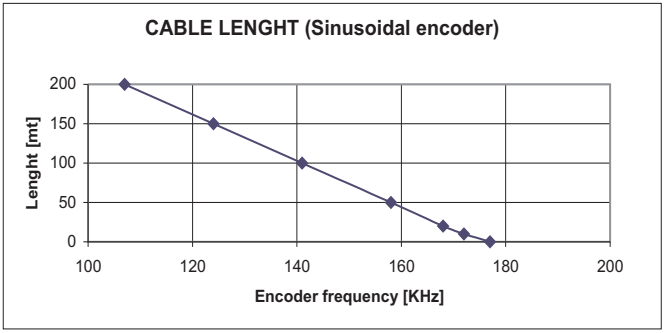
Digital encoder simulation (XER Port)

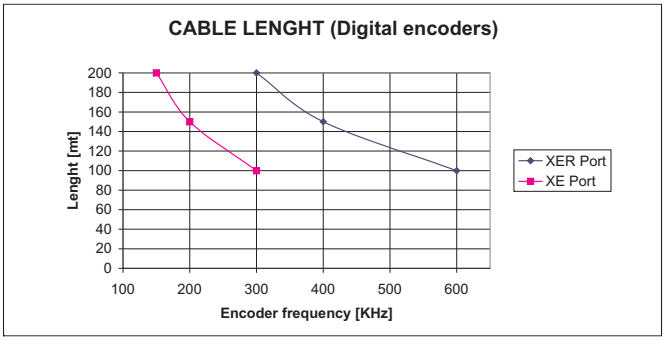
Interface	opto-isolated
Simulation	differential digital incremental
Standard outputs	A+, A-, B+, B-,I+, I-
Outputs levels	Standard TTL
Voltage limits on the TTL high-state outputs (on the pins)	
(Uhigh TTL)	> 2.5V
Voltage limits on the TTL low-state outputs (on the pins)	
(Ulow TTL)	< 0,5V
TTL load capacity	20mA max. each
Parallel connection of standard SIEIDrive - XVy-EV inputs	
with a TTL outputs	3 inputs
Max. frequency	400kHz (select the appropriate number of pulses depending on required max. speed)
Max absorption of the encoder simulation	
power supply	150mA@5V
Mechanics	Male high density 15-pole D-sub connector (type VGA) for standard inputs and extractable terminals to be connected to a 0.14..1.5 mm^2 power supply section

4.4.4 Encoder Cable Length

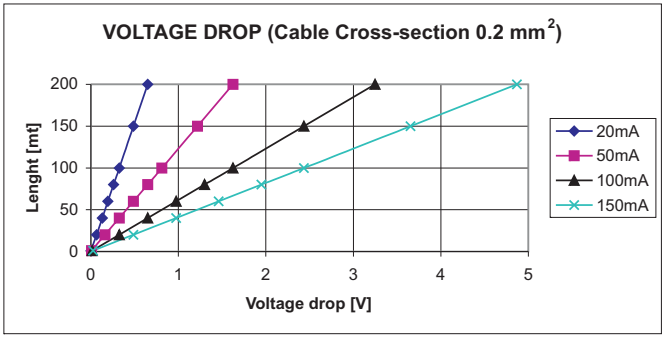
The following figures show the maximum encoder frequency as function of the encoder cable length. For this figures we have considered cables with the following specifications:

Distributed capacitance: 90pF/m





The following figure shows the voltage drop as function of the cable length and of the current absorbtion:



4.4.5 Checking Encoder / Drive Connections

It is strongly recommended to follow the next instructions (parameters to be check are only those for used feedback devices, see next table) :

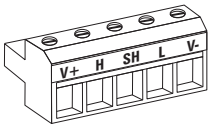
- rotate manually clockwise the motor shaft
- check "**... pos**" parameters values increasing up to "360" and than come back to "0"
- check "**... rev**" parameters values increasing on each turn.

	XE conn.			XER conn.
	SC (SinCos)	HS (Hall+Dig)	RES (resolver)	DE (Dig.Enc.)
menu: SERVICE / ENCODER / XE ENC INC MEAS				
Inc Data Pos (IPA 19002)	X	X		
Inc Data N Rev (IPA 19003)	X	X		
menu: SERVICE / ENCODER / XE ENC ABS MEAS				
Abs Turn Pos (IPA 19017)	X		X	
Abs Rev (IPA 19018)	X		X	
menu: SERVICE / ENCODER / XER/EXP Inc Enc				
XER/EXP Turn Pos (IPA 19011)				X
XER/EXP Rev (IPA 19012)				X
menu: SERVICE / ENCODER / XE HALL TRACKS				
XE Hall Pos (IPA 19022)		X		
XE Hall Rev (IPA 19026)		X		

txv0255

4.5 CANopen Connection

The SIEIDrive - XVy-EV brushless drive can be connected in a CANopen network, the pins are:



Pin / Signal	Description
V-	External supply reference
L	CAN_L bus line (dominant low)
SH	CAN_H shield
H	CAN_H bus line (dominant high)
V+	CAN external positive supply +24V (*), dedicated for supply of transceiver and optocouplers

txv0245

(*) The supplier size have to be according to the used bus specification (CANopen or DeviceNet). Card absorption is 30 mA@24V.

The Bus connection is provided via a shielded loop to be placed far from the power cables, with a minimum distance of 20 cm. The cable shielding must be ground connected on both ends.
If the cable shieldings are ground connected on different points of the system, use the equipotential connection cables to reduce the current flow between the drives and the CAN bus master.

Attention

NOTE ON TERMINATING RESISTOR:

The first and last network components must have a 120 ohm resistance between pins C2 and C4.

4.6 Fast Link Connections

On the XFL connectors a fast serial connection is available, that is optimized to exchange I/O and regulation parameters between different drives. This synchronous serial interface is named FAST LINK. This interface can have two different connection architectures :

- Multi Point : one drive is configured as master (transmitting) and the others as slaves (receiving).
- Peer-to-Peer: This software is not yet released, but is supported by the existing hardware.

Figure 4.6.1: XFL-OUT Connector (FAST LINK Output)

Pin	Function	Description
1	-	
2	-	
3	DT_OUT+	Data output Fast-Link (+)
4	DT_OUT-	Data output Fast-Link (-)
5	CLK_OUT+	Clock ouput Fast-Link (+)
6	CLK_OUT-	Clock ouput Fast-Link (-)
7	-	
8	-	

txv0200

Figure 4.6.2: XFL-IN Connector (FAST LINK Input)

Pin	Function	Description
1	-	
2	-	
3	DT_IN+	Data input Fast-Link (+)
4	DT_IN-	Data input Fast-Link (-)
5	CLK_IN+	Clock input Fast-Link (+)
6	CLK_IN-	Clock input Fast-Link (-)
7	-	
8	-	

txv0210

4.6.1 Fast Link Data

Max number of drops	8 (1 Master + 7 Slaves)
Max length	1.5 meters (with conductor shielded cables), 40 meters (with plastic optical fiber)
Baud rate	3 Mbit
Max Data Exchanged	15 words + 1 CRC / Info every 250 μS in synchronous way from master to slave
PWM	Drive Synchronization
8 conductors shielded cable (*)	L= 65 cm (code S7QK7), L=115 cm (code S7QK8)
Plastic optical fiber cable	L=5 m (code 8S895B), L=10 m (code 8S896B), L=20 m (code 8S897B), L=30 m (code 8S899B)
Optical fiber interface kit	Trasmitter and receiver (code S370E)

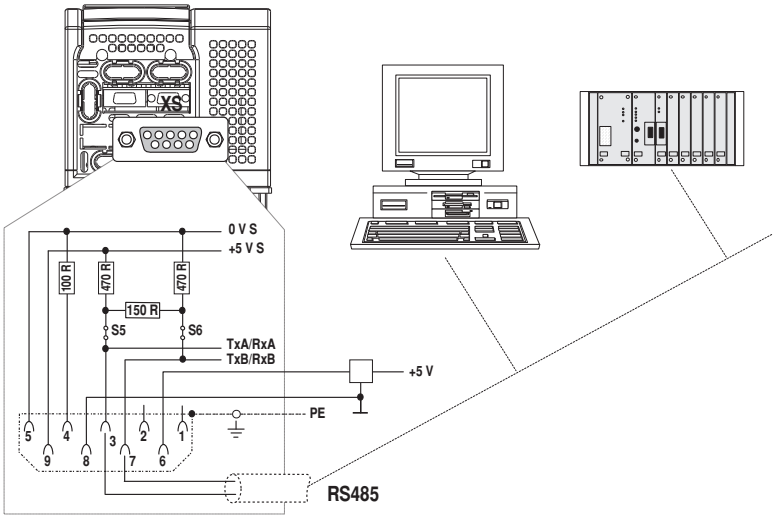
(*) Ferrite on Slave side

4.7 Serial Interface

4.7.1 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 SIEIDrive - XVy-EV devices (up to 128 address selectable) can be networked together via the RS 485 interface. Address setting is carried out via the **Drive Serial Add** (IPA 18031) parameter, **DRIVE CONFIG / COMM CONFIG** menu. Further information concerning the parameters to be transferred, their type and value range is given in the table contained in section 10, “Parameter lists”.

Figure 4.7.1: RS485 Serial Interface



The RS 485 on the SIEIDrive - XVy-EV 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 SIEIDrive - XVy-EV 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-COM” 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-COM” 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! See the manual “SLINK3 Communication protocol” for more detail.

4.7.2 RS 485 Serial Interface Connector Description

Table 4.7.2.1: 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

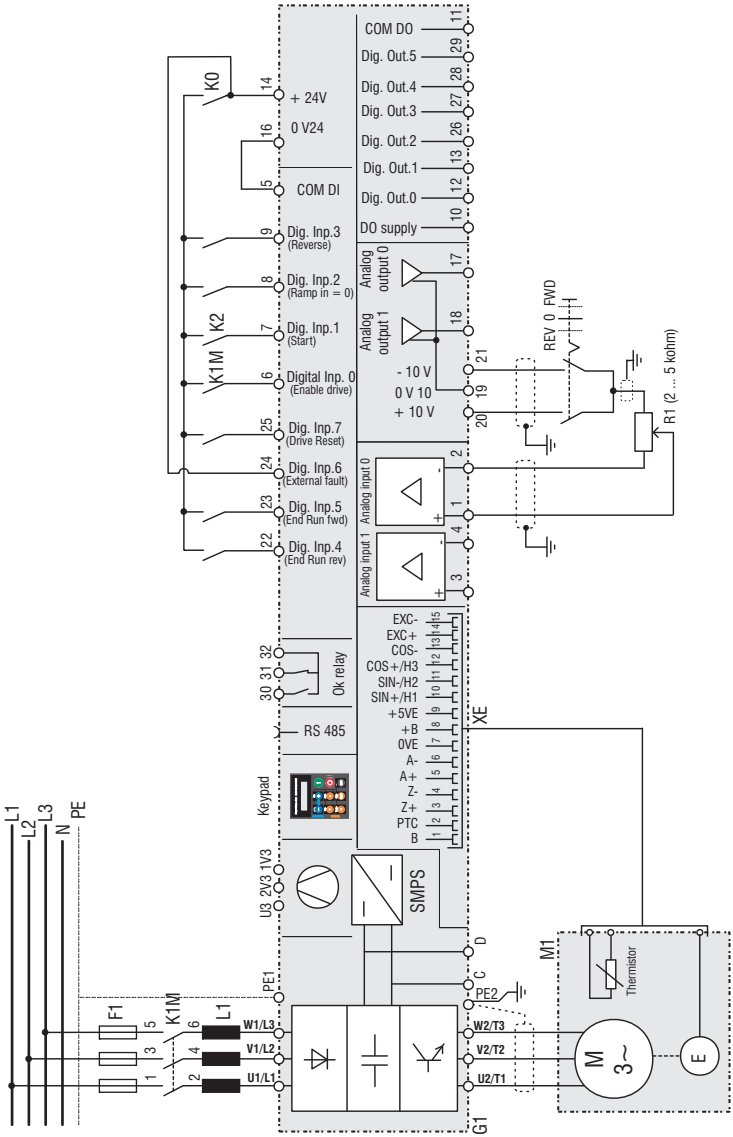
ai4110

I = Input O = Output

4.8 Standard Connection Diagram

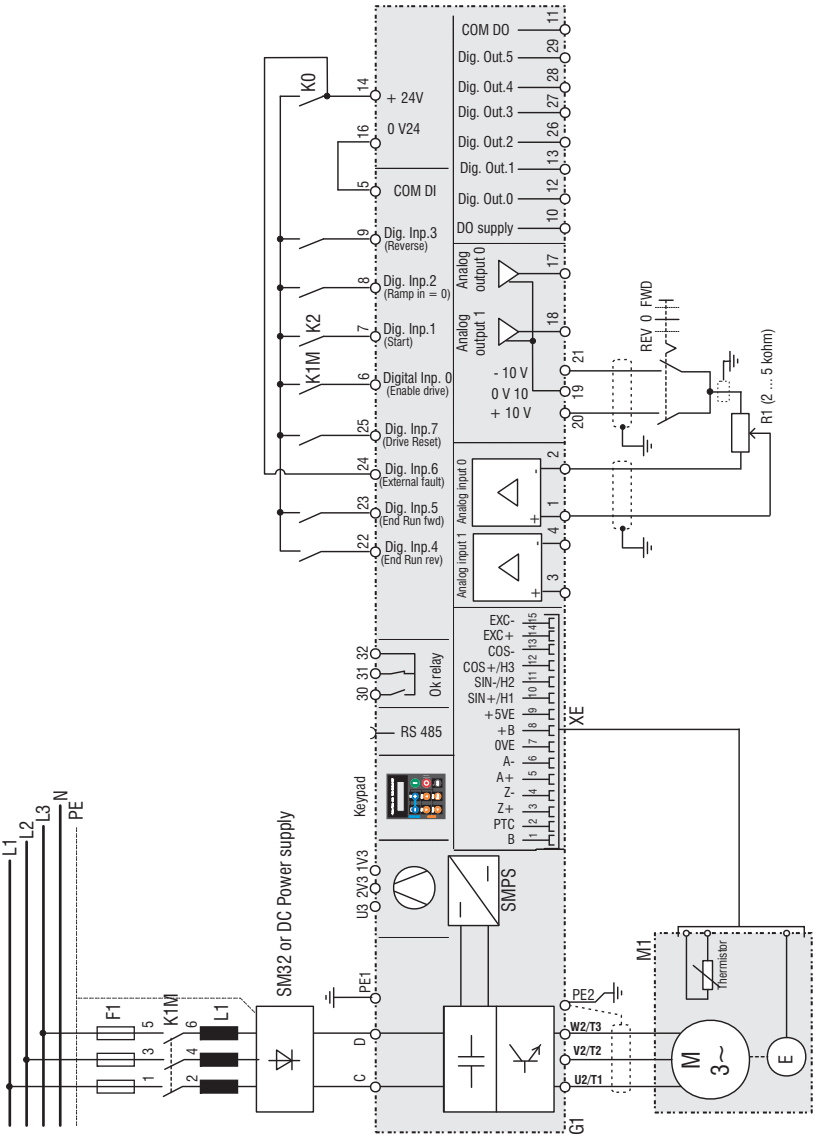
4.8.1 XVy-EV Connections

Figure 4.8.1.1: Typical connection



The circuit diagram is for the standard configuration of the drive as delivered.
EMC installation and wiring techniques are not shown.
For this see appropriate chapter. The connection of option card is also shown separately.
The automatic restart of the drive after a failure alarm is not included.
Nota! U3/2V3 and 1V3 only from sizes 75kW. For more details see chapter 4.2.1
In the case of DC power supply, from size XVy-EV 43366 insertion of an AC mains inductance on the power supply input of the power supply unit is compulsory (for the type of inductance, consult the manual of the power supply unit, see figure 4.8.1.2.

Figure 4.8.1.2: Typical connection diagram for XVy-EV ...-DC versions.



The circuit diagram is for the standard configuration of the drive as delivered.
EMC installation and wiring techniques are not shown.
For this see appropriate chapter. The connection of option card is also shown separately.
The automatic restart of the drive after a failure alarm is not included.
L1 : Insertion of an AC mains inductance the power supply input of the power supply unit is compulsory (for the type of inductance, consult the manual of the power supply unit).

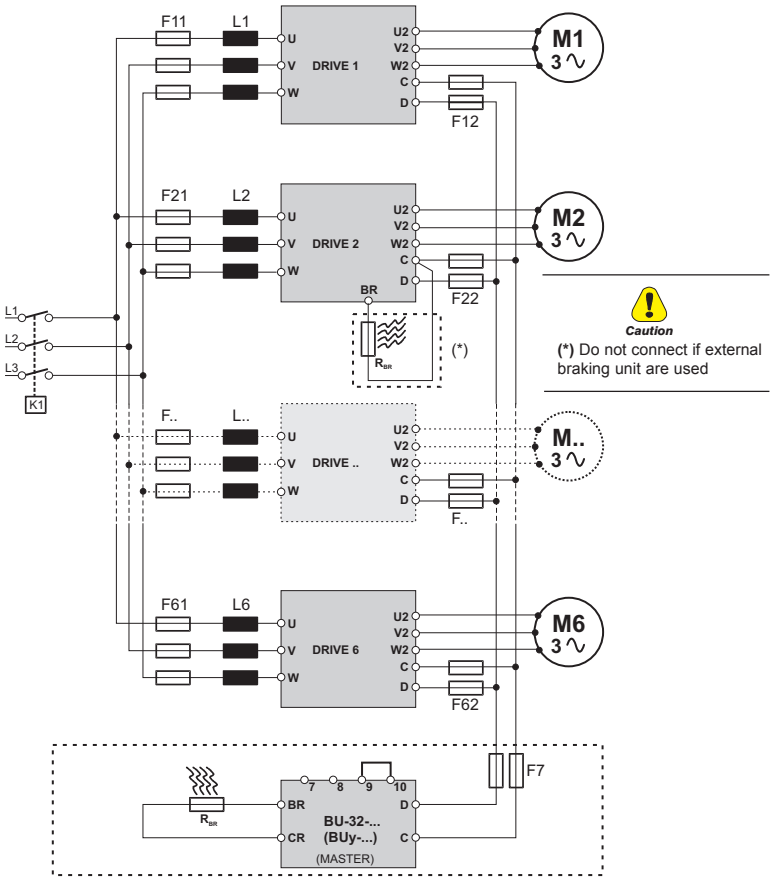
Note! U3/2V3 and 1V3 only from size 6125230 . For more details see chapter 4.2.1

4.8.2 Parallel Connection on the AC (Input) and DC (Intermediate Circuit) Side of Several Drives

Features and Limits:

1 The inverters used have to be all the same size.
2 AC line chokes (see chapter 4.10.1) 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 required, dissipate the braking power; it is necessary to use one internal "BU" braking unit (with external resistance) or one (or more) external braking units ("BU32-.., BUy..") of which one has to be configured as master and the others as slave.
6 Fast fuses (F12...F62) have to be fitted on the dc-link side (C and D terminals) of each inverters (see chapter 4.9.2).

Figure 4.8.2.1: Parallel Connection on the AC and DC Side of Several Drives



4.9 Circuit Protection

4.9.1 External Fuses for the Power Section

The drive must be fused on the AC Input side. Use fast fuses only. Connections with three-phase inductance on AC input are not essential but will improve the DC link capacitors lifetime and drive reliability in unusual power events.

Table 4.9.1.1: External Fuse Types for AC input side

Drive type XVy-EV	DC link capacitors life time [h]	F1 - Fuses type (Code)			
		Europe	America		
		Connections without three-phase reactor			
10306	25000	GRD2/10 (F4D13) or Z14GR10 (F4M03)	A70P10	FWP10	(S7G49)
10408	25000	GRD2/16 (F4D14) or Z14GR16 (F4M05)	A70P20	FWP20	(S7G48)
10612	10000				
20816	25000	GRD2/20 (F4D15) or Z14GR20 (F4M07)	A70P20	FWP20	(S7G48)
21020	25000	GRD2/25 (F4D16) or Z14GR25 (F4M09)	A70P25	FWP25	(S7G51)
21530	10000	GRD3/35 (F4D20) or Z22GR40	A70P35	FWP35	(S7G86)
32040	25000	GRD3/50 (F4D21) or Z22GR40	A70P40	FWP40	(S7G52)
32550	10000	GRD3/50 (F4D21) or Z22GR50 (F4M15)	A70P40	FWP40	(S7G52)
43366 ... 8350460	10000	For these types an external reactor is mandatory if the AC input impedence is equal or less than 1%			
		Connections without three-phase reactor			
10306	50000	GRD2/10 (F4D13) or Z14GR10 (F4M03)	A70P10	FWP10	(S7G49)
10408	50000		A70P10	FWP10	(S7G49)
10612	50000	GRD2/16 (F4D14) or Z14GR16 (F4M05)	A70P20	FWP20	(S7G48)
20816	50000				
21020	50000	GRD2/20 (F4D15) or Z14GR20 (F4M07)	A70P20	FWP20	(S7G48)
21530	50000	GRD2/25 (F4D16) or Z14GR25 (F4M09)	A70P25	FWP25	(S7G51)
32040	50000	GRD3/50 (F4D21) or Z22GR40	A70P35	FWP35	(S7G86)
32550	50000	GRD3/50 (F4D21) or Z22GR50 (F4M15)	A70P40	FWP40	(S7G52)
43366	30000	GRD3/50 (F4D21) or Z22GR50	A70P50	FWP50	(S7G53)
43570	25000				
44590	25000	S00C+üf1/80/80A/660V or Z22gR80	A70P80	FWP80	(S7G54)
455110	25000	S00C+üf1/80/100A/660V or M00üf01/100A/660V (F4G18)	A70P100	FWP100	(S7G55)
570140	25000	S00C+üf1/80/160A/660V or M00üf01/160A/660V (F4E15)	A70P175	FWP175	(S7G57)
5100180	25000				
6125230	25000	S1üf1/110/250A/660V or M1üf1/250A/660V (F4G28)	A70P300	FWP300	(S7G60)
7145290	25000				
7190350	25000	S2üf1/110/400A/660V or M2üf1/400A/660V (F4G34)	A70P400	FWP400	(S7G62)
7230420	25000				
8280400	25000				
8350460	25000	S2üf1/110/500A/660V or M2üf1/500A/660V (F4G30)	A70P500	FWP500	(S7G63)
9470650-C	25000	S2üf1/110/630A/660V (F4E31)	A70P600	FWP600	(S7G65)
9470650-C-IP00	25000	S2üf1/110/630A/660V (F4E31)	A70P600	FWP600	(S7G65)
9560650-CP	25000	S2üf1/110/630A/660V (F4E31)	A70P600	FWP600	(S7G65)
9560650-CP-IP00	25000	S2üf1/110/630A/660V (F4E31)	A70P600	FWP600	(S7G65)

txv0150

Fuse manufacturers:

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

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

4.9.2 External Fuses for the Power Section DC Input Side

Use the following fuses when an external bus supply is used.

Table 4.9.2.1: External fuses type for DC input side

Drive type XVy-EV	Europe		America		
	Fuses type	Code	Fuses type		Code
10306	Z14GR10	F4M03	A70P10	FWP10A14F	S7G49
10408					
10612	Z14GR16	F4M05	A70P20-1	FWP20A14F	S7G48
20816					
21020	Z14GR20	F4M07	A70P20-1	FWP20A14F	S7G48
21530	Z14GR32	F4M11	A70P30-1	FWP30A14F	S7I50
32040	Z14GR40	F4M13	A70P40-4	FWP40B	S7G52
32550	Z22GR63	F4M17	A70P60-4	FWP60B	S7I34
43366	S00C+/üf1/80/80A/660V	F4EAF	A70P80	FWP80	S7G54
43570					
44590	S00C+/üf1/80/100A/660V	F4EAG	A70P100	FWP100	S7G55
455110	S00C+/üf1/80/125A/660V	F4EAJ	A70P150	FWP150	S7G56
570140	S00C+/üf1/80/160A/660V	F4EAL	A70P175	FWP175	S7G57
5100180	S00üF1/80/200A/660V	F4G23	A70P200	FWP200	S7G58
6125230	S1üF1/110/250A/660V	F4G28	A70P250	FWP250	S7G59
7145290	S1üF1/110/315A/660V	F4G30	A70P350	FWP350	S7G61
7190350	S1üF1/110/400A/660V	F4G34	A70P400	FWP400	S7G62
7230420	S1üF1/110/500A/660V	F4E30	A70P500	FWP500	S7G63
8280400					
8350460	S2üf1/110/630A/660V	F4E31	A70P600	FWP600	S7G65
9470650-C	S3üF1/110/800A/660V	F4H02	A70P800	FWP800	S7813
9470650-C-IP00					
9470650-C-DC-IP00					
9560650-CP					
9560650-CP-IP00					
9560650-CP-DC-IP00					

txv0160

Fuse manufacturers:

Type Z14..., Z22, S00 ..., S1..., S2...	Jean Müller, Eltville
A70P...	Gould Shawmut
FWP...	Bussmann

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

4.9.3 Internal Fuses

Table 4.9.3.1: Internal fuses

Drive type	Designation	Protection of	Fuse (source)	Fitted on:
43366 … 9560650	F1	+24V	2A fast 5 x 20 mm (Bussmann: SF523220 or Schurter: FSF0034.1519 or Littlefuse: 217002)	Power card PV33-4 and higher
				Power card PV33-5 and higher
10306 ... 9560650	F1	+24V	Resettable fuse	Regulation card R-XVy and higher
7145290 … 8350460	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)

txv0170

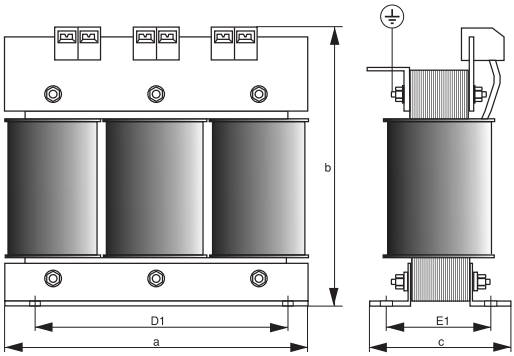
4.10 Chokes / Filters

NOTE! A three-phase inductance should be connected on the AC Input side in order to limit the input RMS current XVy-EV series drives. The inductance can be provided by an AC Input choke or an AC Input transformer. While the drive will work without the inductance, capacitor life will be shortened and general reliability will be less.

NOTE! In the case of DC power supply, from size XVy-EV 43366 insertion of an AC mains inductance on the power supply input of the power supply unit (for the type of inductance, consult the manual of the power supply unit), see figure 4.8.1.2.

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

Figure 4.10.1: Input/output choke dimensions



4.10.1 AC Input Chokes

Table 4.10.1.1: 3-Phase AC Input Chokes

Drive type XVy-EV	Three-phases main chokes											
	Mains inductance	Rated current	Saturat. current	Freq.	Model	Cod.	Weight kg (lbs)	Dimensions : mm (inch)				
	[mH]	[A]	[A]	[Hz]				a	b	c	D1	E1
10306	3.69	3.7	7.4	50/60	**LR3y-1015**	S7AAE	1.8 (4.0)	120 (4.7)	125 (4.9)	65 (2.6)	100 (3.9)	45 (1.8)
10408	2.71	5.5	11	50/60	**LR3y-1022**	S7AAF	1.9 (4.2)					
10612	2.3	6.7	14	50/60	**LR3y-1030**	S7AB3						
20816	1.63	8.7	18	50/60	**LR3y-2040**	S7AAG	2 (4.4)					
21020	1.29	11.8	24.5	50/60	**LR3y-2055**	S7AB5	2.2 (4.4)	120 (4.7)	125 (4.9)	75 (2.6)	100 (3.9)	55 (2.2)
21530	0.89	17.4	36.5	50/60	**LR3y-2075**	S7AB6	4.9 (10.8)	150 (5.9)	155 (6.1)	79 (3.1)	90 (3.5)	54 (2.1)
32040	0.68	22.4	46.5	50/60	**LR3y-3110**	S7AB7	5 (11)	150 (5.9)	155 (6.1)	79 (3.1)	90 (3.5)	54 (2.1)
32550	0.51	30	61	50/60	**LR3y-3150**	S7AB8	6.2 (13.7)	150 (5.9)	168 (6.6)	100 (3.9)	90 (3.5)	69 (2.7)
43366	0.35	41	83	50/60	**LR3-022**	S7FF4	7.8 (17.2)	180 (7.1)	182 (7.2)	130 (5.1)	150 (5.9)	70 (2.8)
43570												
44590	0.24	58	120	50/60	**LR3-030**	S7FF3	9.5 (20.9)	180 (7.1)	160 (6.3)	170 (6.7)	150 (5.9)	80 (3.1)
455110	0.18	71	145	50/60	**LR3-037**	S7FF2	9.5 (20.9)	180 (7.1)	160 (6.3)	180 (7.1)	150 (5.9)	80 (3.1)
570140	0.13	102	212	50/60	**LR3-055**	S7FF1	12.5 (27.6)	240 (9.4)	215 (8.5)	180 (7.1)	150 (5.9)	80 (3.1)
5100180												
6125230	0.148	173	350	50/60	**LR3-090**	S7D19	55 (121.3)	300 (11.8)	265 (10.4)	210 (8.3)	250 (9.8)	85 (3.3)
7145290												
7190350	0.085	297	600	50/60	**LR3-160**	S7D40	44 (97.0)	300 (11.8)	270 (10.6)	260 (10.2)	250 (9.8)	120 (4.7)
7230420												
8280400												
8350460	0.085	380	710	50/60	**LR3-200**	S7AE9	54 (119)	300 (11.8)	270 (10.6)	355 (13.9)	250 (9.8)	130 (5.1)
9470650-C	0.06	550	1050	50/60	**LR3-315**	S7D28	110 (242.5)	375 (14.8)	545 (21.5)	255 (10)	250 (9.8)	133 (5.2)
9560650-CP												

txv0180

For all the sizes an input choke is strongly recommended in order to:
- 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%).

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”.

4.10.2 Output Chokes

For motors with long cable runs (typically over 30 m [98.5 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 4.10.2.1.
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 4.10.2.1: Recommended values for output chokes

Drive type XVy-EV	Three-phases output choke										
	Mains inductance	Rated current	Saturat. current	Model	Cod.	Weight kg (lbs)	Dimensions : mm (inch)				
	[mH]	[A]	[A]				a	b	c	D1	E1
10306	1.4	9.5	20	**LU3-001**	S7FG1	2.7 (6.0)	120 (4.7)	128 (5.0)	71 (2.9)	100 (3.9)	54 (2.1)
10408 10612	1.4	9.5	20	**LU3-003**	S7FG2	5.2 (11.5)	180 (7.1)	170 (6.7)	110 (4.3)	150 (5.9)	60 (2.4)
20816 21020	0.87	16	34	**LU3-005**	S7FG3	5.8 (12.8)	180 (7.1)	170 (6.7)	110 (4.3)	150 (5.9)	60 (2.4)
21530 32040	0.51	27	57	**LU3-011**	S7FG4	8 (17.6)	180 (7.1)	180 (7.1)	130 (5.1)	150 (5.9)	70 (2.8)
32550	0.43	32	68	**LU3-015**	S7FM2	7.5 (16.5)	180 (7.1)	160 (6.3)	170 (6.7)	150 (5.9)	70 (2.8)
43366 43570	0.33	42	72	**LU3-022**	S7FH3	8 (17.6)	180 (7.1)	160 (6.3)	170 (6.3)	150 (5.9)	70 (2.8)
44590	0.24	58	100	**LU3-030**	S7FH4	9.5 (20.9)	180 (7.1)	160 (6.3)	180 (7.1)	150 (5.9)	80 (3.1)
455110	0.18	76	130	**LU3-037**	S7FH5	9.7 (21.4)	180 (7.1)	160 (6.3)	180 (7.1)	150 (5.9)	80 (3.1)
570140 5100180	0.12	110	192	**LU3-055**	S7FH6	14 (30.9)	240 (9.4)	210 (8.3)	180 (7.1)	200 (7.9)	80 (3.1)
6125230 7145290	0.07	180	310	**LU3-090**	S7FH7	18.5 (40.8)	240 (9.4)	210 (8.3)	200 (7.9)	200 (7.9)	80 (3.1)
7190350 7230420 8280400	0.041	310	540	**LU3-160**	S7FH8	27.5 (60.6)	300 (11.8)	260 (10.2)	240 (9.4)	250 (9.8)	90 (3.5)
8350460				**LU3-200**	S7AF0	Please contact the nearest Gefran office					
9470650-C 9560650-CP	0.022	580	1100	**LU3-315**	S7FH9	95 [209.4]	380 [15.0]	500 [10.7]	310 [12.2]	250 [9.8]	134 [5.3]

bxv0190

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. Slightly less drop will occur at 60Hz.

4.10.3 Interference Suppression Filters

SIEIDrive - XVy-EV drives must be equipped with an external EMI filter in order to reduce the radiofrequency emissions on the mains line as required for operation in Europe.

The filter selection is depending on the drive size and the installation environment.

For more information, see the “EMC guide” on the cd-rom included.

In the Guide it is also indicated how to install the drive in an enclosure (connection of filter and mains reactors, cable shield, ground, 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 drives as required by CE.

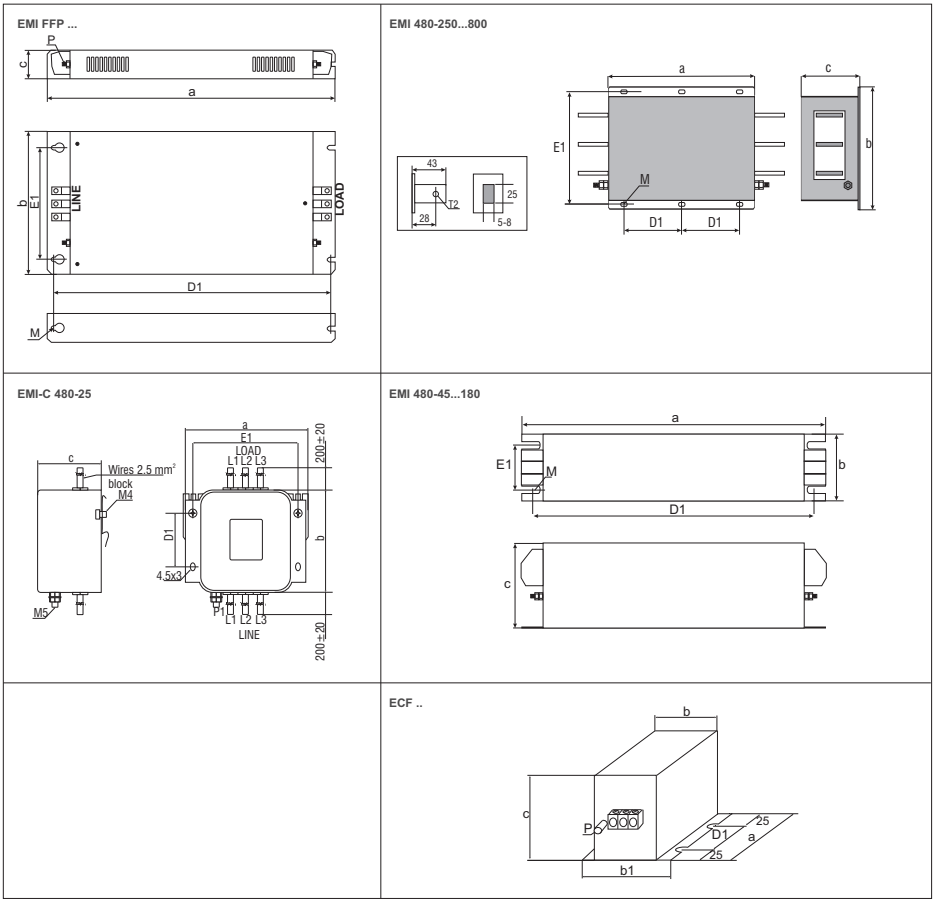
Table 4.10.3.1: Recommended EMI filters

Drive type XVy-EV	EN 61800-3:2004	Model	Cod.	Weight kg (lbs)	Dimensions : mm (inch)								
					a	b	c	d	D1	E1	R	P	M
		Mains supply : 230 - 400V ±15%											
10306 … 10612	(2)	EMI FFP 480-9	S7DEQ	1.1 (2.4)	375 (14.8)	104 (4.1)	45 (1.8)	-	360 (14.2)	59 (2.3)	-	M5	Ø6
20816 … 21530	(2)	EMI FFP 480-24	S7DER	1.4 (3.1)	375 (14.8)	150 (5.9)	45 (1.8)	-	360 (14.2)	105 (4.1)	-	M5	Ø6
32040	(2)	EMI FFP 480-30	S7DES	1.6 (3.5)	390 (15.4)	200 (7.9)	45 (1.8)	-	375 (14.8)	155 (6.1)	-	M5	Ø6
32550	(2)	EMI FFP 480-40	S7DET	2.3 (5.1)	390 (15.4)	200 (7.9)	45 (1.8)	-	375 (14.8)	155 (6.1)	-	M5	Ø6
43366 … 43570	(3)	EMI 480-45	S7DFU	1.3 (2.9)	250 (9.8)	85 (3.3)	90 (3.5)	-	235 (9.3)	60 (2.4)	-	-	M6
44590 … 455110	(3)	EMI 480-70	S7DFZ	2.6 (5.7)	270 (10.6)	90 (3.5)	150 (5.9)	-	255 (10.0)	65 (2.6)	-	-	M6
570140 … 5100180	(3)	EMI 480-100	S7DGA	2.6 (5.7)	270 (10.6)	90 (3.5)	150 (5.9)	-	255 (10.0)	65 (2.6)	-	-	M6
6125230	(3)	EMI 480-150	S7DGB	4.4 (9.7)	400 (15.7)	120 (4.7)	170 (6.7)	-	365 (14.4)	102 (4.0)	-	-	M6
7145290	(3)	EMI 480-180	S7DGC	4.4 (9.7)	400 (15.7)	120 (4.7)	170 (6.7)	-	365 (14.4)	102 (4.0)	-	-	M6
7190350	(3)	EMI 480-250	S7DGG	13 (28.7)	300 (11.8)	260 (10.2)	135 (5.31)	-	120 (4.72)	235 (9.25)	-	-	M10
7230420	(3)	EMI 480-250	S7DGG	13 (28.7)	300 (11.8)	260 (10.2)	135 (5.31)	-	120 (4.72)	235 (9.25)	-	-	M10
8280400	(3)	EMI 480-320	S7DGH	13.2 (29.1)	300 (11.8)	260 (10.2)	135 (5.31)	-	120 (4.72)	235 (9.25)	-	-	M10
8350460	(3)	EMI 480-400	S7DGI	13.4 (29.5)	300 (11.8)	260 (10.2)	135 (5.31)	-	120 (4.72)	235 (9.25)	-	-	M10
9470650-C	(3)	EMI-480-600	S7DGL	40 (88.2)	300 (11.8)	260 (10.2)	135 (5.31)	-	120 (4.72)	235 (9.25)	-	-	M10
9560650-CP	(3)	EMI-480-800	S7DGM	40 (88.2)	350 (13.8)	280 (11.0)	150 (5.9)	-	145 (5.7)	255 (10.0)	-	-	M10
		Mains supply : 460 - 480 +10%											
10306 … 10612	(2)	EMI FFP 480-9	S7DEQ	1.1 (2.4)	375 (14.8)	104 (4.1)	45 (1.8)	-	360 (14.2)	59 (2.3)	-	M5	Ø6
20816 … 21530	(2)	EMI FFP 480-24	S7DER	1.4 (3.1)	375 (14.8)	150 (5.9)	45 (1.8)	-	360 (14.2)	105 (4.1)	-	M5	Ø6
32040	(2)	EMI FFP 480-30	S7DES	1.6 (3.5)	390 (15.4)	200 (7.9)	45 (1.8)	-	375 (14.8)	155 (6.1)	-	M5	Ø6
32550	(2)	EMI FFP 480-40	S7DET	2.3 (5.1)	390 (15.4)	200 (7.9)	45 (1.8)	-	375 (14.8)	155 (6.1)	-	M5	Ø6
43366 … 43570	(3)	EMI 480-45	S7DFU	1.3 (2.9)	250 (9.8)	85 (3.3)	90 (3.5)	-	235 (9.3)	60 (2.4)	-	-	M6
44590	(3)	EMI 480-55	S7DFV	2 (4.4)	250 (9.8)	85 (3.3)	90 (3.5)	-	235 (9.3)	60 (2.4)	-	-	M6
455110	(3)	EMI 480-70	S7DFZ	2.6 (5.7)	270 (10.6)	90 (3.5)	150 (5.9)	-	255 (10.0)	65 (2.6)	-	-	M6
570140 … 5100180	(3)	EMI 480-100	S7DGA	2.6 (5.7)	270 (10.6)	90 (3.5)	150 (5.9)	-	255 (10.0)	65 (2.6)	-	-	M6
6125230 … 7145290	(3)	EMI 480-150	S7DGB	4.4 (9.7)	400 (15.7)	120 (4.7)	170 (6.7)	-	365 (14.4)	102 (4.0)	-	-	M6
7190350	(3)	EMI 480-180	S7DGC	4.4 (9.7)	400 (15.7)	120 (4.7)	170 (6.7)	-	365 (14.4)	102 (4.0)	-	-	M6
7230420	(3)	EMI 480-250	S7DGG	13 (28.7)	300 (11.8)	260 (10.2)	135 (5.31)	-	120 (4.72)	235 (9.25)	-	-	M10
8280400	(3)	EMI 480-250	S7DGG	13 (28.7)	300 (11.8)	260 (10.2)	135 (5.31)	-	120 (4.72)	235 (9.25)	-	-	M10
8350460	(3)	EMI 480-400	S7DGI	13.4 (29.5)	300 (11.8)	260 (10.2)	135 (5.31)	-	120 (4.72)	235 (9.25)	-	-	M10
9560650-CP	(3)	EMI-480-600	S7DGL	40 (88.2)	300 (11.8)	260 (10.2)	135 (5.31)	-	120 (4.72)	235 (9.25)	-	-	M10
		Mains supply : 230 - 400V ±15%, 460 - 480 +10%											
10306 … 32040	(1)	EMI-C 480-25	S7DFA	0.96 (2.1)	105 (4.1)	100 (3.9)	57 (2.2)	-	57 (2.2)	95 (3.7)		M5	4.5x3
		Mains supply : 500V ±10%											
10306 … 9560650-CP	(4)	ECF3	F4ZZ2	1.12 (2.7)	150 (5.9)	120 (4.72)	110 (4.33)	-	100 (3.94)	100 (3.94)	-	M6	-

txv0195

(1): Category C3, 2nd Environment, Motor cable length : max 5 m.
(2): Category C2, 1st Environment, Motor cable length : max 30 m.
(3): Category C3, 2nd Environment, Motor cable length : max 100 m.
(4): Category C4, 2nd Environment, Motor cable length : max 100 m.

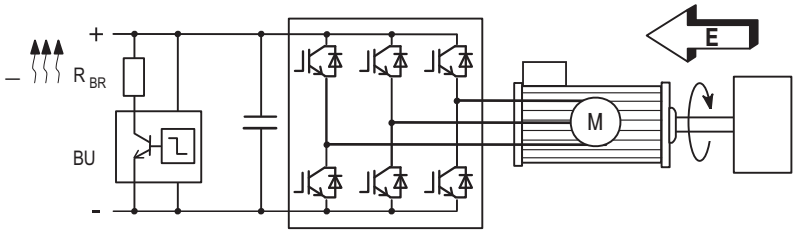
Figure 4.10.3.1: Filter dimension



4.11 Braking Units

In 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 a value causing the drive to trip. When used, these activate a braking resistor that is modulated across 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 four-quadrant operation.

Figure 4.11.1: Operation with Braking Unit (Principle)



All SIEIDrive - XVy-EV drives can be equipped with an external braking unit (BU-32.xx... or BUy-....) connected to terminals C (+Bus) and D (-Bus).

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.

Warning

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

4.11.1 Internal Braking Unit

Drive sizes XVy-EV 10306 up to XVy-EV 32550 have, as standard configuration, an internal braking unit.
Drive sizes XVy-EV 43366 up to XVy-EV 5100180 can have an optional internal braking unit factory mounted.

Table 4.11.1.1: Technical data of the internal braking units

Drive type XVy-EV	I_{RMS} [A]	I_{PK} [A]	T [s]	Minimum R_{BR} [ohm]
10306 …20816	4.1	7.8	19	100
21020 … 21530	6.6	12	16	67
32040	12	22	17	36
32550	17	31	16	26
43366 - 43570	18	52	42	15
44590	37	78	23	10
455110	29	78	37	10
570140 … 5100180	50	104	22	7.5
6125230 … 9560650	External braking unit (optional)			

txv0260

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

4.11.2 Internal and External Braking Resistors

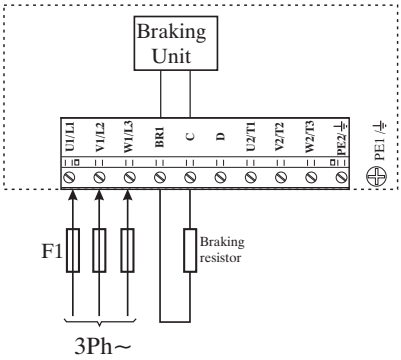
The SIEIDrive - XVy-EV drives, up to size XVy-EV 32550 and XVy-EV...EWHR, are equipped with an Internal Braking Resistor according to the following table:

Drive Type	Resistor Type	P_{NBR} [W]	R_{BR} [Ohm]	E_{BR} [kJ]
10306 …10612	CBR-100R	100	100	11
21020 … 21530	CBR-67R	150	67	11
32040	RFI1300-36R	200	36	16
32550	RFI1300-26R	200	26	16
455110 EWHR	12R-S8T1DE	1000	12	30
570140 EWHR	10R-8SWW1		10	
5100180 EWHR	8R-S8T1DD		8	
5125230 EWHR				

txv0225

For bigger sizes, the braking resistor is optional and has always to be mounted externally. For parameter settings refer to the section 10, **BRAKING RES** menu. The figure below shows the configuration for internal brake unit operation.

Figure 4.11.2.1: Connection with internal Braking Unit and external braking resistor



If the application requires to use an External Braking Resistor, it is necessary to follows the recommended external resistors to be used with drives internal braking units:

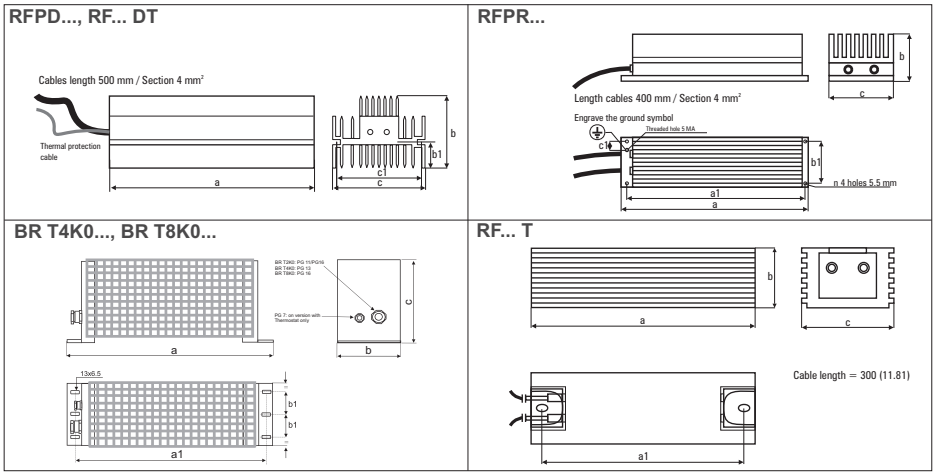
Table 4.11.2.1: Lists and technical data of the external standard resistors

XVy-EV	P_{NBR}	R_{BR}	E_{BR} [kJ]		Resistor	Cod.	Weight	Dimensions : mm (inch)					
	[kW]	[Ohm]	(1)	(2)	Type		kg (lbs)	a	b	c	a1	b1	c1
10306	0.22	100	1.5	11	**RF 220 T 100R**	S8T0CE	0.5 (1.1)	300 (11.8)	27 (1.1)	36 (1.4)	290 (11.4)		
10408 ...20612	0.30	100	2.5	19	**RF 300 DT 100R**	S8T0CB	1.4 (3.09)	260 (10.2)	47 (1.9)	106 (4.2)		17.5 (0.69)	93.5 (3.7)
20816	0.75	100	7.5	38	**RFPD 750 DT 100R**	S8SY4	1.7 (3.75)	200 (7.9)	70 (2.8)	106 (4.17)		17.5 (0.69)	93.5 (3.7)
21020	0.75	68	7.5	38	**RFPD 750 DT 68R**	S8T0CD	1.7 (3.75)	200 (7.9)	70 (2.8)	106 (4.17)		17.5 (0.69)	93.5 (3.7)
21530	0.9	68	9	48	**RFPD 900 DT 68R**	S8SY5	2.2 (4.85)	260 (10.2)	70 (2.8)	106 (4.17)		17.5 (0.69)	93.5 (3.7)
32040	1.1	40	11	58	**RFPD 1100 DT 40R**	S8SY6	2.7 (5.95)	320 (12.6)	70 (2.8)	106 (4.17)		17.5 (0.69)	93.5 (3.7)
32550	1.9	28	19	75	**RFPR 1900 D 28R**	S8SZ5	4.2 (9.3)	365 (14.4)	75 (2.95)	100 (3.9)	350 (13.78)	70 (2.8)	30 (1.2)
43366 ...43570	4	15.4	40	150	**BR T4K0-15R4**	S8T00G	7.0 (15.43)	625 (24.6)	100 (3.9)	250 (9.8)	605 (23.8)	40 (1.6)	
44590 ... 455110	4	11.6	40	150	**BR T4K0-11R6**	S8T00H	7.0 (15.43)	625 (24.6)	100 (3.9)	250 (9.8)	605 (23.8)	40 (1.6)	
570140 ... 5100180	8	7.7	80	220	**BR T8K0-7R7**	S8T00I	11.5 (25.35)	625 (24.6)	160 (6.3)	250 (9.8)	605 (23.8)	60 (2.4)	

txv0250

(1) Max overload energy, 1"- duty-cycle 10%; (2) Max overload energy, 30"- duty-cycle 25%

Figure 4.11.2.2: External resistors



Warning

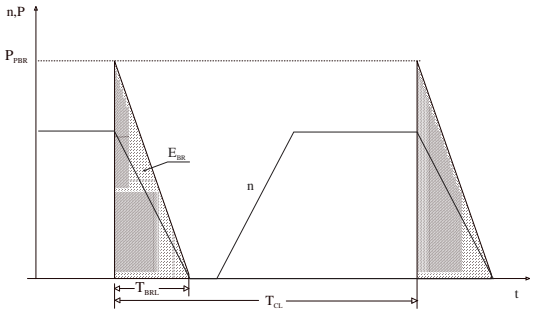
When using an external resistor, remove the connections of the internal braking resistor from terminals BR1 and C and connect the two wires together using the proper faston.

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 4.11.2.3: 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 Overpower** alarm occurs if the duty cycle exceeds the maximum data allowed in order to prevent possible damage to the resistor.

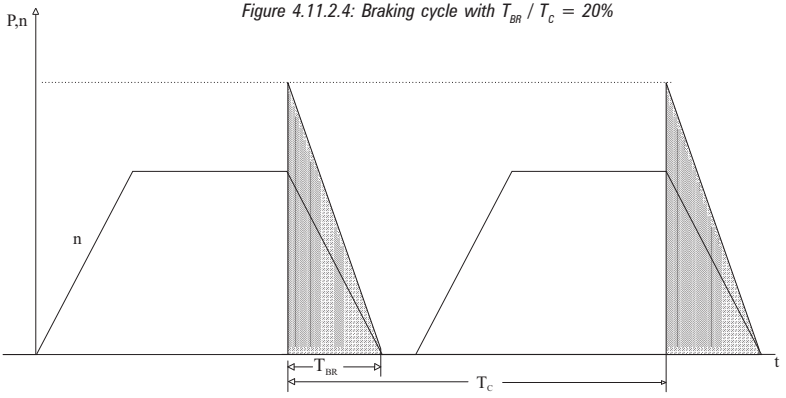
Resistor model: Standard resistor data

Example code: RFPD 900 DT 68R
RFPD = 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 4.11.2.4: Braking cycle with T_{BR} / T_C = 20%



These resistors, whose technical data are reported in the table 4.11.2.1, have been sized to tolerate an overload equal to 4 times 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
With reference to the figure 4.11.2.3, where the power profile is the typical triangular one, the following example can be taken into consideration (see also table 4.11.2.1).

Resistor model: MRI/T600 100R

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

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

It is necessary to consider the following relation:

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

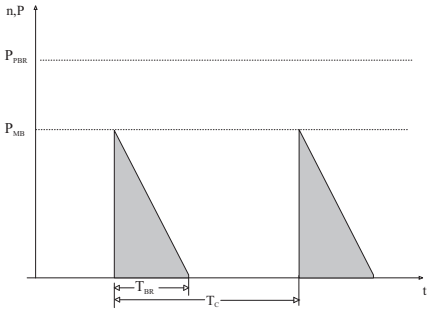
1) $P_{MB} < 2 * E_{BR} / T_{BR}$ Where: P_{MB} is the maximum cycle power (see figure 4.11.2.5)

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 $T_{BR} > E_{BR} / P_{NBR}$ that is to say, in case of very long braking time, it must be dimensioned $P_{MB} < P_{NBR}$

Figure 4.11.2.5: Generic braking cycle with triangular profile



If one of the above mentioned rules is not respected, it is necessary to increase the nominal power of the resistor, respecting the limit of the internal braking unit as stated in the table 4.11.1.

Generally the following condition must be satisfied

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

4.11.3 Control of the External Braking Power

The braking resistance average power is defined by the following formula:

$$P = 0.2 \cdot J_{tot} \cdot \omega^2 \cdot f$$

where: **P** = Dissipated power
J_{tot} = Total inertia (Kgm^2)
ω = Max speed (rad/sec)
f = Cycle frequency in Herz (number of cycles per second).
$f = 1/T_{BR}$ (sec)

4.11.4 External Resistance Interaction with the System Parameters

When the external braking resistance is installed it is always necessary to carry out some modifications in the parameters.
See chapter 10, BRAKING RES menu for furthers details.

4.11.5 Choice of the Thermal Relay for Brake Resistor

Here is a procedure aimed at stating the coordination of a thermal relay for the protection of the resistor bank in case of a sudden component failure (not detected), when the DC bus power supply is continuously connected to the braking resistance.
It is important to remember that the drives are supplied with a I^2t function for the resistor bank protection; such a function is in a position to avoid any possible overload but it cannot protect against component failure that might render impossible the logical control of the braking resistor current.
As stated in the dimensioning procedure for the bus braking system, the resistor bank has, with a given ambient condition, a possible instantaneous overload defined as

$E_{max\ BR}$ in [Joule] or as a product given by
P_{max_BR} **x** T_{max_BR} [Joule]

supplied by the producer of the resistor. Such parameters are able to define the resistor overload possibility in case of continuous maximum power peaks.
According to $E_{max\ BR}$ and to the peak power value, which the resistor bank is subject to, $P_{PBR} = V^2_{BR} / R_{BR}$ (V_{BR}= 780 V, default) the maximum time for the peak power application is calculated as

$$T_{max\ BR} = E_{max\ BR} / P_{PBR}$$

Furthermore, the peak current on the resistors is

$$I_{PK} = V_{BR} / R_{BR}$$

Therefore, the time/current curves of the thermal relays are must have an overload ratio requiring a thermal relay intervention time lower than $T_{max\ BR}$. Given that K, the overload ratio obtained from the curves, the current value to which the thermal relay has to be set is:

$$I_{term} = I_{PK} / k$$

Now it is necessary to check that the product $V_{BR} \times I_{term}$ is higher than the average power, which can be dissipated on the resistor bank; such value is stated during the dimensioning procedure of the braking system.
In case the above-mentioned conditions are not satisfied, it is necessary to use a thermal relay with a time/current feature able to obtain a K factor lower than the one stated above.
The thermal relays to be used are those coordinated for the protection of three-phase motors. In this case it is advisable to use all the three contacts which have to be connected in series to be able to break the substantial DC voltage involved.

4.12 Buffering the Regulator Supply

When no external power supply is available on the terminals 15 and 16 of the regulation card, the power supply of the control section is derived from a switching power supplier (SMPS) of 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 (+ bus) and D(- bus)).

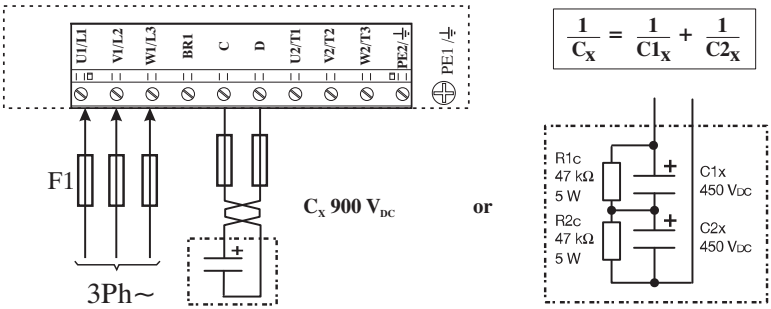
Table 4.12.1: DC Link Buffer Time

XVy-EV	Internal capacitance C_{std} [µF]	Buffer time t_{Buff} (minimum value) with the internal capacitance at : AC Input voltage =400V [s]	AC Input voltage =460V [s]	Maximum permissible external capacitance C_{ext} [µF]	Maximum power required by switched mode power supply P_{SMPS} [W]
10306	220	0.165	0.25	0	65
10408	330	0.24	0.37	0	65
10612	330	0.24	0.37	0	65
20816	830	0.62	0.95	0	65
21020	830	0.62	0.95	0	65
21530	830	0.62	0.95	0	65
32040	1500	1.12	1.72	1500	65
32550	1500	1.12	1.72	1500	65
43366	1800	1.54	2.3	4500	70
43570	1800	1.54	2.3	4500	70
44590	2200	1.88	2.8	4500	70
455110	3300	2.83	4.2	4500	70
570140	4950	4.24	6.3	4500	70
5100180	4950	4.24	6.3	4500	70
6125230	6600	5.6	8.1	0	70
7145290	6600	5.6	8.1	0	70
7190350	9900	8.4	12.1	0	70
7230420	14100	12.8	17.2	0	70
8280400	14100	12.8	17.2	0	70
8350460	14100	12.8	17.2	0	70
9470650	29700	12.1	36.4	0	140
9560650	56400	12.1	36.4	0	140

SMPS = Switched Mode Power Supply

txv0270

Figure 4.12.1: Buffering the Regulator Supply by Means of Additional Intermediate Circuit Capacitors



NOTE! When connecting the intermediate circuit terminals C and D the AC Input side **must** be protected with superfast semiconductor fuses! Formula for calculating the size of the external capacitors:

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

fA018

C_{ext}, C_{std} [µF]
P_{SMPS} [W]
t_{Buff} [s]
U_{Buff}, U_{min} [V]

U_{Buff} = 400 V at U_{LN} = 400 V
U_{Buff} = 460 V at U_{LN} = 460 V
U_{min} = 250 V

Calculation example

A XVy-EV 43570 drive is operated with an AC Input supply U_{LN} = 400 V. A voltage failure buffer is required for max. 1.5 s.

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

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

4.13 Discharge Time of the DC-Link

Table 4.13.1: DC Link Discharge Time

XVy-EV	I_{2N}	Time (seconds)
10306	3.5	90
10408	4.9	150
10612	6.5	
20816	8.3	
21020	12.1	205
21530	15.4	
32040	23.1	220
32550	29.7	
43366	34	60
43570	41	
44590	55	
455110	69	90
570140	81	120
5100180	110	
6125230	124	
7145290	161	
7190350	183	
7230420	218	
8280400	282	
8350460	348	
9330660	485	300
9560650	580	

txv0280

This is the minimum time that must be elapsed when a SIEIDrive - XVy-EV 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 loads on the switching supply are the regulation card, the keypad and the 24Vdc fans “if mounted”).
The drive is disconnected from the line. This represents the worst case condition.

Chapter 5 - Sizing Criteria

Because of the high performance obtained by the drive/brushless motor set, the dynamic performance of the entire system is strongly influenced by the mechanics of the system itself.

In particular, the following considerations are important:
- the degree of precision depends on the sensor and not on the motor
- the response speed depends on the transmission rigidity (mechanical passband)
- the system audible noise, sometimes very strong, does not depend on the motor and/or on the electronics, but on a mechanical design which is not suitable for the required performance.
- the motor noise is due to continuous acceleration and braking. In such conditions, motor overheating may occur, which may not be due to a too-small motor.
- the passband controlling the drive depends on the mechanics, as it is not possible to stabilize the electronics to a period less than 3 times the ring time of the system mechanical oscillations.

The choice of the mechanical transmission must be carried out, therefore, according to the application. In mandrel applications, with significant transmitted power and marginal dynamic performance, common reducer transmissions are used. In this case, that is the optimum economical choice.

In case of axis applications, where the system dynamic performance is fundamental, the required torque is often equal to the sum of the motor and load inertial torques. The use of a reduction ratio in the transmission reduces, on one side, the load inertia influence, but, on the other, it increases the motor side. In such applications, therefore, direct coupling is normally used.
With direct coupling, the system dynamics are influenced by the shaft torsional rigidity and by the relative resonance frequency. The drive and motor are capable of much higher bandwidth than the mechanics. After choosing the motor and the transmission, it is necessary to check the application.
In case of applications whose speed and load are constant or variable for periods longer than the motor time constant, it is sufficient to check that the maximum load is within the capacity limits stated for the motor and the drive.

On the contrary, in applications where the load changes according to a faster cycle, do the following:
- Trace a cycle speed/time diagram, remembering that the reaching of a precise position or speed value requires, apart from the time set by the system limit accelerations, a settling period equal to 3 times the period of the system passband.
- Refer the system inertia and loads back to the motor axis.
- Calculate the acceleration cycle and the cycle of the relative inertial torques.

- State the cycle torque/time diagram by adding the inertial torques to the loads.
- Calculate from the torque/time diagram the cycle effective torque. If the cycle is made up of n duration segments t_1, t_2, ... t_n, and of their corresponding torques C_1, C_2, ... C_n, the cycle effective torque is given by:

$$C_{eff} = \sqrt{\frac{C_1^2 t_1 + C_2^2 t_2 + \ldots + C_n^2 t_n}{t_1 + t_2 + \ldots + t_n}}$$

- Calculate, with the same formula, the average quadratic speed.
- Calculate the cycle average torque.
- Calculate the maximum duration period of the cycle maximum torque.
- Calculate the torque required with the cycle maximum speed.
- Calculate the cycle maximum torque.

The motor and the electronic have to be checked on the basis of the obtained data.

5.1 Motor Check

The motor check phases are:
- check of the peak torque
- thermal Sizing
- electrical Sizing

Check of the demagnetization current
Such control is performed by comparing directly the maximum value of the peak current, which is obtained using the following formula, and the motor demagnetization current.

$$I_{pk} = \sqrt{2}\ \frac{C_{pk}}{K_t}$$

where:
C_{pk} = cycle peak torque
K_t = motor torque constant

Check of the thermal sizing
Check first that the point C_{eff} , ω_{eff} is within the area of the motor continuous operating range.
In particular, calculate the motor temperature increase, given by the relation:

$$\Delta T_{max} = \frac{65}{L_n}\left[\left(\frac{C_{eff}}{T_n}\right)^2 L_n + \left(\frac{\omega_{eff}}{\omega_n}\right)^2 L_0\right]$$

where:
L_n = motor rated losses
T_n = motor rated torque
ω_n = motor rated speed
L_0 = motor rated losses in ω_n

If the maximum temperature is higher than the motor maximum, a bigger motor is needed.

Check of the electric sizing
In this case, it is necessary to check that at maximum speed, the voltage required by the motor is lower or equal to that supplied by the drive with the minimum expected power supply voltage. The following relation must be satisfied:

$$V_{max} = \sqrt{\left(K_e \omega_{pk} + R_w \frac{C_{pk}}{K_t}\right)^2 + \left(\frac{C_{pk}}{K_t} \frac{P_N}{2} \omega_{pk} L_w\right)^2} \leq E_{min}$$

where:

E_{min}	=	minimum voltage supplied by the drive
K_e	=	motor voltage constant
ω_{pk}	=	cycle maximum speed
R_w	=	motor terminal to terminal resistance
C_{pk}	=	cycle maximum torque
K_t	=	motor torque constant
P_N	=	motor pole number
L_w	=	motor terminal to terminal inductance

If such condition is not satisfied, it is necessary to choose a motor with a winding suitable for a higher speed; in this case a higher current will be needed.

5.2 Check of the Drive Size

The drive size is chosen according to the torque to be supplied to the motor with a specific winding, from where the needed energy is derived. The peak and average currents required by the drive are provided by:

$$I_{max} = \frac{C_{pk}}{K_t} \qquad I_{med} = \frac{C_{ave}}{K_t}$$

where:

C_{pk}	=	cycle maximum torque
C_{ave}	=	cycle average torque
K_t	=	motor torque constant

The drive must be in a position to develop continuous and peak currents higher than the calculated values; remember that the drive maximum current must be compared to I_{max} only if the relative time is lower than 2 seconds; if not, the drive must have a rated current higher than I_{max}.

5.3 Application Example: Flying Cut

Consider a continuous belt moving cutter.
The cutter is mounted on a carriage. The belt speed is 5 m/s.
The cutter must, with a command, increase its speed till reaching the belt, get synchronized with the belt speed, keep such speed for 300 ms (cutting time T_t), brake and return to the rest position.
The total stroke of the cutter carriage is 5 m. The cutter weighs 80 kilos plus the motor weight.
As the mechanical transmission system is rather complex, it is necessary to provide a speed stabilization time T_{st} with transients to about 150 ms.

The cutting space with a constant speed is given by:

$$S_t = V_t x (T_t + T_{st}) = 5 x (300 x 10^{-3} + 150 x 10^{-3}) = 2.25 m$$

The carriage will run across the remaining space during its acceleration and deceleration phase. If these two spaces are equal:

$$S_{acc} = S_{dec} = (S_{tot} - S_t) / 2 = (5 - 2.25) / 2 = 1.375 m$$

The average speed during the acceleration is:

$$V_{med} = V_{max} / 2 = 5 / 2 = 2.5 m/s$$

The acceleration and deceleration times are:

$$T_{acc} = S_{acc} / V_{med} = 1.375 / 2.5 = 550 ms$$

The acceleration (and deceleration) is:

$$a = V_{max} / T_{acc} = 5 / 0.55 = 9.091 m/s^2$$

Assuming that the motor weight is about 20 kilos, the required inertial power is:

$$F = a x (M_{carr} + M_{mot}) = 9.091 x (80 + 20) = 909.091 N$$

The total semi-cycle time is:

$$T_{sc} = 2 x T_{acc} + T_{st} + T_t = 2 x 0.550 + 0.150 + 0.300 = 1.55 s$$

The transmission is carried out via a pinion and a rack. The pinion dimensions are:

diameter	Dp = 40 mm
length	hp = 30 mm

The speed, acceleration and inertia brought to the motor axis are:

Speed: $\omega_{max} = V_{max} / (Dp/2) = 5 / (0.04/2) = 250 rad/s$

Acceleration: $m_a = a / (D_p/2) = 9.091/ (0.04/2) = 454.545 rad/s^2$
Inertia: $J = M_{tot} x (D_p/2)^2 = 100 x (0.04/2)^2 = 0.04 kgm^2$

The pinion inertia is given by:

$$Jp = (D_p/2)^4 \ x \ h_p \ x \ \pi \ x \ \delta = 5.806 x 10^{-5} Kgm^2$$

where δ is the density of the material forming the pinion (steel).

Check now a SBM75.30.3 motor with an inertia of 0.0017 kgm^2.

The total inertia is:

$$J_{tot} = J + J_p + 0.0017 = 0.04 + 5.806 \times 10^{-5} + 0.0017 = 0.0417\ kgm^2$$

Assuming a pinion efficiency equal to 0.95, the maximum torque (overload) required to the motor is:

$$C_{max} = m_a \times J_{tot} / 0.95 = 454.545 \times 0.0417 / 0.95 = 19.98\ Nm$$

The average (continuative) and effective torques are therefore, supposing null the torque at constant speed:

$$C_{med} = C_{max} \times T_{acc} \times 2 / T_{sc} = 14.179\ Nm$$

$$C_{eff} = C_{max} \times (2 \times T_{acc} / T_{so})^{1/2} = 16.832\ Nm$$

As the cycle effective torque is higher than the motor rated torque at nominal speed, a motor of a bigger size must be chosen.
Repeating the operations for a SBM77.30.3 motor with an inertia of 0.0023 kgm^2, the obtained average torque is 14.383 Nm while the effective torque is 17.073 Nm. The motor is therefore suitable for the application with a high margin, considering that its nominal torque at nominal speed is 18.8 Nm.
Given the torque constant Kt = 1.50, the average and maximum current absorbed by the motor are:

$$I_{max} = C_{max} / K_t = 12.8\ A_{rms}$$

$$I_{med} = C_{med} / K_t = 9.09\ A_{rms}$$

The drive size to be used with the present application is therefore XVy-EV 21020.

Chapter 6 - Maintenance

6.1 Care

The drives of the XVy series must be installed according to the relevant installation regulations. They do not require any particular maintenance. They should not be cleaned with a wet or moist cloth. The power supply must be switched off before cleaning.

6.2 Service

The screws of all terminals on the drive should be re-tightened two weeks after initial commissioning.
This should be repeated each year. If the drives have been stored for more than three years, the capacitance of the intermediate circuit capacitors may have been impaired. Before commissioning these drives, it is advisable to supply power to the drives for at least two hours in order to regain the capacitor original ratings.
To this purpose apply an input voltage **without applying any load on the output.**
After these steps, the drive is ready to be installed without limits.

6.3 Repairs

Repairs of the drive should only be carried out by qualified personnel (suggested by the manufacturer).
If you carry out a repair on your own, observe the following points:

- When ordering spare parts do not only state the drive type but also the drive serial number. It is also useful to state the type of the regulation card and the system software version.
- When changing the cards ensure that the positions of switches and jumpers are observed!

6.4 Customer Service

For customer service, please refer to your Gefran office.

Chapter 7 - Settings and Commissioning

7.1 PC Configurator

The configurator GF-eXpress is a program supplied together with the product.
Its installation requires a PC with MS Windows ® ME/XP/VISTA or Windows NT®4/2000 system, with minimum 8 Mb RAM.
The configurator communicates with the drive using the Slink-3 protocol.
Together with the drive parameterization, the configurator allows downloading the firmware in order to create some personalized applications using the MDPlc development environment.

7.2 Commissioning

Before powering up the drive, carry out the following verifications:
- Check the connections with the line L1, L2, L3
- Check the connections with the motor U, V, W
- Check the breaking resistance connection (if present)
- Check the connections between the encoder and XE connector
- Check the input connection 24Vdc (if present)
- Check the I/O connections
- Check all the drive and motor ground connections

After having checked as shown above, it's possible now to power the drive; then check:
- Line voltage (max permissible voltage 480Vac + 10%)
- Voltage of the intermediate circuit DC bus (270-350 for input voltage 230Vac, 480-650Vdc for input voltage 400Vac, 432-528 for input voltage 480Vac; if the measured voltage is not in the indicated range, check the line voltage)

7.2.1 Connection with the PC

The drive is delivered from the factory with a standard configuration in the speed mode. The input and output state is already programmed as in the following example; therefore user is able to start up the drive control and run the motor immediately (when used a motor series SBM with encoder sin.cos at 2048 p/r).
To perform the correct parameter settings, it's necessary to use the configurator GF-eXpress. Connect the drive to your PC using the serial communication as suggested in the manual; check that the termination resistance switch is on the 120 ohm position.

GF-eXpress configurator
1) Install the GF-eXpress application from the attached CD-rom (setup.exe, in GF-eXpress folder).
2) Install the Catalog application from the attached CD-rom (setup.exe, in XVyBasic folder).
3) From Windows Start / Programs / GEFRAN menu run the GF-eXpress command to start the configurator.

4) Select DRIVES

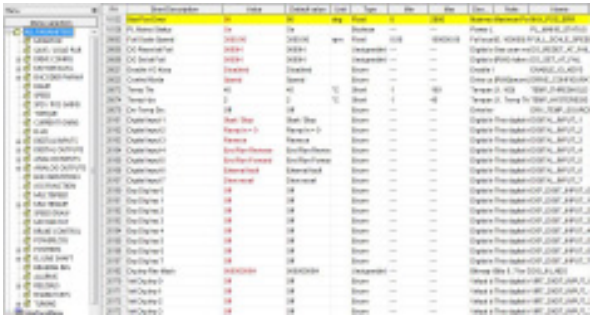
5) Select XVy Servodrive or XVyA

If the PC is connected to the drive via the serial link, the programme recognises the size of the drive and the firmware version.
Otherwise, a window “Manual” is displayed to modify the connection settings. Alternatively, it is possible to continue by deselecting “ON LINE MODE”, when the parameter file (the Basic firmware versions installed will be displayed, e.g. “V.4.37 Basic”) and the size of the drive must be selected manually.

6) At this point there are 2 options:

Wizard:
A guided procedure for easy setup of the drive: windows will open from which the basic setup of the drive, the motor, the loop current, the control method and feedback.

Parameters
For expert users, a list is displayed of all parameters resident in the drive: the data are subdivided into several windows and into Windows-type tree-structure menus.



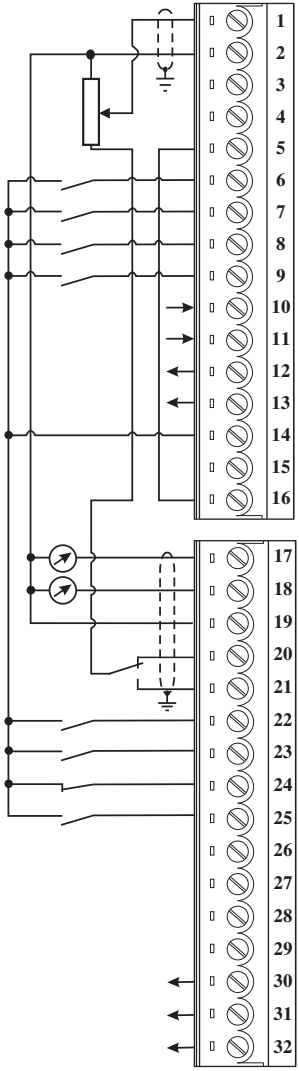
7.2.2 Essential Parameters Set up

The essential parameters to check before starting the motor are:

MENU	PARAMETER
MONITOR	IPA 20053, **Drive size**
DRIVE CONFIG	IPA 20000, **Drive Max Curr**
MOTOR DATA	IPA 20002, **Motor poles**
ENCODER PARAM	IPA 20010, **XE Enc Type**
	IPA 20011, **XE Enc ppr**
	IPA 20012, **XE Enc Supply**
SPEED	IPA 20003, **Full Scale Speed**

It's now possible to enable the drive and rotate the motor in the function of the inputs configuration and setup. As an example three types of configurations are described.

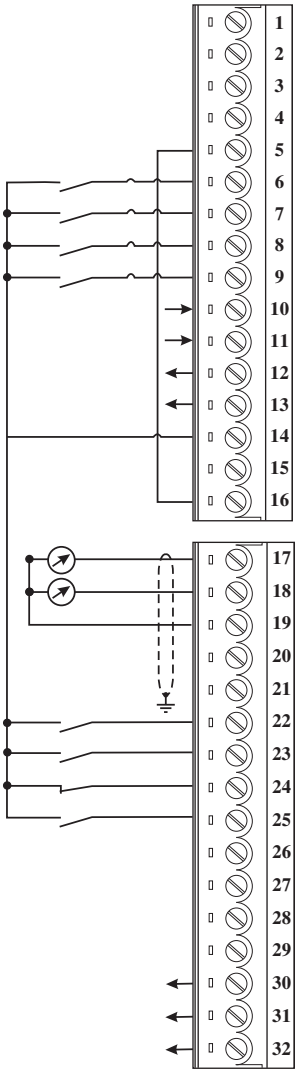
7.2.3 Speed Mode Configuration Example



Strip X1	Function	max
Analog input 0	Programmable/configurable analog differential input. Signal: terminal 1. Reference point: terminal 2. Default setting:"[3] Speed Ref 1".	±10V 0.25mA
Analog input 1	Programmable/configurable analog differential input. Signal: terminal 3. Reference point: terminal 4. Default setting: none	
COM-DI	Reference point for Digital inputs, terminals 6, 7, 8 , 9, 22, 23, 24 and 25.	+10V/10mA -10V
Digital input 0	Drive enable; 0V or open: inverter disabled; +15…+30V: Drive enabled	+30V 3.2mA @ 15V 5mA @ 24V 6.4mA @ 30V
Digital input 1	Programmable digital input, default setting: "[4] Start / Stop"	
Digital input 2	Programmable digital input, default setting: "[8] Ramp In = 0""	
Digital input 3	Programmable digital input, default setting: "[9] Reverse"	
Supply-DO	Supply input for digital outputs	+30V/40mA
COM-DO	Reference point for digital outputs, terminals: 12 and 13	-
Digital output 0	Programmable digital output, default setting: "[3] Speed Reached"	+30V/40mA
Digital output 1	Programmable digital output, default setting: "Speed 0 thr"	
+24V OUT	+24V DC supply output. Reference point: terminal 16	+22...28V 120mA@24V
+24V IN	+24V DC supply input	-
0 V (+24V)	Reference point for +24 V_{DC} I/O	-

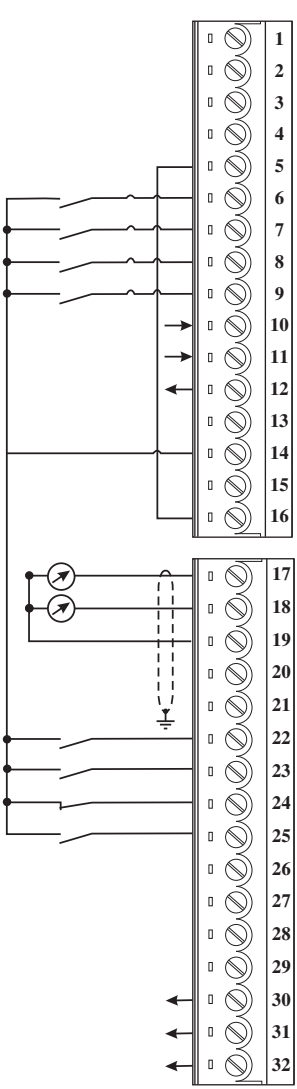
Analog output 0	Programmable analog output, default setting: "[1] Actual speed"	±10V/5mA
Analog output 1	Programmable analog output, default setting: "[2] Motor current"	
0V	Analog output reference point	-
+10V	Reference voltage +10V, reference point: terminal 19	+10V/10mA
- 10V	Reference voltage - 10V, reference point: terminal 19	-10V/10mA
Digital input 4	Programmable digital input, default setting: "[10] End Run Reverse"	+30V 3.2mA @ 15V 5mA @ 24V 6.4mA @ 30V
Digital input 5	Programmable digital input, default setting: "[11] End Run Forward"	
Digital input 6	Programmable digital input, default setting: "[3] External fault"	
Digital input 7	Programmable digital input, default setting: "[2] Drive reset"	
Digital output 2	Programmable digital output, default setting: none	+30V/40mA
Digital output 3		
Digital output 4		
Digital output 5		
Relay-NO	"Drive OK" N.O. contact	250 V AC 1A AC11
Relay-NC	"Drive OK" N.C. contact	
Relay-COM	"Drive OK" common contact	

7.2.4 Position Mode Configuration Example



Strip X1	Function	max
Analog input 0	Not configured	±10V 0.20mA
Analog input 1	Not configured	
COM-DI	Reference point for Digital inputs, terminals 6, 7, 8 , 9, 22, 23, 24 and 25.	
Digital input 0	Drive enable; 0V or open: inverter disabled; +15…+30V: Drive enabled	+30V 3.2mA @ 15V 5mA @ 24V 6.4mA @ 30V
Digital input 1	Programmable digital input, configured as: "[1009] POS Start Pos"	
Digital input 2	Programmable digital input, configured as: "[1007] POS 0 Search"	
Digital input 3	Programmable digital input, configured as: "[1015] POS 0 Sensor"	
Supply-DO	Supply input for digital outputs	+30V/40mA
COM-DO	Reference point for digital outputs, terminals: 12 and 13	-
Digital output 0	Programmable digital output, configured as: "[1002] POS Pos reached"	+30V/25mA
Digital output 1	Programmable digital output, default setting: "Speed 0 thr"	
+24V OUT	+24V DC supply output. Reference point: terminal 16	+24 V ±10% 120mA
+24V IN	+24V DC supply input	+24 V ±10% 1A
0 V (+24V)	Reference point for +24 V_{DC} I/O	-
Analog output 0	Programmable analog output, default setting: "[1] Actual speed"	±10V/5mA
Analog output 1	Programmable analog output, default setting: "[2] Motor current"	
0V	Analog output reference point	-
+10V		+10V/10mA
- 10V		-10V/10mA
Digital input 4	Programmable digital input, default setting: "[10] End Run Reverse"	+30V 3.2mA @ 15V 5mA @ 24V 6.4mA @ 30V
Digital input 5	Programmable digital input, default setting: "[11] End Run Forward"	
Digital input 6	Programmable digital input, default setting: "[3] External fault"	
Digital input 7	Programmable digital input, default setting: "[2] Drive reset"	
Digital output 2	Programmable digital output, default setting: none	+30V/25mA
Digital output 3		
Digital output 4		
Digital output 5		
Relay-NO	"Drive OK" N.O. contact	250 V AC 1A AC11
Relay-NC	"Drive OK" N.C. contact	
Relay-COM	"Drive OK" common contact	

7.2.5 Electrical Line Shaft Mode Configuration Example



Strip X1	Function	max
Analog input 0	Not configured	±10V 0.20mA
Analog input 1	Not configured	
COM-DI	Reference point for Digital inputs, terminals 6, 7, 8 , 9, 22, 23, 24 and 25.	
Digital input 0	Drive enable; 0V or open: inverter disabled; +15…+30V: Drive enabled	+30V 3.2mA @ 15V 5mA @ 24V 6.4mA @ 30V
Digital input 1	Programmable digital input, configured as: "[4] Start / Stop"	
Digital input 2	Programmable digital input, configured as: "[2001] ELS Ratio Sel B0"	
Digital input 3	Programmable digital input, configured as: "[2002] ELS Ratio Sel B1"	
Supply-DO	Supply input for digital outputs	+30V/40mA
COM-DO	Reference point for digital outputs, terminals: 12 and 13	-
Digital output 0	Programmable digital output, configured as: "Speed 0 thr"	+30V/25mA
Digital output 1	Programmable digital output, not configured	
+24V OUT	+24V DC supply output. Reference point: terminal 16	+24 V ±10% 120mA
+24V IN	+24V DC supply input	+24 V ±10% 1A
0 V (+24V)	Reference point for +24 V_{DC} I/O	-
Analog output 0	Programmable analog output, default setting: "[1] Actual speed"	±10V/5mA
Analog output 1	Programmable analog output, default setting: "[2] Motor current"	
0V	Analog output reference point	-
+10V		+10V/10mA
- 10V		-10V/10mA
Digital input 4	Programmable digital input, configured as: "[2003] ELS Inc Ratio"	+30V 3.2mA @ 15V 5mA @ 24V 6.4mA @ 30V
Digital input 5	Programmable digital input, configured as: "[2004] ELS Dec Ratio"	
Digital input 6	Programmable digital input, default setting: "[3] External fault"	
Digital input 7	Programmable digital input, default setting: "[2] Drive reset"	
Digital output 2	Programmable digital output, default setting: none	+30V/25mA
Digital output 3		
Digital output 4		
Digital output 5		
Relay-NO	"Drive OK" N.O. contact	250 V AC 1A AC11
Relay-NC	"Drive OK" N.C. contact	
Relay-COM	"Drive OK" common contact	

7.3 Download Firmware

The standard firmware loaded at the factory is an application called Basic.
The Basic Application Firmware consists of 2 files:
- the firmware (XVyBasicVX_XX.sre)
- the parameter file, the user's tool for the drive tuning (XVyBasicVX_XX.gfe).

The firmware upgrade can be performed making reference to the following points.

1. Open the GF-eXpress configurator.
2. Select the used drive in the displayed window and enable the communication with the drive via the "Target/connect" menu.
3 Open the parameter file of the old firmware version
4 Read all parameters through the “Read All Target Parameter” command in the “Parameter” menu
5. Perform the “Download Firmware” command via the "Service" menu.
6. The XVyBasicVX_XX.sre file of the last version is default (*) stated; choose this file and perform the Load command.

   (*) In case it is not found, search the .gfe file with the Browser button (the file is default located in the path \GEFRAN\CATALOG\ Drives\SERVODRIVE\XVy\XVy-x-xy).

7. Now the firmware download is active; the display shows the quantity of data (Byte number) which are being transferred.
8. Reset the drive with the configurator reset command or disable and afterwards enable again the 24 VDC voltage.
9. Perform the "Load default Target values" command via the "Parameters" menu and answer yes to the question "Save them into target ?".
10. Reset the drive using the configurator "reset" command or switch the device off and then on again.
11. The firmware update is now over; the user can reload the parameters via the “Write All Target Parameter” command in the “Parameter” menu or he can tune the drive

Upgrade from version 3.XX to version 4.XX
The XVy-EV drive is not compatible with 3.X versions.
It is therefore not possible to load firmware earlier than version 4.X onto this drive.

7.4 Automatic Electric Phasing Procedure for Encoder/ Resolver

The knowledge of the right phase relation between the current and the motor magnetic angle is fundamental for the drive performances.
The simple electric and automatic phasing sequence of the XVy drive allows to store the phasing angle in a drive parameter (electric phasing) in order to constantly supply precise information about the phase of the position/speed motor feedback (encoder/resolver).
Such procedure has to be performed every time the XVy drive is used with NON-Gefran motors. All Gefran motors, on the contrary, are factory-phased (mechanical phasing).
Before performing the automatic electric phasing, it is advisable to check the encoder/resolver connections (as described in the paragraph "Encoder Control/Drive Connections") and the power/U-V-W phase sequence connections.

Note! The following procedure must be performed using incremental encoders with zero pulse.
If using an encoder without zero pulse the procedure cannot be completed and will be aborted as unsuccessful.

Procedure

If this procedure is performed using the software of the GF-eXpress configurator, the following sequence has to be respected:

1. Start the software of the GF-eXpress configurator (from the Windows Start menu)
2. Enable the "MONITOR Window" function
3. Display in MONITOR Window the **Enc Mech Offset** (IPA 20058) parameter and the **Enc Offset** (IPA 20057) parameter (from the Service->Phasing menu)
4. Remove any mechanical coupling from the motor shaft, so that it can move freely
5. Set the **Mot Nominal Curr** (IPA 20001) parameter, with the value referring to the motor rated current (from the TUNING / PHASING menu)
6. Set the **Application Sel** (IPA 18140) parameter as "Phasing" (from the TUNING menu)
7. Save the parameters (Command "Save parameters" (*)).
8. Perform the command "Drive Reset" or switch the drive off and on again
9. Enable the drive using the Digital 0 Input
10. Check that the drive performs a current ramp till the limit set in the **Mot Nominal Curr** (IPA 20001) parameter while the motor rotor carries out a small movement
11. After a few seconds the motor starts rotating and stops in a fixed position after performing a revolution. If the motor is SIEI-marked, make sure that it rotates in a clockwise direction (from the motor shaft side); with NON- Gefran,motors, check the wiring on the power cables between the drive and the motor.
    The counting of the encoder/revolver must increase (see 4.4.5 "Encoder Control/Drive Connections" paragraph) during the motor rotation.

12. Check the value of the **Enc Mech Offset** (IPA 20058) parameter keeping the drive enabled. If the motor has been supplied by Gefran, the parameter value has to be near the zero (values in the range of ±4 degrees are allowed) because Gefran motors are factory phased (mechanically) with the XVy-EV Gefran drives.
13. Perform the command "Save parametesr" (*) by keeping the drive enabled. The current value of the phasing angle is stored in the **Enc Mech Offset** (IPA 20058) parameter
14. Disable the drive
15. Set the **Application Sel** (IPA 18140) parameter (from the SERVICE menu) with the original selection "Basic" (factory default) or "Plc"
16. Save the parameters (command "Save parameters" (*))
17. Use the command "Drive Reset" or switch the drive off and on again

At the end of this electric and automatic phasing procedure, it is suggested to configure the XVy drive with a speed mode and to check the motor functioning procedure.

(*) it is possible to run "Save parameters" in the following ways:
- Ctrl+Alt+S
- from the Parameters menu
- "Save parameters into target" key

Chapter 8 - Keypad Operation

8.1 Keypad Description

The keypad consists of an LCD display with two lines of 16 characters each, seven LEDs and nine function keys.

It is used to:
- control operation, when this user option is selected (DRIVE CONFIG / KEYPAD, **Enable I-O Keys** IPA20022 = Keys Enabled)
- display speed, voltage, diagnostics, etc., during operation
- set parameters

8.1.1 LED

The LEDs meaning can be summarized as follows:

- Torque (yellow)	This LED is ON when the drive is running with negative torque.
+ Torque (yellow)	This LED is ON when the drive is running with positive torque.
Alarm (red)	This LED starts to blink in case of a fault condition of the drive. During normal operation this LED will be OFF.
• Enable (green)	This LED is ON when the drive is power supplied and enabled.
ZeroSpeed (yellow)	This LED is ON when the motor speed is zero.
LIMIT (yellow)	This LED is ON if the drive reaches its torque limit. During normal operation this LED will be OFF.

8.1.2 Function Keys

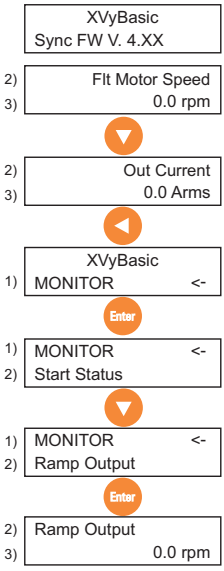
The keypad has nine function keys with different modes defined by the state of the keypad itself.

Control Keys	Text reference	Function
	**START**	START key commands the drive to Enable and Start The **Enable I-O Keys** parameter must be enabled (DRIVE CONFIG / KEYPAD menu)
	**STOP**	STOP key commands to Stop and disable; holding it for 2 seconds disables the drive. The **Enable I-O Keys** parameter must be enabled (DRIVE CONFIG / KEYPAD menu).
	**+** **[Jog] (*)**	The “plus” key increases the reference velocity for the **Motor pot**. function [**Jog**, when the **Shift** key is pressed first]. See paragraph 8.2
	**-** **[Rotation control] (*)**	The “minus” key reduces the reference velocity for the **Motor pot**. function [Control of direction of rotation. When the **Shift** key is pressed, it changes the motor direction of rotation (in **Jog** mode and in **Motor pot** function)]. See paragraph 8.2
	**Down** **[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]
	**Up** **[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 / Down** arrows keys. **Left** arrow key returns to normal mode.
	**Left** **[Escape]**	Used to go down 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 up one level in menu navigation; to enter Selections or numeric values after editing, to issue commands, to acknowledge alarms in the Alarm list mode. [Home second function, return to **Monitor** menu from any main menu level].
	**Shift**	Shift button enables the keypad second functions (Rotation control, Jog, Help, Alarm, Escape, Home)

[...] Secondary function. Press **Shift** to activate these functions.

(*) The Jog and + / - keys (Motor potentiometer) can be activated only when the speed and current are displayed (press Left in the Monitor menu)

8.1.3 Display - Using keypad



At drive power on, the display shown: drive configuration (Basic or Plc) and the firmware version.

After few seconds the display will shown the speed in rpm.

By pressing the **Down** or **Up** key, the load in Arms will be displayed.

Pressing **LEFT** causes the display to show the parameter mode. The first **MONITOR** menu is displayed.

Press Enter to go to the **MONITOR** menu and display the **Start Status** parameter.

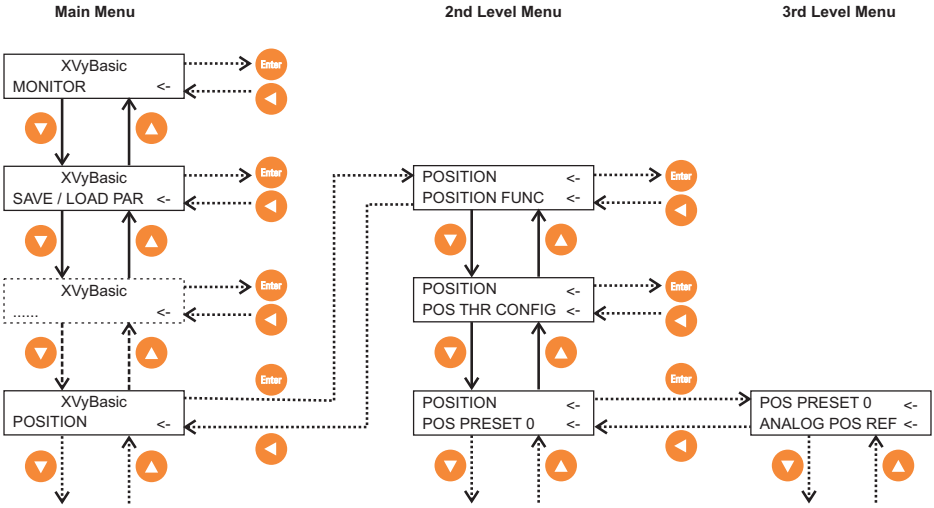
Pressing **Down** displays the next parameter **Ramp Output**

Pressing **Enter** displays the value of the parameter.

1) Menu	This field shows the index for the menu currently displayed (E.g. **MONITOR** menu).
2) Parameter	This field shows the name of the parameter currently displayed (E.g. **Start Status** = IPA 20500).
3)Select / Value	This field shows the selection or true value of the parameter selected.

Note!	When three asterisks (***) are displayed this means the number of characters to be displayed exceeds the field length. In that case you can display the information using a PC and the GF-eXpress configuration software.

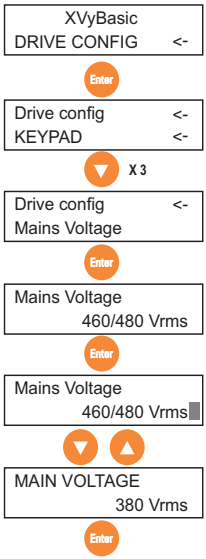
Figure 8.1.3.1: Navigation within the menus



Full list of menus and parameters in chapter 10.

8.2 Keypad operations

Changing parameters



1 From the DRIVE CONFIG menu, press **Enter.**

2 Press **Down** three times to select the **Mains Voltage** parameter.

3 Press **Enter**

4 Press **Enter,** the cursor will start blinking.

5 Set the voltage values using the **Up** or **Down** keys.

6 Press **Enter**

Saving parameters

1 From the SAVE / LOAD PAR menu, press **Enter**.

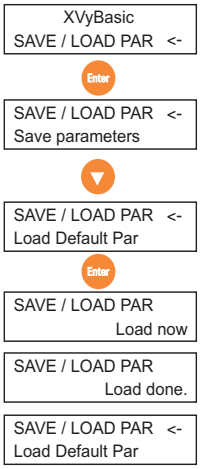
2 Press **Enter** again to save the settings.

3 The display will show the confirmation messages "**Save now**" and "**Save done.**"

4 When the operation is complete, the display will show **Save Parameters** again.

Loading default parameters

The default parameters relate to the size of the drive, which is not modified by this operation.



1 From the SAVE / LOAD PAR menu, press **Enter.**

2 Press the **Down** key to select the **Load Default Par** parameter.

3 Press **Enter**

4 The display will show the confirmation messages "**Load now**" and "**Load done.**"

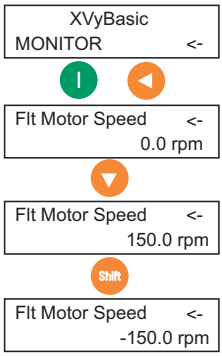
5 When the operation is complete, the display will show the **Load Default Par** parameter again.

Reset alarms and drives

See section 8.3.1.

Jog function

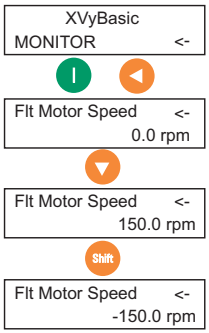
The drive should be enabled: + 24Vdc at terminal 6.



1. From the MONITOR menu, press **Start** to activate, then press **Left**
2. The speed display is enabled (or press **Down** or **Up,** to enable current display).
3. Press **Shift** to enable the secondary functions, then press **+** to pass to the set reference
4. Press **–** to invert the rotation direction and press **+** to decrease the reference speed and pass to the set reference

Motor potentiometer function

Enable the drive (+ 24Vdc at terminal 6) and send the Start command (+ 24Vdc at terminal 6).



1. From the MONITOR menu, press **Start** to activate, then press **Left**
2. The speed display is enabled (or press **Down** or **Up,** to enable current display)
3. Press **+** to increase the reference speed.
4. Press **Shift** to enable the secondary functions, then press **–** to revert the direction rotation and press **+** to decrease the reference speed

8.2.1 Errors

If the operator will try to give to a parameter a wrong value (e.g. outside the Min/Max permitted values), the display will show an "E" followed by the numeric code of the error (e.g. **E 04**); to move back to Status Index 2 "Parameter Display" press any function key of the keypad.

Table 8.2.1.1: Errors list

Code E 01	Error code 1	Parameter does not exist
Code E 02	Error code 2	System error
Code E 03	Error code 3	Type does not exist
Code E 04	Error code 4	Read-only parameter
Code E 05	Error code 5	Write enabled only when drive is enabled
Code E 06	Error code 6	Value outside min value
Code E 07	Error code 7	Value outside max value
Code E 08	Error code 8	System error
Code E 09	Error code 9	Value exceed limit

8.3 Alarms and Errors Handling

8.3.1 Alarms (Failure register)

In the event of an alarm, the "**Alarm**" LED flashes red, while the keypad displays an alarm code and description.

Figure 8.3.1: Led Status and Keypad

A18	alarm code
115.15h	time in which the alarm occurred
Enc Fbk Loss	short description of alarm
RA (Reset Alarm)	To reset the alarm, enable the drive and press **Enter**, then select RA with the **Up** or **Down** keys and press **Enter**.
RD (Reset Drive)	To reset the drive, enable the drive and press **Enter**, then select RD with the **Up** or **Down** keys and press **Enter**.
HIS (Alarm log)	To display the alarm log, select HIS with the **UP** or **DOWN** keys and press **Enter**.

Displaying the alarm log

The drive can save up to 25 alarms. The type of alarm and the moment the alarm occurred, starting from the most recent, can be displayed using the keypad.

To enter the alarm log display mode, press the **Shift** + **UP** keys (if the drive is not in an alarm condition) or select HIS from the list of alarms (par 8.3.1).

```
24   A18              100.13h
Enc Fbk Loss
```

24	record number
A18	alarm code
100.13h	time in which the alarm occurred
Enc Fbk Loss	short description of alarm

Use the **UP** and **DOWN** keys to display all the alarms that have been saved.

No alarm is displayed on the keypad if the item in the list is empty.
No Description is displayed on the keypad if the string describing the alarm has not been defined. In that case reference should be made to the alarm code.

```
24   A00              0.00h
No Alarm
```

```
24   A18              100.13h
No Description
```

Table 8.3.1.1: Alarms list

	Description on the keypad	Description on GF-eXpress	
Code A 01	IGBT desaturat	Short circuit on the power section	(*)
Code A 02	Overcurrent	Drive overcurrent protection	(*)
Code A 03	Overvoltage	DC Link overvoltage	(*)
Code A 04	Heatsink Ot	Drive thermal protection	(*)
Code A 05	Parameter Error	Wrong setting of a parameter	
Code A 06	Current Fbk Loss	Current feedback sensor failure	(*)
Code A 07	Motor Overtemp	Motor thermal protection	(*)
Code A 08	CPU Overtime	CPU overtime error	
Code A 09	Enable key error	Wrong enabling key for PLC and/or DeviceNet	
Code A 11	Inval Flash Par	Invalid parameters value	
Code A 12	Flash Fault	Bad flash device	
Code A 13	Brake Overpower	Overpower of the braking resistor	(*)
Code A 14	Reg Pwr Failure	Failure on the regulation power supply	(*)
Code A 15	System Warning	System Warning	
Code A 16	Main Loss	Main power loss	(*)
Code A 18	Enc Fbk Loss	Encoder feedback loss	(*)
Code A 19	Enc Sim Fault	Encoder simulation alarm	(*)
Code A 20	Undervoltage	Undervoltage of the DC Link section	(*)
Code A 21	Intake Air Ot	Intake air temperature too high	(*)
Code A 22	Regulation Ot	Overtemperature of the regulation board	(*)
Code A 23	Module Overtemp	Overtemperature of the IGBT module	(*)
Code A 24	Load Default Err	Load default error	(*)
Code A 25	Reset Required	Reset required after a parameter modification	
Code A 26	FieldBus Failure	Field bus communication failure	(*)
Code A 27	Enable Seq Error	Wrong drive enabling sequence	(*)
Code A 28	Fast Link Error	Fast link communication failure	(*)
Code A 29	Position Error	Position error greater then the limit	(*)
Code A 30	Drive Overload	Drive overload alarm	(*)
Code A 31	External Fault	External Fault	(*)
Code A 32	PLC Application	PLC application not running	

(*) alarms resettable with an ALARM RESET command

8.3.2 Alarm description

(A 01) IGBT desaturat
Short circuit on the motor winding or on the power bridge.

(A 02) Overcurrent
Overcurrent protection intervention.
The cause could be an incorrect setting of the current regulator gains as compared

(A 03) Overvoltage
Overvoltage on the intermediate circuit.
The braking resistance is not connected in the right way or it is open.
The threshold is 950V.

(A 04) Heatsink Ot
Drive thermal protection.
The working cycle is too high for the drive size.

(A 05) Parameter Error
Parameters setting error.
The IPAs are showed on **IPA 1 Par Set** (IPA 24110) and **IPA 2 Par Set** (IPA 24111)

(A 06) Current Fbk Loss
Current feedback sensor failure.

(A 07) Motor Overtemp
Intervention of the motor thermal protection.
Overtemperature on the motor winding or PTC sensor not connected to the drive.

(A 08) CPU Overtime
On **CPU Err Al Cause** (IPA 18143) the cause is specified.

(A 09) Enable key error
Wrong enabling key for Plc and/or DeviceNet.

(A 11) Inval Flash Par
The parameter value is not recognized.
Do the Parameter Saving and Drive Reset commands with the correct parameters.

(A 12) Flash Fault
Alarm on a non preset flash. Firmware error.

(A 13) Brake Overpower
The internal braking resistance is too warm because of a too high working cycle. Wait 30 seconds and give the Drive Reset command. The resistance temperature is calculated by an algorithm of the drive.

(A 14) Reg Pwr Failure
±15V internal power supply of regulation board R-XVy is not working.

(A 15) System warning
Generic error: Check parameter 18393 for the alarm cause

(A 16) Main Loss
Power supply failure
The **Powerloss** function is activated.

(A 18) Enc Fbk Loss
Error detected in encoder feedback. Failure cause is specified in parameter **Enc Warning Case** (IPA 20016, **ALARMS** menu)

(A 19) Encoder Simulat
Encoder simulation alarm.
Check the encoder simulation parameters..

(A 20) Undervoltage
Always active when the drive is enabled.
The threshold level depends on the power supply level selected in parameter **Mains Voltage** (IPA 20050), according to the following table.

Main supply	DC-bus threshold undervoltage
230 VAC	225.4 VAC
380 VAC	372.3 VAC
400 VAC	391.9 VAC
415 VAC	406.6 VAC
440 VAC	431.1 VAC
460 VAC	450.7 VAC

(A 21) Intake Air Ot
Temperature of intake air too high; detected by TAC sensor.

(A 22) Regulation Ot
Overtemperature of regulation board; detected by sensor on reg board.

(A 23) Module Overtemp
IGBT module Overtemperature; detected by sensors on Power stage.

(A 25) Reset Required
There has been a modification of one or more parameters that requires a DRIVE RESET to be active.

(A 26) FieldBus Failure
Bus communication not present

(A 27) Enable Seq Error
Sequence error alarm
When the drive is power supplied (after the drive reset), it is active if the digital input 0 is high.

(A 28) Fast Link Error
Fast Link communication alarm.
It occurs in slave drives when the fast link serial communication is physically interrupted.

(A 29) Position Error
Position error alarm.
It happens in the position slaves and with the electric shaft mode when the error is higher than the **Max Pos Error** (IPA 18123) parameter.

(A 30) Drive Overload
Drive overload alarm.
Drive overload duration is too high. Check drive sizing using the overload table specified in section 2.3.3 IxT Algorythm

(A 31) External Fault
External alarm present.
A digital input has been programmed as an external alarm, but +24V is not available on this terminal.

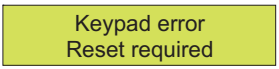
(A 32) PLC Application
MDPlc application not loaded.
Active only if the application selected is MDPlc.

8.4 Saving drive parameters on the keypad

The drive parameters can be saved on the keypad for subsequent configuration of another drive. The IPA and parameter value are saved on the keypad.

To start the procedure, set the Save Param Pad parameter (SAVE / LOAD PAR menu) to Save Now. This might take a few minutes.

The Keypad Error message is displayed in case of an error in the keypad memory



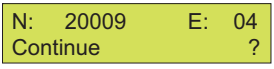
At this stage the only option is to reset the drive by pressing 

8.4.1 Configuring the drive using parameters saved on the keypad

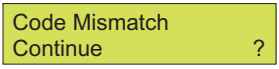
To configure the drive using the parameters saved on the keypad, first set the Load Param Pad parameter (SAVE / LOAD PAR menu) to Load Now. This might take a few minutes.

.

The drive runs a series of checks to verify the compatibility of the parameters. The following messages are displayed if an error occurs:



An error occurred when writing the parameter to the drive (See list of errors 8.2.1.1). Select Continue or Reset using the **UP** and **DOWN** keys. Press **Enter** on Continue to continue. Press **Enter** on Reset to reset the drive.
Press **ESC** to quit and complete the procedure.



The software running on the drive is not the same as that used to save the parameters. This could result in incompatibility of parameters. Select Continue or Reset using the **UP** and **DOWN** keys. Press **Enter** on Continue to continue. Press **Enter** on Reset to reset the drive.

```
Size mismatch
Continue                ?
```

The drive is not the same size as that used to save the parameters. This could result in incompatibility of parameters. Select Continue or Reset using the **UP** and **DOWN** keys. Press **Enter** on Continue to continue. Press **Enter** on Reset to reset the drive.

If any errors have occurred, the following message is displayed at the end of the procedure:

```
Errors loading…
Save
```

Otherwise the following message is displayed

```
Successfully
Save                    y
```

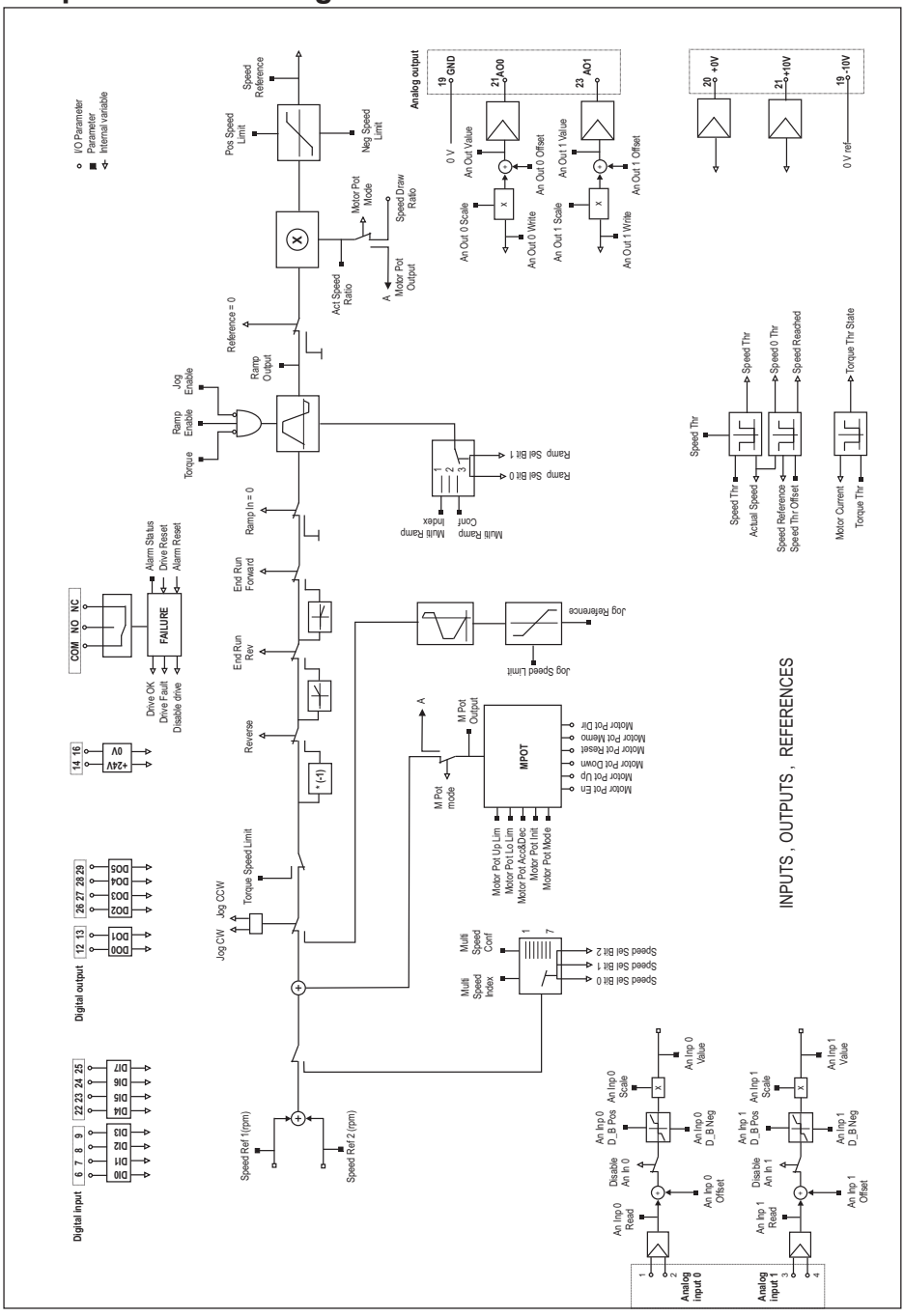
Select y or n using the **UP** and **DOWN** keys. Press Enter on y to save the parameters to the drive. Press **Enter** on n if you do not wish to save the parameters to the drive. The drive will be reset to make all the new parameters operational.

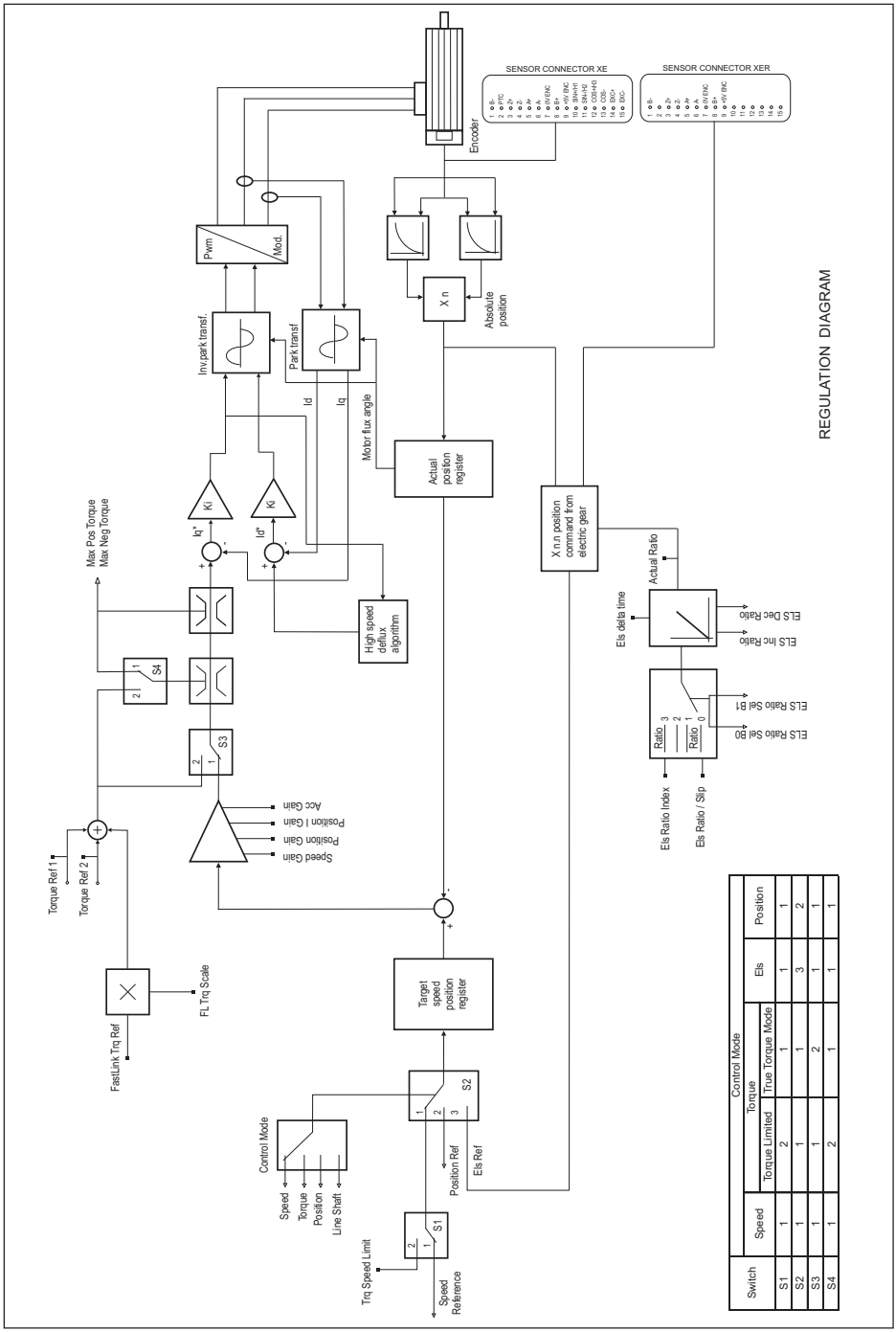
The Keypad Error message is displayed in case of an error in the keypad memory

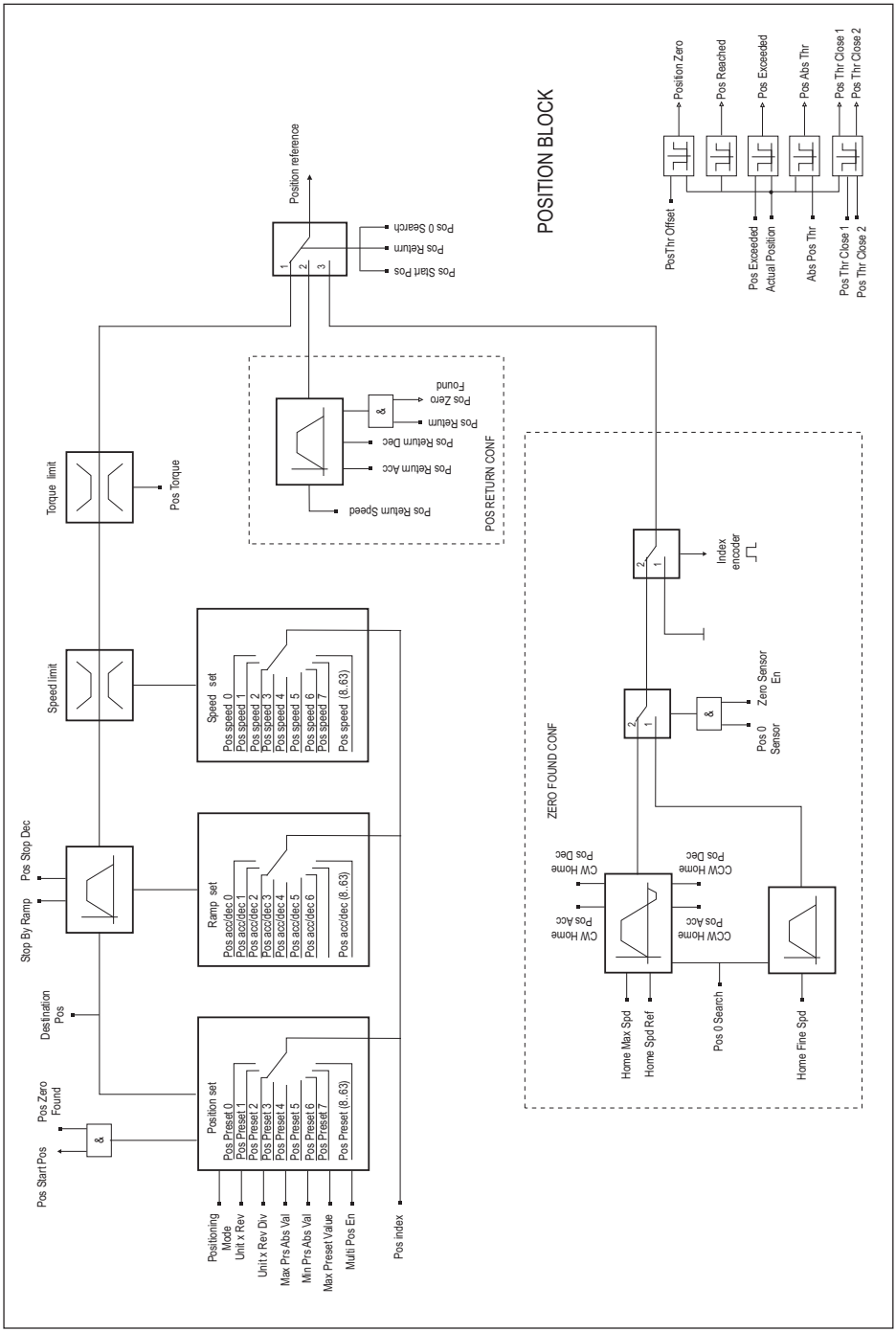
```
    Keypad error
  Reset required
```

At this stage the only option is to reset the drive by pressing 

Chapter 9 - Block Diagrams

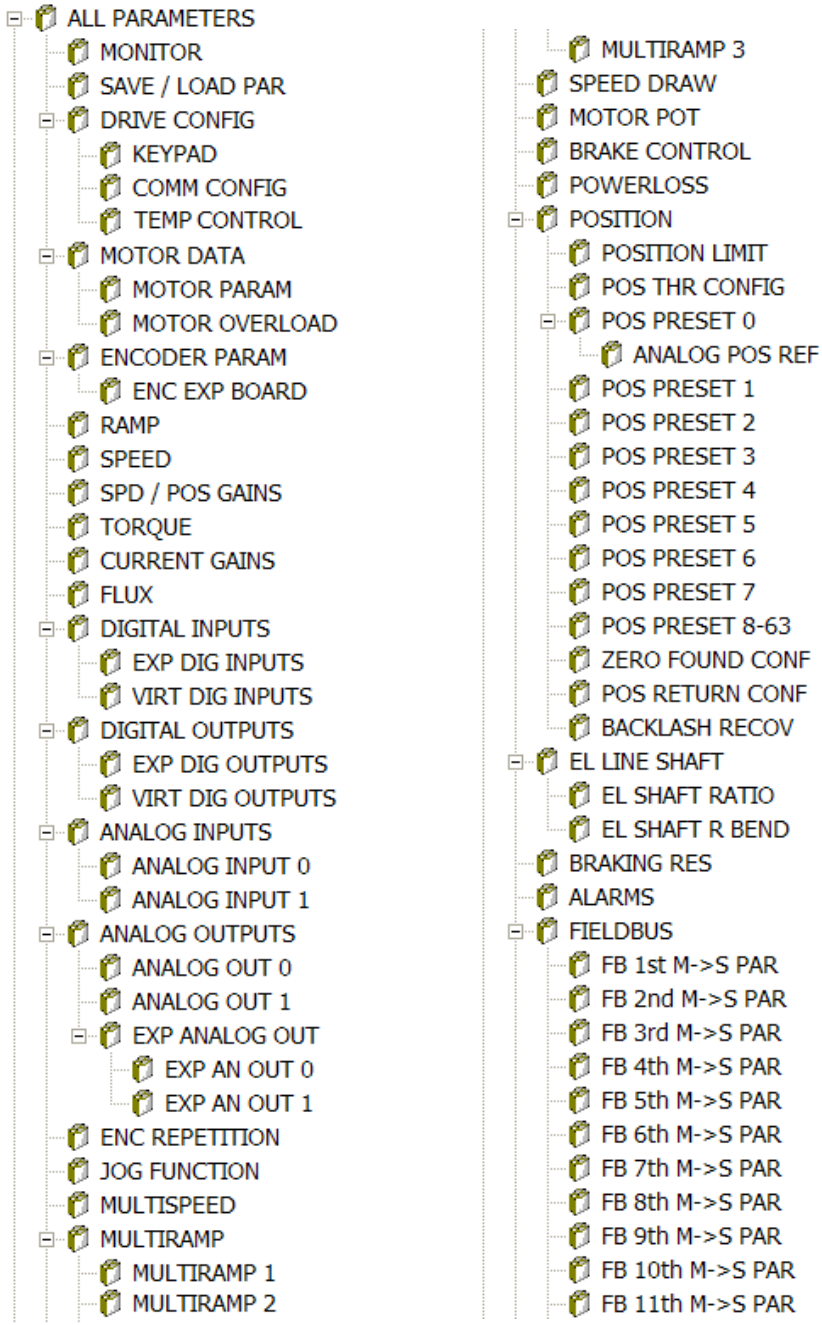


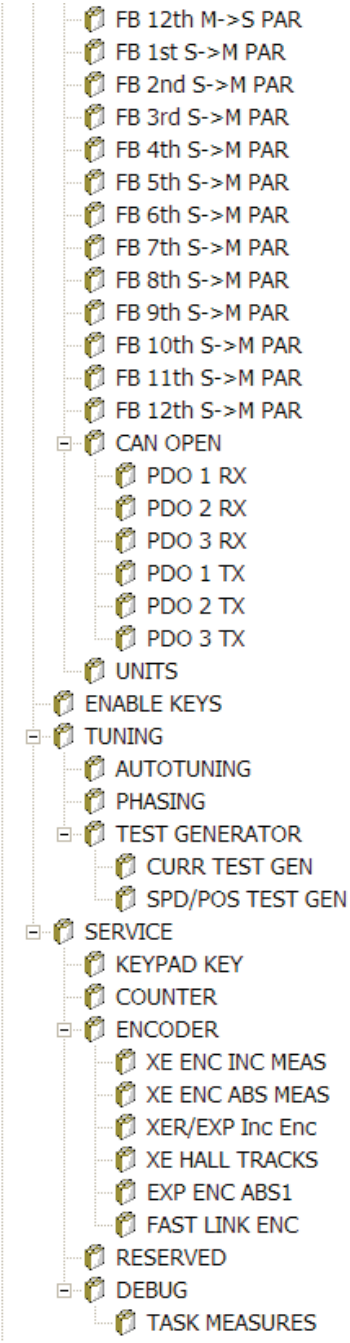

REGULATION DIAGRAM
SENSOR CONNECTOR XE
SENSOR CONNECTOR XER
Encoder
Pwm
Mod.
Inv.park transf.
Park transf
Id
Iq
Motor flux angle
Ki
Kd
Id*
Iq*
High speed deflux algorithm
Actual position register
X n
Absolute position
X n.n position command from electric gear
Actual Ratio
Els delta time
ELS Dec Ratio
ELS Inc Ratio
ELS Ratio Sel B1
ELS Ratio Sel B0
Ratio
Els Ratio Index
Els Ratio / Slip
Max Pos Torque
Max Neg Torque
S4
S3
Speed Gain
Position Gain
Position I Gain
Acc Gain
Torque Ref 1
Torque Ref 2
FastLink Trq Ref
FL Trq Scale
Target speed position register
S2
Control Mode
Speed
Torque
Position
Line Shaft
Position Ref
Els Ref
S1
Trq Speed Limit
Speed Reference
Switch
Speed
Torque
Torque Limited
True Torque Mode
Els
Position
S1
S2
S3
S4


POSITION BLOCK
Position reference
Pos Start Pos
Pos Return
Pos 0 Search
Position Zero
Pos Reached
Pos Exceeded
Pos Abs Thr
Pos Thr Close 1
Pos Thr Close 2
PosThr Offset
Pos Exceeded Actual Position
Abs Pos Thr
Pos Thr Close 1
Pos Thr Close 2
POS RETURN CONF
Pos Return Speed
Pos Return Acc
Pos Return Dec
Pos Return
Pos Zero Found
Torque limit
Pos Torque
Speed limit
Speed set
Pos speed 0
Pos speed 1
Pos speed 2
Pos speed 3
Pos speed 4
Pos speed 5
Pos speed 6
Pos speed 7
Pos speed (8..63)
Stop By Ramp
Pos Stop Dec
Ramp set
Pos accdec 0
Pos accdec 1
Pos accdec 2
Pos accdec 3
Pos accdec 4
Pos accdec 5
Pos accdec 6
Pos accdec (8..63)
Destination Pos
Position set
Pos Preset 0
Pos Preset 1
Pos Preset 2
Pos Preset 3
Pos Preset 4
Pos Preset 5
Pos Preset 6
Pos Preset 7
Pos Preset (8..63)
Pos Start Pos
Pos Zero Found
Positioning Mode
Unit x Rev
Unit x Rev Div
Max Prs Abs Val
Min Prs Abs Val
Max Preset Value
Multi Pos En
Pos index
ZERO FOUND CONF
Index encoder
Zero Sensor En
Pos 0 Sensor
CW Home Pos Dec
CW Home Pos Acc
CCW Home Pos Acc
CCW Home Pos Dec
Home Max Spd
Home Spd Ref
Pos 0 Search
Home Fine Spd

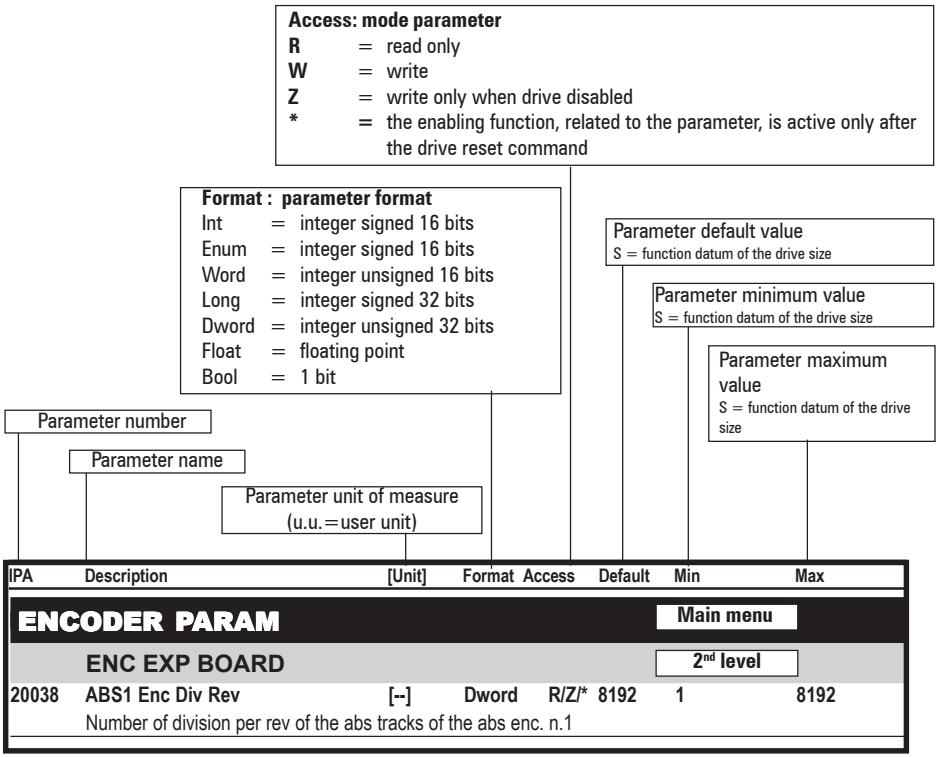
Chapter 10 - Parameters and Functions

10.1 Parameters menu




FB 12th M->S PAR
FB 1st S->M PAR
FB 2nd S->M PAR
FB 3rd S->M PAR
FB 4th S->M PAR
FB 5th S->M PAR
FB 6th S->M PAR
FB 7th S->M PAR
FB 8th S->M PAR
FB 9th S->M PAR
FB 10th S->M PAR
FB 11th S->M PAR
FB 12th S->M PAR
CAN OPEN
PDO 1 RX
PDO 2 RX
PDO 3 RX
PDO 1 TX
PDO 2 TX
PDO 3 TX
UNITS
ENABLE KEYS
TUNING
AUTOTUNING
PHASING
TEST GENERATOR
CURR TEST GEN
SPD/POS TEST GEN
SERVICE
KEYPAD KEY
COUNTER
ENCODER
XE ENC INC MEAS
XE ENC ABS MEAS
XER/EXP Inc Enc
XE HALL TRACKS
EXP ENC ABS1
FAST LINK ENC
RESERVED
DEBUG
TASK MEASURES

10.2 Legend



NOTA!

- FLT_M = 3.40282347^{38}
- In order to perform the **Save Parameters**, the **Reset Drive** command, or **Load Default Par** (*) via the serial line, the number of the parameter index to be brought to a high logic level

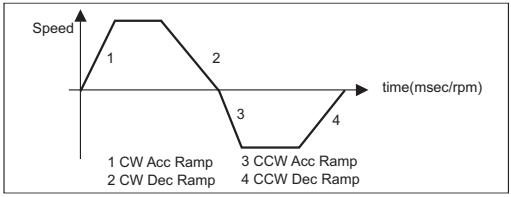
Save Parameters	=	18011
Reset Drive	=	18010
Load Default Par	=	18017

(*) the default command does not change the parameters:
- **Mains Voltage**, IPA 20050
- **Application Sel**, IPA 18140

10.3 Parameters Description and Functions

The standard factory-loaded XVy-EV configuration (IPA 18140=0=Basic in SERVICE menu) allows torque, speed, position and electric shaft regulation. The drive is supplied defaulted to run as a speed regulator. The four regulation modes are correlated one with the other and are enabled via a suitable bit parameter which can be addressed as a digital input.
The parameter list sorted as shown on the keyboard and GF-eXpress (default setting) is given below.

IPA	Description	[Unit]	Format	Access	Default	Min	Max
MONITOR							
20500	**Start Status** Condition of the drive start command.	**[--]**	**Word**	**R**			
21212	**Ramp Output** Parameter reading the speed reference on the output of the ramp block.	**[rpm]**	**Float**	**R**			



18735	**Out Current** Motor present current (filtered).	**[Arms]**	**Float**	**R**			
18805	**Torque Current** Present value of the quadrature axis current (filtered).	**[Arms]**	**Float**	**R**			
18806	**Flux Current** Present value of the direct axis current (filtered).	**[Arms]**	**Float**	**R**			
18807	**Act Out Curr Lim** Present value of the maximum current to be supplied by the drive.	**[Arms]**	**Float**	**R**			
18732	**Act Pos Trq Lim** Present torque upper limit. 100% equal to the motor rated torque.	**[%]**	**Float**	**R**			
18746	**Act Neg Trq Lim** Present torque lower limit. 100% equal to the motor rated torque.	**[%]**	**Float**	**R**			
18739	**Act Torque** Torque applied to motor (filtered). 100% is the rated torque of the IPA 18800 motor, **Base Torque**	**[%]**	**Float**	**R**			
18776	**Act Torque Eng** Torque applied to motor in Nm.	**[Nm]**	**Float**	**R**			
18748	**Ramp Reference** Ramp reference.	**[rpm]**	**Float**	**R**			
18749	**Speed Reference** Speed reference.	**[rpm]**	**Float**	**R**			
18777	**Motor Speed** Speed of motor.	**[rpm]**	**Float**	**R**			
18782	**Act Out Power** Value of the motor Output Power. This parameter is the resulting of the value between Torque and speed.	**[kW]**	**Float**	**R**			

IPA	Description	[Unit]	Format	Access	Default	Min	Max
18754	**Act Pos Spd Lim** Positive speed limit.	**[rpm]**	**Float**	**R**			
18755	**Act Neg Spd Lim** Negative speed limit.	**[rpm]**	**Float**	**R**			
18756	**Enc Postition** Speed/pos feedback position.	**[mech. deg]**	**Float**	**R**			
18757	**Enc Revolution** Revolutions number for speed/pos feedback.	**[--]**	**Float**	**R**			
18742	**Out Frequency** Output frequency	**[Hz]**	**Float**	**R**			
18736	**DC Link Voltage** DC link voltage (filtered).	**[V]**	**Float**	**R**			
18772	**Output Voltage** Output voltage	**[Vrms]**	**Float**	**R**			
18710	**Heatsink Temp** Drive heatsink temperature	**[°C]**	**Int**	**R**			
18711	**Intake Air Temp** Input air temperature. If the temperature probe is not present, the parameter always shows an invalid value.	**[°C]**	**Int**	**R**			
18712	**Reg Card Temp** Regulation card temperature	**[°C]**	**Int**	**R**			
20022	**FW Version** Firmware version	**[--]**	**Float**	**R**			
19607	**Drive Ovld Fact** Drive overload factor: when it reaches 100%, the drive automatically limits the output current to the drive rated current. The maximum peak current can be supplied again by reducing the drive supplied current to a value lower than the rated one till the I2T integral value returns to zero.	**[%]**	**Word**	**R**			

SAVE / LOAD PAR

18011	**Save Parameters** Any changes to the value of the parameters have an immediate effect on the running of the drive, but are not automatically stored in memory. The **Save Parameters** instruction is used to store the value of the current parameters to the permanent store. All unsaved modifications will be lost when the drive is powered down. 0 = Save Done 1 = Save Now	**[--]**	**Bool**	**R/W**	**0**	**0**	**1**
18017	**Load Default Par** The factory setting parameters will be restored. 0 = Load Done 1 = Load Now	**[--]**	**Bool**	**R/W**	**0**	**0**	**1**
18070	**Load Param PAD** Loading values of parameters on the keypad to the drive memory. 0 = Load Done 1 = Load Now	**[--]**	**Bool**	**R/W**	**0**	**0**	**1**
18071	**Save Param PAD** The values of the drive parameters are saved in the keypad memory. 0 = Save Done 1 = Save Now	**[--]**	**Bool**	**R/W**	**0**	**0**	**1**

IPA	Description	[Unit]	Format	Access	Default	Min	Max
18010	**Reset Drive** Resets the drive 0 = Reset Now 1 = Drive Working	**[--]**	**Bool**	**R/W**	**0**	**0**	**1**

DRIVE CONFIG

20023 **Control Mode** **[--]** **Enum** **R/W/*** **2** **1** **8**

Configuration of the drive working mode. It is possible to select four different modes: torque, speed, electric axis and position control (as for the selection see the next table).
The drive is factory programmed for speed control.
1=Torque
2=Speed
4=Position
8=EIs

Function configuration	Bit0	Bit1	Bit2	Bit3	Bit4	Bit5...15 (*)
Drive disabled	0	0	0	0	0	0
Torque control	1	0	0	0	0	0
Speed control	0	1	0	0	0	0
Position control	0	0	1	0	0	0
Electric line shaft control	0	0	0	1	0	0

txv9030

(*) These bits have to be set at 0 to be compatible with future versions.

The different working modes can be selected also via a suitably programmed digital input.
See **Digital inputs** for further details.

20050 **Mains Voltage** **[--]** **Enum** **R/Z/*** **1** **0** **5**
Main voltage supply
0=230 Vrms
1=400 Vrms
2=460/480 Vrms
3=380 Vrms
4=415 Vrms
5=440 Vrms

20051 **Environment Temp** **[--]** **Enum** **R/Z/*** **0** **0** **1**
Environment temperature
0=0..40°C (32°..104°F)
1=0..50°C (32°..122°F)
2=0..60°C (32°..140°F) **(only for XVy-EV ... EWH/EWHR)**

20052 **PWM Frequency** **[--]** **Enum** **R/W/*** **0** **6** **3**
Switching frequency:
0=Default (see table 2.3.2.1)
2= 2 kHz
4= 4 kHz
8= 8 kHz

20000 **Drive Max Curr** **[Arms]** **Float** **R/Z** **IP18701** **0** **IPA18703**
Setting the drive maximum current output to the motor.

18778 **Overload Control** **[--]** **Enum** **R/Z*** **0** **0** **1**
Choice of algorithm to calculate drive overload:
0 = IxT
1 = I^2xT

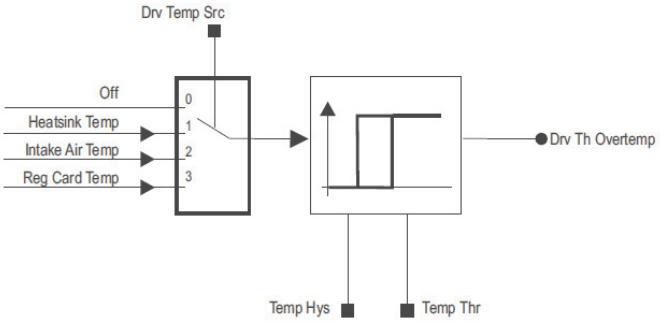
29004 **Act Ctrl Mode** **[--]** **Enum** **R**
It states the selected functioning method, see IPA 20023
1=Torque
2=Speed

IPA	Description	[Unit]	Format	Access	Default	Min	Max
	4=Position 8=Els ***Note!*** When the IPA 18104 **Application Sel** parameter = "Autotuning" or "Phasing" or "Test generator", the **Act Ctrl Mode** parameter is displayed as "* * *"						
20053	**Drive size** Display size of drive. Example: : 10306 = XVy-EV 10306	**[--]**	**Enum**	**R**			
18701	**Drive Nom Curr** Drive nominal current (see I_{2N} table 2.3.2.1)	**[Arms]**	**Float**	**R**			
18704	**Drv Nom Curr 0Hz** Nominal current of drive at 0Hz (see table 2.3.3.1).	**[Arms]**	**Float**	**R**			
18703	**Max Ovld Curr** Maximum overload current.	**[Arms]**	**Float**	**R**			
18222	**Relay Config** Relay Configuration. 0= Drive Ready 1 = Drive OK	**[—]**	**Enum**	**R/Z/***	**0**	**0**	**1**
	KEYPAD						
20021	**Enable I-O Keys** Enables Start (I) and Stop (O) keys on keypad. 0= Disabled 1 = Enabled	**[--]**	**Bool**		**0**	**0**	**1**
	COMM CONFIG						
18031	**Drive Serial Add** Drive address when it is connected via the RS485 serial line.	**[--]**	**Word**	**R/W/***	**0**	**0**	**127**
18032	**Serial Prot Type** Configuration of the communication protocol of the drive 485 serial line: 0=Slink 1= Modbus	**[--]**	**Word**	**R/Z/***	**0**	**0**	**1**
20024	**Serial Baud Rate** Configuration of the communication speed (baudrate) of the drive serial line. It is possible to select one of the following values: 1200, 2400, 4800, 9600, 19200, 38400. If this value is modified, it is advisable to mark the drive with a label if you change the default to highlight the different serial line configuration; in this way, possible communication problems between the drive and the GF-eXpress configurator, whose default setting is 38400, will be avoided. GF-eXpress window, see IPA 20025.	**[--]**	**Enum**	**R/W/***	**38400**	**1200**	**38400**
20025	**Serial Line Conf** Configuration of the drive RS485 serial port. It is possible to select one of the following values: N,8,1=32785 (NO parity, 8 data bit, 1 stop bit) O,8,1=36919 (Odd parity, 8 data bit, 1 stop bit) E,8,1=32823 (Even parity, 8 data bit, 1 stop bit) N,8,2=32793 (No parity, 8 data bit, 2 stop bit) O,8,2=36927 (Odd parity, 8 data bit, 2 stop bit) E,8,2=32831 (Even parity, 8 data bit, 2 stop bit) The factory configuration is 32785 (N,8,1). In this case too, as for the previous parameter, it is advisable to mark the drive with a label. ***Attention !*** The change of the serial port configuration becomes active only after the drive Reset has been performed. The GF-eXpress configurator has to be configured as the drive in the **Communication Settings** menu.	**[--]**	**Enum**	**R/W/***	**32785**	**32785**	**32927**

IPA	Description	[Unit]	Format	Access	Default	Min	Max
20026	**Serial Del Time**	**[msec]**	**Word**	**R/W**	**0**	**0**	**800**
	Setting of the minimum delay between the drive reception of the last byte and the beginning of its response. Such delay avoids any conflict on the serial line when the RS485 interface is not set for an automatic TX / RX switching.						
18110	**Fast Link Addr**	**[--]**	**Word**	**R/Z/***	**0**	**0**	**8**
	Enable of fast link on the XT-IN and XT-OUT connectors. Using fast link in electrical line shaft configuration, it is necessary to configure this parameter. 0 The fast link is disabled 1 Fast link enable (the drive is the master) > 1 Fast link enable (the drive is the slave).						
18124	**FstLnk Slow Sync**	**[--]**	**Bool**	**R/Z/***	**0**	**0**	**1**
	Enabling synchronisation of slow task 0=OFF 1=ON						

TEMP CONTROL

This function is a simple hysteresis comparator: bit **Drv Th Overtemp** (output of function) becomes high when the source temperature is lower or equal to the setted threshold value; **DrvOvertemp** becomes low when the temperature is higher or equal to **Temp Th - Temp Hys** value.
On sizes >18.5kW, **Heatsink Temp** and **Intake Air Temp** are not updated when the power supply is switched off.
So when those temperature are selected bit **Drv Th Overtemp** becomes Low after 5 sec the power supply is off.



20073	**Temp Thr**	**[°C]**	**Int**	**R/W**	**45**	**1**	**100**
	Temperature intervention threshold.						
20074	**Temp Hys**	**[°C]**	**Int**	**R/W**	**2**	**1**	**IPA20073**
	Fall in Hysteresis						
20075	**Drv Temp Src**	**[--]**	**Enum**	**R/W**	**0**	**0**	**3**
	Selection of source temperature. 0=Off 1=Heatsink Temp 2=Intake Air Temp 3=Reg Card Temp						

IPA	Description	[Unit]	Format	Access	Default	Min	Max
MOTOR DATA							
20002	**Motor Poles** Settings of motor poles. ***Note*:** the motor pole number has to be lower than the pulse number/revolution of the motor mounted encoder.	**[--]**	**Word**	**R/Z/***	**8**	**2**	**8**
20001	**Mot Nominal Curr** Motor nominal current	**[Arms]**	**Float**	**R/Z/***	**IPA18701**	**0.0**	**IPA18703**
18360	**Mot Nom K Torque** Motor torque constant.	**[Nm/Arms]**	**Float**	**R/Z**	**1.5**	**0.1**	**100**
20004	**Mot Thermal Prot** Thermal protection type of servomotors. 0=PTC 1=NC Contact 2=KTY84	**[--]**	**Enum**	**R/Z/***	**1**	**0**	**1**
	MOTOR PARAM						
18313	**LKG Inductance** Motor inductance.	**[H]**	**Float**	**R/Z/***	**0.005**	**10^{-6}**	**20**
	MOTOR OVERLOAD						
20080	**Mot Ovld Control** Enabled the motor protection to excessive overload.	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**1**
20081	**Mot Ovld Curr** Motor overload current. 0 = Disabled 1= Enabled — When this is selected the **Mot Ovld Time** and **Mot Ovld Factor** parameters must be set. ***Note:*** The **Mot Ovld Time** and **Mot Ovld Factor** parameters are only used to calculate the I2t motor limit.	**[A]**	**Float**	**R/Z**	**IPA18701**	**0**	**IPA18703**
20082	**Mot Ovld Time** Motor overload time.	**[sec]**	**Float**	**R/Z**	**5**	**0,1**	**2097**
20083	**Mot Ovld Factor** Motor overload factor. When 100% has been reached, the current limit is reduced to the value **Mot Nominal Curr** (IPA 20001) till when **Mot Ovld Factor** goes back to zero. It is calculated with the following formula: $\textbf{Mot Ovld Factor}\ (\%) = \dfrac{\int (I_{mot}^2 - \textbf{Mot Nominal Curr}^2)\ .\ dt}{(\textbf{Mot Ovld Curr}^2 - \textbf{Mot Nominal Curr}^2)\ .\ \textbf{Mot Ovld Time}} \ .\ 100$	**[%]**	**Int**	**R**			

ENCODER PARAM

The signals coming from the position sensors are mainly used in two points of the brushless motor control system: First is to modulate the three stator currents in order to obtain an equivalent field presenting a 90 electric degree phase shift as compared to the field of the permanent magnets. They are also used for feedback of the speed/space loop. These two functions are usually performed by two different position sensors, which are usually integrated into one single encoder. The features of the two sensors are, in fact, different. One determines commutation, the other, speed and sinewave accuracy. In order to keep the stator field in the desired position, it is necessary to know, also at power-on, the absolute position in the electrical revolution; for this purpose resolvers are normally used, but digital encoders with hall channels are also supported.
The feedback of the speed/space loop requires the maximum possible resolution; the loop quality defines the limit of the control loop. We recommend for best accuracy and smoothness, the resolver, or a Sin-Cos type encoder.

IPA	Description	[Unit]	Format	Access	Default	Min	Max

The XVy-EV drive digitizes the data of the sinewave in a resolver or SinCos encoder to a resolution of 212 (16,384 pulses equivalent), thus obtaining a high precision level and very good behaviour in conditions of low speed and locked shaft.
In the XVy-EV drives (as default configuration), after the initialization phasing procedure (executed at power on and alarm reset), the field modulation is based on the reading of the sensor with the highest resolution, which becomes absolute since the sensor mechanical position is known.
The above working mode can be changed through the parameters on **SERVICE / ENCODER** menu.

IPA	Description	[Unit]	Format	Access	Default	Min	Max
20007	**Mot Enc Source** Motor encoder source 1=XE Main Encoder 2=Riservato 3=EXP ABS1 Encoder 4=Reserved	**[--]**	**Enum**	**R/Z/***	**1**	**1**	**4**
20008	**Spd-Pos Enc Sour** Speed/pos encoder source 0=Same as motor 1=XE Main Encode 2=XER/EXP Aux Enc 3=EXP ABS1 Encoder 4=Reserved	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**4**
20010	**XE Enc Type** Software setting of the encoder type used for the feedback, to be connected to the XE connector (standard connection). To select the encoder type the XVy-EV drives needs a software parameter setting and also a hardware setting through jumpers. This is necessary to allow so many kinds with so few connectors. 0=Off 1=Sincos 5 tracks — Absolute sine and cosine once per revolution, incremental and sinusoidal A and B, I zero slot or index 2=Dig + Hall — Hall sensors, incremental digital A-B channel, I zero marker or index 4=Hall — Hall sensors 5=Sincos 2 tracks — Absolute sine and cosine once per revolution. 6=An + Hall 8=Resolver — Two pole resolver 9=Only Ana Inc Trk — Incremental encoder with analog tracks (*) 10=Only Dig Inc Trk — Incremental encoder with digital tracks (*) (*) When using these encoders, each time the drive is reset and the enable command is performed, the drive executes an internal phasing procedure for approx. 5 sec. ***Warning!*** During this procedure the motor shaft performs a limited number of rotations.	**[--]**	**Enum**	**R/Z/***	**1**	**0**	**10**
20011	**XE Enc ppr** Number of pulses per revolution of the encoder.	**[--]**	**Word**	**R/Z/***	**2048**	**1**	**65535**
20012	**XE Enc Supply** It is possible to program the encoder supply level between the minimum 5.2V and the maximum 6.5V value, in order to balance possible voltage drops on a long encoder cable, so that the level of the motor feedback signals is suitable to be read by the drive. 0=5.2V 1=5.6V 2=6.1V 3=6.5V	**[V]**	**Enum**	**R/Z**	**0**	**0**	**3**
20020	**Resolver Poles** Number of poles on resolver.	**[--]**	**Word**	**R/Z/***	**0**	**0**	**1**

IPA	Description	[Unit]	Format	Access	Default	Min	Max
20036	**Aux Enc Type**	**[--]**	**Enum**	**R/Z/***	**1**	**0**	**2**
	Auxiliary encoder type: XER connector						
	0=OFF	XER port disabled					
	1=XER In EXP out	XER used for secondary encoder input and encoder output on expansion card.					
	2=XER/EXP Rep/Sim	XER and output on expansion used for repeat/simulation of motor encoder.					
	3=XER Out EXP In	XER used as encoder repeat output and encoder input on expansion card.					
20037	**XER/EXP Enc ppr**	**[--]**	**Word**	**R/Z/***	**2048**	**1**	**65535**
	Auxiliary encoder pulses per revolution.						
20019	**XER Enc Supply**	**[V]**	**Enum**	**R/W**	**0**	**0**	**3**
	Auxiliary encoder supply. See **XE Enc Supply**, IPA 20012.						
	0=5.2V						
	1=5.6V						
	2=6.1V						
	3=6.5V						
20078	**Res Data Inv**	**[°C]**	**Bool**	**R/Z/***	**0**	**0**	**1**
	Enables inversion of the resolver SIN channel.						
	0=Off						
	1=On						
	Caution! *Phasing must be repeated if this parameter is modified.*						

ENC EXP BOARD

20040	**ABS1 Enc Type**	**[--]**	**Enum**	**R/Z**	**0**	**0**	**4**
	First absolute enc. type: ABS1 connector.						
	0 = Off						
	1 = EnDat + 2 ana inc						
	2 = SSI						
	3 = EnDat						
	4 = SSI + 2 ana inc						
	5 = Hiperface						
20039	**ABS1 Enc Revol**	**[--]**	**Word**	**R/Z/***	**4096**	**1**	**4096**
	Number of turns that can be distinguished by the ABS encoder No. 1.						
20038	**ABS1 Enc Div Rev**	**[--]**	**Dword**	**R/Z/***	**8192**	**1**	**131072**
	Number of division per rev of the abs tracks of the abs enc. n.1.						
20042	**ABS1 Enc ppr**	**[--]**	**Word**	**R/Z/***	**512**	**1**	**65535**
	Number of pulses per rev of the inc tracks (if present) of the abs enc. n.1						
20041	**ABS1 Enc Supply**	**[--]**	**Enum**	**R/W**	**0**	**0**	**3**
	Absolute encoder n.1 encoder supply.						
	0 = 5.2V						
	1 = 5.6V						
	2 = 6.1V						
	3 = 6.5V						
20043	**EnDat Del Comp**	**[--]**	**Enum**	**R/W**	**0**	**0**	**2**
	Signal propagation delay compensation on EnDat cable:						
	0 = No delay comp						
	1 = 1 us delay comp						
	2 = 2 us delay comp						

IPA	Description	[Unit]	Format	Access	Default	Min	Max

ENC MOTOR RATIO

There are engines on the market that have the device mounted position feedback via toothed belt or other multiplier (see fig.), This implies a kinematic unit that should not be considered for the proper torque (case of absolute encoder) and the calculation of motor speed.

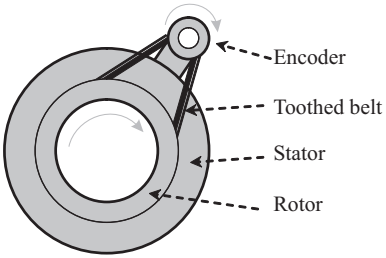


Figure: Motor with encoder mounted with the kinematic

The kinematic relations are handled by the drive and many depend on the number of poles of the motor (Pn) in accordance with the following report:

ki = (Pn/2) / i for all values of i ranging from 1 to Pn / 2

Es: pole motor => have managed the following kinematic relations k

$k_1 = 1$, $k_2 = 2$, $k_3 = 1.\overline{3} = 1.33333...$, $k_4 = 4$

20077	**Encoder Ratio Enable**	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**1**

Enables the management of the mounted encoder with the encoder ratio
0 = Disable
1 = Enable

20009	**MotPoles/EncRev**	**[--]**	**Word**	**R/Z/***	**8**	**2**	**IPA20002**

This parameter indicates the number of poles of the motor corresponding to a turn encoder. Can be seen by the following calculation:
Considering an 8-pole motor and an encoder that are k = 4:3 = 1.3333... we obtain the following value:
8 / k = 8 / (4 / 3) = 6

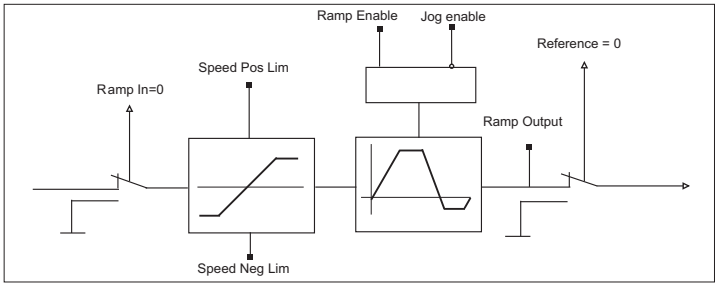
20076*	**Enc Mot Ratio**	**[:1]**	**Float**	**R**	

Ratio K encoder used monitor (displayed with 5 decimal places)

IPA	Description	[Unit]	Format	Access	Default	Min	Max

RAMP

The acceleration and deceleration of the speed reference is set by the **CW Acc Ramp / CW Dec Ramp** parameters for clockwise rotation direction and by **CCW Acc Ramp / CCW Dec Ramp** for counterclockwise rotation direction. The Fast stop function allows stopping the motor in the shortest possible time in case of emergency regardless of the normal ramps set. Set a digital input as Fast/stop.
These parameters are active in the only in the speed control configuration; for a position control application see the specific paragraph.



The drive behaviour after the Start command depends on the parameter settings:
- If the ramp circuit is used (**Ramp Enable** = enable) the motor reaches the desired speed at set ramp rate. If commanded to stop, the drive stops with the deceleration ramp time. If during the deceleration time a new start command is given, the drive regains the set speed.
- If the ramp circuit is not used (**Ramp Enable** = disable) the motor reaches the desired speed in the shortest possible time limited only by current.

When the motor is stopped, the drive is torque-enabled. The drive can be disabled by opening the Enable drive command.
The Jog function does not require the Start command, but requires the enable.
In case the Start and Jog+ or Jog- commands are given simultaneously, the start command has the priority.

21115	**Fast Stop Dec**	**[ms/krpm]**	**Float**	**R/W**	**100**	**0**	**IPA21111**
	Setting of the Fast Stop deceleration time						
21116	**End Run Dec**	**[ms/krpm]**	**Float**	**R/W**	**100**	**0**	**IPA21111**
	Setting of the End Run deceleration time						
21210	**Ramp Enable**	**[--]**	**Enum**	**R/W**	**1**	**0**	**1**
	Ramp enabling command : 0=Disabled 1=Enabled						
21102	**CW Acc Ramp**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the clockwise acceleration time.						
21103	**CCW Acc Ramp**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the counterclockwise acceleration time.						
21104	**CW Dec Ramp**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the clockwise deceleration time.						
21105	**CCW Dec Ramp**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the counterclockwise deceleration time.						
21110	**Ramp Exp Factor**	**[--]**	**Int**	**R/W**	**1**	**1**	**1000**
	Ramp expansion factor, used to increase the maximum value allowed for the ramp parameters. The cycle time of the speed control loop is 125 μs and if the parameter **Ramp Exp Factor** is set to 1, the ramp generator updates the ramp output every 125 μs; this means that the slowest ramp will increase the speed by 1count/125 μs every 125 μs and this will limit the maximum value of the ramp						

parameters to 8738 msec/krpm (with a 2048 ppr encoder); if this parameter is set to a value N higher than 1 this means that the ramp output will be updated every N x 125 μs and this will mean that the maximum value of the ramp parameters will be limited to N x 8738 msec/krpm. In the following table there are some examples about the influence of the **Ramp Exp Factor** parameter on all the ramp parameters settings:

Encoder pulses/rev	Ramp Exp Factor	Max Ramp Rate
2048	1	8738 msec/krpm
2048	4	34952 msec/krpm
2048	10	87355 msec/krpm
1024	1	4369 msec/krpm
512	2	4369 msec/krpm

txv9065

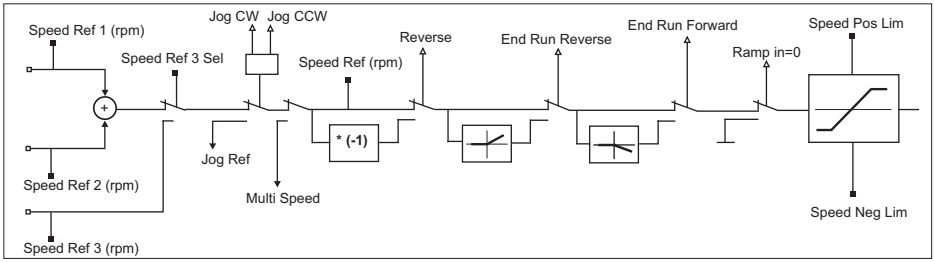
21111 Max Ramp Rate [ms/krpm] Float R

Max ramp time

SPEED

The value of the speed reference determines the value of the motor speed, while the sign defines the rotation direction. When the ramp is enabled (parameter **Ramp Enable** = enable), the speed reference (**Speed Ref**) follows the time set in the acc and dec parameters (CW - CCW).

The **Speed Ref 1**, **Speed Ref 2**, **Pos Speed Lim** and **Neg Speed Lim** parameters are active only in the Speed loop configuration. See the specific paragraph for the Position loop configuration



20003 Full Scale Speed [rpm] Float R/Z/* 3000 0 100000

Setting of the analog input full scale value.

21200 Speed Ref 1 [rpm] Float R/W 0 -IPA20003 IPA20003

Speed reference 1. Setting of the speed reference if no analog input has been set as **[3] Speed Ref 1** . In case an analog input is set as **[3] Speed Ref 1**, the parameter is read-only.

21201 Speed Ref 2 [rpm] Float R/W 0 -IPA20003 IPA20003

Speed reference 2. Setting of the speed reference 2 if no analog input has been set as **[4] Speed Ref 2**. In case an analog input is set as **[4] Speed Ref 2**, the **Speed Ref 2** parameter is read-only. The total reference is the result of the sum of the values of **Speed Ref 1** and **Speed Ref 2**.

Example 1: Speed Ref 1 = 1500 rpm
Speed Ref 2 = 500 rpm
Speed Ref = 1500 + 500 = 2000 rpm

Example 2: Speed Ref 1 = 1500 Rpm
Speed Ref 2 = -500 rpm
Speed Ref = 1500 - 500 = 1000 rpm

21202 Speed Ref 3 [rpm] Dword R/W 0 -IPA20003 IPA20003

Speed Ref 3 may be used instead of **Speed Ref 1** e **Speed Ref 2** sum by means **Speed Ref 3 Sel** digital input selection to set speed reference of the control.

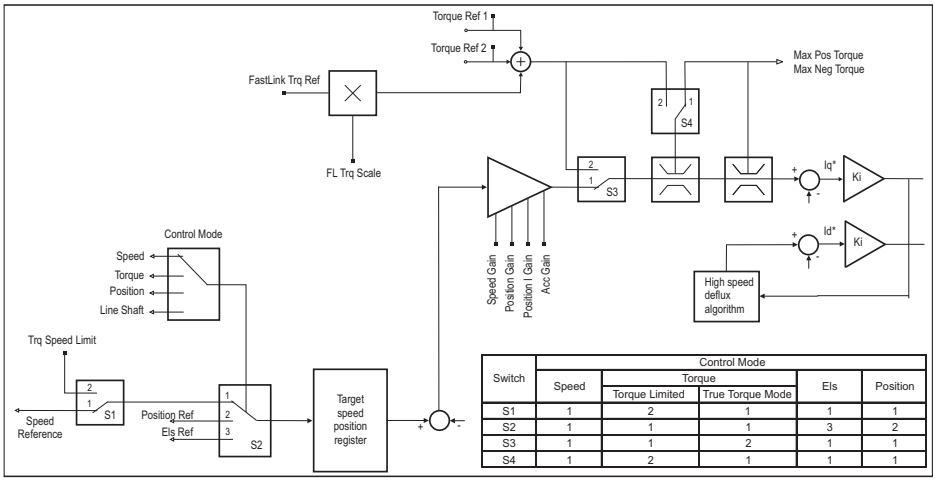
IPA	Description	[Unit]	Format	Access	Default	Min	Max
21206	**Speed Thr**	**[rpm]**	**Float**	**R/W**	**10**	**0**	**IPA20003**
	Setting of the threshold value for overspeed. Such threshold is stated as an absolute value. When the speed is higher than the value set in this parameter, the digital output set as **[4] = Speed Thr** goes to +24V.						
21207	**Speed Reach Wnd**	**[rpm]**	**Float**	**R/W**	**10**	**0**	**IPA20003**
	Setting of the window on the speed reference in order to consider the digital output programmed as **[4] = Speed Reached** enabled.						
21208	**Speed Zero Thr**	**[rpm]**	**Float**	**R/W**	**10**	**0**	**1000**
	Zero speed threshold (the test is performed according to the speed filtered at 100ms)						
21209	**Speed Zero Delay**	**[sec]**	**Float**	**R/W**	**0.1**	**0**	**1000**
	Delay on zero speed signalling						
21213	**Speed Thr Delay**	**[sec]**	**Float**	**R/W**	**10**	**0**	**1000**
	Setting of the delay for signalling that the motor has reached the speed threshold (**IPA 21206 - Speed Thr)**. When the motor speed is higher than the value set in **Speed Thr** + **Speed Thr Wnd** for a time higher than the value of this parameter, a digital output set with **[15] Speed Thr de** is brought to +24V. If the speed falls under the **Speed Thr - Speed Thr Wnd** value, the digital output programmed as **[15] Speed Thr de** is set to 0V.						
21211	**Speed Thr Wnd**	**[sec]**	**Float**	**R/W**	**10**	**0**	**100000**
	Window applied to the **Speed Thr IPA 21206** parameter to enable digital output [15] Speed Thr. See parameter **Speed Thr Delay IPA 21213**.						
21204	**Pos Speed Limit**	**[rpm]**	**Float**	**R/W**	**3000.0**	**0**	**100000**
	Setting of the maximum speed for motor clockwise rotation direction.						
21205	**Neg Speed Limit**	**[rpm]**	**Float**	**R/W**	**3000.0**	**0**	**100000**
	Setting of the maximum speed for motor counterclockwise rotation direction						

SPD / POS GAIN

18150	**Inertia**	**[kg*m^2]**	**Float**	**R/W**	**0**	**0**	
	Motor inertia used for inertial compensation.						
18151	**Inertia Filter**	**[msec]**	**Float**	**R/W**	**1**	**0**	**200**
	Filter time constant on inertial compensation.						
23000	**Speed Gain**	**[--]**	**Int**	**R/W**	**100**	**0**	**32767**
	Speed proportional gain.						
23001	**Position Gain**	**[--]**	**Int**	**R/W**	**50**	**0**	**32767**
	Position proportional gain.						
23002	**Position I Gain**	**[--]**	**Int**	**R/W**	**0**	**0**	**32767**
	Position integral gain. These are conservative, relatively low performance settings, suitable for most general purpose applications, they can be set much higher if machine construction allows it and the application requires it.						
23003	**Acc Gain**	**[--]**	**Int**	**R/Z/***	**3000.0**	**0**	**100000**
	Acceleration proportional gain (speed regulator).						
23010	**Gain Mult Fct**	**[--]**	**Enum**	**R/W**	**1**	**1**	**16**
	Multiplier factor speed and position gains. 1= x 1 16= x 16						

TORQUE

The current loop is the fastest control section and has a sampling frequency of 16 kHz.
There are two current loops working simultaneously. The components of the forward and quadrature current are calculated directly from the phase currents read by the AD converters; both components are controlled in order to obtain the desired behaviour. The quadrature component contributes to the rotating torque while the forward component is (usually) set at zero.
The torque control functioning mode is active if the **Control Mode** parameter (IPA 20023) is set as "Torque". In this case the motor supplies a torque equal to the sum of **Torque Ref 1** (IPA 22000) and **Torque Ref 2** (IPA 22001)..
All torque values (references, limits and thresholds) are stated as a percentage. 100% is equal to the motor rated torque, **Base Torque** parameter (IPA 18800).



Switch	Control Mode				
	Speed	Torque		Els	Position
		Torque Limited	True Torque Mode		
S1	1	2	1	1	1
S2	1	1	1	3	2
S3	1	1	2	1	1
S4	1	2	1	1	1

22000 Torque Ref 1 [%] Float R/W 0 -IPA22012 IPA22012

Setting of the torque reference if no analog input has been programmed as **[1] Torque Ref 1**. If an analog input has been programmed as **[1] Torque Ref 1**, the parameter is read-only.

22001 Torque Ref 2 [%] Float R/W 0 -IPA22012 IPA22012

Setting of the torque reference if no analog input has been programmed as **[2] Torque Ref 2**. If an analog input has been programmed as **[2] Torque Ref 2**, the parameter is read-only.
The **Torque Ref 1** and **Torque Ref 2** parameters are active if the Torque loop functioning mode is selected. The total reference is the sum of the values of **Torque Ref 1** and **Torque Ref 2**.

22002 Torque Mode [--] Enum R/W 0 0 1

0 = Torque Limited — The speed reference can be ignored. To allow the motor to run, the torque reference must be set to **Torque Ref 1**, **Torque Ref 2** or through **FastLink Trq Ref**. If the torque reference is high enough, the motor will reach the maximum speed set in 22009 **Trq Speed Limit**.
The torque limits (22004 **Max Pos Torque** and 22005 **Max Neg Torque**) are operative as well.

1 = True Torque Mode — The speed regulator is disabled, therefore no control is carried out. To allow the motor to run, the torque reference must be set to **Torque Ref 1**, **Torque Ref 2** or through **FastLink Trq Ref**. If the torque reference is high enough, the motor can

IPA	Description	[Unit]	Format	Access	Default	Min	Max
		reach a speed higher than the rated one. The torque limits (22004 **Max Pos Torque** and 22005 **Max Neg Torque**) are operative as well.					
22003	**Trq Lim Config**	**[--]**	**Enum**	**R/W**	**0**	**0**	**2**
	0 = Torque lim symm	Symmetric torque limits. The limit is considered equal to the value of the **Max Pos Torque** parameter (IPA 22004).					
	1=Torque lim +/-	Asymmetric torque limits. **Max Pos Torque** = positive torque limit, **Max Neg Torque** = negative torque limit.					
	2 = Torque lim motor/brake	Different torque limits for the functioning of the drive as a motor (**Max Pos Torque**) and as a brake (**Max Neg Torque**)					
22004	**Max Pos Torque**	**[%]**	**Float**	**R/W**	**100**	**0**	**IPA22012**
	Setting of the positive torque limit.						
22005	**Max Neg Torque**	**[%]**	**Float**	**R/W**	**100**	**0**	**IPA22012**
	Setting of the negative torque limit.						
22007	**Torque Thr**	**[Arms]**	**Float**	**R/W**	**0**	**0**	**IPA20000**
	Setting of the torque threshold defined with an absolute value. When the torque is higher than the value set in this parameter, the digital output set as **[6] Torque Thr** is brought to +24V.						
22009	**Trq Speed Limit**	**[rpm]**	**Float**	**R/W**	**3000**	**0**	**10000**
	Speed limit during the torque control. When **Torque Mode** is selected as Torque Limited.						
22010	**Torque Thr Delay**	**[sec]**	**Float**	**R/W**	**10**	**0**	**10**
	Setting of the delay time signaling that the level of the torque supplied by the motor has been reached. When the motor supplied torque is higher than that set in **Torque Thr** for a period longer than the value of this parameter, the digital output programmed as **[16] Torque Thr Del** is brought to +24V.						
22011	**Torque Reduction**	**[%]**	**Float**	**R/W**	**50**	**0**	**IPA22012**
	Active torque limit when the digital input set as **Torque reduction** is brought to +24V.						
22013	**FastLink Trq En**	**[--]**	**Bool**	**R/W/Z**	**0**	**0**	**1**
	If this function is enabled, the torque reference coming from a drive master through Fast Link is added to **Torque Ref 1** and **Torque ref 2**. This function is normally used to perform a Helper configuration between two motors.						
22515	**FL Trq Scale**	**[--]**	**Float**	**R/W**	**1**	**-10**	**+10**
	Torque reference scale coming from the drive master. If the scale which has been set is negative, the torque direction is inverted compared to the master.						
22012	**Max Torque**	**[%]**	**Float**	**R**			
	Maximum torque value supplied by the drive-motor system equal to **Mot Nom K Torque** * **Drive Max Curr**, stated as a percentage of the motor rated torque.						
22014	**FastLink Trq Ref**	**[%]**	**Float**	**R**			
	Torque reference reading from Fast Link (after the scaling).						
18800	**Base Torque**	**[Nm]**	**Float**	**R**			
	Rated torque of motor matching rated current of motor.						

IPA	Description	[Unit]	Format	Access	Default	Min	Max

CURRENT GAINS

The current loop is controlled by a PID regulator; the maximum control bandwidth is 5 kHz. The gains of this loop are factory set with appropriate values for the motors and specifically for the motor purchased if this drive was bought with a motor. For advanced applications such values have to be optimized according to the motor used.

18100	**Curr Prop Gain**	**[--]**	**Int**	**R/W**	**S**	**0**	**32767**
	Current loop proportional gain.						
18101	**Curr Integr Gain**	**[--]**	**Int**	**R/W**	**S**	**0**	**32767**
	Current loop integral gain.						
18102	**Curr Deriv Gain**	**[--]**	**Int**	**R/W**	**0**	**0**	**32767**
	Current loop derivative gain.						
18345	**Curr Gain Calc**	**[--]**	**Enum**	**R/W**	**0**	**0**	**1**
	0=Off :	no calculation					
	1=Calc from motor parameter	the current gains are recalculated according to the motor parameters (**LKG Inductance** , IPA 18313).					

FLUX

Flux reduction function

In the brushless motor, the flux is constant, generated by the permanent magnets.
It is possible to implement the flux reduction function by passing a negative current through the stator windings with vectors oriented to reduce overall flow.

Caution ! If the drive is disabled when the motor is running above nominal speed, the voltage on the motor could reach values that might damage the drive.

Normally it is possible to run the motor up to 150% of nominal speed, without taking special precautions.
In order to reach higher speeds, and avoid damage to the drive, an independent braking unit must be used, to brake the load at least up to the motor's nominal speed.
For information on how to reach speeds greater than 150% of nominal, contact the Gefran technical support centre.

18320	**Max Deflux Curr**	**[Arms]**	**Float**	**R/Z/***	**0**	**IPA20000**	**0**
	Maximum flux reduction current of motor (only negative values are permitted).						
18321	**User Vlt Max Lim**	**[Vrms]**	**Int**	**R/W**	**400**	**10**	**612**
	Setting flux reduction starting voltage. Only values below mains voltage have an effect. It is used to reduce the maximum working voltage of the motor.						
18322	**Out Volt Filter**	**[msec]**	**Float**	**R/W**	**10**	**1**	**500**
	Filter time constant on output voltage.						
18325	**Volt Prop Gain**	**[--]**	**Int**	**R/W**	**500**	**0**	**32767**
	Proportional gain on voltage loop						
18326	**Volt Int Gain**	**[--]**	**Int**	**R/W**	**500**	**0**	**32767**
	Integral gain on voltage loop						
18328	**Out Vlt Max Lim**	**[Vrms]**	**Int**	**R**			
	Monitor flux reduction starting voltage.						

DIGITAL INPUTS

The regulation board of the XVy-EV drive has 8 digital inputs. Seven digital inputs can be programmed to different functions and they are located on the I/O terminal block on R-XVy regulation board.
Refreshing time = 8ms. The changes in the digital input setting can be enabled by resetting the drive.
This rule can be applied also to the virtual inputs.

IPA	Description	[Unit]	Format	Access	Default	Min	Max
20101	**Digital Input 1**	**[--]**	**Enum**	**R/W**	**4**	**0**	**2007**

Choice of the parameters to be set on **Digital Input 1**. The possibilities listed as "**Choices for the digital input association**" are available. Default = **Start/stop**

Choices for the digital input association:

0 = OFF	Unconfigured input.
2 = Drive reset	Alarm **Reset** command. Momentary input active on the edge. The drive must be disabled for a reset to occur.
3 = External fault	External alarm signal. It is active on the leading edge.
4 = Start/stop	Start /stop command. It is active on the leading edge. In the torque, speed and electric axis configuration this command must be programmed on a digital input. If its value is high, it starts the drive operation; if its value is low, the drive will stop. When this command is active, if a speed reference is present, the motor goes to the set speed.
5 = Fast/stop	Emergency stop command. Active on the drop wire leading edge. It is active on the leading edge, it stops the speed command instantly, braking the motor with no decel ramp in the shortest possible time till zero speed has been reached. The **Fast/stop** command is used in emergency and dangerous situations in order to stop the drive in the shortest possible time. If a digital input is set as **Fast/stop**, this input must be high to run in any mode. The **Fast/stop** command must be present before the drive enabling command (**Enable** command). By disabling the voltage on this input while the drive is active, it is possible to cause a braking stop with the shortest possible time. **With a start following a Fast/stop command it is necessary to set the Enable digital input with a low logic status and the Fast/stop digital input with a high logic status; before a jog function can be performed.**
6 = Jog CW	Jog forward function command. It is active only in the speed and position configurations. When this input is active, the speed reference and the ramp times are those set in the Jog parameter menu.
7 = Jog CCW	Jog reverse function command. It is active only in the speed and position configurations. When this input is active, the speed reference and the ramp times are those set in the Jog parameter menu.
8 = Ramp in = 0	Ramp In = 0 command. It is active only in the speed configuration. When this input is active (high logic status), it replaces the present reference with a zero reference and uses the set ramp. This digital zero keeps the motor rotor stopped in a torque condition, without any offset drift typical for A/D (analog/digital) converters.
9 = Reverse	Inverse command. When the command is active, it changes the motor rotation direction by following the set ramp.
10 = End Run Reverse	Clockwise end run command. It is active only in the speed and position configuration. It only allows, regardless of reference, motor x rotation in a clockwise (CW) direction.
11 = End Run Forward	Counterclockwise end run command. It is active only in the speed and position configuration. It only allows, regardless of reference, motor rotation in a counterclockwise (CCW) direction.
12 = Reference = 0	Speed reference = 0. It is active only in the torque and speed configurations (with 22002 = Torque limited).
14 = Torque loop	It selects the Torque Regulation mode.
15 = Speed loop	Select the mode to Speed regulation.
16 = Position loop	Select the mode to Position regulation.

IPA	Description	[Unit]	Format	Access	Default	Min	Max

17 = ELS loop It selects the Electric Axis mode.

18 = Disable An Inp 0 Command Disabling analog input 0 (both the value and the offset are disabled). With a high logic level analog input 0 is disabled.

19 = Disable An Inp 1 Command Disabling analog input 1 (both the value and the offset are disabled). With a high logic level the analog input 1 is disabled.

Speed sel bit 0...2

The number given by the binary combination of these digital inputs selects a digital speed reference set in the parameters of the Multispeed function.

21 = Speed sel Bit 0 Multi-speed function, Bit 0 selection.

22 = Speed sel Bit 1 Multi-speed function, Bit 1 selection.

23 = Speed sel Bit 2 Multi-speed function, Bit 1 selection.

Ramp sel bit 0...1

The number given by the binary combinations of these digital inputs selects the ramp times set in the parameters of the Multiramp function.

24 = Ramp sel Bit 0 Multi-ramp function, Bit 0 selection.

25 = Ramp sel Bit 1 Multi-ramp function, Bit 1 selection.

26 = Virtual DI OK When the virtual digital input 14 (only this one) is set with VIRTUAL DI OK, all the set Virtual digital inputs are active only if this input is equal to 1 (high logic level). In other words, this enables virtual digital input to be used.

27 = Alarm reset When this digital input is active, it is possible to reset all the active alarm (high logic level). The reset is executed only if the alarm cause is no more present.

28 = Virtual Enable Virtual Enable, it functions in parallel with the physical one (Digital Input 0).

29 = Torque Reduct It enables the torque reduction. When it is active, the torque limits are set by the **Torque Reduction** parameter, IPA 22011.

Motor potentiometer selection

30 = Motor Pot Up Increases speed reference according to the ramp time set in **Motor Pot Acc**.

31 = Motor Pot Down Reduces speed reference according to the ramp time set in **Motor Pot Dec**.

32 = Motor Pot Enable Enables motor potentiometer function

33 = Motor Pot Reset Reset memory

35 = Motor Pot Memo Storage of reference setting in memory
High state = storage of last speed setting in memory. After Start, the motor accelerates automatically up to the speed setting.
Low state = After Start, the motor stops, waiting for the **Motor Pot Up** command

36 = Motor Pot Dir Speed reference polarity
Low state = positive reference, High state = negative reference

Sequential position control selection

Inputs active only in Sequential position control configuration. The number given of the binary combination of the digital inputs set as **POS Event Bit 0...7**, forms the parameter value IPA 30800 **Pos Actual Event** which is the event that causes the multiposition controller to go to "Event Match" or "Dwell + Event".

37 = POS Event Bit 0

38 = POS Event Bit 1

39 = POS Event Bit 2

40 = POS Event Bit 3

41 = POS Event Bit 4

42 = POS Event Bit 5

43 = POS Event Bit 6

44 = POS Event Bit 7

45 = Multi Pos Enable Enabling multi-position controller

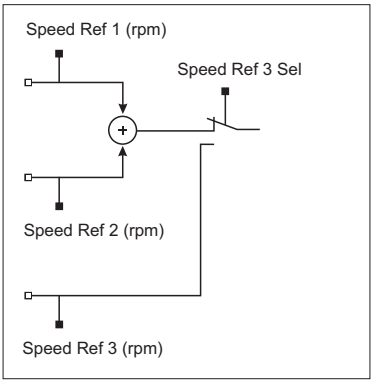
IPA	Description	[Unit]	Format	Access	Default	Min	Max

46 = Multi Pos Abort Ends position sequence.

Powerloss

47 = PL Mains status It signals the mains voltage reset to the drive

48 = Speed ref 3 Sel If active the speed set point is **Speed Ref 3** instead of**Speed Ref 1** and **Speed Ref 2** sum



Pos-preset 0...5

These inputs are only active with the position configuration. The number given by the binary combination of the digital inputs set as **Pos Preset** (0...5) selects the number of the active position preset.

Example: with a three-position positioner, all **Pos Preset** parameters must have a default value (=0) with the exception of **Pos Preset 0** and **Pos Preset 1**, whose task is the identification of the active position preset (binary combination).

1001 = POS Preset 0 Bit 0 position preset.

1002 = POS Preset 1 Bit 1 position preset.

1003 = POS Preset 2 Bit 2 position preset.

1004 = POS Preset 3 Bit 3 position preset.

1005 = POS Preset 4 Bit 4 position preset.

1006 = POS Preset 5 Bit 5 position preset.

1007 = POS 0 Search Command to Search for the zero position. It is active only in the position configuration. Momentary input active on the rising leading edge. When this command is active, the motor performs a homing (see the **POSITION** menu).

1009 = POS Start Pos Positioning start command.Initiates the start of a move to new position.

1010 = POS Memo 0 Command Storing the 0 position. Momentary input active on the rising leading edge, it allows storage of the present position as a zero position. Such function is normally used in point-to-point self-acquisition positioning procedures.

1011 = POS Memo Pos Position storing command. Momentary input active on the rising leading edge; it allows storage of the present position as a destination position. Such function is normally used in point-to-point self-acquisition positioning procedures.

1012 = POS Return Command returning to a set position. Active pulse input on the climbing leading edge. Movement starting towards an absolute predefined position.

1015 = POS 0 sensor Zero sensor. Used for the zero search.

1016 = Save parameters

Els ratio sel 0...1

The number given by the binary combinations of these digital inputs selects the active speed ratio.

IPA	Description	[Unit]	Format	Access	Default	Min	Max
	2001 = ELS Ratio Sel B0	Electric Line Shaft function: Preset selection of the bit 0 ratio.					
	2002 = ELS Ratio Sel B1	Electric Line Shaft function: Preset selection of the bit 1 ratio.					
	2003 = ELS Inc Ratio	Ratio increasing command. When this command is active, the selected ratio between master and slave is increased with a time constant defined by the **Els Delta Time** and **Els Delta Ratio** parameters.					
	2004 = ELS Dec Ratio	Ratio decreasing command. When this command is active, the selected ratio between master and slave is decreased with a time constant defined by the **Els Delta Time** and **Els Delta Ratio**. parameters.					
	2005 = ELS RampRatioDis	Ramp disabling command during a ratio switching phase. When this command is active, the ramp time set via the **Els Delta Ratio** parameter (ramp for ratio switching) is ignored and the change will be made immediately. Be careful when using this since new ratios will change as fast as current limit allows.					
	2006 = ELS Bend Rec CW	Command to activate the correction reference (slave drive), bend recover, in CW rotation.					
	2007 = ELS Bend Rec CCW	Command to activate the correction reference (slave drive), bend recover, in CCW rotation.					
20102	**Digital Input 2**	**[--]**	**Enum**	**R/W/***	**8**	**0**	**2007**
	Choice of the parameters to be set on **Digital Input 2**. The possibilities listed as "**Choices for the digital input association**" are available, see IPA 20100. Default = **[8] Ramp in = 0**						
20103	**Digital Input 3**	**[--]**	**Enum**	**R/W/***	**9**	**0**	**2007**
	Choice of the parameters to be set on **Digital Input 3**. The possibilities listed as "**Choices for the digital input association**" are available, see IPA 20100. Default = **[9] Inverse**						
20104	**Digital Input 4**	**[--]**	**Enum**	**R/W/***	**10**	**0**	**2007**
	Choice of the parameters to be set on **Digital Input 4**. The possibilities listed as "**Choices for the digital input association**" are available, see IPA 20100. Default = **[10] End Run Reverse**						
20105	**Digital Input 5**	**[--]**	**Enum**	**R/W/***	**11**	**0**	**2007**
	Choice of the parameters to be set on **Digital Input 5**. The possibilities listed as "**Choices for the digital input association**" are available, see IPA 20100. Default = **[11] End Run Forward**						
20106	**Digital Input 6**	**[--]**	**Enum**	**R/W/***	**3**	**0**	**2007**
	Choice of the parameters to be set on **Digital Input 6**. The possibilities listed as "**Choices for the digital input association**" are available, seee IPA 20100. Default = **[3] External fault**						
20107	**Digital Input 7**	**[--]**	**Enum**	**R/W/***	**2**	**0**	**2007**
	Choice of the parameters to be set on **Digital Input 7**. The possibilities listed as "**Choices for the digital input association**" are available, see IPA 20100. Default = **[2] Drive reset**						
20162	**Dig Inp Rev Mask**	**[--]**	**DWord**	**R/W**	**0H**	**0H**	**0FFFFFFFFH**
	This parameter allows changing the logic level of the set digital inputs. Normally digital inputs become active when switching from a low to a high logic level occurs. Through this bit-set parameter it is possible to decide whether to change the logic condition, i.e. active low logic level, inactive high logic level. This parameter cannot modify the logic level of digital input 0.						

Example: The intervention of two limit switches (End Run Forward and End Run Reverse) has to be set on two digital inputs, digital input 3 and digital input 4; the limit switch intervention has to be active with a low logic level.

DIGITAL INPUT	7	6	5	4	3	2	1	0
Dig Inp Rev Mask	0	0	0	1	1	0	0	0
			1			8		

txv9110

It is necessary to set **Dig Inp Rev Mask** = 18H

IPA	Description	[Unit]	Format	Access	Default	Min	Max
20100	**Dig Inp 0 Status** Drive enabled.	**[--]**	**Enum**	**R**			
20163	**Dig Inp Status**	**[--]**	**Word**	**R**			

Read-only parameter stating the present condition (high logic level 1 and low logic level 0) of the digital inputs. It is an hexadecimal parameter.

Example: The digital inputs are:

DIG IN 0 = 1 DIG IN 1 = 1 DIG IN 6 = 1

DIGITAL INPUT	7	6	5	4	3	2	1	0
Dig Inps Status	0	1	0	0	0	0	1	1
		4			3			

txv9111

The value displayed by the **Dig Inps Status** parameter is 43H .

EXP DIG INPUTS

Inside the XVy-EV drive it is possible to install an option expansion card of the digital inputs and outputs. It is possible to add up to 8 programmable digital inputs through the following parameters. The programming procedure is the same as the one for the digital inputs.

20150	**Exp Dig Inp 0**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**2007**

Choice of the programmable parameters on a digital input. The same possibilities stated for the digital inputs are available. See "**Choices for the digital input association**" list on IPA 20101.

20151	**Exp Dig Inp 1**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**2007**

Scelta dei parametri programmabili su un ingresso digitale. Sono disponibili le stesse possibilità degli ingressi digitali. Vedere la lista "**Codifica per l'associazione degli ingressi"** IPA 20101.

20152	**Exp Dig Inp 2**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**2007**

Choice of the programmable parameters on a digital input. The same possibilities stated for the digital inputs are available. See "**Choices for the digital input association**" list on IPA 20101.

20153	**Exp Dig Inp 3**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**2007**

Choice of the programmable parameters on a digital input. The same possibilities stated for the digital inputs are available. See "**Choices for the digital input association**" list on IPA 20101.

20154	**Exp Dig Inp 4**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**2007**

Choice of the programmable parameters on a digital input. The same possibilities stated for the digital inputs are available. See "**Choices for the digital input association**" list on IPA 20101.

20155	**Exp Dig Inp 5**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**2007**

Choice of the programmable parameters on a digital input. The same possibilities stated for the digital inputs are available. See "**Choices for the digital input association**" list on IPA 20101.

20156	**Exp Dig Inp 6**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**2007**

Choice of the programmable parameters on a digital input. The same possibilities stated for the digital inputs are available. See "**Choices for the digital input association**" list on IPA 20101.

20157	**Exp Dig Inp 7**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**2007**

Choice of the programmable parameters on a digital input. The same possibilities stated for the digital inputs are available. See "**Choices for the digital input association**" list on IPA 20101.

20164	**Exp Dig Inp Stat**	**[--]**	**Word**	**R**			

Only-reading parameter stating the present condition (high logic level 1 and low logic level 0) of the digital inputs on the EXP-D14A4F expansion card. It is an hexadecimal parameter.

Example: The digital inputs are:

Exp Dig Inp 0 = 1
Exp Dig Inp 5 = 1
Exp Dig Inp 7 = 1

IPA	Description	[Unit]	Format	Access	Default	Min	Max

EXP DIGIT INPUT	7	6	5	4	3	2	1	0
Exp Dig Inp Stat	1	0	1	0	0	0	0	1
	A				1			

txv9112

The value displayed by the **Exp Dig Inp Stat** parameter is A1 H.

VIRT DIG INPUTS

Digital virtual inputs which are not physically present on the terminals but which are available to program possible commands, configured through the serial interface or field bus. When an external application needs to use some drive programmable functions through digital input, it is always necessary :

- Set the desired functionality see list "**Choices for the digital input association**" IPA 20101
- Write the status of the virtual digital inputs (see IPA 20186).

20170 **Virt Dig Inp 0** **[--]** **Enum** **R/W/*** **0** **0** **2007**

Choice of the programmable parameters on **Virt Dig Inp 0**. The same possibilities stated for the digital inputs are available. See "**Choices for the digital input association**" list on IPA 20101.

20171 **Virt Dig Inp 1** **[--]** **Enum** **R/W/*** **0** **0** **2007**

Choice of the programmable parameters on **Virt Dig Inp 1**. The same possibilities stated for the digital inputs are available. See "**Choices for the digital input association**" list on IPA 20101.

20172 **Virt Dig Inp 2** **[--]** **Enum** **R/W/*** **0** **0** **2007**

Choice of the programmable parameters on **Virt Dig Inp 2**. The same possibilities stated for the digital inputs are available. See "**Choices for the digital input association**" list on IPA 20101.

20173 **Virt Dig Inp 3** **[--]** **Enum** **R/W/*** **0** **0** **2007**

Choice of the programmable parameters on **Virt Dig Inp 3**. The same possibilities stated for the digital inputs are available. See "**Choices for the digital input association**" list on IPA 20101.

20174 **Virt Dig Inp 4** **[--]** **Enum** **R/W/*** **0** **0** **2007**

Choice of the programmable parameters on **Virt Dig Inp 4**. The same possibilities stated for the digital inputs are available. See "**Choices for the digital input association**" list on IPA 20101.

20175 **Virt Dig Inp 5** **[--]** **Enum** **R/W/*** **0** **0** **2007**

Choice of the programmable parameters on **Virt Dig Inp 5**. The same possibilities stated for the digital inputs are available. See "**Choices for the digital input association**" list on IPA 20101.

20176 **Virt Dig Inp 6** **[--]** **Enum** **R/W/*** **0** **0** **2007**

Choice of the programmable parameters on **Virt Dig Inp 6**. The same possibilities stated for the digital inputs are available. See "**Choices for the digital input association**" list on IPA 20101.

20177 **Virt Dig Inp 7** **[--]** **Enum** **R/W/*** **0** **0** **2007**

Choice of the programmable parameters on **Virt Dig Inp 7.** The same possibilities stated for the digital inputs are available. See "**Choices for the digital input association**" list on IPA 20101.

20178 **Virt Dig Inp 8** **[--]** **Enum** **R/W/*** **0** **0** **2007**

Choice of the programmable parameters on **Virt Dig Inp 8**. The same possibilities stated for the digital inputs are available. See "**Choices for the digital input association**" list on IPA 20101.

20179 **Virt Dig Inp 9** **[--]** **Enum** **R/W/*** **0** **0** **2007**

Choice of the programmable parameters on **Virt Dig Inp 9**. The same possibilities stated for the digital inputs are available. See "**Choices for the digital input association**" list on IPA 20101.

20180 **Virt Dig Inp 10** **[--]** **Enum** **R/W/*** **0** **0** **2007**

Choice of the programmable parameters on **Virt Dig Inp 10**. The same possibilities stated for the digital inputs are available. See "**Choices for the digital input association**" list on IPA 20101.

20181 **Virt Dig Inp 11** **[--]** **Enum** **R/W/*** **0** **0** **2007**

Choice of the programmable parameters on **Virt Dig Inp 11**. The same possibilities stated for the digital inputs are available. See "**Choices for the digital input association**" list on IPA 20101.

IPA	Description	[Unit]	Format	Access	Default	Min	Max
20182	**Virt Dig Inp 12**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**2007**

Choice of the programmable parameters on **Virt Dig Inp 12**. The same possibilities stated for the digital inputs are available. See "**Choices for the digital input association**" list on IPA 20101.

20183	**Virt Dig Inp 13**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**2007**

Choice of the programmable parameters on **Virt Dig Inp 13**. The same possibilities stated for the digital inputs are available. See "**Choices for the digital input association**" list on IPA 20101.

20184	**Virt Dig Inp 14**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**2007**

Choice of the programmable parameters on **Virt Dig Inp 14**. The same possibilities stated for the digital inputs are available. See "**Choices for the digital input association**" list on IPA 20101.

20185	**Virt Dig Inp 15**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**2007**

Choice of the programmable parameters on **Virt Dig Inp 15**. The same possibilities stated for the digital inputs are available. See "**Choices for the digital input association**" list on IPA 20101.

20186	**Virt DI Status**	**[--]**	**Word**	**R/W**	**0000H**	**0000H**	**FFFFH**

It displays and sets the status of the virtual digital inputs. Hexadecimal setting.

Programming example

If the virtual digital inputs have to be enabled via the serial input:

Virt Dig Inp 0 Programmed as POS Preset 0
Virt Dig Inp 1 Programmed as POS Preset 1
Virt Dig Inp 2 Programmed as POS Preset 2
Virt Dig Inp 3 Programmed as POS Preset 3

If we set to high logic level :

- the bit 0 referring to Virt Dig Inp 0 = 1
- the bit 1 referring to Virt Dig Inp 1 = 1
- the bit 2 referring to Virt Dig Inp 2 = 1
- the bit 3 referring to Virt Dig Inp 3 = 1

VIRT DIG IN	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Virt DI Status	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1

txv9113

The drive will write in the **Virt DI Status** parameter the value obtained by adding

1 (bit 0) + 2 (bit 1) + 4 (bit 2) + 8 (bit 3) = 15 = F

Virt DI Status = 000FH

20187	**Virt DI at Start**	**[--]**	**Word**	**R/W**	**FFFFH**	**0000H**	**FFFFH**

Setting of the status of the virtual digital inputs when the drive is started.
Through this parameter it is possible to state if each configured input will be reset or not at the power-on.
This is a Hexadecimal setting.
1 = The parameter is not reset at each drive starting.
0 = The parameter is reset at each drive starting.

Application example

If the virtual digital inputs 0 and 2 must be reset at the power-on, it is necessary to:
- (reset) **Virt Dig Inp 0**
Programmed as Pos Preset 0
- (do not reset) **Virt Dig Inp 1**
Programmed as Pos Preset 1
- (reset) **Virt Dig Inp 2**
Programmed as Pos Preset 2
- (do not reset) **Virt Dig Inp 3**

IPA	Description	[Unit]	Format	Access	Default	Min	Max

Programmed as Pos Preset 3

It is necessary to set with a high logic level (not reset):
- bit 1 referring to **Virt Dig Inp 1** = 1
- bit 3 referring to **Virt Dig Inp 3** = 1

It is necessary to set with a low logic level (reset):
- bit 0 referring to **Virt Dig Inp 0** = 0
- bit 2 referring to **Virt Dig Inp 2** = 0

VIRT DIG IN	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Virt DI at Start	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0

txv9114

it is therefore necessary to write in the **Virtual DI at start** parameter the value obtained by adding

0 (bit 0) + 2 (bit 1) + 0 (bit 2) + 8 (bit 3) = 10 = A

Virt DI at Start = A

20188 **Virt DI at Dis** **[--]** **Word** **R/W** **FFFFH** **0000H** **FFFFH**

Setting of the status of the virtual digital inputs when the drive is disabled.
Through this parameter it is possible to state if each configured input will be reset or not when the drive is disabled. Hexadecimal setting.
1 = The parameter is not reset at each drive starting.
0 = The parameter is reset at each drive starting.

20189 **Virt DI at Reset** **[--]** **Word** **R/W** **0000H** **0000H** **FFFFH**

Setting of the virtual digital input condition when a drive alarm gets active.
Through this parameter it is possible to state if each configured input has to be reset or not when an alarm intervenes. Hexadecimal setting.
1 = The parameter is reset when the drive is in an alarm condition
0 = The parameter is not reset when the drive is in an alarm condition.
The procedure to be followed is the same as the one used for the **Virt DI at Start** parameter.

DIGITAL OUTPUTS

In the regulation board of the XVy-EV drives there is one slow Relay Output and six fast Digital Outputs. The relay output has one N.O. and one N.C. contact, and it is used as "**Drive OK**". Refreshing time = 8ms.
The changes in the digital output setting can be enabled by resetting the drive.
The same rule can be applied also to the virtual outputs.

NOTE! It is possible to set all the drive alarms on a digital output. The logic status is normally low and it becomes high when the drive is in an alarm condition.

20005 **DO Reset at Fail** **[--]** **Long** **R/W** **0H** **0H** **FFFFH**

Setting of the digital output state when a drive alarm gets active: only for alarm code 1...6, 8...12, 18...32, which disable PWM. This parameter allows to state, when an alarm condition intervenes, which digital output, corresponding to the set bit, is brought to a 0 logic level. Hexadecimal setting.
The bits 0 ... 5 refer to the digital outputs, the bits 8 ... 13 refer to the digital outputs of the expansion card.
0 = The output does not change its logic level
1 = The output is reset and set with 0.

20006 **DO Set at Fail** **[--]** **Long** **R/W** **0H** **0H** **FFFFH**

Setting of the digital output state when a drive alarm gets active: only for alarm code 1...6, 8...12, 18...32, which disable PWM. This parameter allows to state, when a drive alarm intervenes, which digital output, corresponding to the set bit, is brought to a high logic level. Hexadecimal setting.
The bits 0 ... 5 refer to the digital outputs, the bits 8 ... 13 refer to the digital outputs of the expansion card.

IPA	Description	[Unit]	Format	Access	Default	Min	Max
	0 = The output does not change its logic level 1 = The output is set to an high logic level.						
20200	**Digital Output 0**	**[--]**	**Enum**	**R/W/***	**3**	**0**	**1010**

Selection of parameters that can be set as Digital Output **Digital Output**.:

Choices for digital output association:

0 = OFF Output not configured.

1 = Drive Enable The digital output reaches high logic status when the drive is power supplied, enabled (enable command active) and no alarm is present.

2 = Drive Ready The digital output is set to a high logic level when the unit is initialised (with or without the mains power supply) and no alarms are present.

3 = Speed Reached Reached speed.

The digital output reaches high logic status when the motor present speed is equal to the reference within a window defined by the **Speed Reach Wnd** parameter.

4 = Speed 0 Thr Speed = 0.

The digital output acquires high logic status when the motor speed is zero with a dead band (positive and negative) defined on the **Speed Zero Thr** and **Speed Zero Delay** parameters.

5 = Torque Limit Torque limit.

The digital output acquires the high logic status with a torque limit functioning condition.

6 = Torque Thr Overcome torque.

The digital output acquires the high logic status when the motor supplied torque, with an absolute value, is higher than the one set in the **Torque Thr** parameter.

7 = Speed Thr Speed threshold exceeded.

The digital output acquires the high logic status if the speed, with an absolute value, is higher than the value set in the **Speed Thr** and **Speed Thr Wnd** parameters.

8 = AD Index (XE) Repetition of incremental encoder index connected on XE connector. The signal remains active for 8 ms.

9 = DI Index (XER) Repetition of incremental encoder index connected on XER connector. The signal remains active for 8 ms.

10 = Position Error The drive is in Position error (exceeded the threshold of **Max Pos Error** set in the **SERVICE** menu).

11 = Fast Link Rx On slave drive active during reception of Fast link. This output can be used only on a slave drive.

12 = UV Active The drive is in undervoltage alarm (power supply voltage is lower than the undervoltage threshold).

13 = Cost Through Act When there is a Mains loss condition, it activates the energy recovery, braking to a stop; in this way the motor can brake in controlled mode.

14 = Speed Thr > 0 Speed ≠ 0.

Same meaning of **Speed 0 Thr** but with an inverted logic level.

15 = Speed Thr del Delayed speed threshold reached. The digital output reaches a high logic evel if the speed, either positive or negative, is higher than the value set in the **Speed Thr** parameter for a time higher than the value set in the **Speed Thr Delay** parameter.

16 = Torque thr del Reached delayed torque threshold. The digital output reaches the high logic status if the torque, with an absolute value, is higher than the value set in the **Torque Thr** parameter for a period longer than **Torque Thr Delay**.

17 = Alarm Warning Active alarm.

When a previously masked alarm goes active (see IPA 24100), the digital output set as **Alarm warning** reaches the high logic level.

18 = Alarm Coming Delayed alarm.

When a previously delayed alarm gets active (see IPA 24102), the digital output set as **Alarm coming**

IPA	Description	[Unit]	Format	Access	Default	Min	Max

reaches the high logic level.

19 = 80% Overload Thr The IxT or I2t integral has reached 80% of the maximum value.

20 = Brake Command Command for the motor emergency brake.

21 = Fast Stop It states that the drive is in a Fast Stop condition.

22 = PL Stop active It indicates that the drive is in an Emergency stop condition.

23 = Drv Th Overtemp Output of the temperature check function

24 = Drive OK The digital output is set to a high logic level when the drive is powered and there are no alarms present

100 = Drive fault Drive in an alarm condition.

101 = IGBT Desaturat Short circuit alarm of the power module.

102 = Overcurrent Overcurrent alarm.

103 = Overvoltage Overcurrent alarm on the DC LINK intermediate circuit.

104 = Heatsink Ot Heatsink overtemperature alarm.

105 = Drive Overload Drive IxT integral has reached maximum value

106 = Current Fbk Loss Loss of Power Supply TA.

107 = Motor overtemp Motor overtemperature alarm.

108 = Motor Overload Motor Overload

109 = CPU Overtime CPU alarm

111 = Inval Flash Par Invalid flash parameter alarm.

112 = Flash Fault Flash error alarm.

113 = Brake Overpower Brake overpower alarm.

118 = Enc Fbk Loss Main encoder count alarm.

119 = Enc Sim Fault Encoder simulation alarm.

120 = Undervoltage Undervoltage alarm.

121 = Intake Air Ot Temperature of intake air too high; detected by TAC sensor.

122 = Regulation Ot Overtemperature of regulation board; detected by TAR sensor on regulation board.

123 = Module Overtemp IGBT module Overtemperature; detected by OTS sensors on Power stage.

127 = Enable Seq Error Alarm for a wrong sequence in the drive power supply. This alarm gets active when, at the start up, the drive shows a high Digital input 0.

128 = Fast Link Error Fast link communication error.

129 = Position Fault The drive is in Position error (A 29) alarm.

131 = Sequence Fault External alarm for the drive.

1001 = Position Zero Position 0 reached.

The digital output reaches high logic status when the motor present position is equal to the zero position with an dead band defined by the **Pos 0 Thr Offset** parameter.

1002 = Pos Reached The digital output acquires the high logic status when the control finishes the positioning procedure and the position is equal to the destination position +- **Pos Window** for a period equal to **Pos Window Time**.

1003 = Pos Exceeded Position threshold.

The digital output acquires the high logic status when the difference between the present position and the starting position is higher than the value set in the **Positon Thr** parameter.

1004 = Pos Abs Thr Absolute position threshold.

The digital output reaches high logic status if the position is higher than the value set in the **Pos Abs Thr**. parameter.

1005 = Pos Zero Found Found zero position.

The digital output reaches high logic status at the end of the zero searching phase.

1006 = Pos Thr Close 1 Reached position threshold 1.

The digital output acquires the high logic status when the difference between the motor present position and the destination position is lower or equal to the **Pos Thr Close 1** parameter.

IPA	Description	[Unit]	Format	Access	Default	Min	Max

1007 = Pos Thr Close 2 Reached position threshold 2.
The digital output acquires the high logic status when the difference between the motor present position and the destination position is lower or equal to the **Pos Thr Close 2** parameter.
1008 = Pos Out Of Lim A value has been set up out of range **Min Preset Value/Max Preset Value**. If a value required is out of range, it is not executed and the digital output programmed as **Pos Out Of Lim** changes to high logic status.
1009 = Pos Loop Active It states that the drive present functioning mode is Position
1010 = Pos Not Reached The digital output has a logic state high when position control has ended, and the position is not entered in the **+- Pos Window** for a period at least equal to **Pos Window Time**.
Takes the low logic state when a new **POS Start Pos** command is issued.
1011 = Mpos end cycle The output becomes high when the multi-positioning sequence is complete

20201 **Digital Output 1** **[--]** **Enum** **R/W/*** **4** **0** **1010**
Choice of the programmable parameters on **Digital Output 1** The possibilities listed as "**Choices for Digital output association**" are available, see IPA 20200. Default = **Speed 0 thr**

20202 **Digital Output 2** **[--]** **Enum** **R/W/*** **5** **0** **1010**
Choice of the programmable parameters on **Digital Output 2** The possibilities listed as "**Choices for Digital output association**" are available, see IPA 20200.Default = **Torque Limit**

20203 **Digital Output 3** **[--]** **Enum** **R/W/*** **100** **0** **1010**
Choice of the programmable parameters on **Digital Output 3** The possibilities listed as "**Choices for Digital output association**" are available, see IPA 20200. Default = **Drive Fault**

20204 **Digital Output 4** **[--]** **Enum** **R/W/*** **131** **0** **1010**
Choice of the programmable parameters on **Digital Output 4** The possibilities listed as "**Choices for Digital output association**" are available, see IPA 20200. Default = **External Fault**

20205 **Digital Output 5** **[--]** **Enum** **R/W/*** **1** **0** **1010**
Choice of the programmable parameters on **Digital Output 5** The possibilities listed as "**Choices for Digital output association**" are available, see IPA 20200. Default = **Drive Enable**

20254 **Dig Out Reverse** **[--]** **Dword** **R/W** **00H** **0H** **FFFFFFFFH**
This parameter allows to change the logic level of the programmed digital outputs. The digital outputs usually have a 0 logic level when they are inactive and they switch to a high logic level when they become active. Via this bit-mapped parameter it is possible to choose which output the normal logic level has to be switched to. Hexadecimal setting.

Example: the digital outputs 1, 4 and 5 have to be programmed with an inverted condition:

DIGITAL OUTPUT	5	4	3	2	1	0
Dig Out Reverse	1	1	0	0	1	0
	3		2			

txv9115

It is necessary to set **Dig Out Reverse** = 32H

20255 **Dig Out Status** **[--]** **Word** **R**
Only-reading parameter stating the present condition (high logic level 1 and low logic level 0) of the digital outputs. It is an hexadecimal parameter.

Example: the digital outputs are:

DIGITAL OUTPUT	5	4	3	2	1	0
Dig Out Status	0	0	1	0	0	0
	0		8			

txv9116

DIG OUT 3 = 1
The value displayed by the **Dig Out Status** parameter is 8H

IPA	Description	[Unit]	Format	Access	Default	Min	Max

EXP DIG OUTPUTS

It is possible to install inside the drive a card for the digital inputs and outputs expansion. Up to six Digital Outputs can be expanded and programmed through the below parameters. The programming procedure for the expanded digital outputs is the same as for the digital outputs. Refreshing time = 8ms.

IPA	Description	[Unit]	Format	Access	Default	Min	Max
20250	**Exp Dig Out 0**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**1010**
	Choice of the programmable parameters on **Exp Dig Out 0**. The same possibilities stated for the digital outputs are available. See "**Choices for the digital output association**" list on IPA 20200..						
20251	**Exp Dig Out 1**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**1010**
	Choice of the programmable parameters on **Exp Dig Out 1**. The same possibilities stated for the digital outputs are available. See "**Choices for the digital output association**" list on IPA 20200..						
20252	**Exp Dig Out 2**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**1010**
	Choice of the programmable parameters on **Exp Dig Out 2.** The same possibilities stated for the digital outputs are available. See "**Choices for the digital output association**" list on IPA 20200..						
20253	**Exp Dig Out 3**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**1010**
	Choice of the programmable parameters on **Exp Dig Out 3**. The same possibilities stated for the digital outputs are available. See "**Choices for the digital output association**" list on IPA 20200..						
20257	**Exp Dig Out 4**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**1010**
	Choice of the programmable parameters on **Exp Dig Out 4**. The same possibilities stated for the digital outputs are available. See "**Choices for the digital output association**" list on IPA 20200..						
20258	**Exp Dig Out 5**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**1010**
	Choice of the programmable parameters on **Exp Dig Out 5**. The same possibilities stated for the digital outputs are available. See "**Choices for the digital output association**" list on IPA 20200..0.						
20259	**Exp Dig Out 6**	**[--]**	**Enum**	**R/W/***	**1**	**0**	**1010**
	Choice of the programmable parameters on **Exp Dig Out 6**. The same possibilities stated for the digital outputs are available. See "**Choices for the digital output association**" list on IPA 20200..						
20260	**Exp Dig Out 7**	**[--]**	**Enum**	**R/W/***	**1**	**0**	**1010**
	Choice of the programmable parameters on **Exp Dig Out 7**. The same possibilities stated for the digital outputs are available. See "**Choices for the digital output association**" list on IPA 20200..						
20256	**Exp Dig Out Stat**	**[--]**	**Word**	**R**			
	Only-reading parameter stating the present condition (high logic level 1 and low logic level 0) of the digital outputs set on the EB-DIO expansion card.						

VIRT DIG OUTPUTS

Virtual digital outputs, which are not physically present on the terminals but which are available to set possible Digital outputs to be read via the serial line or the field bus.
By setting the Virtual digital outputs, the Digital outputs on the terminal strip are still available. The function performed by a digital output programmed on a Digital output or on a Virtual digital output is the same.
The programming procedure is the same as the one stated for the digital outputs.

IPA	Description	[Unit]	Format	Access	Default	Min	Max
20270	**Virt Dig Out 0**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**1010**
	Choice of the programmable parameters on **Virt Dig Out 0**. The same possibilities stated for the digital outputs are available. See "**Choices for the digital output association**" list on IPA 20200.						
20271	**Virt Dig Out 1**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**1010**
	Choice of the programmable parameters on **Virt Dig Out 1**. The same possibilities stated for the digital outputs are available. See "**Choices for the digital output association**" list on IPA 20200.						
20272	**Virt Dig Out 2**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**1010**
	Choice of the programmable parameters on **Virt Dig Out 2**. The same possibilities stated for the digital outputs are available. See "**Choices for the digital output association**" list on IPA 20200.						

IPA	Description	[Unit]	Format	Access	Default	Min	Max
20273	**Virt Dig Out 3**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**1010**
	Choice of the programmable parameters on **Virt Dig Out 3**. The same possibilities stated for the digital outputs are available. See "**Choices for the digital output association**" list on IPA 20200.						
20274	**Virt Dig Out 4**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**1010**
	Choice of the programmable parameters on **Virt Dig Out 4**. The same possibilities stated for the digital outputs are available. See "**Choices for the digital output association**" list on IPA 20200.						
20275	**Virt Dig Out 5**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**1010**
	Choice of the programmable parameters on **Virt Dig Out 5**. The same possibilities stated for the digital outputs are available. See "**Choices for the digital output association**" list on IPA 20200.						
20276	**Virt Dig Out 6**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**1010**
	Choice of the programmable parameters on **Virt Dig Out 6**. The same possibilities stated for the digital outputs are available. See "**Choices for the digital output association**" list on IPA 20200.						
20277	**Virt Dig Out 7**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**1010**
	Choice of the programmable parameters on **Virt Dig Out 7**. The same possibilities stated for the digital outputs are available. See "**Choices for the digital output association**" list on IPA 20200.						
20278	**Virt Dig Out 8**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**1010**
	Choice of the programmable parameters on **Virt Dig Out 8.** The same possibilities stated for the digital outputs are available. See "**Choices for the digital output association**" list on IPA 20200.						
20279	**Virt Dig Out 9**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**1010**
	Choice of the programmable parameters on **Virt Dig Out 9**. The same possibilities stated for the digital outputs are available. See "**Choices for the digital output association**" list on IPA 20200.						
20280	**Virt Dig Out 10**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**1010**
	Choice of the programmable parameters on **Virt Dig Out 10**. The same possibilities stated for the digital outputs are available. See "**Choices for the digital output association**" list on IPA 20200.						
20281	**Virt Dig Out 11**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**1010**
	Choice of the programmable parameters on **Virt Dig Out 11**. The same possibilities stated for the digital outputs are available. See "**Choices for the digital output association**" list on IPA 20200.						
20282	**Virt Dig Out 12**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**1010**
	Choice of the programmable parameters on **Virt Dig Out 12.** The same possibilities stated for the digital outputs are available. See "**Choices for the digital output association**" list on IPA 20200.						
20283	**Virt Dig Out 13**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**1010**
	Choice of the programmable parameters on **Virt Dig Out 13**. The same possibilities stated for the digital outputs are available. See "**Choices for the digital output association**" list on IPA 20200.						
20284	**Virt Dig Out 14**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**1010**
	Choice of the programmable parameters on **Virt Dig Out 14**. The same possibilities stated for the digital outputs are available. See "**Choices for the digital output association**" list on IPA 20200.						
20285	**Virt Dig Out 15**	**[--]**	**Enum**	**R/W/***	**0**	**0**	**1010**
	Choice of the programmable parameters on **Virt Dig Out 15**. The same possibilities stated for the digital outputs are available. See "**Choices for the digital output association**" list on IPA 20200.						
20289	**Virt DO at Reset**	**[--]**	**Word**	**R/W**	**0000H**	**0000H**	**FFFFH**
	Setting of the virtual digital output state when a drive alarm gets active: only for alarm code 1...6, 8...12, 18...32, which disable PWM. This parameter allows to state, when an alarm condition intervenes, which virtual output, corresponding to the set bit, is brought to a 0 logic level. Hexadecimal setting. 0 = The output does not change its logic level 1 = The output is reset and set with 0.						
20290	**Virt DO at Fail**	**[--]**	**Word**	**R/W**	**0000H**	**0000H**	**FFFFH**
	Setting of the virtual digital output state when a drive alarm gets active: only for alarm code 1...6, 8...12, 18...32, which disable PWM. This parameter allows to state, when a drive alarm intervenes, which virtual digital output,						

IPA	Description	[Unit]	Format	Access	Default	Min	Max

corresponding to the set bit, is brought to a high logic level. Hexadecimal setting.
0 = The output does not change its logic level
1 = The output is set to an high logic level.

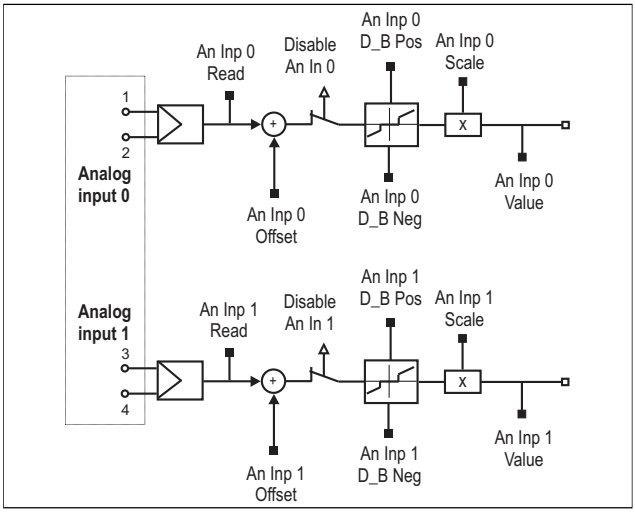
20286 Virt DO Status [--] Word R

Only-reading parameter stating the present condition of the virtual digital outputs (high logic level 1 and low logic level 0). Hexadecimal setting.

ANALOG INPUTS

The regulation board of the XVy-EV drive has two programmable analog inputs.
The Analog Input channels are available on the I/O Terminal Block.

NOTE! Input maximum value: 10.81 V.
Resolution = 12 bit (11 bit + sign).
Bandwith = 1,5 kHz.



20300 Analog Inp 0 Sel [--] Enum R/W 3 0 24

Choice of the parameter to be programmed on analog_input_0. The possibilities listed as "**Choices for Analog Input association**" are available. Default = **Speed Ref 1.**

Choices for Analog Input association

0 = OFF	The analog input is not configured.
1 = Torque Ref 1 (500 us)	Torque reference 1, active in the configuration of the torque control (1)
2 = Torque Ref 2 (500 us)	Torque reference 2, active in the configuration of the torque control (1)
3 = Speed Ref 1 (500 us)	Speed 1 reference signal. (2)
4 = Speed Ref 2 (500 us)	Speed 2 reference signal. (2)
5 = Speed Pos Lim (8 ms)	Signal setting the maximum speed for clockwise rotation direction. (2)
6 = Speed Neg Lim (8 ms)	Signal setting the max speed for CCW rotation direction. (2)
7 = Speed limit (8 ms)	Signal setting the same maximum speed for both clockwise and counterclockwise rotation direction. (2)
8 = Jog Ref (8 ms)	Reference signal for jog function. 10V=par. **Jog Speed Limit** parameter, **JOG FUNCTION** menu.
9 = Torque Limit + (8 ms)	Setting of the positive torque limit. (1)
10 = Torque Limit - (8 ms)	Setting of the negative torque limit. (1)

IPA	Description	[Unit]	Format	Access	Default	Min	Max

11 = Torque Limit (8 ms) Setting of the positive and negative torque limit. (1)
12 = Max Spd Trq Lim (8 ms) Speed limit with torque control (speed limited). (2)
13 = Pos Speed (8 ms) Speed reference during positioning procedures. (2)
14 = Pos Speed Ref 0 (8 ms) Speed reference during zero search.
10V = **Home Max Spd** parameter, **ZERO FOUND CONF** menu
15 = Speed Threshold (8 ms) Analog signal setting the "over-speed" threshold. (2)
16 = Torque Thr (8 ms) Setting of the reached torque threshold. (1)
17 = Multi Speed 1 (8 ms) Analog input of Speed 1 reference for the multi-speed function.(2)
18 = Multi Speed 2 (8 ms) Analog input of Speed 2 reference for the multi-speed function.(2)
19 = Multi Speed 4 (8 ms) Analog input of Speed 4 reference for the multi-speed function.(2)
20 = Els Rb Spd Ref (8 ms) An. signal to set the bend recover ref. in electrical line shaft mode.
10V = **Els Max RB Speed** parameter, **EL SHAFT R BEND** menu
21 = Els Ratio [0] (8 ms) An.signal to set the active ratio (ratio 0) with an electric axis mode. (3)
22 = Els Ratio [1] (8 ms) An.signal to set the active ratio (ratio 1) with an electric axis mode. (3)
23 = Els Ratio [2] (8 ms) An.signal to set the active ratio (ratio 2) with an electric axis mode. (3)
24 = Els Ratio [3] (8 ms) An.signal to set the active ratio (ratio 3) with an electric axis mode. (3)
25 = Pos Preset 0 (8 ms) Position reference. (4)
26 = Speed Ratio 3 (500 ns) Speed reference. (2)
27 = Speed Ratio (8 ms) Speed reference multiplication factor (5)

(1): 10V = 2 * **Base Torque** parameter, **TORQUE** menu
(2): 10V = **Full Scale Speed** parameter , **SPEED** menu
(3): 10V = **Els Max RB Speed** parameter , **EL SHAFT R BEND** menu
(4): 10V = **Max Prs Abs Val** parameter , **POSITION FUNC** menu
0V = **Min Prs Abs Val** parameter , **POSITION FUNC** menu
(5) 10V = multiplication factor 2.00

20301	**Analog Inp 1 Sel**	**[--]**	**Enum**	**R/W**	**1**	**0**	**65535**

Choice of the parameter to be programmed on **Analog Inp 1 Sel**. The possibilities listed as "**Choices for Analog Input association**" are available, see IPA 20300. Default = **Torque Ref 1**

ANALOG INPUT 0

20320	**An Inp 0 Offset**	**[V]**	**Float**	**R/W**	**0**	**-10**	**10**

Writing parameter for the offset setting to be algebraically added to the analog signal.

20330	**An Inp 0 D_B Pos**	**[V]**	**Float**	**R/W**	**0**	**0**	**10**

Writing parameter for the setting of a positive reference threshold, under which the analog value is set to 0.

20340	**An Inp 0 D_B Neg**	**[V]**	**Float**	**R/W**	**0**	**-10**	**0**

Writing parameter for the setting of a negative reference threshold, under which the analog value is set to 0.

20350	**An Inp 0 Scale**	**[--]**	**Float**	**R/W**	**1**	**-3.0**	**3**

Writing parameter for the setting of a multiplication factor of the analog signal.

20310	**An Inp 0 Read**	**[V]**	**Float**	**R**			

Parameter reading the voltage value of the analog input

20360	**An Inp 0 Value**	**[V]**	**Float**	**R**			

Read-only parameter of the analog input after the offset, the scaling and the dead band.

ANALOG INPUT 1

20321	**An Inp 1 Offset**	**[V]**	**Float**	**R/W**	**0**	**-10**	**10**

Writing parameter for the offset to be algebraically added to the analog signal.

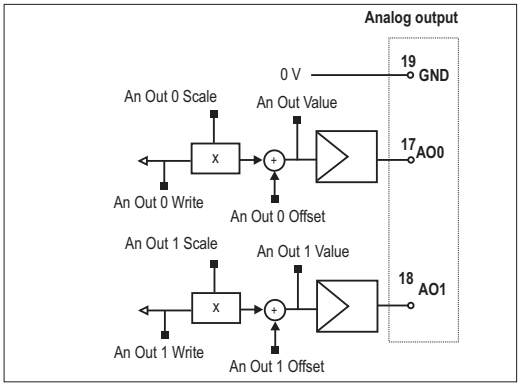
20331	**An Inp 1 D_B Pos**	**[V]**	**Float**	**R/W**	**0**	**-10**	**10**

Writing parameter for the setting of a positive reference threshold under which the analog value is set to 0.

IPA	Description	[Unit]	Format	Access	Default	Min	Max
20341	**An Inp 1 D_B Neg**	**[V]**	**Float**	**R/W**	**0**	**-10**	**10**
	Writing parameter for the setting of a negative reference threshold under which the analog value is set to 0.						
20351	**An Inp 1 Scale**	**[--]**	**Float**	**R/W**	**1**	**-3.0**	**3**
	Writing parameter for the setting of a multiplication factor of the analog signal.						
20311	**An Inp 1 Read**	**[V]**	**Float**	**R**			
	Parameter reading the analog input.						
20361	**An Inp 1 Value**	**[V]**	**Float**	**R**			
	Read-only parameter of the analog input after the offset, the scaling and the dead band.						

ANALOG OUTPUTS

The drives of the XVy-EV series are equipped with 2 ±10V differential analog outputs and a 12-bit (11 bit + sign) A/D converter. Basic Software allows to program up to two Analog Outputs.
Bandwith = 280 Hz



20400	**Analog Out 0 Sel**	**[--]**	**Enum**	**R/W**	**1**	**0**	**12**

Choice of the parameter to be programmed on **Analog Out 0 Sel**. The possibilities listed as "**Choices for Analog Output association**" are available. Deafult =**Actual speed (8 ms)**

Choices for Analog Output association:

0=Off	The analog output is not configured.
1=Actual Speed (8 ms)	Analog signal proportional to the actual motor speed. With a scale factor equal to 1, the analog output supplies 10V when the speed is equal to the **Full Scale Speed** parameter.
2=MotorCurrent (8 ms)	Analog signal proportional to the actual current supplied by the drive. With a scale factor equal to 1, the analog output supplies 10V when the current is equal to the **Drive Max Curr** parameter.
3=Motor Torque (8 ms)	Analog signal proportional to the torque supplied by the motor. With a scale equal to 1, the analog output supplies 10V when the torque is equal to 200% of the **Base Torque** parameter (IPA 18800, 001 - **MONITOR** or **TORQUE** menu).
4=DC Link Voltage (8 ms)	Analog signal proportional to the Voltage of the DC+/ DC- drive intermediate circuit (DC Bus). With a scale factor equal to 1, the analog output supplies 10V when the voltage is equal to 1000 V.
5=Drive Temp (8 ms)	Analog signal proportional to the drive internal temperature. With a scale factor equal to 1, the analog output supplies 10V when the temperature is equal to 100°C (212°F).

IPA	Description	[Unit]	Format	Access	Default	Min	Max

Note! The drive internal fan is normally stopped. It becomes active when the temperature exceeds 55°C (131°F).

6=Ramp Output (8 ms) Analog signal proportional to the output of the ramp circuit. With a scale factor equal to 1, the analog output supplies 10V when the output voltage of the ramp circuit is equal to the **Full Scale Speed** parameter.

7=+10V (8 ms) +10V Analog signal. Signal available for possible potentiometer connections for the drive references. Unit of measure : Volt.

8= -10V (8 ms) -10V Analog signal. Signal available for possible potentiometer connections for the drive references. Unit of measure : Volt.

9=Position Error (8 ms) Analog signal proportional to the position error. The analog output reaches 10V when the position error is equal to the **AnOut MaxPosErr** parameter (IPA 32200).

10=Flt Act Spd 400 (8 ms) Actual speed value with low pass filter (400 msec)

11=Flt Motor Curr (8 ms) Motor current value with low pass filter (400 msec)

12=Flt Motor Torque Value of the motor torque with low-pass filter (400 msec)

13 = PL Next Factor Speed reference multiplication factor.

14=Flt Act Spd 100 (8 ms) Actual speed value with low-pass filter (100 msec)

20401	**Analog Out 1 Sel**	**[--]**	**Enum**	**R/W**	**2**	**0**	**12**

Choice of the parameter to be programmed on **Analog Out 1 Sel**. The possibilities listed as "**Choices for Analog Output association**" are available. Default = **[2] Motor current (1 ms).**

32200	**AnOut MaxPosErr**	**[deg]**	**Float**	**R/W**	**90**	**0**	**2880**

Position error to scale the Analog Output.

ANALOG OUT 0

20420	**An Out 0 Scale**	**[--]**	**Float**	**R/W**	**1**	**-3.0**	**3**

Parameter for the setting of a multiplication factor of the analog signal.

20430	**An Out 0 Offset**	**[V]**	**Float**	**R/W**	**0**	**-10**	**10**

Parameter for the offset setting to be algebraically added to the analog signal.

20410	**An Out 0 Write**	**[V]**	**Float**	**R**			

Parameter reading the analog output.

20440	**An Out 0 Value**	**[V]**	**Float**	**R**			

Parameter reading the actual voltage of the analog output 0.

ANALOG OUT 1

20421	**An Out 1 Scale**	**[--]**	**Float**	**R/W**	**1**	**-3.0**	**3**

Parameter for the setting of a multiplication factor of the analog signal.

20431	**An Out 1 Offset**	**[V]**	**Float**	**R/W**	**0**	**-10**	**10**

Parameter for the offset setting to be algebraically added to the analog signal.

20411	**An Out 1 Write**	**[V]**	**Float**	**R**			

Parameter reading the analog output.

20441	**An Out 1 Value**	**[V]**	**Float**	**R**			

Parameter reading the real value of the analog output 1.

EXP ANALOG OUT

It is possible to install inside the drive a card for the analog outputs expansion. Up to two Analog Outputs can be expanded and programmed through the below parameters. The programming procedure for the expanded analog outputs is the same as for the digital inputs. Refreshing time = 8ms.

20402	**Exp Analog Out 0**	**[--]**	**Enum**	**R/W**	**0**	**0**	**14**

Choice of the parameter to be programmed on **Exp Analog Out 0**. The possibilities listed as "**Choices for Analog Output association**" are available, see IPA 20400 (except selections 1 and 13).

IPA	Description	[Unit]	Format	Access	Default	Min	Max
20403	**Exp Analog Out 1**	[--]	Enum	R/W	0	0	14
	Choice of the parameter to be programmed on **Exp Analog Out 1**.						
	The possibilities listed as "**Choices for Analog Output association**" are available, see IPA 20400 (except selections 1 and 13).						
	EXP AN OUT 0						
20422	**ExAn Out 0 Scale**	[--]	Float	R/W	1	-3.0	3
	Writing parameter for the setting of a multiplication factor of the analog signal.						
20432	**ExAn Out 0 Offse**	[V]	Float	R/W	0	-10	10
	Writing parameter for the offset setting to be algebraically added to the analog signal.						
20412	**ExAn Out 0 Write**	[V]	Float	R			
	Parameter reading the analog output.						
20442	**ExAn Out 0 Value**	[V]	Float	R			
	Parameter reading the actual voltage of the analog output.						
	EXP AN OUT 1						
20423	**ExAn Out 1 Scale**	[--]	Float	R/W	1	-3.0	3
	Writing parameter for the setting of a multiplication factor of the analog signal.						
20433	**ExAn Out 1 Offse**	[V]	Float	R/W	0	-10	10
	Writing parameter for the offset setting to be algebraically added to the analog signal.						
20413	**ExAn Out 1 Write**	[V]	Float	R			
	Parameter reading the analog output.						
20443	**ExAn Out 1 Value**	[V]	Float	R			
	Parameter of the actual voltage of the analog output 1.						

ENC REPETITION

The signal coming from the encoder/resolver and used as a feedback for the speed/space loop can be repeated/ simulated (as a digital encoder) on the XER port with a desired ratio. This port can be configured both as an input (frequency reference, coming from the master encoder, for the electric axis) or as an output.

The repetition can be enabled/disabled via the software (in order to avoid possible failures the XER connector is default configured as an input).

The maximum repetition frequency is 500 kHz; if such frequency is exceeded, a drive alarm occurs as the counting storage can not be assured.

The index can be repeated up to a total accumulated limit of 131070 pulses.

It is possible to set the position of the first repeated index pulse as compared to the first master index after the index repetition has been enabled.

The following indexes will be repeated with a frequency set independently of the master index.

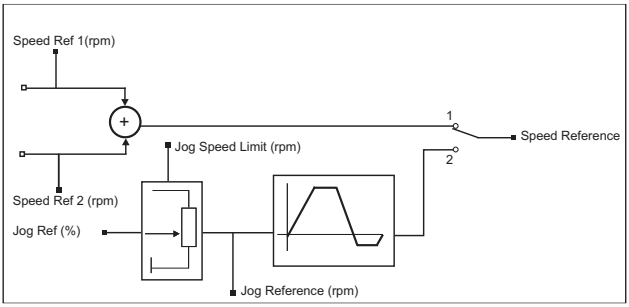
20035	**Enc Rep Sim Cfg**	[--]	Enum	R/Z/*	0	0	1
	The following possibilities are available:						
	0=Main Enc Repet	Hw repetition of motor encoder (not available on motor with resolver)					
	1=Spd Pos Enc Sim	Simulation of motor encoder.					
	2=Aux Enc Repeater	Hw repetition of the auxiliary encoder (XER).					
20030	**PPR Simulation**	[--]	Dword	R/Z/*	1024	1	131071
	Parameter setting the pulse/revolution number for the encoder simulation signal.						
20032	**Index Puls Simul**	[--]	Dword	R/Z/*	1024	1	536871000
	Parameter setting the gain for the simulation of the zero slot. It states the pulse frequency with which the encoder index is repeated. For example, 100 means that a zero index is obtained every 100 repeated pulses.						
20033	**Index Offset Sim**	[--]	Long	R/Z/*	0	1	536871000
	Parameter setting the offset for the simulation of the index signal. With this parameter it is possible to program the						

IPA	Description	[Unit]	Format	Access	Default	Min	Max
	position of the first repeated index pulse as compared to the first master index, after the index repetition has been enabled. Following indexes will be repeated with the set frequency (**Index Puls Simul** parameter) independently of the master index.						
19040	**Enc Err Simul**	**[mech.deg.]**	**Float**	**R**			
	Encoder simulation error.						

JOG FUNCTION

The JOG function can be used both with a speed control and with a position control. By programming specific digital inputs, "**Jog CW**" and/or "**Jog CCW**", it is possible to replace the Speed ref speed reference (position 1 for the switch) with the jog one (position 2 for the switch). Speed ref (speed reference) is active when is present the START command while the jog reference is active when is present **Jog CW** or **Jog CCW**.

In case both the START and the JOG command are present, the START command has the priority.



21000	**Jog Speed Limit**	**[rpm]**	**Float**	**R/W**	**1500.0**	**0**	**IPA20003**
	Parameter setting the maximum reference limit for the jog function.						
21001	**Jog Reference**	**[%]**	**Float**	**R/W**	**10**	**0**	**100**
	Jog function reference, which can be set also via an analog input. Its percentage value states the jog						
21003	**CW Jog Acc**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the clockwise acceleration time (active on the **Jog CW** reference).						
21004	**CCW Jog Acc**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the counterclockwise acceleration time (active on the **Jog CCW** reference).						
21005	**CW Jog Dec**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the clockwise deceleration time (active on the **Jog CW** reference).						
21006	**CCW Jog Dec**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the counterclockwise deceleration time (active on the **Jog CCW** reference).						

MULTISPEED

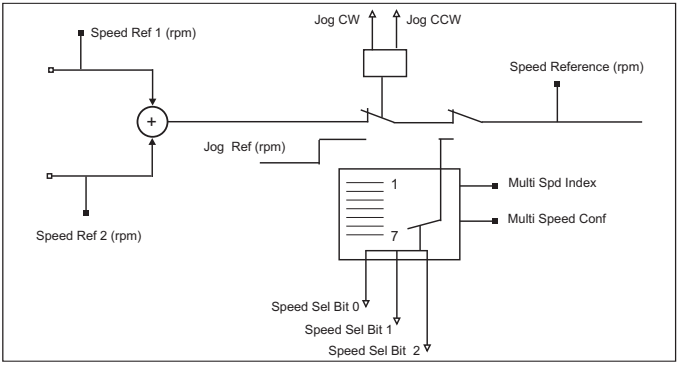
As an alternative to the Speed ref analog reference (in the speed control configuration), it is possible to enable the Multispeed function. Enabling some digital inputs configured as Speed sel bit X (see IPA 20101). it is possible to recall up to seven fixed speeds set in the **Multi Speed XX**. parameters.

The references can be supplied with signs, so that their definition sets the desired rotation direction.

In case the digital inputs programmed as **Speed Sel Bit** are all at 0, the reference **Speed Ref 1/2** remains active

	Speed sel bit 0	Speed sel bit 1	Speed sel bit 2
Multi speed 1	high	low	low
Multi speed 2	low	high	low
Multi speed 3	high	high	low
Multi speed 4	low	low	high
Multi speed 5	high	low	high
Multi speed 6	low	high	high
Multi speed 7	high	high	high

txv9201



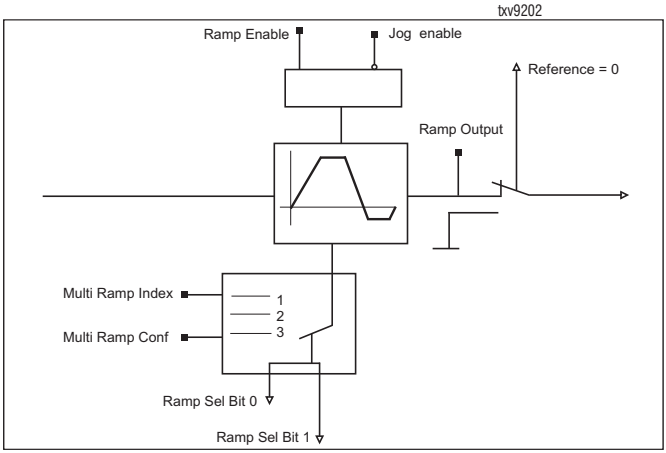
21301	**Multi Speed 1**	**[rpm]**	**Float**	**R/W**	**0**	**-IPA20003**	**IPA20003**
	Setting of the multispeed 1 speed reference						
21302	**Multi Speed 2**	**[rpm]**	**Float**	**R/W**	**0**	**-IPA20003**	**IPA20003**
	Setting of the multispeed 2 speed reference						
21303	**Multi Speed 3**	**[rpm]**	**Float**	**R/W**	**0**	**-IPA20003**	**IPA20003**
	Setting of the multispeed 3 speed reference						
21304	**Multi Speed 4**	**[rpm]**	**Float**	**R/W**	**0**	**-IPA20003**	**IPA20003**
	Setting of the multispeed 4 speed reference						
21305	**Multi Speed 5**	**[rpm]**	**Float**	**R/W**	**0**	**-IPA20003**	**IPA20003**
	Setting of the multispeed 5 speed reference						
21306	**Multi Speed 6**	**[rpm]**	**Float**	**R/W**	**0**	**-IPA20003**	**IPA20003**
	Setting of the multispeed 6 speed reference						
21307	**Multi Speed 7**	**[rpm]**	**Float**	**R/W**	**0**	**-IPA20003**	**IPA20003**
	Setting of the multispeed 7 speed reference						
21310	**Multi Spd Index**	**[--]**	**Word**	**R/W**	**0**	**0**	**7**
	Read parameter, if **Multi Speed Conf** = *Digital input*. It states the currently used speed reference.						
	Read/write parameter if **Multi Speed Conf** = *Parameter*. Setting of the multi speed reference.						
21311	**Multi Speed Conf**	**[--]**	**Enum**	**R/W**	**0**	**0**	**1**
	Parameter for the selection of the commands enabling the multi speed references.						
	0 = Digital input Reference selection via digital input						
	1 = Parameter Reference selection via the **Multi Spd Index** parameter						
	It is also possible to select up to 3 analog references as Multispeed (see IPA 20300), which can be recalled via the selection of three digital inputs.						

IPA	Description	[Unit]	Format	Access	Default	Min	Max

MULTIRAMP

The Multiramp function allows to recall up to three different ramps (in addition to the main ramp).
The acceleration and deceleration times can be set in an independent way. The recall of the desired ramp is carried out via a / two digital signals programmed as Ramp sel bit 0 and ramp sel bit 1 (see IPA 20201).
The selection of each different ramp allows the reference to follow the new ramp during the acceleration and deceleration phase.

	Ramp sel bit 0	Ramp sel bit 1
Ramp 1	high	low
Ramp 2	low	high
Ramp 3	high	high



21440	**Multi Ramp Index**	**[--]**	**Word**	**R/W**	**0**	**0**	**3**
	Read parameter if **Multi Ramp Conf** = Digital input. It states the ramp being used. Read/write parameter if **Multi Ramp Conf** = Parameter. Setting of the multi-ramp selection.						
21441	**Multi Ramp Conf**	**[--]**	**Enum**	**R/W**	**1**	**0**	**1**
	Parameter for the selection of the multi-ramp enabling commands 0 = Digital input Ramp selection via digital input 1 = Parameter Ramp selection via the **Multi Ramp Index**						

MULTIRAMP 1

21401	**M Ramp 1 CW Acc**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Rate 1 setting of the clockwise acceleration						
21411	**M Ramp 1 CCW Acc**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Rate 1 setting of the counterclockwise acceleration						
21421	**M Ramp 1 CW Dec**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Rate 1 setting of the clockwise deceleration						
21431	**M Ramp 1 CCW Dec**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Rate 1 setting of the counterclockwise deceleration						

MULTIRAMP 2

21402	**M Ramp 2 CW Acc**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Rate 2 setting of the clockwise acceleration						

IPA	Description	[Unit]	Format	Access	Default	Min	Max
21412	**M Ramp 2 CCW Acc** Rate 2 setting of the counterclockwise acceleration	[ms/krpm]	Float	R/W	336.1	0	IPA21111
21422	**M Ramp 2 CW Dec** Rate 2 setting of the clockwise deceleration	[ms/krpm]	Float	R/W	336.1	0	IPA21111
21432	**M Ramp 2 CCW Dec** Rate 2 setting of the counterclockwise deceleration	[ms/krpm]	Float	R/W	336.1	0	IPA21111
	MULTIRAMP 3						
21403	**M Ramp 3 CW Acc** Rate 3 setting of the clockwise acceleration	[ms/krpm]	Float	R/W	336.1	0	IPA21111
21413	**M Ramp 3 CCW Acc** Rate 3 setting of the counterclockwise acceleration	[ms/krpm]	Float	R/W	336.1	0	IPA21111
21423	**M Ramp 3 CW Dec** Rate 3 setting of the clockwise deceleration	[ms/krpm]	Float	R/W	336.1	0	IPA21111
21433	**M Ramp 3 CCW Dec** Rate 3 setting of the counterclockwise deceleration	[ms/krpm]	Float	R/W	336.1	0	IPA21111

SPEED DRAW

The Speed Draw functional enables the speed reference from the ramp unit to be multiplied by a value between 0 and 2 (0-200%). This value can be entered manually via the configurator, bus or come from the motor potentiometer function.
The SPEED DRAW function is working only if parameter 20023 **Control Mode** is set as **Speed**; in all other modes, this function is bypassed (ratio = 1). The function is bypassed in case of Jog run as well.
The SPEED DRAW function enables the speed reference from the ramp unit to be multiplied by a value between 0 and 2 (0-200%). This value can be entered manually via the configurator and bus, it can be sampled from an external analog reference or come from the motor potentiometer function.

20085	**Speed Draw Ratio** Multiplication factor	[--]	Float	R/W	1	0	2
20086	**Speed Draw Out** Resulting reference speed.	[rpm]	Float	R			
20089	**Speed Draw In** Speed reference input at SPEED DRAW function.	[rpm]	Float	R			
20092	**Act SpdDrw Ratio** Speed ratio currently used.	[%]	Float	R			

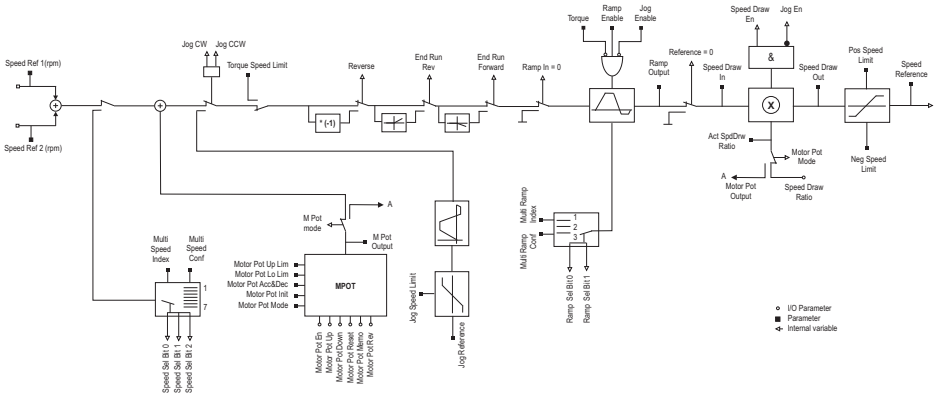
IPA	Description	[Unit]	Format	Access	Default	Min	Max

MOTOR POT

The Motor potentiometer function allows the speed of the drive to be varied, with the command entered from the keypad, from digital inputs, from the serial link or the field bus.

Changes are made by setting a ramp time. The Motor-potentiometer reference can be added or multiplied with the output from the ramp.

The Jog function is separate from the Motor potentiometer function.



22502 **Motor Pot Up Lim** **[%]** **Float** **R/W** **100** **0** **200**

Upper limit of the motor potentiometer output reference. 0 … 200%

Referred to **Full scale** speed if **Motor Pot Mode** = **Add To Ramp Ref**.

Considered as maximum percentage of main speed reference multiplication if **Motor Pot Mode** = **Speed ref Multip**.

The parameter can be set through keyboard, serial line or bus.

22503 **Motor Pot Lo Lim** **[%]** **Float** **R/W** **100** **0** **200**

Lower limit of the motor potentiometer output reference. 0 … 200%

Referred to **Full scale speed** if **Motor Pot Mode** = **Add To Ramp Ref**.

Considered as minimum percentage of main speed reference multiplication if **Motor Pot Mode** = **Speed ref Multip**.

The parameter can be set through keyboard, serial line or bus.

22504 **Motor Pot Acc** **[msec]** **Long** **R/W** **4000** **0** **IPA20003**

Speed reference acceleration time. [s] 0 … 6553,5 (Referred to **Full Scale Speed**).

If **Motor Pot Mode** = **Add To Ramp Ref**: the drive main ramp (RAMP menu) is overwritten by **Motor Pot Acc**.

If **Motor Pot Mode** = **Speed Ref Multip**: the drive main ramp (RAMP menu) is completely independent from **Motor Pot Acc**.

The command can be sent through keyboard, terminals, serial line or bus.

22505 **Motor Pot Dec** **[msec]** **Long** **R/W** **4000** **0** **IPA20003**

Speed reference deceleration time. [s] 0 … 6553,5 (Referred to **Full Scale Speed**).

If **Motor Pot Mode** = **Add To Ramp Ref**: the drive main ramp (RAMP menu) is overwritten by **Motor Pot Dec**.

If **Motor Pot Mode** = **Speed Ref Multip**: the drive main ramp (RAMP menu) is completely independent from **Motor Pot Dec**.

The parameter can be set through keyboard, serial line or bus.

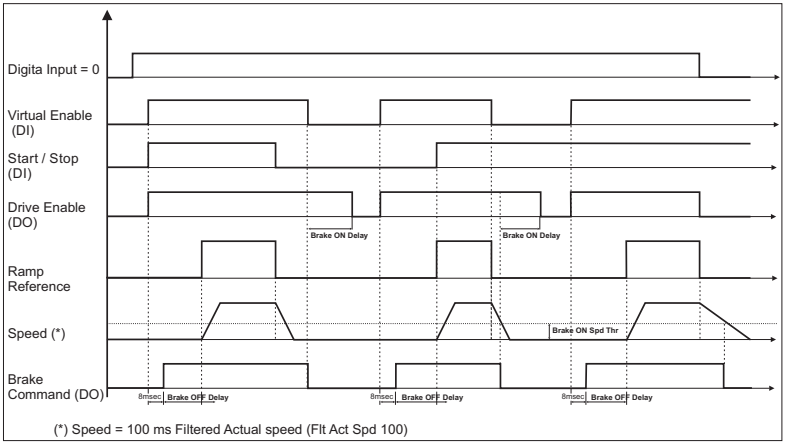
IPA	Description	[Unit]	Format	Access	Default	Min	Max
22506	**Motor Pot Init**	**[%]**	**Float**	**R/W**	**0**	**0**	**100**
	Initialisation of the motor potentiometer output reference. 0 … 200% Referred to **Full scale speed** if **Motor Pot Mode** = **Add To Ramp Ref**. Considered as percentage of main speed reference multiplication if **Motor Pot Mode** = **Speed ref Multip**. The parameter can be set through keyboard, serial line or bus.						
22507	**Motor Pot En**	**[--]**	**Enum**	**R/W**	**0**	**0**	**1**
	Enabling of motor potentiometer function. The command can be sent through keyboard, terminals, serial line or bus. 0 = Disabled 1 = Enabled						
22508	**Motor Pot Reset**	**[--]**	**Float**	**R/W**	**0**	**0**	**1**
	Reset memory and initialisation of **Motor Pot Output** to a value set in **Motor Pot Init**. 0 = Disabled 1 = Enabled Reset The command can be sent through keyboard, terminals, serial line or bus.						
22509	**Motor Pot Mode**	**[--]**	**Enum**	**R/W**	**0**	**0**	**1**
	Operational mode of the motor potentiometer. The command can be sent through keyboard, terminals, serial line or bus. 0 = Add to Ramp Ref Speed reference is added to **Speed Ref** 1 = Ramp Ref Multip The motor potentiometer acts as a **Speed Ref** multiplier. In this case, the drive Speed Draw function is used. ***Note:*** if the Speed Ratio parameter is set to analog input, this takes the priority over the motor-potentiometer function. If this parameter is modified parameter 22506 must be reinitialised: - 22509 changed from 0 to 1 by user -> 22506 reset automatically = 100 - 22509 changed from 1 to 0 by user -> 22506 reset automatically = 0						
22510	**Motor Pot Memo**	**[--]**	**Float**	**R/W**	**0**	**0**	**1**
	Storage of reference setting in memory 0 = Disabled Restart from default configuration If **Motor Pot Mode** = **Add To Ramp Ref**: the speed reference is set to the value shown in **Motor Pot Lo Lim**. If **Motor Pot Mode** = **Speed Ref Multip**: the speed ratio is set to 100%. The command can be sent through keyboard, terminals, serial line or bus. 1 = Enabled Storage of last speed or speed ratio set. If **Motor Pot Mode** = **Add To Ramp Ref**: after Start, the motor accelerates automatically up to the preset speed. If **Motor Pot Mode** = **Speed Ref Multip**: after Start, the motor follows the speed reference multiplied by the preset ratio.						
22511	**Motor Pot Dir**	**[--]**	**Bool**	**R/W**	**0**	**0**	**1**
	Polarity inversion of speed reference. 0=Forward direct 1=Reverse reversed reference The command can be sent through keyboard, terminals, serial line or bus.						
22501	**Motor Pot Output**	**[%]**	**Float**	**R**			
	Monitor for motor potentiometer setting 0 … 200%. The command can be sent through keyboard, serial line or bus.						

BRAKE CONTROL

The brake function allows to control in a suitable way the motor emergency brake with a drive digital output programmed as **[20] Brake Command**..

The drive enabling and disabling requires the use of a digital input programmed as **[28] Virtual Enable**.

In case an alarm occurs or the digital input 0 drops out during the functioning procedure, the output controlling the brake drops out when the motor speed is lower than the programmable threshold.



Note! In case an alarm occurs, the behavior is the same as the one used for the Digital Input 0 drop.

20600	**Brake Enable**	**[--]**	**Enum**	**R/W**	**0**	**0**	**1**
	0 = Disabled Disabled brake function.						
	1 = Enabled Enabled brake function						
20601	**Brake OFF Delay**	**[sec]**	**Float**	**R/W**	**0**	**0**	**10**
	Delay stated in seconds from the brake opening command to the reference enabling.						
20602	**Brake ON Delay**	**[sec]**	**Float**	**R/W**	**0**	**0**	**10**
	Delay stated in seconds from the brake closing command to the drive disabling (non-torque motor).						
20603	**Brake ON Spd Thr**	**[rpm]**	**Float**	**R/W**	**100**	**0**	**20000**
	Speed threshold closing the brake in case an alarm occurs or the digital input 0 drops out.						

POWERLOSS

The Powerloss function controls the loss of power whether transient or long term. When running in Powerloss mode, the system is controlled so as to use the motor's kinetic energy, keeping the DC link voltage value high.

The function is activated automatically for a cut-in threshold of around 78% of normal operating voltage of the DC Link (e.g.: for a 400 V AC supply, the threshold is 440 V DC).

The function's activation can be detected by the programmable **PL Stop Active** parameter on the digital output.

There are two operating modes implemented: **Coast through** and **Emergency Stop**.

The choice is made from the **Powerloss Config**. parameter.

Coast-through mode

This mode is designed to allow the controlled motor to pass through a mains dip with as little loss of speed as possible.

When the function activation threshold is detected, the motor speed is controlled by a PI regulator, in order to maintain the DC Link voltage constant at a predefined value of 12% above the voltage drop threshold.

The gains on the PI regulator are set via **P Loss Prop Gain** and **P Loss Int Gain**.

IPA	Description	[Unit]	Format	Access	Default	Min	Max

The function is automatically deactivated when the mains power returns, restoring the motor to the operating conditions prior to the break.

If the power loss is permanent, or the motor speed drops too low to allow kinetic energy to be recovered, the drive stops in the **Main Power Loss** (A16) alarm conditions.

Emergency Stop mode

This mode is designed for use in applications where the motor or motors installed in a machine have to be stopped in a controlled and synchronised way, including where mains power is lost.

When the function activation threshold is detected, the drive reduces the output frequency according to the **P Loss Ramp** setting, causing the motor to operate as a generator, recharging the DC Link to the value specified in the **P Loss Volt Ref** parameter. The motor speed is then controlled via a PI regulator and regulated to keep the DC Link voltage constant. The gains on the PI regulator are set via **P Loss Prop Gain** and **P Loss Int Gain**.

While operating in Powerloss the drive current limit is set with **P Loss Trq Limit**.

When the motor speed drops below the threshold set in **P Loss Spd 0 Thr**, the drive stops in **Main Power Loss** (A16) alarm conditions.

The **PL Next Factor** parameter, that can be set on the analogue output, provides the speed reference (**Motor Speed / Speed Reference**). It can be used as a speed reference multiplier for the other motors installed on the machine, to permit synchronised stop.

The drive can be notified that the mains voltage is restored via the **PL Mains Status** parameter or via a digital input. When the parameter value returns to the high state, and if the motor speed is above the threshold set in **P Loss NoRes Thr**, the system accelerates the motor again to the operating conditions prior to the break, with the standard system ramp (**RAMP** menu).

18138	**PL Mains status** It signals the mains voltage reset to the drive. The command can be sent through keyboard, programmable digital input, serial line or bus. 0 = Off 1 = On	**[--]**	**Bool**	**R/W**	**0**	**0**	**1**
18130	**Powerloss Config** Configuration of Powerloss function. 0 = Disabled 1 = Coast - Through 2 = Emergency Stop	**[--]**	**Enum**	**R/W/***	**0**	**0**	**2**
18131	**P Loss Prop Gain** Proportional gain of Powerloss function regulation algorithm.	**[--]**	**Int**	**R/W**	**500**	**0**	**32767**
18132	**P Loss Int Gain** Integral gain of Powerloss function regulation algorithm.	**[--]**	**Int**	**R/W**	**500**	**0**	**32767**
18133	**P Loss Volt Ref** Reference value for Emergency stop function algorithm.	**[V]**	**Float**	**R/W**	**790**	**100**	**820**
18134	**P Loss Ramp** Ramp value used for activation of Emergency stop function algorithm.	**[ms/krmp]**	**Float**	**R/W**	**336.1**	**0**	**FLT_MAX**
18135	**P Loss Trq Lim** Maximum value of braking torque in Emergency Stop phase.	**[%]**	**Float**	**R/W**	**100**	**0**	**FLT_MAX**
18136	**P Loss Spd 0 Thr** **Main Loss** alarm (A 16) activation threshold..	**[rpm]**	**Float**	**R/W**	**10**	**0**	**FLT_MAX**
20088	**P Loss NoRes Thr** Speed threshold below which operation can no longer be restored to the state prior to a break in power, when the power returns.	**[rpm]**	**Float**	**R/W**	**10**	**0**	**100000**

IPA	Description	[Unit]	Format	Access	Default	Min	Max
18137	**PL Next Factor**	**[--]**	**Float**	**R**			
	Provides the speed reference (**Motor Speed / Speed Reference**). It can be used as a speed reference multiplier for the other motors installed on the machine, to permit synchronised stop. The parameter can be set to a programmable analog output.						
20087	**Loss Active**	**[--]**	**ENUM**	**R**	**0**	**0**	**1**
	Power loss function activity state. 0 = Not Active 1 = Active						

POSITION

The drives can be configured in Position Control; the default mode is however Speed Control.
DRIVE CONFIG / **Control Mode** -> Position

> ***Caution!*** In order to perform a right positioning, the drive has to reach the position 0 (or homing position) at least once. When the home position has been found, it is maintained till the drive is switched off or reset. It is possible to perform a new 0 search (or homing) at any moment by rising the digital input programmed as Pos zero search.

There are 8 point-point conditions available, with constant acceleration profile, configurable in absolute or relative mode, and with options of various speed and acceleration settings for each position.

Absolute mode:
- **Position Mode** parameter= [0] Absolute : used to vary distances between stations, by modifying the position of each individual station, and in the event of an unwanted stop, allowing easier return to the zero position (home).
- **Position Mode** parameter= [1] IncAbs : movements are incremental, in absolute steps.
Example: if the preset position is 2000 u.u., the destination settings are 2000, 4000, 6000,

Relative mode:
- **Position Mode** parameter = [2] Incremental : movements are incremental with respect to the starting position
Example: if the selected position preset is 2000 u.u. (user unit), with each Pos start pos command the position increases by 2000 u.u.

For each movement, the parameters can be set:

Pos Preset X	Setting initial sector
Pos Speed X	Setting speed
Pos Acc X	Setting acceleration
Pos Dec X	Setting deceleration

The parameters for managing functions are in the **Position** menu:
- Find Zero
- Position start
- Position reference from analogue input
- Self-learning measurements
- Sequential position control (multi-position controller)

Zero search (Pos 0 search)
The zero search phase can be performed following different procedures:
A - Using the zero sensor and the encoder slot (default mode)

IPA	Description	[Unit]	Format	Access	Default	Min	Max

B - Using only the zero sensor

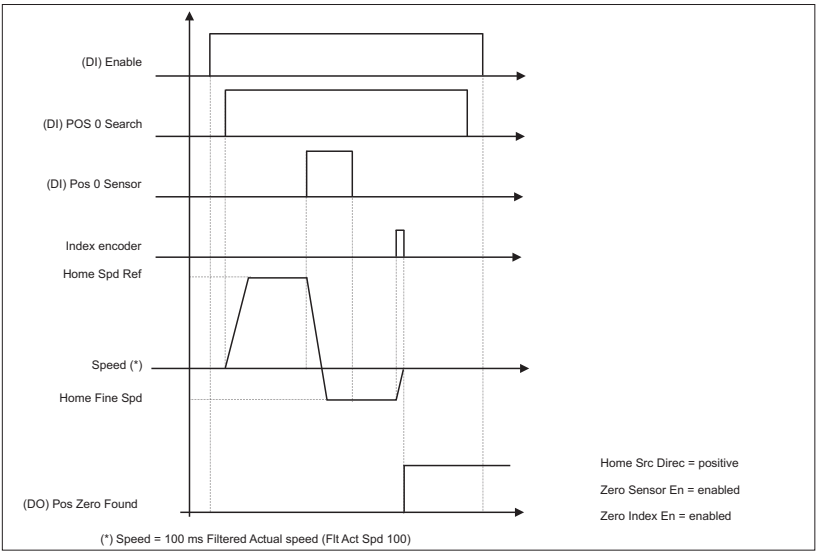
C - Using the encoder slot

D - With parameter IPA 30045, 0 Pos at Startup (ZERO FOUND CONF menu)

- also see "Self-tuning positions - POS Memo 0", on the following pages.

A - Using the zero sensor and the encoder slot (default mode):

Zero Sensor En = Enabled;
Zero Index En = Enabled.



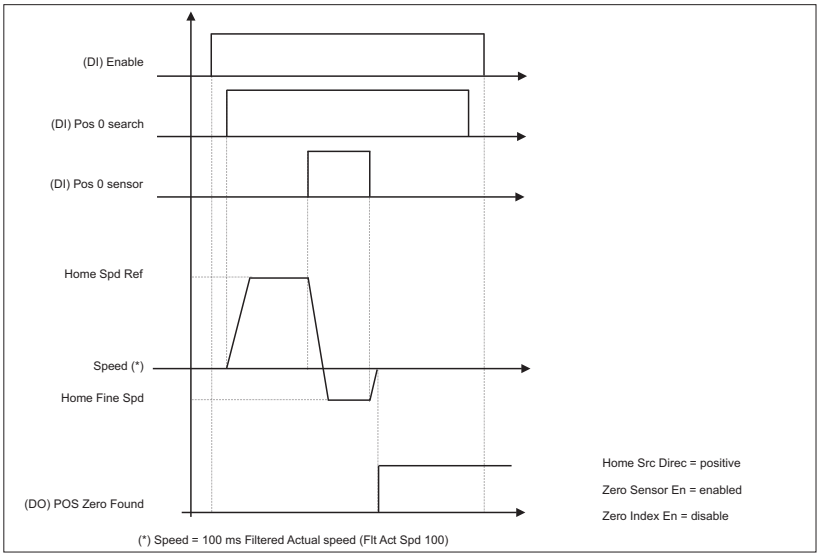
1) Enable the drive: "**Enable**" digital input with a high logic status.
2) Enable (high logic status) the digital input programmed as **POS 0 Search**.
3) When the motor receives the **POS 0 Search** command, it starts moving in the direction stated by the **Home Src Direc** parameter (positive = motor clockwise rotation direction) with the **Home Spd Ref** reference. When the sensor is used (high **POS 0 Sensor**), the motor changes its rotation direction and the active speed reference becomes **Home Fine Spd**. The motor stops at the first encoder slot after freeing the sensor (low **POS 0 Sensor**) The position of the encoder slot is acquired as position 0.

If the sensor is used at the motor start up (high **POS 0 Sensor**) the motor starts rotating in an opposite direction as compared to the one stated by the **Home Src Direc** parameter (positive = the motor rotates in an anti-clockwise direction) with the **Home Fine Spd** reference. The motor stops at the first encoder slot after freeing the sensor (low **POS 0 Sensor**). The position of the encoder slot is acquired as position 0.
The **Inside Index Src** parameter allows to define if the encoder index corresponding to zero is internal or external to the sensor.
The **Zero Sensor Edge** parameter allows to choose the active edge of the zero sensor. For further information see the **ZERO FOUND CONFIG** menu.

IPA	Description	[Unit]	Format	Access	Default	Min	Max

B - Using only the zero sensor

Zero Sensor En = Enabled;
Zero Index En = Disabled.



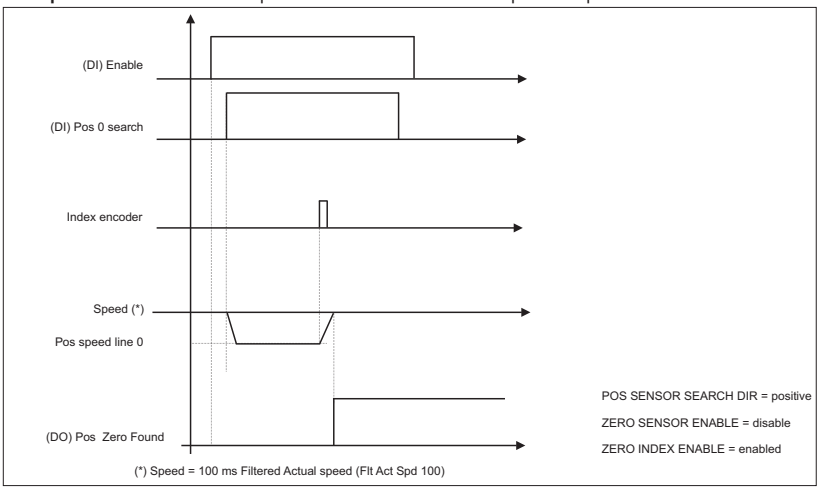
1) Enable the drive: "**Enable**" digital input with a high logic status.
2) Enable (high logic status) the digital input programmed as **POS 0 Search**.
3) When the motor receives the **POS 0 Search** command, it starts moving in the direction stated by the **Home Src Direc** parameter (positive = motor clockwise rotation direction) with the **Home Spd Ref** reference. When the sensor is used (high **POS 0 Sensor**), the motor changes its rotation direction and the active speed reference becomes **Home Fine Spd.**
   The motor stops after the sensor has been freed (low **POS 0 Sensor**). This position is acquired as position 0.

If the sensor is used at the motor start up (high **POS 0 Sensor**) the motor starts rotating in an opposite direction as compared to the one stated by the **Home Src Direc** parameter (positive = the motor rotates in an anti-clockwise direction) with the **Home Fine Spd** reference. The motor stops after the sensor has been freed (low **POS 0 Sensor**). This position is acquired as position 0.
The **Zero Sensor Edge** parameter allows to choose the active edge of the zero sensor. For further information see the **ZERO FOUND CONF** menu.

IPA	Description	[Unit]	Format	Access	Default	Min	Max
C -	**Using the encoder slot**						

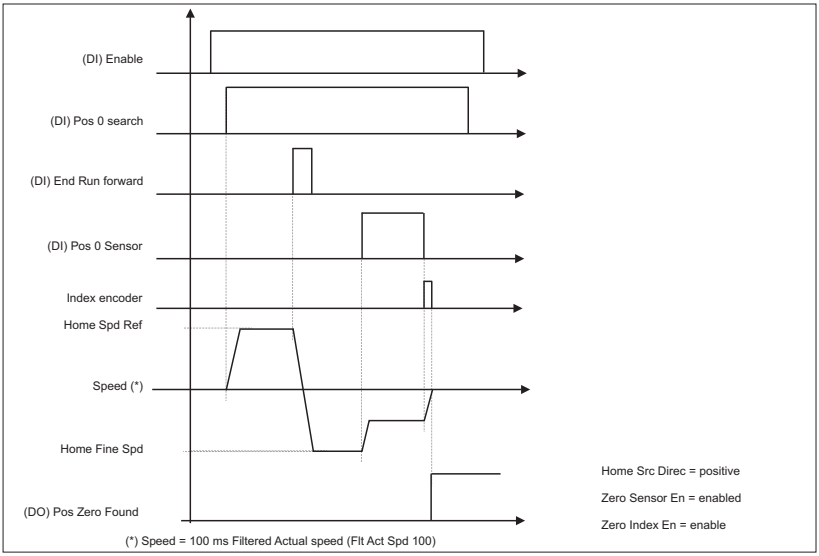
Zero Sensor En = Disabled;
Zero Index En = Enabled

1) Enable the drive: "**Enable**" digital input with a high logic status.
2) Enable (high logic status) the digital input programmed as **POS 0 Search**.
3) When the motor receives **POS 0 Search** command, the motor starts rotating in a direction opposite to the one stated by the **Home Src Direc** parameter (positive = the motor rotates in an anti-clockwise direction) with the **Home Fine Spd** reference. The motor stops at the first encoder slot and acquires this position as 0.



NOTE! If **Zero Sensor En** = Disabled and **Zero Index En** = Disabled by rising **POS 0 Search** the motor stands still and the home search is not performed.

If in the A and B condition the limit switch is found (**End Run Forward** if the speed is positive and **End Run Reverse** if the speed is negative) before using the sensor, the motor changes its rotation direction maintaining the **Home Spd Ref** reference speed. When the sensor is used (high **POS 0 Sensor**), the active speed reference is **Home Fine Spd**, but the motor does not change its rotation direction. The motor stops when the sensor is freed (low **POS 0 Sensor**). This position is acquired as position 0. This is useful when the 0 sensor is not placed at one of the stroke ends.



If an offset is set for the zero position (**Home Pos Offset** different from 0), during the zero search the motor behaves as previously described. The only difference is that in the home point the position is equal to -**Home Pos Offset**.
Through the **Home Pos Offs En** parameter it is possible to stop the motor at 0 user units, i.e. a movement of - **Home Pos Offset** as compared to the encoder slot.

D - With parameter IPA 30045, 0 Pos at Startup (ZERO FOUND CONF menu)

1) Enable parameter IPA 30045, **0 Pos at Startup** (**ZERO FOUND CONF** menu)
2) Next time the drive is turned on it will sample the position of the encoder which will be acquired as Zero position (Home).

Note: If a further zero search is made with one of the above methods, the initial zero position will be overwritten.

Position Start

At the end of the zero search phase it is possible to carry out the position start. The motor, when the drive (enabled) receives the **POS Start Pos** command, starts rotating with the reference **Pos Speed** and reaches the set value. There are 64 registers where it is possible to store the desired values and to recall them via digital inputs programmed as **Pos Preset 0,1,2,3,4,5**. (They are used to state in a binary way the positioning value. It is not necessary to use them all. If they have not been programmed, the bits are set at 0).
For each value of the first 8 registers it is possible to set a maximum speed and a personalized acceleration and deceleration ramp. As for the other registers, the speed, the acceleration and deceleration ramp is the same for them all.

Position reference from analogue input

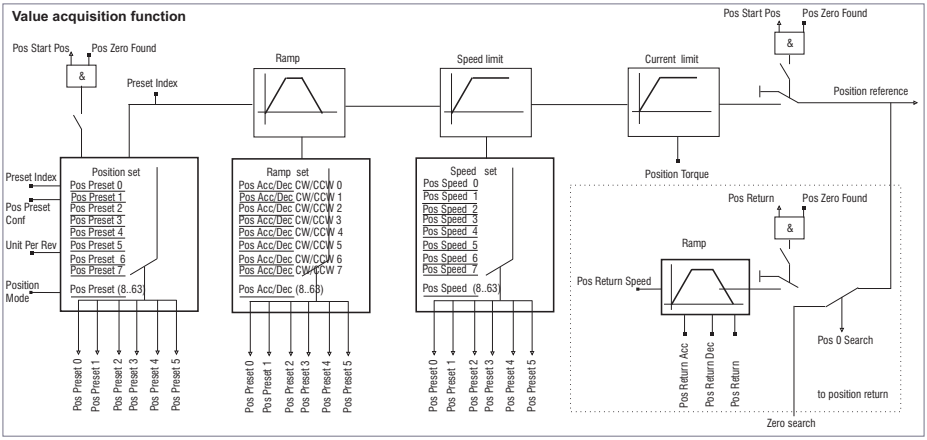
For absolute positioning (IPA 30091, **Position Mode** = 1) with continuous sampling enabled (IPA 30099, **Pos An Mode** = 1

) an analogue input can be sampled to set the position reference **Pos Preset 0**.
The sampled reference will go from **Min Prs Abs Val** to **Max Prs Abs Val**

Example: 0V = **Min Prs Abs Val**, 10V = **Max Prs Abs Val**

If 30099 **Pos An Mode** = Continuous, the analog reference is followed as long as the **POS-Start Pos** command remains active, and when it is deactivated the value is frozen as the final position.
If 30099 **Pos An Mode** = Step, the analog reference is sampled by enabling the **POS-Start Pos** command when the engine reaches the specified position, after which sampling is deactivated (even if **POS-Start Pos** is still active).

Other parameters dedicated to the function: IPA 30098, **Pos An Filter**; IPA 30097, **Pos An Stdy Wind**; IPA 30096, **Pos An Wind Del**; IPA 30099, **Pos An Mode** .
Value Self-acquisition



POS Memo 0: (see IPA 20101) it stores the present position as a zero position. If the zero position is stored, the value is considered to have been found (a further zero search is not necessary to perform the positioning procedure).

POS Memo Pos: (see IPA 20101) it stores the present position as a value xx . The register where the value has to be stored is stated by the **Preset Index** parameters if the **Pos Preset Conf** parameter has been set as Parameter, or by the digital input if **Pos Preset Conf** has been set as Digital Input.

Sequential position control (multi-position controller)

When a position is completed (within the first eight) it is possible to continue to follow it with any subsequent movement, as long as certain conditions are fulfilled. This allows a composite movement to be executed.
The following parameters control the sequence

M Pos X Progress	At the end of each position setting, this parameter enables or prevents movement to the next position.
M Pos X Dwell	Sets the delay time for forward movement
M Pos X Event	Setting the forward movement following an event from digital or field bus inputs
M Pos X Next Pos	Setting of next positioning step.

The forward movement may take place:

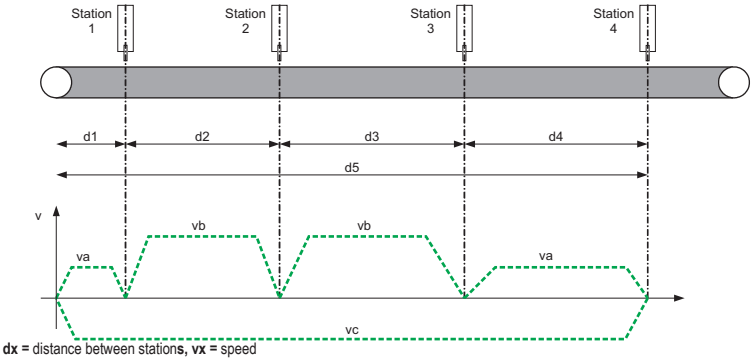
- with a delay, set in **M Pos X Dwell**
- following an event. The event is a value given by the digital or field bus inputs which equals **M Pos X Event**
- Combination of both the above: after a period waiting for an event to be performed.

The command **POS Start Pos** selects the initial sector as a function of **POS Preset**

The following parameters are available to enable, display and interrupt the sequence:

Menu	Parameter	Function
POSITION	**Multi Pos Enable**	Enabling multi-position controller
	[46] MultiPos Abort	Command from digital or field bus input: Interrupts position sequence. Interruption possible with **POS Start Pos** disabled or with drive disabled. At next **POS Start Pos** command, the sector will be chosen according to **POS Preset**.
	Multi Pos Index	Sector in execution
	Actual Event	Value of variable Event., is compared to **M Pos X Event**
	Start on Edge	Enabled: with **Multi Pos Enable** = ON, **Start on Edge** is always Disabled.
	Start on Edge	Disabled: with the **POS Start Pos** command it advances, as the command is cut, it stops. As the next command is given, it moves on from the stop point.

Example of use of Multi-position controller: **Repeated movement of a conveyor belt**



Movement to the next station takes place when the micro-switches are in position, and in each case after a minimum preset time.

- Setting parameters in absolute mode - POSITION \ POSITION FUNC Menu

Position Mode = Absolute The positions shown are absolute with respect to zero (home)
Multi Pos Enable = On

- Event definition: with three digital inputs, ***Pos Actual Event*** *can be set from 0 to 7*

Digital Input 4 = POS Event Bit 0
Digital Input 5 = POS Event Bit 1
Digital Input 6 = POS Event Bit 2

IPA	Description	[Unit]	Format	Access	Default	Min	Max

*- Setting five presets for the position (**Pos Preset 0, 1, 2, 3** and **4**)*

*> Menu POSITION**Pos Preset 0***

Parameter	*setting*	*note*
Pos Preset 0	d1	
Pos Speed 0	va	
Pos Acc 0	xxx	will not be relayed to the other settings
Pos Dec 0	xxx	will not be relayed to the other settings
MPos 0 Progress	Dwell+Event	advance to the next position setting
MPos 0 Dwell	100	arrived at station 1, waits 100 msec
MPos 0 Event	3	waits until **Pos Actual Event** word equals 3, so that the digital inputs 4 and 5 are high.
MPos 0 Next Pos	1	advancement to **Pos Preset 1**

*> Menu POSITION**Pos Preset 1***

Parameter	*setting*	*note*
Pos Preset 1	d1+d2	
Pos Speed 1	vb	
MPos 1 Progress	Dwell+Event	advance to the next position setting
MPos 1 Dwell	100	arrived at station 2, waits 100 msec
MPos 1 Event	7	waits until **Pos Actual Event** word equals 7, so that the digital inputs 4, 5 and 6 are high.
MPos 1 Next Pos	2	advancement to **Pos Preset 2**

*> Menu POSITION**Pos Preset 2***

Parameter	*setting*	*note*
Pos Preset 2	d1+d2+d3	
Pos Speed 2	vb	
MPos 2 Progress	= Dwell+Event	advance to the next position setting
MPos 2 Dwell	= 100	arrived at station 3, waits 100 msec
MPos 2 Event	= 1	waits until **Pos Actual Event** word equals 1, so that the digital input 4 is high.
MPos 2 Next Pos	3	advancement to **Pos Preset 3**

*> Menu POSITION**Pos Preset 3***

Parameter	*setting*	*note*
Pos Preset 3	d1+d2+d3+d4	
Pos Speed 3	va	
MPos 3 Progress	Dwell+Event	advance to the next position setting
MPos 3 Dwell	100	arrived at station 4, waits 100 msec
MPos 3 Event	2	waits until **Pos Actual Event** word equals 2, so that the digital input 2 is high.
MPos 3 Next Pos	4	advancement to **Pos Preset 4**

*> Menu POSITION**Pos Preset 4***

Parameter	*setting*	*note*
Pos Preset 4	0	Home
Pos Speed 4	vc	
MPos 4 Progress	Dwell+Event	advance to the next position setting
MPos 4 Dwell	100	arrived at home waits 100 msec
MPos 4 Event	5	waits until **Pos Actual Event** word equals 5, so that the digital inputs 4 and 5 are high.
MPos 4 Next Pos	0	advancement to **Pos Preset 0**

*> Menu POSITION**Pos Preset 5 ... 8***

Parameter	*setting*	*note*
MPos 5 Progress ... MPos 8 Progress	None	default

18123	**Max Pos Error**	**[deg]**	**Float**	**R/W**	**90**	**0**	**2880**
	Maximum position error which, if overcome, causes the intervention of the "(A 29) Position error" alarm in the "Els" or "Position" condition.						
30000	**Unit Per Rev**	**[--]**	**Float**	**R/Z/***	**1000**	**-10000**	**100000**
	Setting of distance (in u.u.) covered by one motor revolution. Parameter used for the conversion of the position into engineering units; by setting a negative value it is possible to combine positive positioning procedures with motor anti-clockwise rotations.						

IPA	Description	[Unit]	Format	Access	Default	Min	Max
30001	**Unit Per Div**	**[--]**	**Float**	**R/Z/***	**1**	**1**	**10000.0**

This parameter is used as divider to calculate the number of motor pulses per user unit, and to avoid rounding errors introduced by mechanical ratios.

As example let's consider a mechanical system made with a 10 mm pitch ballscrew and a 1:3 gear ratio. If we want to express the distances in millimeters we can set the parameters as follows:

Unit Per Rev (IPA 30000) = 10

Unit Per Div (IPA 30001) = 3

IPA	Description	[Unit]	Format	Access	Default	Min	Max
30002	**Multi Pos Enable**	**[--]**	**Bool**	**R/W**	**0**	**0**	**1**

Enabling multi-position controller

0 = Disabled

1 = Enabled

IPA	Description	[Unit]	Format	Access	Default	Min	Max
30010	**Pos CW Acc**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**

Setting of the clockwise acceleration rate during the positioning procedures (ramp rate active for the positions set by the registers 8 to 63)..

IPA	Description	[Unit]	Format	Access	Default	Min	Max
30011	**Pos CCW Acc**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**

Setting of the counterclockwise acceleration rate during the positioning procedures (ramp rate active for the positions set by the registers 8 to 63).

IPA	Description	[Unit]	Format	Access	Default	Min	Max
30012	**Pos CW Dec**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**

Setting of the clockwise deceleration rate during the positioning procedures (ramp rate active for the positions set by the registers 8 to 63).

IPA	Description	[Unit]	Format	Access	Default	Min	Max
30013	**Pos CCW Dec**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**

Setting of the counterclockwise deceleration rate during the positioning procedures (ramp rate active for the positions set by the registers 8 to 63)

IPA	Description	[Unit]	Format	Access	Default	Min	Max
30014	**Position Speed**	**[rpm]**	**Float**	**R/W**	**3000.0**	**0**	**IPA20003**

It is active if the Pos_speed analog input is not programmed.

Setting of the speed reference during the positioning procedures.

IPA	Description	[Unit]	Format	Access	Default	Min	Max
30042	**Start on Edge**	**[--]**	**Enum**	**R/W**	**0**	**0**	**1**

0 = Disabled — If the **POS Start Pos** command is disabled during a positioning phase, the motor stops in accordance with the IPA 30043 **Stop by Ramp**. parameter.

1 = Enable — During the positioning phase the motor can be stopped only disabling the drive.

The change of this parameter is active only after a homing phase.

The change to this parameter is active only after the drive is reset.

IPA	Description	[Unit]	Format	Access	Default	Min	Max
30043	**Stop by Ramp**	**[--]**	**Enum**	**R/W**	**0**	**0**	**1**

0 = Disabled — If **Start on Edge** = Disabled, the motor stops without ramp if the **POS Start Pos** command is disabled during a positioning phase.

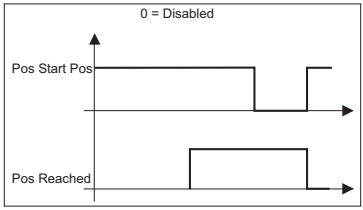
1 = Enable — If **Start on Edge** = Disabled, the motor stops with a ramp time set in the **Pos Stop Dec** parameter if the **POS Start Pos** command is disabled during a positioning phase.

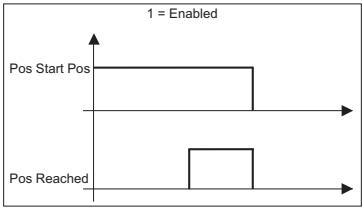
The change to this parameter is active only after the drive is reset.

IPA	Description	[Unit]	Format	Access	Default	Min	Max
30044	**Pos Reach Behav**	**[--]**	**Enum**	**R/W**	**0**	**0**	**1**

0 = Disabled

1 = Enable





IPA	Description	[Unit]	Format	Access	Default	Min	Max
30057	**Back Lash Window**	**[u.u.]**	**Float**	**R/W**	**2000.0**	**0**	**IPA30018**

This parameter sets the width of the position window where it is possible to correct the positioning errors caused by some mechanical clearance. During the positioning process if the input defined as **[1010] POS Memo 0** becomes active the drive will complete the move, but it will be consider that the starting point of the next move command will be the position where **POS Memo 0** input become active. If the input defined as **POS Memo 0** becomes active outside the position window defined in **Back Lash Window**, the drive will not start the next position command until new zero search will be completed. This function is active only in "Inc Abs"

30090	**Preset Index**	**[--]**	**Word**	**R/W**	**0**	**0**	**63**

Read parameter if **Pos Preset Conf** = Digital input.
Read/write parameter if **Pos Preset Conf** = Parameter. It states which position preset is currently used.

30091	**Position Mode**	**[--]**	**Enum**	**R/W**	**0**	**0**	**1**

This parameter states if the positioning values make reference to the zero position or to the actual position. (Relative or absolute moves).

0 = Inc Abs It states that the value of the position register is incremental for absolute pitches.
Example: if the position preset is 2000 u.u., the destination values are 2000, 4000, 6000, ...
If the positioning procedure is stopped, the new **POS Start Pos** command ends the previous positioning procedure.

1 = Absolute It states that the value of the position register is absolute as compared to the zero position.
Example: If the currently selected position preset is 2000 u.u., with the first command of **POS Start Pos** the destination position is 2000 u.u. (referred to the zero position); with the following commands (if the register is not modified) the position will not change.

2=Incremental It indicates that the position register setting is incremental compared to the current position.
Example: if the preset position presently selected is at 2000 u.u. (user unit), each **POS Start Pos** command will increase the position by 2000 u.u. If the seeking is interrupted, the next **POS Start Pos** command will increase the position by 2000 u.u. from the point where the motor stopped.

30094	**Pos Stop Dec**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**

Setting of the active clockwise/anti-clockwise deceleration time when the **POS Start Pos** command is disabled before the in process positioning procedure is completed.

19113	**Actual Pos Error**	**[deg]**	**Float**	**R**

Position error used with the "Els" or "Position" condition.

30004	**Multi Pos Index**	**[--]**	**Int**	**R**

Displays the sector of Pos Preset in execution during execution of the Multiposition function.

30016	**Actual Position**	**[u.u.]**	**Float**	**R**

Read-only parameter. It states the motor present position as compared to the zero position.

30081	**Destination Pos**	**[u.u.]**	**Float**	**R**

Read-only parameter stating the destination position in user units.

30093	**Position Config**	**[--]**	**Dword**	**R**

Bit-configured parameter with hexadecimal setting.
Bit 0: Mapping the IPA 30044 parameter
Bit 1: Mapping the IPA 30042 parameter
Bit 2: Mapping the IPA 30043 parameter
Bit 9: Using the absolute encoder to close the position loop
Bit 11: Using the revolver to close the position loop.
Bit 12: Using the external encoder to close the position loop.

IPA	Description	[Unit]	Format	Access	Default	Min	Max
	Bit 16: Mapping the IPA 30037 parameter Bit 17: Mapping the IPA 30038 parameter Bit 18: Mapping the IPA 30036 parameter Bit 19: Mapping the IPA 30039 parameter Bit 20: Mapping the IPA 30040 parameter Bit 21: Mapping the IPA 30041 parameter						
30800	**Pos Actual Event** Displays the present state of the events from the digital or bus inputs active in the function Multi position controller to advance from one position to the next.	**[--]**	**Word**	**R**			

POSITION LIMIT

30015	**Position Torque** Setting of the maximum torque during the positioning procedures (active for all positions set in the records from 0 to 63).	**[%]**	**Float**	**R/W**	**100**	**0**	**IPA22012**
30017	**Min Preset Value** Parameter stating the minimum value to be set in the different position registers. In case the setting of a position is lower than this value, such setting is not accepted.	**[u.u.]**	**Float**	**R/Z/***	**-4194304**	**-2^{23}**	**$2^{23}-1$**
30018	**Max Preset Value** Parameter stating the maximum value to be set in the different position registers. In case the setting of a position is higher than this value, such setting is not accepted.	**[u.u.]**	**Float**	**R/Z/***	**4194303**	**-2^{23}**	**$2^{23}-1$**
30056	**Max Prs Abs Val** Software limit switch: maximum absolute value. When it is equal to **Min Prs Abs Val**, it is not enabled. If the destination value is higher than this value, the command is not performed and the drive enables the digital output **[1008] Pos Out Of Lim**.	**[u.u.]**	**Float**	**R/W**	**0**	**-2^{23}**	**$2^{23}-1$**
30055	**Min Prs Abs Val** Software limit switch: minimum absolute value. When it is equal to **Max Prs Abs Val**, it is not enabled. If the destination value is lower than this value, the command is not performed and the drive enables the digital output **[1008] Pos Out Of Lim**.	**[u.u.]**	**Float**	**R/W**	**0**	**-2^{23}**	**$2^{23}-1$**

POS THR CONFIG

30050	**Pos Abs Thr** Setting of the threshold indicating the machine has passed the position referred to the zero position. When the position is higher than the value set in this parameter, the digital output programmed as **[1004] Pos Abs Thr** goes to +24V.	**[u.u.]**	**Float**	**R/W**	**0**	**-2^{23}**	**$2^{23}-1$**
30051	**Pos Exceeded** Setting of the threshold signaling the "overcome position" referred to the last positioning procedure: | present position - starting position | > Positon Thr, the "Position Exceeded" output is set.	**[u.u.]**	**Float**	**R/W**	**0**	**0**	**IPA30018**
30052	**Pos 0 Thr Offset** Setting the offset of the position threshold. When the absolute value position is lower than the value set in this parameter, the digital output programmed as **[1001] Position Zero** is active.	**[u.u.]**	**Float**	**R/W**	**0**	**0**	**IPA30018**
30053	**Pos Thr Close 1** Reached position threshold 1. The digital output reaches high logic status when the motor present position is equal to the destination position minus the **Pos Thr Close 1** parameter	**[u.u.]**	**Float**	**R/W**	**0**	**0**	**IPA30018**
30054	**Pos Thr Close 2** Reached position threshold 2. The digital output reaches high logic status when the motor present position is equal to the destination position minus the **Pos Thr Close 2** parameter	**[u.u.]**	**Float**	**R/W**	**0**	**0**	**IPA30018**
30058	**Pos Window** This parameter, together with **Pos Window Time**, defines the behavior of the **[1002] Pos Reached** digital output. The output is set when, after terminating the positioning procedure, the present position is equal to the destination position +- **Pos Window** for a period equal to **Pos Window Time**.	**[u.u.]**	**Float**	**R/W**	**0**	**0**	**IPA30018**

IPA	Description	[Unit]	Format	Access	Default	Min	Max
30059	**Pos Window Time**	**[sec]**	**Float**	**R/W**	**0**	**0**	**30**
	This parameter sets the time delay for the correct positioning inside **Pos Window**, IPA 30058). Used with digital output set to **[1002] Pos Reached.**						
30060	**Pos Window Tout**	**[sec]**	**Float**	**R/W**	**0**	**0**	**0**
	This parameter defines the period of time within which the position is considered as not reached. Used with digital output set to **[1010] Pos Not Reached** (see IPA 30058).						
	POS PRESET 0						
30100	**Pos Preset 0**	**[u.u.]**	**Float**	**R/W**	**0**	**IPA30017**	**IPA30018**
	Setting of the position value in the register 0.						
30200	**Pos Speed 0**	**[rpm]**	**Float**	**R/W**	**0**	**0**	**IPA20003**
	Maximum speed setting during the positioning phase of preset 0. If this value is set with 0 (rpm) the **Pos Speed** parameter in the **POSITION** menu becomes active.						
30300	**Pos CW Acc 0**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the clockwise acceleration rate during the positioning phase of preset 0.						
30400	**Pos CW Dec 0**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the clockwise acceleration rate during the positioning phase of preset 0.						
30380	**Pos CCW Acc 0**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the counterclockwise acceleration rate during the positioning phase of preset 0.						
30490	**Pos CCW Dec 0**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the counterclockwise acceleration rate during the positioning phase of preset 0.						
30500	**Pos 0 Progress**	**[--]**	**Enum**	**R/W**	**0**	**0**	**3**
	Setting performance of the Multi-position controller function to reach the required setting 0 = None — The position control sequence is interrupted 1 = Dwell — When the position is reached before going to the next phase, waits for the period set with **MPos 0 Dwel** 2 = Event match — When the position is reached before going to the next phase, waits until the **Pos Actual Event** parameter equals **MPos 0 Event** 3 = Dwell+Event — When the position is reached before going to the next phase, waits for the time set in **MPos 0 Dwell** and then until the **Pos Actual Event** parameter equals **MPos 0 Event**						
30600	**Pos Dwell 0**	**[msec]**	**Long**	**R/W**	**0**	**0**	**32000**
	Delay in reaching the specified value and moving onto the next station.						
30700	**Pos Event 0**	**[--]**	**Word**	**R/W**	**0**	**0**	**65535**
	Value of **Pos Actual Event** variable, from which to move on to the next value.						
30710	**MPos 0 Next Pos**	**[--]**	**Word**	**R/W**	**1**	**0**	**7**
	Setting of next positioning step. 0= Pos Preset 0 … 7=Pos Preset 7						
	ANALOG POS REF						
30096	**Pos An Wind Del**	**[msec]**	**Word**	**R/W**	**20**	**0**	**65**
	Delay time after entering the **Pos An Stdy Wind** window to ensure that the position reference is stable. Usually, **Pos An Wind Del** should be increased according to the **Pos An Stdy Wind** increase.						
30097	**Pos An Stdy Wind**	**[u.u.]**	**Float**	**R/W**	**0.5**	**0**	**-**
	Windows expressed in u.u., within which the position analog reference can oscillate without changing **Pos Preset 0**. The window is controlled according to the last stable position. An increase of the **Pos An Stdy Wind** value as regards the default value will result in a stability increase, but also in a delay in following the required position. **Pos An Stdy** should however be set to a value higher than the max. position resolution defined by the analog input.						

IPA	Description	[Unit]	Format	Access	Default	Min	Max
	Example: **Min Prs Abs Val** = 0 [u.u.], **Max Prs Abs Val** = 10000 [u.u.], 10000 / 2047 = 4.88, set **Pos An Stdy Wind** = 2 * 4.88 = 10[u.u.]						
30098	**Pos An Filter** Filter on sampling of Position 0 from analogue input.	**[msec]**	**Float**	**R/W**	**0.2**	**0**	**10**
30099	**Pos An Mode** Enables continuous sampling of the Position reference 0 (typically where it is assigned to an analogue input); this function is active only when the **Position Mode** parameter is set to Absolute. 0 = Step 1 = Continuous	**[--]**	**Bool**	**R/W**	**0**	**0**	**1**
	POS PRESET 1						
30101	**Pos Preset 1** Setting of the position value in the register 1.	**[u.u.]**	**Float**	**R/W**	**0**	**IPA30017**	**IPA30018**
30201	**Pos Speed 1** Maximum speed setting during the positioning phase of preset 1. If this value is set with 0 (rpm) the **Pos Speed** parameter in the **POSITION** menu becomes active.	**[rpm]**	**Float**	**R/W**	**0**	**0**	**IPA20003**
30301	**Pos CW Acc 1** Setting of the clockwise acceleration rate during the positioning phase of preset 1.	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
30401	**Pos CW Dec 1** Setting of the clockwise acceleration rate during the positioning phase of preset 1.	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
30481	**Pos CCW Acc 1** Setting of the counterclockwise acceleration rate during the positioning phase of preset 1.	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
30491	**Pos CCW Dec 1** Setting of the counterclockwise acceleration rate during the positioning phase of preset 1.	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
30501	**Pos 1 Progress** Setting performance of the Multi-position controller function to reach the required setting 0 = None — The position control sequence is interrupted 1 = Dwell — When the position is reached before going to the next phase, waits for the period set with **MPos 1 Dwell** 2 = Event match — When the position is reached before going to the next phase, waits until the **Pos Actual Event** parameter equals **MPos 1 Event** 3 = Dwell+Event — When the position is reached before going to the next phase, waits for the time set in **MPos 1 Dwell** and then until the **Pos Actual Event** parameter equals **MPos 1 Event**	**[--]**	**Enum**	**R/W**	**0**	**0**	**3**
30601	**Pos Dwell 1** Delay in reaching the specified value and moving onto the next station.	**[msec]**	**Long**	**R/W**	**0**	**0**	**32000**
30701	**Pos Event 1** Value of **Pos Actual Event** variable, from which to move on to the next value.	**[--]**	**Word**	**R/W**	**0**	**0**	**65535**
30711	**MPos 1 Next Pos** Setting of next positioning step. 0= Pos Preset 0 ... 7=Pos Preset 7	**[--]**	**Word**	**R/W**	**2**	**0**	**7**
	POS PRESET 2						
30102	**Pos Preset 2** Setting of the position value in the register 2.	**[u.u.]**	**Float**	**R/W**	**0**	**IPA30017**	**IPA30018**
30202	**Pos Speed 2** Maximum speed setting during the positioning phase of preset 2. If this value is set with 0 (rpm) the **Pos Speed** parameter in the **POSITION** menu becomes active.	**[rpm]**	**Float**	**R/W**	**0**	**0**	**IPA20003**

IPA	Description	[Unit]	Format	Access	Default	Min	Max
30302	**Pos CW Acc 2**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the clockwise acceleration rate during the positioning phase of preset 2.						
30402	**Pos CW Dec 2**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the clockwise acceleration rate during the positioning phase of preset 2.						
30482	**Pos CCW Acc 2**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the counterclockwise acceleration rate during the positioning phase of preset 2.						
30492	**Pos CCW Dec 2**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the counterclockwise acceleration rate during the positioning phase of preset 2.						
30502	**Pos 2 Progress**	**[--]**	**Enum**	**R/W**	**0**	**0**	**3**
	Setting performance of the Multi-position controller function to reach the required setting						
	0 = None	The position control sequence is interrupted					
	1 = Dwell	When the position is reached before going to the next phase, waits for the period set with **MPos 2 Dwell**					
	2 = Event match	When the position is reached before going to the next phase, waits until the **Pos Actual Event** parameter equals **MPos 2 Event**					
	3 = Dwell+Event	When the position is reached before going to the next phase, waits for the time set in **MPos 2 Dwell** and then until the **Pos Actual Event** parameter equals **MPos 2 Event**					
30602	**Pos Dwell 2**	**[msec]**	**Long**	**R/W**	**0**	**0**	**32000**
	Delay in reaching the specified value and moving onto the next station.						
30702	**Pos Event 2**	**[--]**	**Word**	**R/W**	**0**	**0**	**65535**
	Value of **Pos Actual Event** variable, from which to move on to the next value.						
30712	**MPos 2 Next Pos**	**[--]**	**Word**	**R/W**	**3**	**0**	**7**
	Setting of next positioning step.						
	0= Pos Preset 0	... 7=Pos Preset 7					

POS PRESET 3

30103	**Pos Preset 3**	**[u.u.]**	**Float**	**R/W**	**0**	**IPA30017**	**IPA30018**
	Setting of the position value in the register 3.						
30203	**Pos Speed 3**	**[rpm]**	**Float**	**R/W**	**0**	**0**	**IPA20003**
	Maximum speed setting during the positioning phase of preset 3. If this value is set with 0 (rpm) the **Pos Speed** parameter in the **POSITION** menu becomes active.						
30303	**Pos CW Acc 3**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the clockwise acceleration rate during the positioning phase of preset 3.						
30403	**Pos CW Dec 3**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the clockwise acceleration rate during the positioning phase of preset 3.						
30483	**Pos CCW Acc 3**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the counterclockwise acceleration rate during the positioning phase of preset 3.						
30493	**Pos CCW Dec 3**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the counterclockwise acceleration rate during the positioning phase of preset 3.						
30503	**Pos 3 Progress**	**[--]**	**Enum**	**R/W**	**0**	**0**	**3**
	Setting performance of the Multi-position controller function to reach the required setting						
	0 = None	The position control sequence is interrupted					
	1 = Dwell	When the position is reached before going to the next phase, waits for the period set with **MPos 3 Dwell**					
	2 = Event match	When the position is reached before going to the next phase, waits until the **Pos Actual Event** parameter equals **MPos 3 Event**					
	3 = Dwell+Event	When the position is reached before going to the next phase, waits for the time set in					

IPA	Description	[Unit]	Format	Access	Default	Min	Max
	MPos 3 Dwell and then until the **Pos Actual Event** parameter equals **MPos 3 Event**						
30603	**Pos Dwell 3**	**[msec]**	**Long**	**R/W**	**0**	**0**	**32000**
	Delay in reaching the specified value and moving onto the next station.						
30703	**Pos Event 3**	**[--]**	**Word**	**R/W**	**0**	**0**	**65535**
	Value of **Pos Actual Event** variable, from which to move on to the next value.						
30713	**MPos 3 Next Pos**	**[--]**	**Word**	**R/W**	**4**	**0**	**7**
	Setting of next positioning step. 0= Pos Preset 0 ... 7=Pos Preset 7						
	POS PRESET 4						
30104	**Pos Preset 4**	**[u.u.]**	**Float**	**R/W**	**0**	**IPA30017**	**IPA30018**
	Setting of the position value in the register 4						
30204	**Pos Speed 4**	**[rpm]**	**Float**	**R/W**	**0**	**0**	**IPA20003**
	Maximum speed setting during the positioning phase of preset 4. If this value is set with 0 (rpm) the **Pos Speed** parameter in the **POSITION** menu becomes active.						
30304	**Pos CW Acc 4**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the clockwise acceleration rate during the positioning phase of preset 4.						
30404	**Pos CW Dec 4**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the clockwise acceleration rate during the positioning phase of preset 4.						
30484	**Pos CCW Acc 4**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the counterclockwise acceleration rate during the positioning phase of preset 4.						
30494	**Pos CCW Dec 4**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the counterclockwise acceleration rate during the positioning phase of preset 4.						
30504	**Pos 4 Progress**	**[--]**	**Enum**	**R/W**	**0**	**0**	**3**
	Setting performance of the Multi-position controller function to reach the required setting 0 = None — The position control sequence is interrupted 1 = Dwell — When the position is reached before going to the next phase, waits for the period set with **MPos 4 Dwell** 2 = Event match — When the position is reached before going to the next phase, waits until the **Pos Actual Event** parameter equals **MPos 4 Event** 3 = Dwell+Event — When the position is reached before going to the next phase, waits for the time set in **MPos 4 Dwell** and then until the **Pos Actual Event** parameter equals **MPos 4 Event**						
30604	**Pos Dwell 4**	**[msec]**	**Long**	**R/W**	**0**	**0**	**32000**
	Delay in reaching the specified value and moving onto the next station.						
30704	**Pos Event 4**	**[--]**	**Word**	**R/W**	**0**	**0**	**65535**
	Value of **Pos Actual Event** variable, from which to move on to the next value.						
30714	**MPos 4 Next Pos**	**[--]**	**Word**	**R/W**	**5**	**0**	**7**
	Setting of next positioning step. 0= Pos Preset 0 ... 7=Pos Preset 7						
	POS PRESET 5						
30105	**Pos Preset 5**	**[u.u.]**	**Float**	**R/W**	**0**	**IPA30017**	**IPA30018**
	Setting of the position value in the register 5.						
30205	**Pos Speed 5**	**[rpm]**	**Float**	**R/W**	**0**	**0**	**IPA20003**
	Maximum speed setting during the positioning phase of preset 5. If this value is set with 0 (rpm) the **Pos Speed** parameter in the **POSITION** menu becomes active.						

IPA	Description	[Unit]	Format	Access	Default	Min	Max
30305	**Pos CW Acc 5**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the clockwise acceleration rate during the positioning phase of preset 5.						
30405	**Pos CW Dec 5**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the clockwise acceleration rate during the positioning phase of preset 5.						
30485	**Pos CCW Acc 5**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the counterclockwise acceleration rate during the positioning phase of preset 5.						
30495	**Pos CCW Dec 5**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the counterclockwise acceleration rate during the positioning phase of preset 5.						
30505	**Pos 5 Progress**	**[--]**	**Enum**	**R/W**	**0**	**0**	**3**
	Setting performance of the Multi-position controller function to reach the required setting						
	0 = None	The position control sequence is interrupted					
	1 = Dwell	When the position is reached before going to the next phase, waits for the period set with **MPos 5 Dwell**					
	2 = Event match	When the position is reached before going to the next phase, waits until the **Pos Actual Event** parameter equals **MPos 5 Event**					
	3 = Dwell+Event	When the position is reached before going to the next phase, waits for the time set in **MPos Dwell** and then until the **Pos Actual Event** parameter equals **MPos 5 Event**					
30605	**Pos Dwell 5**	**[msec]**	**Long**	**R/W**	**0**	**0**	**32000**
	Delay in reaching the specified value and moving onto the next station.						
30705	**Pos Event 5**	**[--]**	**Word**	**R/W**	**0**	**0**	**65535**
	Value of **Pos Actual Event** variable, from which to move on to the next value.						
30715	**MPos 5 Next Pos**	**[--]**	**Word**	**R/W**	**6**	**0**	**7**
	Setting of next positioning step.						
	0= Pos Preset 0	... 7=Pos Preset 7					

POS PRESET 6

30106	**Pos Preset 6**	**[u.u.]**	**Float**	**R/W**	**0**	**IPA30017**	**IPA30018**
	Setting of the position value in the register 6.						
30206	**Pos Speed 6**	**[rpm]**	**Float**	**R/W**	**0**	**0**	**IPA20003**
	Maximum speed setting during the positioning phase of preset 6. If this value is set with 0 (rpm) the **Pos Speed** parameter in the **POSITION** menu becomes active.						
30306	**Pos CW Acc 6**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the clockwise acceleration rate during the positioning phase of preset 6.						
30406	**Pos CW Dec 6**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the clockwise acceleration rate during the positioning phase of preset 6.						
30486	**Pos CCW Acc 6**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the counterclockwise acceleration rate during the positioning phase of preset 6.						
30496	**Pos CCW Dec 6**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the counterclockwise acceleration rate during the positioning phase of preset 6.						
30506	**Pos 6 Progress**	**[--]**	**Enum**	**R/W**	**0**	**0**	**3**
	Setting performance of the Multi-position controller function to reach the required setting						
	0 = None	The position control sequence is interrupted					
	1 = Dwell	When the position is reached before going to the next phase, waits for the period set with **MPos 6 Dwell**					
	2 = Event match	When the position is reached before going to the next phase, waits until the **Pos Actual Event** parameter equals **MPos 6 Event**					
	3 = Dwell+Event	When the position is reached before going to the next phase, waits for the time					

IPA	Description	[Unit]	Format	Access	Default	Min	Max
	set in **MPos 6 Dwell** and then until the **Pos Actual Event** parameter equals **MPos 6 Event**						
30606	**Pos Dwell 6**	**[msec]**	**Long**	**R/W**	**0**	**0**	**32000**
	Delay in reaching the specified value and moving onto the next station.						
30706	**Pos Event 6**	**[--]**	**Word**	**R/W**	**0**	**0**	**65535**
	Value of **Pos Actual Event** variable, from which to move on to the next value.						
30716	**MPos 6 Next Pos**	**[--]**	**Word**	**R/W**	**7**	**0**	**7**
	Setting of next positioning step. 0= Pos Preset 0 ... 7=Pos Preset 7						
	POS PRESET 7						
30107	**Pos Preset 7**	**[u.u.]**	**Float**	**R/W**	**0**	**IPA30017**	**IPA30018**
	Setting of the position value in the register 7.						
30207	**Pos Speed 7**	**[rpm]**	**Float**	**R/W**	**0**	**0**	**IPA20003**
	Maximum speed setting during the positioning phase of preset 7. If this value is set with 0 (rpm) the **Pos Speed** parameter in the **POSITION** menu becomes active.						
30307	**Pos CW Acc 7**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the clockwise acceleration rate during the positioning phase of preset 7.						
30407	**Pos CW Dec 7**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the clockwise acceleration rate during the positioning phase of preset 7.						
30487	**Pos CCW Acc 7**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the counterclockwise acceleration rate during the positioning phase of preset 7.						
30497	**Pos CCW Dec 7**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Setting of the counterclockwise acceleration rate during the positioning phase of preset 7.						
30507	**Pos 7 Progress**	**[--]**	**Enum**	**R/W**	**0**	**0**	**3**
	Setting performance of the Multi-position controller function to reach the required setting 0 = None — The position control sequence is interrupted 1 = Dwell — When the position is reached before going to the next phase, waits for the period set with **MPos 7 Dwell** 2 = Event match — When the position is reached before going to the next phase, waits until the **Pos Actual Event** parameter equals **MPos 7 Event** 3 = Dwell+Event — When the position is reached before going to the next phase, waits for the time set in **MPos 7 Dwell 7** and then until the **Pos Actual Event** parameter equals **MPos 7 Event**						
30607	**Pos Dwell 7**	**[msec]**	**Long**	**R/W**	**0**	**0**	**32000**
	Delay in reaching the specified value and moving onto the next station.						
30707	**Pos Event 7**	**[--]**	**Word**	**R/W**	**0**	**0**	**65535**
	Value of **Pos Actual Event** variable, from which to move on to the next value.						
30717	**MPos 7 Next Pos**	**[--]**	**Word**	**R/W**	**0**	**0**	**7**
	Setting of next positioning step. 0= Pos Preset 0 ... 7=Pos Preset 7						
	POS PRESET (8-63)						
30108	**Pos Preset 8**	**[u.u.]**	**Float**	**R/W**	**0**	**IPA30017**	**IPA30018**
	Setting of the position value in the register 8.						
.....							
30163	**Pos Preset 63**	**[u.u.]**	**Float**	**R/W**	**0**	**IPA30017**	**IPA30018**
	Setting of the position value in the register 63.						

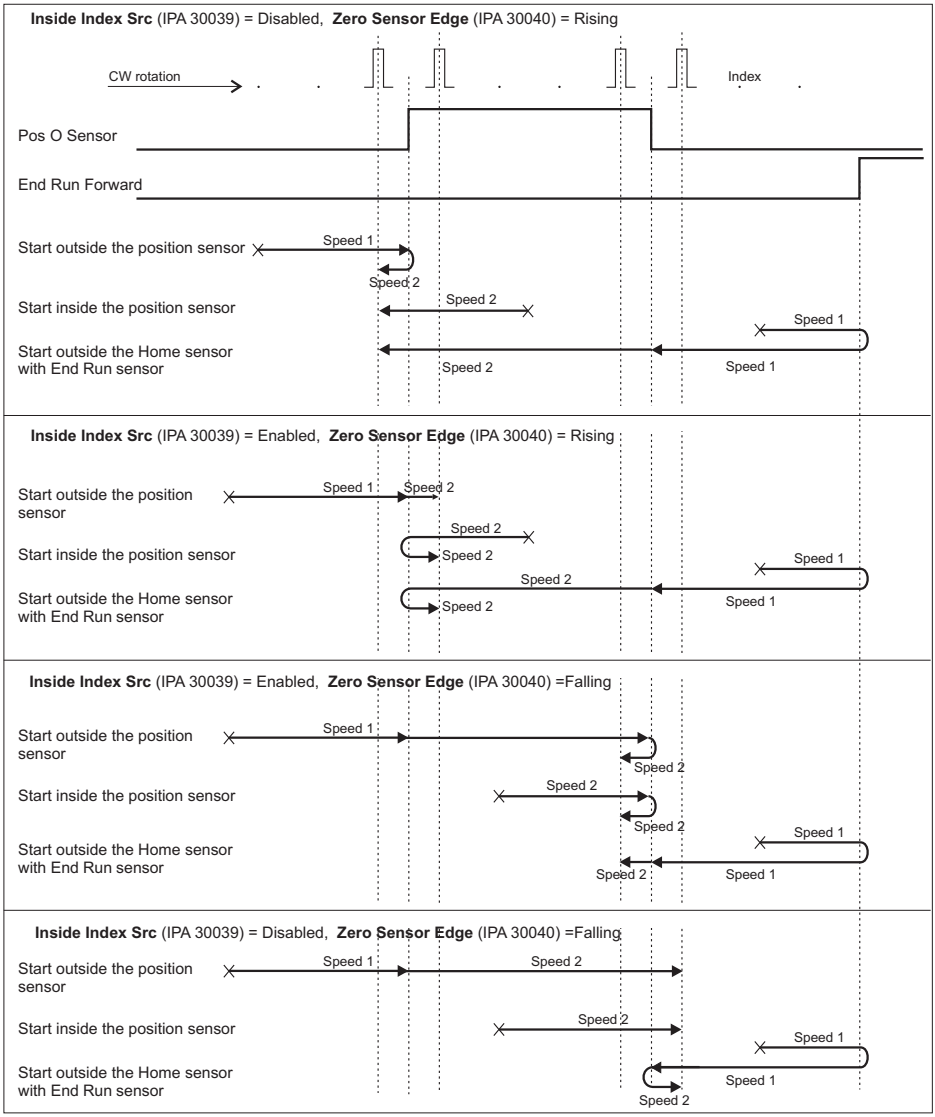
IPA	Description	[Unit]	Format	Access	Default	Min	Max

ZERO FOUND CONF (Zero Configuration)

Search with Zero Sensor En (IPA 30037) **= Enabled, Zero Index En** (IPA 30038) **= Enabled**
Home Src Direc (IPA 30036) **= Positive**

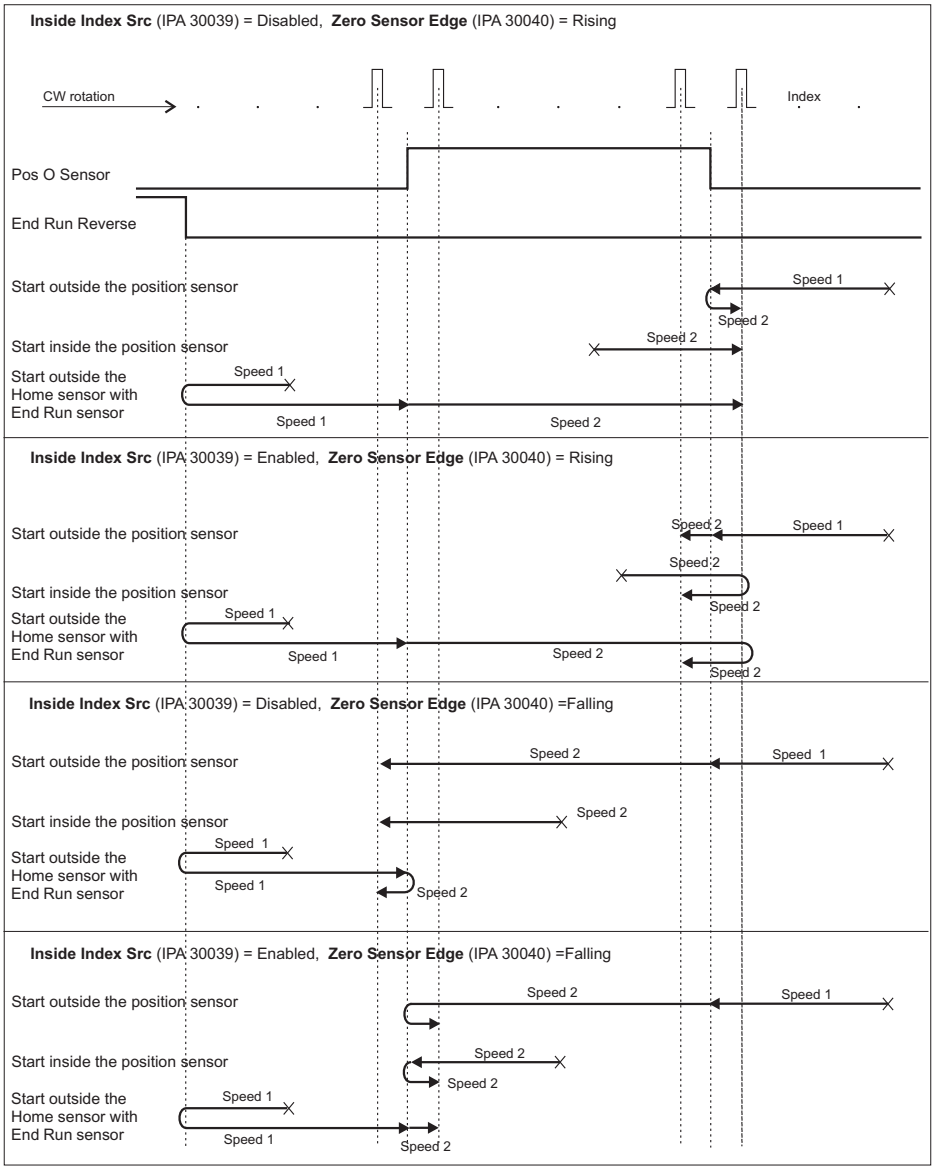
Speed 1 = Home Spd Ref $*$ $\frac{\textbf{Home Max Spd (IPA 30024)}}{\textbf{100}}$

Speed 2 = Home Fine Spd (IPA 30027)



Search with Zero Sensor En (IPA 30037) **= Enabled, Zero Index En (IPA 30038) = Enabled**
Home Src Direc (IPA 30036) = Negative

Speed 1 = Home Spd Ref * $\frac{\text{Home Max Spd (IPA 30024)}}{100}$
Speed 2 = Home Fine Spd (IPA 30027)



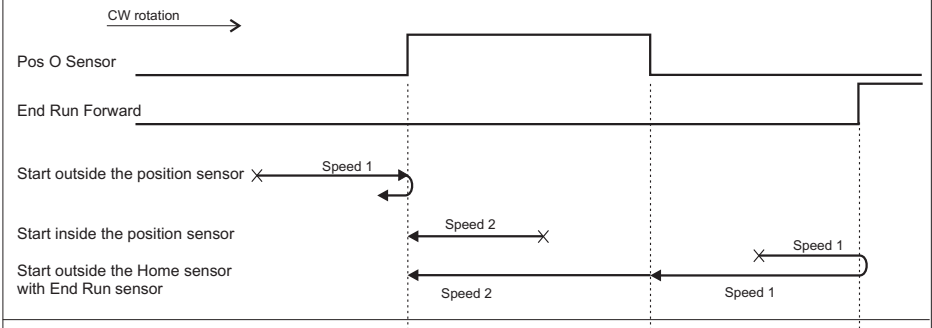
IPA	Description	[Unit]	Format	Access	Default	Min	Max

Search with Zero Sensor En (IPA 30037) **= Enabled , Zero Index En** (IPA 30038) **= Disabled**

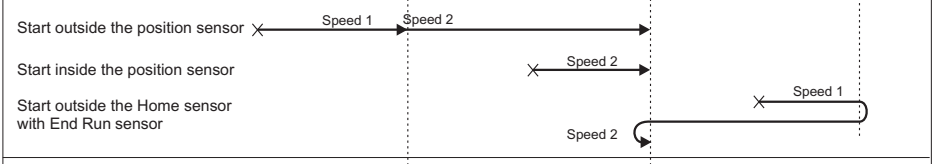
Speed 1 = Home Spd Ref * $\frac{\text{Home Max Spd (IPA 30024)}}{100}$

Speed 2 = Home Fine Spd (IPA 30027)

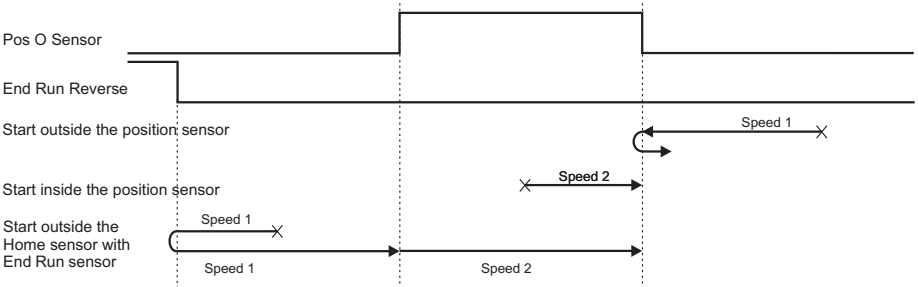
Home Src Direc (IPA 30036) = Positive, **Inside Index Src** (IPA 30039) = Indifferente, **Zero Sensor Edge** (IPA 30040) = Rising



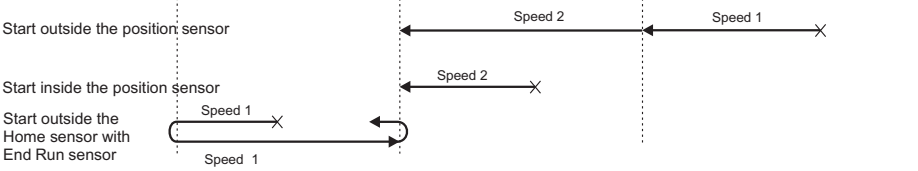
Home Src Direc (IPA 30036) = Positive, **Inside Index Src** (IPA 30039) = Indifferente, **Zero Sensor Edge** (IPA 30040) = Falling



Home Src Direc (IPA 30036) = Negative, **Inside Index Src** (IPA 30039) = Indifferente, **Zero Sensor Edge** (IPA 30040) = Rising



Home Src Direc (IPA 30036) = Negative, **Inside Index Src** (IPA 30039) = Indifferente, **Zero Sensor Edge** (IPA 30040) =Falling



IPA	Description	[Unit]	Format	Access	Default	Min	Max

Search with **Inside Index Src** (IPA 30039) **= Indifferent, Zero Sensor Edge** (IPA 30040) **= Indifferent Zero Sensor En** (IPA 30037) = Disabled, **Zero Index En** (IPA 30038) = Enabled

Home Src Direc (IPA 30036) = Positive

Home Src Direc (IPA 30036) = Negative

30020	**CW Home Pos Acc**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Clockwise acceleration during the home search.						
30021	**CCW Home Pos Acc**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Counterclockwise acceleration during the home search.						
30022	**CW Home Pos Dec**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Clockwise deceleration during the home search.						
30023	**CCW Home Pos Dec**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Counterclockwise deceleration during the home search.						
30024	**Home Max Spd**	**[rpm]**	**Float**	**R/W**	**1500.0**	**0**	**100000**
	Maximum speed during the home search.						
30025	**Home Spd Ref**	**[%]**	**Float**	**R/W**	**10**	**-100.0**	**100**
	Speed reference during the home search, stated as a percentage of **Home Max Spd**						
30027	**Home Fine Spd**	**[rpm]**	**Float**	**R/W**	**50.0**	**0**	**100000**
	Speed reference while searching the home absolute position.						
30028	**Home Pos Offset**	**[u.u.]**	**Float**	**R/W**	**0**	**IPA 30017**	**IPA30018**
	Offset della posizione di home. Vedere IPA 30041.						
30036	**Home Src Direc**	**[--]**	**Enum**	**R/W**	**0**	**0**	**1**
	Position indicator of the found home.						
	0 = Positive	The motor rotates clockwise					
	1 = Negative	The motor rotates counterclockwise.					
30037	**Zero Sensor En**	**[--]**	**Enum**	**R/W**	**1**	**0**	**1**
	0 = Disabled	The **[1015] POS 0 sensor** input is not used during the searching of home					
	1 = Enabled	The **[1015] POS 0 sensor** input is used during the searching of home.					
30038	**Zero Index En**	**[--]**	**Enum**	**R/W**	**1**	**0**	**1**
	0 = Disabled	The 0 index of the encoder is not used during the searching of home					
	1 = Enabled	The 0 index of the encoder is used during the searching of home					
30039	**Inside Index Src**	**[--]**	**Enum**	**R/W**	**0**	**0**	**1**
	If both index and sensor are used, the home position corresponds to the first code						
	0 = Disabled	placed outside the sensor.					
	1 = Enabled	placed inside the sensor.					

IPA	Description	[Unit]	Format	Access	Default	Min	Max
30040	**Zero Sensor Edge**	**[--]**	**Enum**	**R/W**	**0**	**1**	**0**
	The zero sensor is active on the						
	0 = Rising	climbing leading edge					
	1 = Falling	drop wire leading edge					
30041	**Home Pos Offs En**	**[--]**	**Enum**	**R/W**	**0**	**0**	**1**
	0 = Disable	At the end of the zero search procedure, the motor stops on the slot/sensor and the position of the slot/sensor is equal to - **Home Pos Offset** u.u.					
	1 = Enable	At the end of the zero search procedure, after finding the slot/sensor, the motor movement corresponds to + **Home Pos Offset** u.u. and its position is 0 u.u.					
30045	**Startup Zero Pos**	**[--]**	**Bool**	**R/W**	**0**	**0**	**1**
	0 = Disable						
	1 = Enable						
	If authorised, next time the drive is turned on it will sample the position of the encoder which will be acquired as Zero position (Home).						

POS RETURN CONF

When the digital input programmed as **[1012] POS Return** becomes high, the motor reaches the **Pos Return** position with the speed and acceleration stated in this menu.
The start for the return phase is the climbing leading edge of the **Pos Return** input. After the start, it can be stopped with a **Fast Stop** or by disabling the drive.

Example: Forward and return movement: connect the digital output programmed as **[1002] Pos Reached** to the digital input programmed as **[1012] POS Return**. When the positioning procedure is over, the position reached output is risen thus causing the return to the starting position.

30164	**Pos Return**	**[u.u.]**	**Float**	**R/W**	**0**	**IPA30017**	**IPA30018**
	Final value of the return movement in user units.						
30264	**Pos Return Speed**	**[rpm]**	**Float**	**R/W**	**1000**	**0**	**IPA20003**
	Maximum speed during the return movement.						
30364	**Pos Return Acc**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Acceleration ramp during the return movement.						
30464	**Pos Return Dec**	**[ms/krpm]**	**Float**	**R/W**	**336.1**	**0**	**IPA21111**
	Deceleration ramp during the return movement.						

BACKLASH RECOV

It allows to compensate possible mechanical clearances by performing the positioning procedures in the same direction.

Example: **Back Lash En** = Enable, **Back Lash Dir** = Positive, **Delta Pos** = 100 u.u., **Speed Comp** = 10 rpm, **Actual Position** = 10000 u.u., **Destination Pos** = 15000 u.u.

As the movement is positive, the drive performs the first positioning procedure at 15100 u.u. (without increasing the reached position output) and a new positioning procedure at 15000 u.u. with a 10 rpm maximum speed. The reached position output is increased at the end of this positioning procedure.
Let's assume to perform a new positioning procedure:

Actual Position = 15000 u.u.
Destination Pos = 8000 u.u.

The movement is negative and the recovery function is not active.

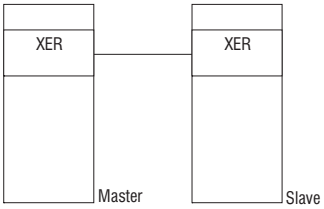
31000	**Back Lash En**	**[--]**	**Enum**	**R/W**	**0**	**0**	**1**
	It enables the compensation function of the mechanical allowance:						
	0 = Disable						
	1 = Enable						

IPA	Description	[Unit]	Format	Access	Default	Min	Max
31001	**Back Lash Dir**	**[--]**	**Enum**	**R/W**	**0**	**0**	**1**
	It detects the movement direction: 0 = Positive 1 = Negative ***NOTE!*** A positive direction is able to generate a positive position delta.						
31002	**Delta Pos**	**[u.u.]**	**Float**	**R/W**	**10**	**0**	**IPA30018**
	u.u. position added or taken away from the destination position.						
31003	**Speed Comp**	**[rpm]**	**Float**	**R/W**	**100**	**0**	**IPA20003**
	Maximum speed of the return "positioning" procedure.						

EL LINE SHAFT

In the configuration Electrical line shaft it is possible to provide synchronism between 2 or more motors. The master encoder can be connected to XER or it is possible to use the fast link.
Moreover, it is possible to save into the drive up to 4 ratios selectable through 2 programmed digital input as **[2001] ELS Ratio Sel B0, [2002] ELS Ratio Sel B1**. Whatever ratio is actually selected, it is possible to increase/decrease by two programmed digital inputs as **[2003] ELS Inc Ratio** ed **[2004] ELS Dec Ratio**.

Connection of a digital encoder using repetition



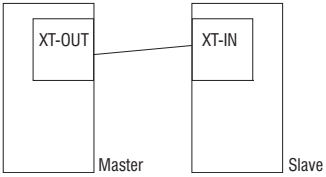
Master XVy-EV: The connector XER give the encoder repetition / simulation to the connector XER of the slave drive. Set up the parameters as follows:
- IPA 20036: **Aux Enc Type** = XER/EXP Rep/Sim
- IPA 20035: **Enc Rep Sim Cfg** = Select encoder repetition or simulation

If you select encoder simulation then you must program the correct number of pulses with the parameter **PPR Simulation** (IPA 20030).

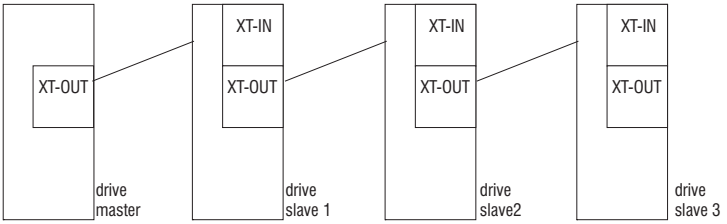
Slave XVy-EV: The connector XER receives the encoder repetition / simulation from the connector XER of the master drive. Set up the parameters as follows:
- IPA 20036: **Aux Enc Type** = XER In_EXP Out
- IPA 32009: **Els Master Sel** = XER/EXP Aux Enc

Fast link connection instead of encoder connection

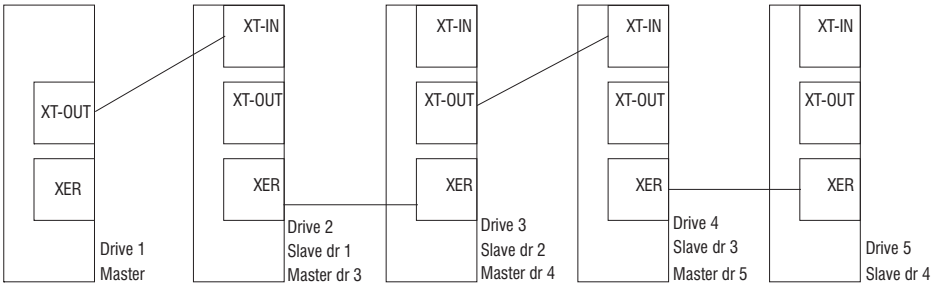
Master XVy-EV: XT-OUT connector (master), connected to the XT-IN connector (slave)
Set up: enable the fast link, parameter **Fast Link Addr** (IPA 18110) set as 1 (Master)
Slave XVy-EV: Connector XT-IN (slave).
Set up: enable the fast link, parameter **Fast Link Addr** (IPA 18110) set as >1 (Slave).
The fast link is active only after a reset drive command.



In applications with a drive master and drive slave it is possible to make a connection with fast link XT-OUT (master) -XT-IN (slave) because from the master encoder frequency is always available at connector XT-OUT.



The drive slave 1,2,3 are all synchronized with the drive master.
In applications where it is necessary to synchronize the drive in cascade, master –slave, where the previous is always the master of the next it is necessary to use both the encoder repetition and the fast link.



32000 **Els PPR Master** **[--]** **Word** **R/Z/*** **2048** **16** **65535**

Set the number pulses per turn of the master encoder present on the connector XER or on the fast-link.

32008 **Els Delta Time** **[sec]** **Float** **R/W** **1** **0** **10**

This parameter is used together with the programmed digital input as **[2003] ELS Inc Ratio** and **[2004] ELS Dec Ratio**. It defines the rate of change from a ratio to a new ratio. This parameter is used together with the parameter **Els Delta Ratio**.

Example: when the **Els Inc/Dec ratio** inputs are active, the ratio changes according to the value set by **Els Delta Ratio** (ex. 0.002) in the time set in the **Els Delta Time** parameter (ex 0.1 sec).

32009 **Els Master Sel** **[--]** **Enum** **R/W** **0** **0** **2**

Setting the master encoder reference source.

0 = XER/EXP Aux Enc	Master encoder port XER or expansion encoder input
1 = Fast link	Connectors XFL-IN, XFL-OUT
2 = XE Main Encoder	Master encoder main port XE

IPA	Description	[Unit]	Format	Access	Default	Min	Max
32010	**Els Mec Ratio**	**[--]**	**Float**	**R/W**	**1**	**1e-007**	**20**
	Setting this parameter equal to : Master mechanical ratio / Slave mechanical ratio The **Els Ratio X** parameters show directly the ratio/slip between the speed of the slow shafts.						
32011	**Els FL Source**	**[--]**	**Enum**	**R/W**	**0**	**0**	**2**
	0 = Spd Pos Enc Mst	The slave follows the Master encoder which closes the speed/position loop (IPA 20008 Master).					
	2 = XER Master	The slave follows the motor auxiliary encoder.					
32012	**ElsMec Ratio Mul**	**[--]**	**Float**	**R/W**	**1**	**1**	**-**
	Multiplication factor in the mechanical ratio for electrical shaft.						
32013	**ElsMec Ratio Div**	**[--]**	**Float**	**R/W**	**1**	**1**	**-**
	Divisor factor in the mechanical ratio for electrical shaft.						
32014	**Els Delta Ratio**	**[--]**	**Float**	**R/W**	**1**	**IPA32090**	**IPA32090**
	Define how much the ratio should increment (or decrement) every cycle of slow task (8msec). *Example*: if through the digital input a new ratio is selected changing from 1.000 up to 2.000 the change is not immediate but follows a ramp profile with a set increase in this parameter. If **Els Delta Ratio** is set 1.000 means an increment of 1.000 every 8msec, therefore it changes to the new ratio in 8msec. If **Els Delta Ratio** is set 0.010 means a change of 0.01 every 8msec, therefore it changes to the new ratio (2.000) in 800msec. Through a programmed digital input, **[2005] ELS RampRatioDis** it's possible to disable this time to ramp.						
32016	**Els Control Mode**	**[--]**	**Enum**	**R/W**	**0**	**0**	**1**
	Selects the speed control method						
	0 = Speed	The drive is set to speed control					
	1 = Position	The drive is set to position control					
	Note! The position error check is not enabled in Speed mode.						
32020	**Els Ratio / Slip**	**[--]**	**Enum**	**R/W**	**0**	**0**	**1**
	0 = Slip	The parameters **Els Ratio 0, 1, 2, 3** are not set as ratio but as % of slipping from the Master. For instance 10 % slip correspond to 110% of the speed master, or ratio of 1.1: **Els Ratio** = 1 + **Els Slip** / 100 By default, when the ratio is sampled from the analog input, 10V correspond to what is set in parameter 32021 **Els Slip Limit.**					
	1 = Ratio	If set up to Ratio the ratio is activated. By default, when the ratio is sampled from the analog input, 10V correspond to what is set in parameter 32090 **Els Ratio Range**.					
	When changing the setting from "Slip" to "Ratio", check parameters 32014, 32001, 32002, 32003 and 32004.						
32021	**Els Slip Limit**	**[--]**	**Int**	**R/W**	**100**	**0**	
	Limit of slippage sampled from analogue input. At default conditions, with 10V on the analog input, the set slippage is **Els Slip Limit**. The **Els Ratio ratio** corresponds to 1 + (Slip sampled by analog input / 100).						
32090	**Els Ratio Range**	**[--]**	**Word**	**R/W**	**8**	**4**	**64**
	Value of max. ratio for ELS. A high value can reduce the ELS accuracy level. Available range: 4, 8, 16, 32 e 64. ***Note!*** This parameter shows the limits for the ratio between the speed of the motor shafts, therefore for the product **Els Mec Ratio** * **Els Ratio**. When changing the values of **Els Ratio Range**, check parameters 32014, 32001, 32002, 32003 and 32004.						

IPA	Description	[Unit]	Format	Access	Default	Min	Max

EL SHAFT RATIO

It is possible to load into the drive up to 4 ratios selectable through 2 programmed digital input as Els ratio sel bit 0,1 or from parameter. It is also possible to set the 4 ratios via the analog input.
The set ratio is calculated as: R = slave speed/master speed.
Example: if the master speed is 1000 rpm and the slave must rotate at 2000 rpm it is necessary to set a ratio: Ratio = 2000 rpm / 1000 rpm = 2.000.

IPA	Description	[Unit]	Format	Access	Default	Min	Max
32001	**Els Ratio 0** Set up speed ratio 0 for electric axis.	**[--]**	**Float**	**R/W**	**1**	**-IPA32090**	**IPA32090**
32002	**Els Ratio 1** Set up speed ratio 1 for electric axis.	**[--]**	**Float**	**R/W**	**1**	**-IPA32090**	**IPA32090**
32003	**Els Ratio 2** Set up speed ratio 2 for electric axis.	**[--]**	**Float**	**R/W**	**1**	**IPA32090**	**IPA32090**
32004	**Els Ratio 3** Set up speed ratio 3 for electric axis.	**[--]**	**Float**	**R/W**	**1**	**-IPA32090**	**IPA32090**
32006	**Els Ratio Index** Set up of the ratio selection (ratio 0, 1, 2, 3). Can also be programmed by digital inputs with **[2001] Els Ratio Sel B0** and **[2002] Els Ratio Sel B1**.	**[--]**	**Word**	**R/W**	**0**	**0**	**3**
32005	**Actual Ratio** Read-only parameter, it shows the value of the active ratio.	**[--]**	**Float**	**R**			

EL SHAFT R BEND

Through an external command it is possible to increase/decrease the motor slave speed momentarily to create a phase offset or “bend” in the shaft. To do this, for a fixed time the motor slave is not in synchronism with the master, because its reference is modified to be either faster or slower. At the end of the fixed time by parameter or when the digital input is not longer present, the slave gets back in synchronism with the master.
The modified speed can be set on an analog input or fixed by parameter.
The digital inputs activating this function ([2006] **ELS Bend Rec CW**, [2007] **ELS Bend Rec CCW**) are active even if the Start / Stop input is disabled.

IPA	Description	[Unit]	Format	Access	Default	Min	Max
32100	**Els Max RB Speed** Parameter to set up the max limit of speed reference for the bend recover function.	**[rpm]**	**Float**	**R/W**	**1000**	**-IPA20003**	**IPA20003**
32101	**Els RB Time** Time setting for the correction reference to be active. The digital input that enables this function (**[2006] ELS Bend Rec CW , [2007] ELS Bend Rec CCW**) must be kept activated during the recovery. At the end of the acceleration phase of the bend recover function, the timing starts. When the time is equal to that set in this parameter the bend recover reference becomes zero. The remaining bend will remain. If the digital input that enables this function (**[2006] ELS Bend Rec CW , [2007] ELS Bend Rec CCW**) goes low before the time expires (0V) the bend recover reference becomes zero. In other words, if time is not sufficient to recover, the bend that is left after time runs out will remain.	**[sec]**	**Float**	**R/W**	**500.0**	**0**	**500.0**
32102	**Els RB Acc** Acceleration ramp during the speed change. Increase the speed of the set revolutions number in the parameter every 8 msec	**[rpm]**	**Float**	**R/W**	**0.97**	**0**	**100000**
32103	**Els RB Dec** Deceleration ramp during the speed change. Decrease the speed of the set revolutions number in the parameter every 8 msec	**[rpm]**	**Float**	**R/W**	**0.97**	**0**	**100000**
32104	**Els RB Speed Ref** Reference for bend recover function, setting available also from an analog input (**[20] Els Rb Spd Ref**). At default conditions, 10V on the analog input correspond to 100% of **Els Max RB Speed**, IPA 32100.	**[%]**	**Float**	**R/W**	**0.97**	**0**	**100**

IPA	Description	[Unit]	Format	Access	Default	Min	Max
32105	**Els RB Speed Sel**	**[%]**	**Bool**	**R/W**	**0**	**0**	**1**
	Selection of the percentage value of the maximum speed reference limit or Master speed value 0 = Els Max RB Speed 1= Master Speed						

BRAKING RES

Parameters required for the optimization of the internal or external braking resistance system (see paragraph 4.8, Braking unit). The parameters are described in the paragraph 4.8.4.
The XVy-EV drives up to size XVy-EV 32550-KBX have an internal braking resistor according to the following table:

Drive size	Resistor value [ohm]	Braking Resistor [W]
XVy-EV 10306 … XVy-EV 10612	100	100
XVy-EV 21020 … XVy-EV 21530	67	150
XVy-EV 32040	36	200
XVy-EV 32550	26	200

txv9340

CAUTION!

Please not that if you use an external braking resistor on drives up to size XVy-EV 32550, you must disconnect internal resistor and connect its two wires together using the proper faston.

18105	**Brake Config**	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**2**
	Configuration of braking resistance 0=No BU or Ext BU — Braking resistor not present or external braking unit 1=Ext BR & Int BU — External Braking resistor and internal braking unit 2=Int BR & Int BU — Internal Braking resistor and internal braking unit If you select “Int BR & Int BU” then all the other parameters are ignored. This happens also if any of the parameters **Brake Res Power**, **Max Brake Energy** or **Brake Res Value** is set to zero.						
18109	**Brake Res Value**	**[ohm]**	**Float**	**R/Z/***	**0**	**0**	**FLT_M**
	Braking resistance value.						
18107	**Brake Res Power**	**[kW]**	**Float**	**R/Z/***	**0**	**0**	**FLT_M**
	Nominal power of braking resistance.						
18104	**Max Brake Energy**	**[kJ]**	**Float**	**R/Z/***	**0**	**0**	**FLT_M**
	Maximum brake energy.						
18103	**Brake Volt Thr**	**[V]**	**Float**	**R/Z/***	**780**	**(*)**	**820**
	BU intervention threshold. (*): function of IPA 20050						
18412	**BR Ovld Factor**	**[%]**	**Word**	**R**			
	Brake resistor overload factor. When 100% has been reached, the **Brake Overpower** (A 13) alarm gets active.						

ALARMS

24101	**Alarm Delay Mask**	**[--]**	**Dword**	**R/Z/***	**0H**	**0H**	**FFFFFFFFH**
	Delayed alarms mask. List of possible alarms on IPA 24100.						
24102	**Alarm Delay**	**[sec]**	**Float**	**R/W**	**10**	**0.001**	**10**
	Delayed alarms delay.						
24100	**Alarm Dis Mask**	**[--]**	**Dword**	**R/Z/***	**20000000H**	**0H**	**FFFFFFFFH**
	This parameter allows masking the intervention of some alarms thus making them inactive. It is an hexadecimal						

IPA	Description	[Unit]	Format	Access	Default	Min	Max

alarm. When the masked alarm gets active, the drive goes on functioning properly (the OK relay does not change its state) and **Enc W->A Mask** parameter with the digital output programmed as **[17] Alarm Warnings** changes its logic level.

List of possible excluded alarms:

Motor Overtemp	(error code 7)
System Warning	(error code 15)
Enc Fbk Loss	(error code 18)
Enc Sim Fault	(error code 19)
Undervoltage	(error code 20)
Field Bus failure	(error code 26)
Enable Seq Error	(error code 27)
Fast link	(error code 28)
Position Error	(error code 29)
Drive Overload	(error code 30)
External Fault	(error code 31)

Example for a parameter setting :

32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1				8				0				0				0				0				0				0			

Alarm Dis Mask = 18000000h (disabled Position error and Fast link alarms)

Note: The Position Error alarm is disabled as default.

1° row: Alarm code

2° row: Setting of the alarm functions : 0 = active, 1 = masked

3° row: Parameter hexadecimal setting

18042 **Alarm List Clear** **[--]** **Enum** **R/W** **0** **0** **1**

It cancels the whole alarm history. It can be made permanent by saving the parameters:

0=Off

1=Clear Al History

24000 **Alarm Status** **[--]** **Dword** **R**

Alarm status. See the alarm list, table 8.3.1.1.

24120 **Warning Status** **[--]** **Dword** **R**

Warnings state. See the alarm list, table 8.3.1.1.

20016 **Enc Warning Cause** **[--]** **Enum** **R**

N. bit IPA 20018=Meaning	*Cause*
0 = None	Encoder is OK
1=Low Enc AD Level	Check encoder supply.
2=Low Enc AN level	Check encoder supply.
3=Hall Sens Error	The sequence of the Hall effect sensors is not correct. Check encoder wiring.
4=Aux DI Enc Loss	No encoder on expansion input.
9=Abs 1 Ini Res Er	EN DAT reset failure. Check encoder parameters setting (**ENC EXP BOARD** menu) and encoder connections.
10=Abs 1 Ini RX Er	Reception problem at power on (EN DAT, SSI). Check encoder parameters setting (**ENC EXP BOARD** menu) and encoder connections.
11=Abs 1 RX Error	Checksum error in the serial communication of the absolute data. Check noise on the encoder signals.
12=Abs 1 Alarm bit	The error bit on the absolute encoder (EN DAT) is active.
13=Abs 1 RX Tout Er	Time-out error of absolute data serial communication.

IPA	Description	[Unit]	Format	Access	Default	Min	Max
	17=Phasing Loss	The incremental channel and the absolute channel of the encoder shows a misalignment.					
	18=Enc Pulses Loss	The number of incremental pulses detected between two index signals is not correct. Check noise on encoder signals.					
	25= Idx Out Of Site	Index signal in the incremental encoder channel is not in the correct place. Check noise on encoder signal.					
	26= Idx Not Presen	Index signal in the incremental encoder channel is not detected. Check encoder connections.					
20018	**Enc W->A Mask**	**[--]**	**Dword**	**R**			
	This mask shows active encoder warnings. If encoder alarms are not disabled warnings becomes immediately alarms. If encoder alarms are disabled, **Alarm Dis Mask** signals a problem on the encoder even if there are no alarm active. The meaning of each bit is listed in the table 8.3.1.1.						
24109	**Par Set Cause Al**	**[--]**	**Enum**	**R**			
	This parameter indicates the cause that generated the Parameter Error (A 05) alarm; parameters IPA 24110, 24111 and 24112 show the parameters with incorrect setting.						
	0 = None						
	1 = HW Unavail	Hardware unavailable					
	2 = Resource Unavail	Hardware resource unavailable					
	3 = Mot Fbk Not Supp	Motor feedback encoder configuration error					
	4 = Mot Fbk Undefin	Motor feedback not defined					
	5 = Spd/Pos Fbk Und	Speed and position loop feedback encoder configuration error.					
	6 = Enc par Range	Encoder parameters out of range					
	7 = Enc par Pow of 2	The parameter that has been entered is not a power of 2					
	8 = Motor Res Poles	The number of resolver poles is not consistent with the number of motor poles					
	20 = Magn Induc Range	Incorrect motor magnetisation inductance setting (Async.)					
	21 = Rotor Res Range	Incorrect motor rotor resistance setting (Async.)					
	22 = Flux Fact Range	Flow factor out of range (Async.)					
	23 = Slip Fact Range	Slip factor out of range (Async.)					
	24 = Slip Value Range	Slip value out of range (Async.)					
	30 = Size Code Err	Incorrect size code					
	31 = Brake Volt Thr	Brake threshold too low					
	40 = Value Not Supp	Parameter value not allowed					
24110	**IPA 1 Par Set**	**[--]**	**Word**	**R**			
	IPA of the first parameter that causes **Parameter Error** (A 05) alarm						
24111	**IPA 2 Par Set**	**[--]**	**Word**	**R**			
	IPA of the second parameter that causes **Parameter Error** (A 05) alarm.						
24112	**IPA 3 Par Set**	**[--]**	**Word**	**R**			
	IPA of the third parameter that causes **Parameter Error** (A 05) alarm.						
18143	**CPU Err Al Cause**	**[--]**	**Enum**	**R**			
	This parameter indicates the cause that generated the CPU Overtime (A 08) alarm:						
	0 = None						
	1 = Ph In Fst Tsk OT	(Phase In Fast Task Overtime)					
	2 = PhExe Fst Tsk OT	(Phase Execution Fast Task Overtime)					
	3 = PhOut Fst Tsk OT	(Phase Out Fast Task Overtime)					
	4 = PhAux Fst Tsk OT	(Phase Auxiliary Fast Task Overtime)					
	5= Slow Tsk OT	(Slow Task Overtime)					
	6 = System Tsk OT	(System Task Overtime)					
	7 = DSP Tsk OT	(DSP Task Overtime)					
	8 = Backgnd Tsk OT	(Background Task Overtime)					

IPA	Description	[Unit]	Format	Access	Default	Min	Max
	20 = CPU Fault 21 = Watchdog Alarm						
18391	**PLC Err Cause** Cause of the "PLC not running" alarm: 0 = None 1 = Wrong PLC ID 2 = Wrong PLC Tsk N (Wrong PLC Task Number) 3 = Wrong PLC Tgt ID 4 = Wrong Build N 6 = Wrong PLC Tsk ID 7 = Missing Tsk info 8 = PLC Code Chckerr 9 = DB Code Chk Err 20 = Wrong Enable Key In the cases from 1 to 8 it is necessary to reload the fw; in case 20 it is necessary to enter the right activation key in the **PLC Enable Key**, IPA 41001 parameter.	**[--]**	**Word**	**R**			
18393	**Sys Warn Cause** Indicates the reason the alarm Warning System. 0= None 1= Low Max Reg Temp You are using a regulation board in range 0 .. 50 °C (see parameter **18393 RegTemp Alarm Th**) type size on a EWH/EWHR (in the operating range 0 .. 60 °C). Disable the alarm to use the drive a temperature range of 0 .. 50 ° C or mount a regulation board in range 0 .. 60 °C.	**[--]**	**Enum**	**R**			
18751	**Load Def Err IPA** Par IPA that caused load default error.	**[--]**	**Word**	**R**			

IPA	Description	[Unit]	Format	Access	Default	Min	Max

FIELDBUS

Using Process Data Channel (PDC), it is possible to exchange up to 12 words on the input and 12 words on the output. For each PDC it is possible to choose, via the **FB Assign XXX X** parameters, one of the following modes for the data exchange according to the following table:

- Parameter:

The parameters are entered into engineering units and are exchanged in an asynchronous way.
The **FB Format M->S 1** parameter sets the parameter writing format. The format can be different from the parameter original one.
The **FB Exp M->S 1** parameter defines the 10th power which the parameter is multiplied by before being transferred to the drive.

- Direct Access:

The parameters are entered into internal counts and are exchanged in an asynchronous way (one every 8 msec). The writing format identified by the **FB Format M->S 1** parameter (see the following table) must coincide with the drive internal format.
See Appendix, Chapter 4.0 Fieldbus : Parameter List and Conversion.

Before establishing the Profibus communication between the Master and the drive, it is necessary to assign the drive parameters to the Process Channel. These parameters can be activated by resetting the drive.

Dimension	Format	Conversion
Speed	INT 32	$cnts = \frac{\text{Speed (rpm)}}{\textbf{Rpm Conv Fact}}$
Ramp	INT 16	$cnts = \frac{\textbf{Max Ramp Rate}}{\text{Ramp [ms / krpm]}}$
Position	FLOAT	User unit
Torque	INT 16	$cnts = \frac{\text{Torque [\%]} * \textbf{Base Torque}}{100 * \textbf{Torque Conv Fact}}$
Current	INT 16	$cnts = \frac{\text{Current [Arms]}}{\textbf{Arms Conv Fact}}$

***Attention*: The conversion parameters (ex. Rpm Conv Fact) are in the FIELDBUS / UNITS menu and are a function of the motor data, of the drive size and of the encoder. It is therefore necessary to read them after configuring the drive.**

40000	**Field Bus Type** Type of expansion board if installed 0 = Not Used 1 = Profibus 2 = CanOpen 3 = DeviceNet 4 = GD-Net 5 = RTE	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**4**
40001	**Bus Baude Rate** Baud rate of expansion board installed, if any	**[kbits/s]**	**Dword]**	**R/Z/***	**50**	**0**	**2^{32}-1**
40100	**Bus Address** Address of expansion board installed	**[--]**	**Word**	**R/Z/***	**0**	**0**	**65535**
40110	**CC Enabling** Enables or disables the CC 0 = OFF	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**65535**

IPA	Description	[Unit]	Format	Access	Default	Min	Max
	1 = ON						
40111	**PDC Enabling** Enables or disables the PDC channel 0 = OFF 1 = ON	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**65535**
40115	**FB Alarm Watch** Field bus communication alarm control when drive disabled. 0 = OFF control inactive 1 = ON control active	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**65535**
00999	**Modbus IPA Ofst** Offset used to address all drive parameter with a modbus connected PLC having limitated addressing capacity.	**[--]**	**Word**	**R/W**			
40116	**Float Word Order** Identical configuration of words for Direct Access and Parameter modes	**[--]**	**Word**	**R/W**	**0**	**0**	**65535**
40113	**Field Bus Status** Status of FB device	**[--]**	**Enum**	**R**			
40114	**FB Fail Cause** Failure cause of FB card	**[--]**	**Dword**	**R**			
40119	**RTE protocol** Protocol used on the optional RTE communication card. 0 - None 1 - Ethercat 2 - EthernetIP 3 - GdNet 4 - Profinet 5 - ModbusTCP 6 - Powerlink 7 - SercosIII	**[--]**	**Enum**	**R**			
	FB 1st M->S PAR						
40190	**FB Assign M->S 1** Exchange data mode. 0 = Not assigned 1 = Parameter 3 = Direct Acc Par Direct access parameter (8ms) 4 = Filling 5 = Fast Access Par Fast access parameter (250uS)	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**5**
40200	**FB IPA M->S 1** Parameter index (IPA) to write into XVy-EV with PDC channel	**[--]**	**Word**	**R/Z/***	**0**	**0**	**65535**
40210	**FB Format M->S 1** Format of the parameter to write into XVy-EV 1 = 16 Bit Integer 2 = 16 Bit Uns Int 3 = 32 Bit Integer 4 = 32 Bit Uns Int 6 = Floating Point	**[--]**	**Enum**	**R/Z/***	**1**	**0**	**65535**
40220	**FB Exp M->S 1** Power of 10 used to multiply the parameter value to write into XVy-EV.	**[--]**	**Int**	**R/Z/***	**0**	**-9**	**9**

IPA	Description	[Unit]	Format	Access	Default	Min	Max
	FB 2ndM->S PAR						
40191	**FB Assign M->S 2** Exchange data mode. 0 = Not assigned 1 = Parameter 3 = Direct Acc Par Direct access parameter (8ms) 4 = Filling 5 = Fast Access Par Fast access parameter (250uS)	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**5**
40201	**FB IPA M->S 2** Parameter index (IPA) to write into XVy-EV with PDC channel	**[--]**	**Word**	**R/Z/***	**0**	**0**	**65535**
40211	**FB Format M->S 2** Format of the parameter to write into XVy-EV 1 = 16 Bit Integer 2 = 16 Bit Uns Int 3 = 32 Bit Integer 4 = 32 Bit Uns Int 6 = Floating Point	**[--]**	**Word**	**R/Z/***	**1**	**0**	**65535**
40221	**FB Exp M->S 2** Power of 10 used to multiply the parameter value to write into XVy-EV.	**[--]**	**Enum**	**R/Z/***	**0**	**-9**	**9**
	FB 3rd M->S PAR						
40192	**FB Assign M->S 3** Exchange data mode. 0 = Not assigned 1 = Parameter 3 = Direct Acc Par Direct access parameter (8ms) 4 = Filling 5 = Fast Access Par Fast access parameter (250uS)	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**5**
40202	**FB IPA M->S 3** Parameter index (IPA) to write into XVy-EV with PDC channel	**[--]**	**Word**	**R/Z/***	**0**	**0**	**65535**
40212	**FB Format M->S 3** Format of the parameter to write into XVy-EV 1 = 16 Bit Integer 2 = 16 Bit Uns Int 3 = 32 Bit Integer 4 = 32 Bit Uns Int 6 = Floating Point	**[--]**	**Enum**	**R/Z/***	**1**	**0**	**65535**
40222	**FB Exp M->S 3** Power of 10 used to multiply the parameter value to write into XVy-EV.	**[--]**	**Int**	**R/Z/***	**0**	**-9**	**9**
	FB 4th M->S PAR						
40193	**FB Assign M->S 4** Exchange data mode. 0 = Not assigned 1 = Parameter 3 = Direct Acc Par Direct access parameter (8ms) 4 = Filling 5 = Fast Access Par Fast access parameter (250uS)	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**5**
40203	**FB IPA M->S 4** Parameter index (IPA) to write into XVy-EV with PDC channel	**[--]**	**Word**	**R/Z/***	**0**	**0**	**65535**

IPA	Description	[Unit]	Format	Access	Default	Min	Max
40213	**FB Format M->S 4**	**[--]**	**Enum**	**R/Z/***	**1**	**0**	**65535**
	Format of the parameter to write into XVy-EV 1 = 16 Bit Integer 2 = 16 Bit Uns Int 3 = 32 Bit Integer 4 = 32 Bit Uns Int 6 = Floating Point						
40223	**FB Exp M->S 4**	**[--]**	**Int**	**R/Z/***	**0**	**-9**	**9**
	Power of 10 used to multiply the parameter value to write into XVy-EV.						
	FB 5th M->S PAR						
40194	**FB Assign M->S 5**	**[--]**	**Int**	**R/Z/***	**0**	**0**	**5**
	Exchange data mode. 0 = Not assigned 1 = Parameter 3 = Direct Acc Par — Direct access parameter (8ms) 4 = Filling 5 = Fast Access Par — Fast access parameter (250uS)						
40204	**FB IPA M->S 5**	**[--]**	**Word**	**R/Z/***	**0**	**0**	**65535**
	Parameter index (IPA) to write into XVy-EV with PDC channel						
40214	**FB Format M->S 5**	**[--]**	**Enum**	**R/Z/***	**1**	**0**	**65535**
	Format of the parameter to write into XVy-EV 1 = 16 Bit Integer 2 = 16 Bit Uns Int 3 = 32 Bit Integer 4 = 32 Bit Uns Int 6 = Floating Point						
40224	**FB Exp M->S 5**	**[--]**	**Int**	**R/Z/***	**0**	**-9**	**9**
	Power of 10 used to multiply the parameter value to write into XVy-EV.						
	FB 6th M->S PAR						
40195	**FB Assign M->S 6**	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**5**
	Exchange data mode. 0 = Not assigned 1 = Parameter 3 = Direct Acc Par — Direct access parameter (8ms) 4 = Filling 5 = Fast Access Par — Fast access parameter (250uS)						
40205	**FB IPA M->S 6**	**[--]**	**Word**	**R/Z/***	**0**	**0**	**65535**
	Parameter index (IPA) to write into XVy-EV with PDC channel						
40215	**FB Format M->S 6**	**[--]**	**Enum**	**R/Z/***	**1**	**0**	**65535**
	Format of the parameter to write into XVy-EV 1 = 16 Bit Integer 2 = 16 Bit Uns Int 3 = 32 Bit Integer 4 = 32 Bit Uns Int 6 = Floating Point						
40225	**FB Exp M->S 6**	**[--]**	**Int**	**R/Z/***	**0**	**-9**	**9**
	Power of 10 used to multiply the parameter value to write into XVy-EV.						

IPA	Description	[Unit]	Format	Access	Default	Min	Max
	FB 7th M->S PAR						
40196	**FB Assign M->S 7** Exchange data mode. 0 = Not assigned 1 = Parameter 3 = Direct Acc Par Direct access parameter (8ms) 4 = Filling 5 = Fast Access Par Fast access parameter (250uS)	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**5**
40206	**FB IPA M->S 7** Parameter index (IPA) to write into XVy-EV with PDC channel	**[--]**	**Word**	**R/Z/***	**0**	**0**	**65535**
40216	**FB Format M->S 7** Format of the parameter to write into XVy-EV 1 = 16 Bit Integer 2 = 16 Bit Uns Int 3 = 32 Bit Integer 4 = 32 Bit Uns Int 6 = Floating Point	**[--]**	**Enum**	**R/Z/***	**1**	**0**	**65535**
40226	**FB Exp M->S 7** Power of 10 used to multiply the parameter value to write into XVy-EV.	**[--]**	**Int**	**R/Z/***	**0**	**-9**	**9**
	FB 8th M->S PAR						
40197	**FB Assign M->S 8** Exchange data mode. 0 = Not assigned 1 = Parameter 3 = Direct Acc Par Direct access parameter (8ms) 4 = Filling 5 = Fast Access Par Fast access parameter (250uS)	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**5**
40207	**FB IPA M->S 8** Parameter index (IPA) to write into XVy-EV with PDC channel	**[--]**	**Word**	**R/Z/***	**0**	**0**	**65535**
40217	**FB Format M->S 8** Format of the parameter to write into XVy-EV 1 = 16 Bit Integer 2 = 16 Bit Uns Int 3 = 32 Bit Integer 4 = 32 Bit Uns Int 6 = Floating Point	**[--]**	**Enum**	**R/Z/***	**1**	**0**	**65535**
40227	**FB Exp M->S 8** Power of 10 used to multiply the parameter value to write into XVy-EV.	**[--]**	**Int**	**R/Z/***	**0**	**-9**	**9**
	FB 9th M->S PAR						
41198	**FB Assign M->S 9** Exchange data mode. 0 = Not assigned 1 = Parameter 3 = Direct Acc Par Direct access parameter (8ms) 4 = Filling 5 = Fast Access Par Fast access parameter (250uS)	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**5**
41208	**FB IPA M->S 9** Parameter index (IPA) to write into XVy-EV with PDC channel	**[--]**	**Word**	**R/Z/***	**0**	**0**	**65535**

IPA	Description	[Unit]	Format	Access	Default	Min	Max
41218	**FB Format M->S 9**	**[--]**	**Enum**	**R/Z/***	**1**	**0**	**65535**
	Format of the parameter to write into XVy-EV 1 = 16 Bit Integer 2 = 16 Bit Uns Int 3 = 32 Bit Integer 4 = 32 Bit Uns Int 6 = Floating Point						
41228	**FB Exp M->S 9**	**[--]**	**Int**	**R/Z/***	**0**	**-9**	**9**
	Power of 10 used to multiply the parameter value to write into XVy-EV.						
	FB 10th M->S PAR						
41199	**FB Assign M->S 10**	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**5**
	Exchange data mode. 0 = Not assigned 1 = Parameter 3 = Direct Acc Par Direct access parameter (8ms) 4 = Filling 5 = Fast Access Par Fast access parameter (250uS)						
41209	**FB IPA M->S 10**	**[--]**	**Word**	**R/Z/***	**0**	**0**	**65535**
	Parameter index (IPA) to write into XVy-EV with PDC channel						
41219	**FB Format M->S 10**	**[--]**	**Enum**	**R/Z/***	**1**	**0**	**65535**
	Format of the parameter to write into XVy-EV 1 = 16 Bit Integer 2 = 16 Bit Uns Int 3 = 32 Bit Integer 4 = 32 Bit Uns Int 6 = Floating Point						
41229	**FB Exp M->S 10**	**[--]**	**Int**	**R/Z/***	**0**	**-9**	**9**
	Power of 10 used to multiply the parameter value to write into XVy-EV.						
	FB 11th M->S PAR						
41200	**FB Assign M->S 11**	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**5**
	Exchange data mode. 0 = Not assigned 1 = Parameter 3 = Direct Acc Par Direct access parameter (8ms) 4 = Filling 5 = Fast Access Par Fast access parameter (250uS)						
41210	**FB IPA M->S 11**	**[--]**	**Word**	**R/Z/***	**0**	**0**	**65535**
	Parameter index (IPA) to write into XVy-EV with PDC channel						
41220	**FB Format M->S 11**	**[--]**	**Enum**	**R/Z/***	**1**	**0**	**65535**
	Format of the parameter to write into XVy-EV 1 = 16 Bit Integer 2 = 16 Bit Uns Int 3 = 32 Bit Integer 4 = 32 Bit Uns Int 6 = Floating Point						
41230	**FB Exp M->S 11**	**[--]**	**Int**	**R/Z/***	**0**	**-9**	**9**
	Power of 10 used to multiply the parameter value to write into XVy-EV.						

IPA	Description	[Unit]	Format	Access	Default	Min	Max
	FB 12th M->S PAR						
41201	**FB Assign M->S 12** Exchange data mode. 0 = Not assigned 1 = Parameter 3 = Direct Acc Par Direct access parameter (8ms) 4 = Filling 5 = Fast Access Par Fast access parameter (250uS)	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**5**
41201	**FB IPA M->S 12** Parameter index (IPA) to write into XVy-EV with PDC channel	**[--]**	**Word**	**R/Z/***	**0**	**0**	**65535**
41221	**FB Format M->S 12** Format of the parameter to write into XVy-EV 1 = 16 Bit Integer 2 = 16 Bit Uns Int 3 = 32 Bit Integer 4 = 32 Bit Uns Int 6 = Floating Point	**[--]**	**Enum**	**R/Z/***	**1**	**0**	**65535**
41231	**FB Exp M->S 12** Power of 10 used to multiply the parameter value to write into XVy-EV.	**[--]**	**Int**	**R/Z/***	**0**	**-9**	**9**
	FB 1st S->M PAR						
40290	**FB Assign S->M 1** Exchange data mode. 0 = Not assigned 1 = Parameter 3 = Direct Acc Par Direct access parameter (8ms) 4 = Filling 5 = Fast Access Par Fast access parameter (250uS)	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**5**
40300	**FB IPA S->M 1** Parameter index (IPA) to read from XVy-EV with PDC channel	**[--]**	**Word**	**R/Z/***	**0**	**0**	**65535**
40310	**FB Format S->M 1** Format of the parameter to read into XVy-EV 1 = 16 Bit Integer 2 = 16 Bit Uns Int 3 = 32 Bit Integer 4 = 32 Bit Uns Int 6 = Floating Point	**[--]**	**Enum**	**R/Z/***	**1**	**0**	**65535**
40320	**FB Exp S->M 1** Power of 10 used to multiply the parameter value to read into XVy-EV.	**[--]**	**Int**	**R/Z/***	**0**	**-9**	**9**
	FB 2nd S->M PAR						
40291	**FB Assign S->M 2** Exchange data mode. 0 = Not assigned 1 = Parameter 3 = Direct Acc Par Direct access parameter (8ms) 4 = Filling 5 = Fast Access Par Fast access parameter (250uS)	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**5**
40301	**FB IPA S->M 2** Parameter index (IPA) to read from XVy-EV with PDC channel	**[--]**	**Word**	**R/Z/***	**0**	**0**	**65535**

IPA	Description	[Unit]	Format	Access	Default	Min	Max
40311	**FB Format S->M 2**	**[--]**	**Enum**	**R/Z/***	**1**	**0**	**65535**
	Format of the parameter to read into XVy-EV 1 = 16 Bit Integer 2 = 16 Bit Uns Int 3 = 32 Bit Integer 4 = 32 Bit Uns Int 6 = Floating Point						
40321	**FB Exp S->M 2**	**[--]**	**Int**	**R/Z/***	**0**	**-9**	**9**
	Power of 10 used to multiply the parameter value to read into XVy-EV.						
	FB 3rd S->M PAR						
40292	**FB Assign S->M 3**	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**5**
	Exchange data mode. 0 = Not assigned 1 = Parameter 3 = Direct Acc Par Direct access parameter (8ms) 4 = Filling 5 = Fast Access Par Fast access parameter (250uS)						
40302	**FB IPA S->M 3**	**[--]**	**Word**	**R/Z/***	**0**	**0**	**65535**
	Parameter index (IPA) to read from XVy-EV with PDC channel						
40312	**FB Format S->M 3**	**[--]**	**Enum**	**R/Z/***	**1**	**0**	**65535**
	Format of the parameter to read into XVy-EV 1 = 16 Bit Integer 2 = 16 Bit Uns Int 3 = 32 Bit Integer 4 = 32 Bit Uns Int 6 = Floating Point						
40322	**FB Exp S->M 3**	**[--]**	**Int**	**R/Z/***	**0**	**-9**	**9**
	Power of 10 used to multiply the parameter value to read into XVy-EV.						
	FB 4th S->M PAR						
40293	**FB Assign S->M 4**	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**5**
	Exchange data mode. 0 = Not assigned 1 = Parameter 3 = Direct Acc Par Direct access parameter (8ms) 4 = Filling 5 = Fast Access Par Fast access parameter (250uS)						
40303	**FB IPA S->M 4**	**[--]**	**Word**	**R/Z/***	**0**	**0**	**65535**
	Parameter index (IPA) to read from XVy-EV with PDC channel						
40313	**FB Format S->M 4**	**[--]**	**Enum**	**R/Z/***	**1**	**0**	**65535**
	Format of the parameter to read into XVy-EV 1 = 16 Bit Integer 2 = 16 Bit Uns Int 3 = 32 Bit Integer 4 = 32 Bit Uns Int 6 = Floating Point						
40323	**FB Exp S->M 4**	**[--]**	**Int**	**R/Z/***	**0**	**-9**	**9**
	Power of 10 used to multiply the parameter value to read into XVy-EV.						

IPA	Description	[Unit]	Format	Access	Default	Min	Max
	FB 5th S->M PAR						
40294	**FB Assign S->M 5** Exchange data mode. 0 = Not assigned 1 = Parameter 3 = Direct Acc Par Direct access parameter (8ms) 4 = Filling 5 = Fast Access Par Fast access parameter (250uS)	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**5**
40304	**FB IPA S->M 5** Parameter index (IPA) to read from XVy-EV with PDC channel	**[--]**	**Word**	**R/Z/***	**0**	**0**	**65535**
40314	**FB Format S->M 5** Format of the parameter to read into XVy-EV 1 = 16 Bit Integer 2 = 16 Bit Uns Int 3 = 32 Bit Integer 4 = 32 Bit Uns Int 6 = Floating Point	**[--]**	**Enum**	**R/Z/***	**1**	**0**	**65535**
40324	**FB Exp S->M 5** Power of 10 used to multiply the parameter value to read into XVy-EV.	**[--]**	**Int**	**R/Z/***	**0**	**-9**	**9**
	FB 6th S->M PAR						
40295	**FB Assign S->M 6** Exchange data mode. 0 = Not assigned 1 = Parameter 3 = Direct Acc Par Direct access parameter (8ms) 4 = Filling 5 = Fast Access Par Fast access parameter (250uS)	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**5**
40305	**FB IPA S->M 6** Parameter index (IPA) to read from XVy-EV with PDC channel	**[--]**	**Word**	**R/Z/***	**0**	**0**	**65535**
40315	**FB Format S->M 6** Format of the parameter to read into XVy-EV 1 = 16 Bit Integer 2 = 16 Bit Uns Int 3 = 32 Bit Integer 4 = 32 Bit Uns Int 6 = Floating Point	**[--]**	**Enum**	**R/Z/***	**1**	**0**	**65535**
40325	**FB Exp S->M 6** Power of 10 used to multiply the parameter value to read into XVy-EV.	**[--]**	**Int**	**R/Z/***	**0**	**-9**	**9**
	FB 7th S->M PAR						
40296	**FB Assign S->M 7** Exchange data mode. 0 = Not assigned 1 = Parameter 3 = Direct Acc Par Direct access parameter (8ms) 4 = Filling 5 = Fast Access Par Fast access parameter (250uS)	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**5**
40306	**FB IPA S->M 7** Parameter index (IPA) to read from XVy-EV with PDC channel	**[--]**	**Word**	**R/Z/***	**0**	**0**	**65535**

IPA	Description	[Unit]	Format	Access	Default	Min	Max
40316	**FB Format S->M 7**	**[--]**	**Enum**	**R/Z/***	**1**	**0**	**65535**
	Format of the parameter to read into XVy-EV 1 = 16 Bit Integer 2 = 16 Bit Uns Int 3 = 32 Bit Integer 4 = 32 Bit Uns Int 6 = Floating Point						
40326	**FB Exp S->M 7**	**[--]**	**Int**	**R/Z/***	**0**	**-9**	**9**
	Power of 10 used to multiply the parameter value to read into XVy-EV.						
	FB 8th S->M PAR						
40297	**FB Assign S->M 8**	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**5**
	Exchange data mode. 0 = Not assigned 1 = Parameter 3 = Direct Acc Par Direct access parameter (8ms) 4 = Filling 5 = Fast Access Par Fast access parameter (250uS)						
40307	**FB IPA S->M 8**	**[--]**	**Word**	**R/Z/***	**0**	**0**	**65535**
	Parameter index (IPA) to read from XVy-EV with PDC channel						
40317	**FB Format S->M 8**	**[--]**	**Enum**	**R/Z/***	**1**	**0**	**65535**
	Format of the parameter to read into XVy-EV 1 = 16 Bit Integer 2 = 16 Bit Uns Int 3 = 32 Bit Integer 4 = 32 Bit Uns Int 6 = Floating Point						
40327	**FB Exp S->M 8**	**[--]**	**Int**	**R/Z/***	**0**	**-9**	**9**
	Power of 10 used to multiply the parameter value to read into XVy-EV.						
	FB 9th S->M PAR						
41298	**FB Assign S->M 9**	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**5**
	Exchange data mode. 0 = Not assigned 1 = Parameter 3 = Direct Acc Par Direct access parameter (8ms) 4 = Filling 5 = Fast Access Par Fast access parameter (250uS)						
41308	**FB IPA S->M 9**	**[--]**	**Word**	**R/Z/***	**0**	**0**	**65535**
	Parameter index (IPA) to read from XVy-EV with PDC channel						
41318	**FB Format S->M 9**	**[--]**	**Enum**	**R/Z/***	**1**	**0**	**65535**
	Format of the parameter to read into XVy-EV 1 = 16 Bit Integer 2 = 16 Bit Uns Int 3 = 32 Bit Integer 4 = 32 Bit Uns Int 6 = Floating Point						
41328	**FB Exp S->M 9**	**[--]**	**Int**	**R/Z/***	**0**	**-9**	**9**
	Power of 10 used to multiply the parameter value to read into XVy-EV.						

IPA	Description	[Unit]	Format	Access	Default	Min	Max
	FB 10th S->M PAR						
41299	**FB Assign S->M 10** Exchange data mode. 0 = Not assigned 1 = Parameter 3 = Direct Acc Par Direct access parameter (8ms) 4 = Filling 5 = Fast Access Par Fast access parameter (250uS)	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**5**
41309	**FB IPA S->M 10** Parameter index (IPA) to read from XVy-EV with PDC channel	**[--]**	**Word**	**R/Z/***	**0**	**0**	**65535**
41319	**FB Format S->M 10** Format of the parameter to read into XVy-EV 1 = 16 Bit Integer 2 = 16 Bit Uns Int 3 = 32 Bit Integer 4 = 32 Bit Uns Int 6 = Floating Point	**[--]**	**Enum**	**R/Z/***	**1**	**0**	**65535**
41329	**FB Exp S->M 10** Power of 10 used to multiply the parameter value to read into XVy-EV.	**[--]**	**Int**	**R/Z/***	**0**	**-9**	**9**
	FB 11th S->M PAR						
41300	**FB Assign S->M 11** Exchange data mode. 0 = Not assigned 1 = Parameter 3 = Direct Acc Par Direct access parameter (8ms) 4 = Filling 5 = Fast Access Par Fast access parameter (250uS)	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**5**
41310	**FB IPA S->M 11** Parameter index (IPA) to read from XVy-EV with PDC channel	**[--]**	**Word**	**R/Z/***	**0**	**0**	**65535**
41320	**FB Format S->M 11** Format of the parameter to read into XVy-EV [1] 16 Bit Integer [2] 16 Bit Uns Int [3] 32 Bit Integer [4] 32 Bit Uns Int [6] Floating Point	**[--]**	**Enum**	**R/Z/***	**1**	**0**	**65535**
41331	**FB Exp S->M 11** Power of 10 used to multiply the parameter value to read into XVy-EV.	**[--]**	**Int**	**R/Z/***	**0**	**-9**	**9**
	FB 12th S->M PAR						
41301	**FB Assign S->M 12** Exchange data mode. 0 = Not assigned 1 = Parameter 3 = Direct Acc Par Direct access parameter (8ms) 4 = Filling 5 = Fast Access Par Fast access parameter (250uS)	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**5**
41311	**FB IPA S->M 12** Parameter index (IPA) to read from XVy-EV with PDC channel	**[--]**	**Word**	**R/Z/***	**0**	**0**	**65535**

IPA	Description	[Unit]	Format	Access	Default	Min	Max
41321	**FB Format S->M 12** Format of the parameter to read into XVy-EV 1 = 16 Bit Integer 2 = 16 Bit Uns Int 3 = 32 Bit Integer 4 = 32 Bit Uns Int 6 = Floating Point	**[--]**	**Enum**	**R/Z/***	**1**	**0**	**65535**
41331	**FB Exp S->M 12** Power of 10 used to multiply the parameter value to read into XVy-EV.	**[--]**	**Int**	**R/Z/***	**0**	**-9**	**9**
	CANOPEN						
40902	**Sync Period** This parameter defines the SYNC interval (communication cycle, Object 1006h). Used to synchronise execution of the task within the inverter in SYNC message. If set to 0, the bus loss timeouts on SYNC are disabled.	**[usec]**	**dword**	**RZ***	**0**	**0**	**100000**
40903	**Guard Time** This parameter defines the Node Guarding interval (Object 100Ch). If set to 0, the bus loss timeouts on Node Guarding are disabled.	**[msec]**	**word**	**RZ***	**20**	**0**	**65535**
40904	**Life Time Factor** Life time factor (Object 100Dh) multiplied by Node Guarding period or SYNC period is the timeout for bus loss errors.	**[--]**	**Word**	**RZ***	**3**	**0**	**65535**
40905	**COBID Em Obj** COB-ID of Emergency object (Object 1014h).	**[--]**	**Dword**	**RZ***	**0x80000081**	**0x00000080**	**0x800000FF**
40906	**Cus OBJ Idx Mode** Sets the address method for parameters in SDO requests. 0 = Offset 1 = Mod 100	**[--]**	**Enum**	**RZ***	**Mod100**	**0**	**65536**
	PDO 1 RX						
40910	**PDO 1 RX COBID** COB ID for 1° PDO receiver (Object 1400h , Subindex 1)	**[--]**	**Dword**	**RZ***	**0x40000201**	**0x00000200**	**0x4000027F**
40915	**PDO 1 RX TYPE** 1° PDO in reception (Object 1400h , Subindex 2)	**[--]**	**word**	**RZ***	**1**	**1**	**255**
	PDO 2 RX						
40911	**PDO 2 RX COBID** COB ID for 2° PDO receiver (Object 1401h , Subindex 1).	**[--]**	**Dword**	**RZ***	**0x40000301**	**0x00000300**	**0x4000037F**
40916	**PDO 2 RX TYPE** 2° PDO in reception (Object 1401h , Subindex 2)	**[--]**	**word**	**RZ***	**1**	**1**	**255**
	PDO 3 RX						
40912	**PDO 3 RX COBID** COB ID for 3° PDO receiver (Object 1404h , Subindex 1).	**[--]**	**Dword**	**RZ***	**0x40000401**	**0x00000400**	**0x4000047F**
40917	**PDO 3 RX TYPE** 3° PDO in reception (Object 1402h , Subindex 2)	**[--]**	**word**	**RZ***	**1**	**1**	**255**
	PDO 1 TX						
40920	**PDO 1 TX COBID** COB ID of 1° PDO in transmission (Object 1800h , Subindex 1).	**[--]**	**Dword**	**RZ***	**0x40000181**	**0x00000181**	**0x400001FF**
40925	**PDO 1 TX TYPE** 1° PDO in transmission (Object 1800h , Subindex 2).	**[--]**	**word**	**RZ***	**1**	**1**	**255**

IPA	Description	[Unit]	Format	Access	Default	Min	Max
40930	**PDO 1 TX INH** Inhibition time of 1° PDO in transmission (Object 1800h , Subindex 3).	**[100us]**	**word**	**RZ***	**40**	**0**	**65535**
	PDO 2 TX						
40921	**PDO 2 TX COBID** COB ID of 2° PDO in transmission (Object 1801h , Subindex 1).	**[--]**	**Dword**	**RZ***	**0x40000281**	**0x00000281**	**0x400002FF**
40926	**PDO 2 TX TYPE** 2° PDO in transmission (Object 1801h , Subindex 2).	**[--]**	**word**	**RZ***	**1**	**1**	**255**
40931	**PDO 2 TX INH** Inhibition time of 2° PDO in transmission (Object 1801h , Subindex 3)	**[100us]**	**word**	**RZ***	**40**	**0**	**65535**
	PDO 3 TX						
40922	**PDO 3 TX COBID** COB ID of 3° PDO in transmission (Object 1802h , Subindex 1).	**[--]**	**Dword**	**RZ***	**0x40000381**	**0x00000381**	**0x400003FF**
40927	**PDO 3 TX TYPE** 3° PDO in transmission (Object 1802h , Subindex 2).	**[--]**	**word**	**RZ***	**1**	**1**	**255**
40932	**PDO 3 TX INH** Inhibition time of 3° PDO in transmission (Object 1802h , Subindex 3)	**[100us]**	**word**	**RZ***	**40**	**0**	**65535**
	UNITS						
18700	**Arms Conv Fact** Current conversion factor.	**[Arms/cnts]**	**Float**	**R**			
18752	**Rpm Conv Fact** Speed conversion factor.	**[rpm/cnts]**	**Float**	**R**			
18753	**Pos Conv Fact** Position conversion factor.	**[deg/cnts]**	**Float**	**R**			
18790	**Torque Conv Fact** Torque conversion factor.	**[Nm/cnts]**	**Float**	**R**			

ENABLE KEYS

The communications via the DeviceNet communication protocol and the applications developed via the MDPlc environment are protected by a software key customized for each single drive. The code of the activation key can be purchased through the **Gefran** commercial department.

In order to allow the function check and while waiting for the personal key, each drive is enabled to function without the key protection for 100 hours. The functioning period is given adding the values read in the IPA 20045 and IPA 20046 parameters (COUNTER menu).

41000	**DeviceNet Enable** DeviceNet activation code.	**[--]**	**Dword**	**R/W***
41001	**PLC Enable Key** Key disabling the Plc functions.	**[--]**	**Dword**	**R/W***
41050	**DNet En Key Stat** Status of the DeviceNet enabling key: 0 = Disabled 1 = Enabled 60 = 200 Hours Free 200h free for valuation.	**[--]**	**Word**	**R**
41051	**PLC En Key Stat** Status of the Plc enabling key 0 = Disabled 1 = Enabled 60 = 200 Hours Free 200h free for valuation.	**[--]**	**Word**	**R**

IPA	Description	[Unit]	Format	Access	Default	Min	Max
41020	**En Keys Mask** Enabled key mask.	**[--]**	**Word**	**R**			
18504	**Ser Num En Keys** Serial number used to enable the key codes.	**[--]**	**Word**	**R**			

TUNING

18140	**Application Sel** Application selection parameter. It is possible to select different applications: 0=Basic 2=Phasing 3=Test Generator 4=Autotuning	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**65535**

AUTOTUNING

18330	**Tuning Status** Tuning developing process 0 = Off 1 = Lsigma Tuning... 2 = Rs Tuning... 3 = Magn Tuning... 4 = Rr Tuning... 90 = Done 100 = Err Drive Dis 110 = Err Lsigma TOut 111 = Err Lsigma Range 130 = Err Rs Range 150 = Err Lm Range 151 = Err Lm Neg Value 160 = Err Imagn Range 170 = Err Rr Range	**[--]**	**Enum**	**R**			
18313	**LKG Inductance** Motor inductance	**[H]**	**Float**	**R**			

PHASING

20058	**Enc Mech Offset** Offset between electrical angle zero of motor phases and encoder feedback device.	**[el.deg.]**	**Float**	**R/Z/***	**0**	**-180**	**180**
20057	**Enc Offset** Offset between absolute and incremental tracks on encoder feedback device.	**[mech deg]**	**Float**	**R/Z/***	**0**	**-180**	**180**
20059	**Phasing Speed** Motor speed during Phasing procedure	**[rpm]**	**Float**		**5**	**0**	**100**

TEST GENERATOR

20060	**Test Gen Ref** Used to select current or speed loop adjusting procedure : 0 = Current Ref: current loop adjust 1 = Pos \ Spd Ref speed loop adjust	**[--]**	**Enum**	**R/Z**	**0**	**0**	**1**

CURR TEST GEN

20061	**Period Test Gen** In current generator mode (current loop adjustment), this is the period of the generated square wave.	**[ms]**	**Int**	**R/W**	**16**	**0**	**32767**
20062	**Hig Curr Ref Gen** Maximum value of the current reference as compared to the motor U phase.	**[Apk]**	**Float**	**R/W**	**IPA18703**	**S**	**S**

IPA	Description	[Unit]	Format	Access	Default	Min	Max
20063	**Low Curr Ref Gen**	**[Apk]**	**Float**	**R/W**	**0**		**S**
	Minimum value of the current reference as compared to the motor U phase.						

SPD/POS TESTGEN

20070	**CW Rev Test Gen**	**[rev]**	**Float**	**R/W**	**5**		
	Number of clockwise revolutions performed by the motor during the speed generator Test as compared to the starting position.						
20071	**CCW Rev Test Gen**	**[rev]**	**Float**	**R/W**	**5**		
	Number of anti-clockwise revolutions performed by the motor during the speed generator Test as compared to the starting position.						
20072	**Speed Test Gen**	**[rpm]**	**Float**	**R/W**	**100**	**0**	**100000**
	Motor speed during speed generator test						

KEYPAD PSW

18145	**Keypad PSWD**	**[--]**	**Dword**	**R/W**	**00000000H**		

The drive manages two password access levels:
- level 1 “user” access to prevent any unauthorised modification of drive configuration parameters. **See Entering the user Password.**
- level 2 to access the Service menu (reserved for use by GEFRAN technicians).

Both Passwords are entered from the keypad in the **Keypad PSWD** (*) parameter.
The default value for the **Keypad PSWD** parameter is 00000000H. If it is not changed, access is always allowed to the complete list of menus and parameters (except the SERVICE menu).
If a user password has been configured, access is only allowed to the MONITOR menu.
Access to the complete list of menus and parameters (except the Service menu) is only allowed if the correct password is entered in the Keypad PSWD parameter

Entering the user Password.
1) When the drive is turned on the motor speed is shown on the display. Press **Escape** (**Shift** + ◀) to access the menus.
2) Press **Escape** to display the MONITOR menu, then **Enter** to show all the measurements.
3) In the MONITOR menu, press ▼ to display all the drive menus in sequence until the **Keypad PSWD** parameter appears. Press **Enter** to display the value 00000000H.
4) Enter a value from 1 up to a maximum of 8 digits.
5) Press **Enter** to confirm
Press ▲ to return to the menu list.
6) To make the password operational, store it using the **Save Parameter** command.
The protection will be enabled the next time the inverter is turned off and then on again.

Temporarily disabling the Password
1) Select the **Keypad PSWD** parameter (see points 1 to 3 in the previous section).
2) Press **Enter** to display the value 00000000H.
3) Enter the correct password value.
4) Press **Enter** to confirm
5) Press ▲ to exit the password parameter and return to the MONITOR menu.
In this menu, press ▼ to display all the drive menus in sequence.
The password is automatically re-enabled the next time the inverter is turned off and then on again.

Removing the Password
1) After temporarily disabling the password as described in the previous point, return to the **Keypad PSWD** parameter.

2) Press **Enter** to display the value 00000000H.
3) Press Enter to confirm
4) Press ▲ to exit the password parameter
5) Store using the **Save Parameter** command.
You can now access the complete list of menus and parameters again (except the SERVICE menu) even after turning the inverter off and then on again.

Repeat the "**Entering the user Password**" procedure to enter a new password.

(*) The **Keypad PSWD** parameter is not visible via the GF-eXpress.
Using the GF-eXpress tool the password (only required to enable the SERVICE menu) can be entered in the File / Password pull-down menu.

NOTE ! The KEYPAD PSWD menu is shown on the keypad:

- with the user password enabled	after the MONITOR menu
- without a password (or password disabled)	after the TUNING menu
- with the Service password enabled	after the SERVICE menu

NOTE ! With the GF-eXpress tool you can always display all the menus except the SERVICE menu:

0 - Basic Level	only the MONITOR menu is displayed
1 - User Menu (default)	all the menus are displayed except the SERVICE menu
3 - Service Menu	all the menus are displayed (reserved for use by GEFRAN technicians)

SERVICE

This menu is reserved for use by Gefran technicians.
To access the SERVICE menu simply enter the level 2) password:
- using the GF-eXpress tool, from the File / Password pull-down menu, select "3 - Service menu" and enter the password.
- using the keypad, via the **Keypad PSWD** parameter (from the MONITOR menu, keep pressing ▼ until the **Keypad PSWD** parameter is displayed).

Please refer to the **Keypad PSWD** parameter for more details about how to enter the Password.

Temporarily disabling the Service Password
This password, which is reserved for use by GEFRAN technicians, allows access to the SERVICE menu.
The password is fixed with a hexadecimal value …..H
1) When the drive is turned on the motor speed is shown on the display. Press **Escape** (**Shift** + ◀) to access the menus.
2) Press **Escape** to display the MONITOR menu
3) In the MONITOR menu, press ▼ to display all the drive menus in sequence until the Keypad PSWD parameter appears. Press **Enter** to display the value 00000000H.
4) Enter the Service password value.
5) Press **Enter** to confirm
5) Press ▲ to exit the password parameter and return to the MONITOR menu.
In this menu, press ▼ to display all the drive menus in sequence, including the SERVICE MENU.
The password is automatically re-enabled the next time the inverter is turned off and then on again.

The SERVICE menu only displays the **Keypad Key Word** parameter, which can be used to display the user password that is enabled. If 00000000H appears in the parameter no password has been enabled.

IPA	Description	[Unit]	Format	Access	Default	Min	Max
18792	**FW Build Number** It is a number which identifies univocally a version of the FW. The higher numbers identify more recent FW versions.	[--]	Dword	R			
18793	**Reg Temp Alarm Th** "**Overtemperature of regulation board**" alarm threshold (code A22).	[°C]	Int16	R	0	0	1
	KEYPAD KEY						
18144	**Keypad Key Word** Displays the user password. If the value shown is 00000000H the password has not been entered.	[--]	Dword	R	00000000H		
	COUNTER						
20044	**Load Def Counter** Counter for the number of performed loading procedures for the factory-set parameters.	[--]	Dwor	R			
20045	**Tot Life Hours** Life hours at last power on.	[Hour]	Float	R			
20046	**Act Life Hours** Hours from last power on.	[Hour]	Float	R			
20047	**Power Fail Count** Counter listing the number of times the drive has been switched off.	[--]	Dwor	R			
20048	**Save Param Count** Save parameters counter.	[--]	Dwor	R			
20049	**SW Reset Count** Software reset counter.	[--]	Dwor	R			
	ENCODER						
20017	**Enc Inc Tracks** Incremental encoder enabling for current regulation 0=Disabled 1=Enabled	[--]	Enum	R/Z/*	1	0	1
20031	**Enc Inc Index** Indicates if index on incremental encoder is present. 0=Not Present 1= Present	[--]	Enum	R/Z/*	1	0	1
20028	**Enc No Idx Range** Maximum number of revolutions to be performed without reading the zero slot. 0...65535. If 0, the control is disabled.	[--]	Word	R/W	2	0	65535
20029	**Enc M Lost Puls** Maximum number of lost incremental pulses for each revolution.	[--]	Word	R/W	2	0	65535
20034	**Max Loss Pos** Maximum allowed position loss.	[mech deg]	Float	R/Z/*	90.0	0	180
20013	**Phasing Err** Actual phasing error	[el deg]	Float	R			
20014	**Act Enc Pos Loss** Actual position loss	[mech deg]	Float	R			
20015	**Act Mot El Angle** Motor electrical angle.	[el deg]	Float	R			
	XE ENC INC MEAS						
18744	**Inc Data Min Mod** AD minimum allowed module.	[cnts]	Int	R/W	11000	0	32767

IPA	Description	[Unit]	Format	Access	Default	Min	Max
18741	**Inc Data Act Mod** [cnts] Int AD measured module.		**R**				
19002	**Inc Data Pos** AD incremental position, main fbk.	**[mech deg]**	**Float**	**R**			
19003	**Inc Data N Rev** AD incremental revolution, main fbk.	**[--]**	**long**	**R**			
19096	**Index Position** AD index position, main fbk.	**[mech deg]**	**Float**	**R**			
19004	**Inc Pulses / Rev** AD incremental pulses/revolution, main fbk.	**[--]**	**Dword**	**R**			
19006	**Inc B Data Count** [cnts] Int AD incremental B channel, main fbk (XE pin 8-1)		**R**				
19005	**Inc A Data Count** AD incremental A channel, main fbk (XE pin 5-6)	**[cnts]**	**Int**	**R**			
	XE ENC ABS MEAS						
18747	**Resolver Gain** Resolver input gain 0 = 5 times 1 = 2 times 2 = 1.25 times 3 = 1 times	**[times]**	**Enum**	**R/Z/***	**1**	**0**	**3**
18126	**Res Shift Time** Resolver sampling shift time. 1cnts=33.3 ns.	**[cnts]**	**Int**	**R/W**	**580**	**-4000**	**4000**
18745	**Abs Data Min Mod** AN minimum allowed module.	**[cnts]**	**Int**	**R/W**	**17000**	**0**	**32767**
18760	**Abs Comp En** Enable offset compensation and amplitudes difference of AN channel. 0 = Disabled 1 = Enabled	**[--]**	**Enum**	**R/W**	**1**	**0**	**1**
18761	**Abs Comp TAU** AN comp time constant.	**[--]**	**Int**	**R/W**	**100**	**1**	**32767**
18767	**Abs Max Noise** Maximum value of electrical noise on AN transducer.	**[count]**	**INT**		**0**	**0**	**65535**
18740	**Abs Act Module** AN measured module.	**[cnts]**	**Int**	**R**			
19017	**Abs Turn Pos** AN position, main fbk.	**[mech deg]**	**Float**	**R**			
19018	**Abs Rev** AN revolution, main fbk.	**[--]**	**Long**	**R**			
18762	**Abs Sin Offset** AN SIN ch. compensed offset, main fbk (XE pin 10-11).	**[cnts]**	**Int**	**R**			
18763	**Abs Cos Offset** AN COS ch. compensed offset, main fbk (XE pin 12-13).	**[cnts]**	**Int**	**R**			
18764	**Abs Gain Err** AN SIN/COS ch. compensed gain error	**[%]**	**Float**	**R**			

IPA	Description	[Unit]	Format	Access	Default	Min	Max
18766	**Abs Meas Noise** Momentary value of electrical noise on AN transducer.	**[count]**	**INT**		**0**	**0**	**65535**
19019	**Abs Sin Meas** AN SIN ch., main fbk (XE pin 10-11)	**[--]**	**Int**	**R**			
19020	**Abs Cos Meas** AN COS ch., main fbk (XE pin 12-13)	**[--]**	**Int**	**R**			
	XER/EXP Inc Enc						
19011	**XER/EXP Turn Pos** DI incremental position, aux encoder (XER connector)	**[mech deg]**	**Float**	**R**			
19012	**XER/EXP Rev** DI incremental revolution, aux encoder (XER connector)	**[--]**	**Long**	**R**			
19013	**XER/EXP Puls Rev** DI incremental pulses/revolution, aux encoder (XER connector)	**[--]**	**Dword**	**R**			
19095	**XER/EXP Ind Pos** DI index position, aux encoder (XER connector)	**[el deg]**	**Float**	**R**			
	XE HALL TRACKS						
19022	**XE Hall Pos** HA position, main fbk (XE connector).	**[el deg]**	**Float**	**R**			
19026	**XE Hall Rev** HA electrical revolution, main fbk (XE connector).	**[--]**	**Long**	**R**			
19027	**XE Hall Meas** HA inputs pins H1, H2, H3, main fbk (XE connector).	**[--]**	**Word**	**R**			
19028	**XE Hall N Error** Number of times when the 000 or 111 wrong configuration has appeared during the probe reading.	**[--]**	**Int**	**R**			
	EXP ENC ABS1						
19030	**ABS1 Al Bit En** ABS1 alarm bit check enable (EnDat only). 0=Disabled 1=Enabled	**[--]**	**Enum**	**R/W**	**1**	**0**	**1**
19031	**EXP ABS1 Pos** ABS1 absolute position, main fbk.	**[mech deg]**	**Float**	**R**			
19032	**EXP ABS1 Sw Rev** Number of calculated absolute turns. Not valid in case of encoder with Hiperface protocol. This parameter can be greater than max number of revolutions set by encoders hardware limit.	**[--]**	**Long**	**R**			
19033	**EXP ABS1 Hw Rev** Number of absolute revolutions. This number has a maximum value, the maximum number of revolutions that encoder can measure. After maximum value, count starts from zero.	**[--]**	**Int**	**R**			
19034	**ABS1 Rx N Err** ABS1 total communication error.	**[--]**	**Int**	**R**			
19035	**ABS1 Alarm Bit** ABS1 alarm bit value (EnDat only).	**[--]**	**Enum**	**R**			
	FAST LINK ENC						
29103	**RX Rev** Number of incremental revolutions of the speed/position loop encoder, fast link receiver.	**[--]**	**Long**	**R**			

IPA	Description	[Unit]	Format	Access	Default	Min	Max
29104	**RX Pos** Incremental position of the speed/position loop encoder, fast link receiver.	**[--]**	**Long**	**R**			
29106	**TX Rev** Number of incremental revolutions of the speed/position loop encoder, fast link transmitter.	**[--]**	**Long**	**R**			
29107	**TX Pos** Incremental position of the speed/position loop encoder, fast link transmitter.	**[--]**	**Long**	**R**			
29108	**RX Rev Aux** Number of incremental revolutions of the auxiliary encoder, fast link receiver.	**[--]**	**Long**	**R**			
29109	**RX Pos Aux** Incremental position of the auxiliary encoder, fast link receiver.	**[--]**	**Long**	**R**			
29110	**TX Rev Aux** Number of incremental revolutions of the auxiliary encoder, fast link transmitter.	**[--]**	**Long**	**R**			
29111	**TX Pos Aux** Incremental position of the auxiliary encoder, fast link transmitter.	**[--]**	**Long**	**R**			
32015	**FL Error** Incremental number of the fast link reception errors. It is active only on the FL slaves configured with the functioning of the electric shaft. A drive reset takes it back to zero.	**[--]**	**INT16**	**R**			
	RESERVED						
18111	**XER/EXP Enc Mod** 0 = Fourfold 1 = A=Up B=Dir 2 = A=Up B=Down	**[--]**	**Enum**	**R/Z/***	**0**	**0**	**2**
18112	**XER/EXP Enc Flt** DI glitches digital filter	**[--]**	**Word**	**R/Z/***	**4**	**0**	**7**
18113	**XE Inc Enc Flt** AD glitches digital filter	**[--]**	**Word**	**R/Z/***	**4**	**0**	**7**
18114	**XE Index Mask** 0=original ChZ 1=ChZ & ChA & ChB	**[--]**	**Enum**	**R/Z/***	**1**	**0**	**1**
18121	**Spd Loop Filter** Speed loop output LP filter time constant.	**[msec]**	**Float**	**R/W**	**1**	**0**	**50**
18122	**XE Enc Abs Flt** AN filter time constant.	**[msec]**	**Float**	**R/W**	**1**	**0**	**50**
18119	**Curr Comp Time** Current sampling compensation time.	**[msec]**	**Float**	**R/W**	**0**	**-1000**	**1000**
18120	**Over Mod Factor** Overmodulation factor.	**[%]**	**Float**	**R/W**	**15**	**0**	**50**
40901	**FBCFG** Not to be modified, reserved for internal use.						
	DEBUG						
18146	**Debug Mode** Enabling the “Debug mode” 0=Disabled 1=Enabled	**[--]**	**Enum**	**R/W**	**0**	**0**	**1**

IPA	Description	[Unit]	Format	Access	Default	Min	Max
18392	**PLC Correct ChkS** Restricted	[--]	DWord	R	0	0	65535
18390	**PLC Saved ChkS** Restricted	[--]	DWord	R	0	0	65535
18773	**Quadrature Volt** Quadrature output voltage.	[Vrms]	Float	R			
18774	**Direct Volt** Direct output voltage.	[Vrms]	Float	R			
18765	**Measured Speed** Speed measurement deriving from feedback devices.	[rpm]	Float	R			
	TASK MEASURES						
18726	**MaxIn Ph Exe T** Maximum task INPUT phase execution time.	[us]	Word	R/W	0	0	62
18727	**MaxFst Tsk Exe T** Maximum task EXECUTE phase execution time.	[us]	Word	R/W	0	0	62
18728	**MaxOut Ph Exe T** Maximum task OUTPUT phase execution time.	[us]	Word	R/W	0	0	62
18729	**MaxAux Ph Exe T** Maximum task AUXILIARY phase execution time.	[us]	Word	R/W	0	0	62
18721	**MaxSl Tsk Exe T** Maximum slow task execution task time.	[us]	Long	R/W	0	0	8000
18709	**MaxSys Tsk Exe T** Maximum system task execution task time.	[us]	Long	R/W	0	0	64000
18781	**MaxBkg Tsk Exe T** Maximum execution time of the "Background Task".	[msec]	Long	R/W	0	0	8000
18771	**MaxDSP Exe T** Maximum DSP execution time. DSP. 1 cnts=33.3 nsec.	[cnts]	Word	R/W	0	0	1875
18722	**Inp Phase Exe T** Present execution time of the fast task "INPUT phase".	[us]	Word	R			
18723	**Fst Tsk Exe T** Actual fast task EXECUTE phase execution time.	[us]	Word	R			
18724	**Out Phase Tsk T** Actual task OUTPUT phase execution time.	[us]	Word	R			
18725	**Aux Phase Exe T** Actual task AUXILIARY phase execution time.	[us]	Word	R			
18720	**Slow Tsk Exe T** Actual slow task execution time.	[us]	Long	R			
18708	**Sys Tsk Exe T** Actual system task execution time.	[us]	Long	R			
18780	**Bkg Tsk Exe T** Present execution time of the "Background Task".	[msec]	Long	R			
18770	**DSP Exe Time** Actual DSP execution time 1 cnts=33.3 nsec.	[cnts]	Word	R			

Chapter 11 - Parameters Index

In UPPERCASE = Menu
In lowercase = Parameter description

IPA

A

B

C

D

E

F

G

H

I

J

K

L

M

N

O

P

Q

R

S

T

U

V

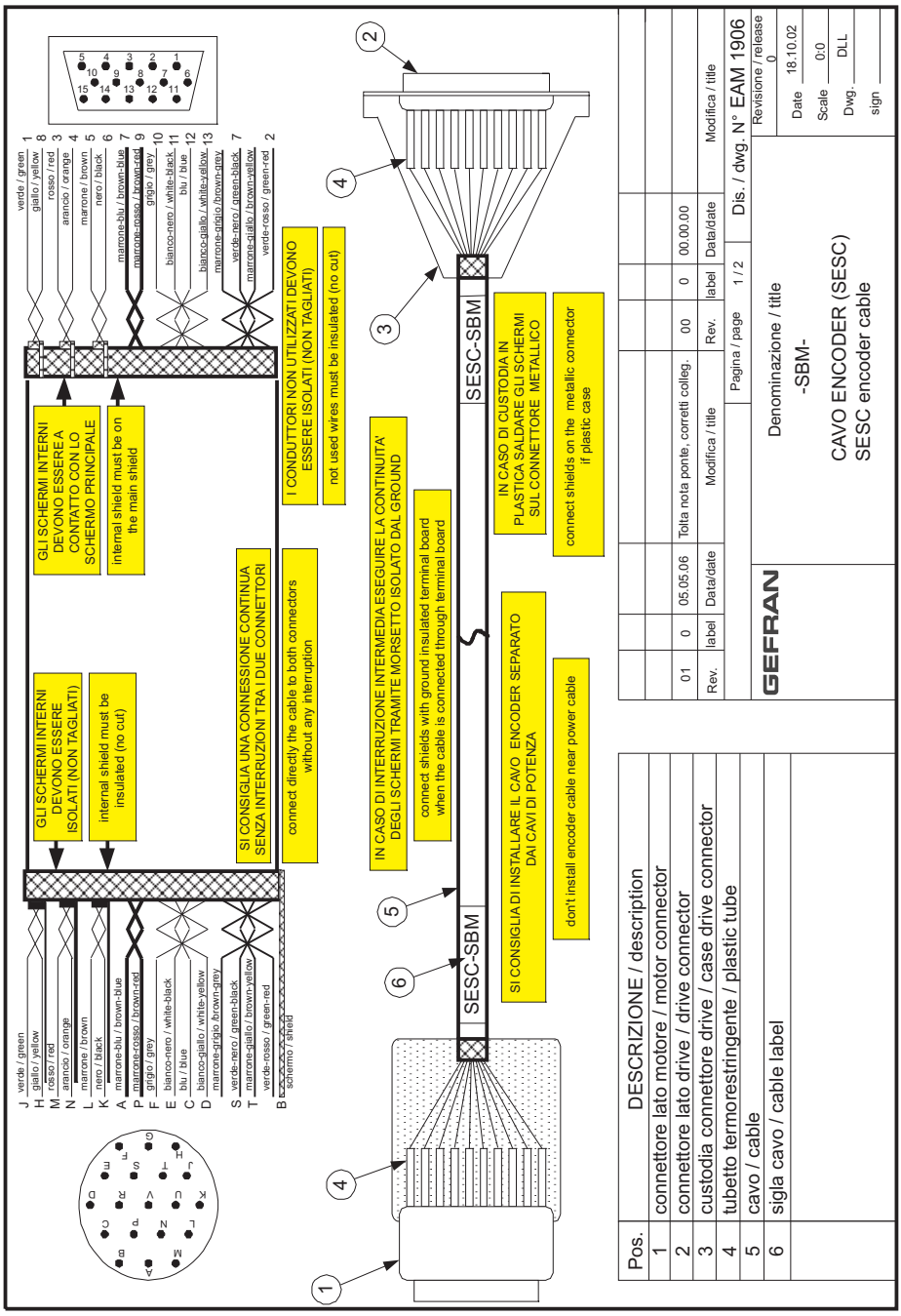
W

X

Z

Chapter 12 - Motor Cables

Figure 12.1: Cable SBM Motor Series / Sinusoidal Encoder



Pos.	DESCRIZIONE / description
1	connettore lato motore / motor connector
2	connettore lato drive / drive connector
3	custodia connettore drive / case drive connector
4	tubetto termorestringente / plastic tube
5	cavo / cable
6	sigla cavo / cable label

Figure 12.2: Cable SBM Motor Series / Digital Encoder + Hall Sensors

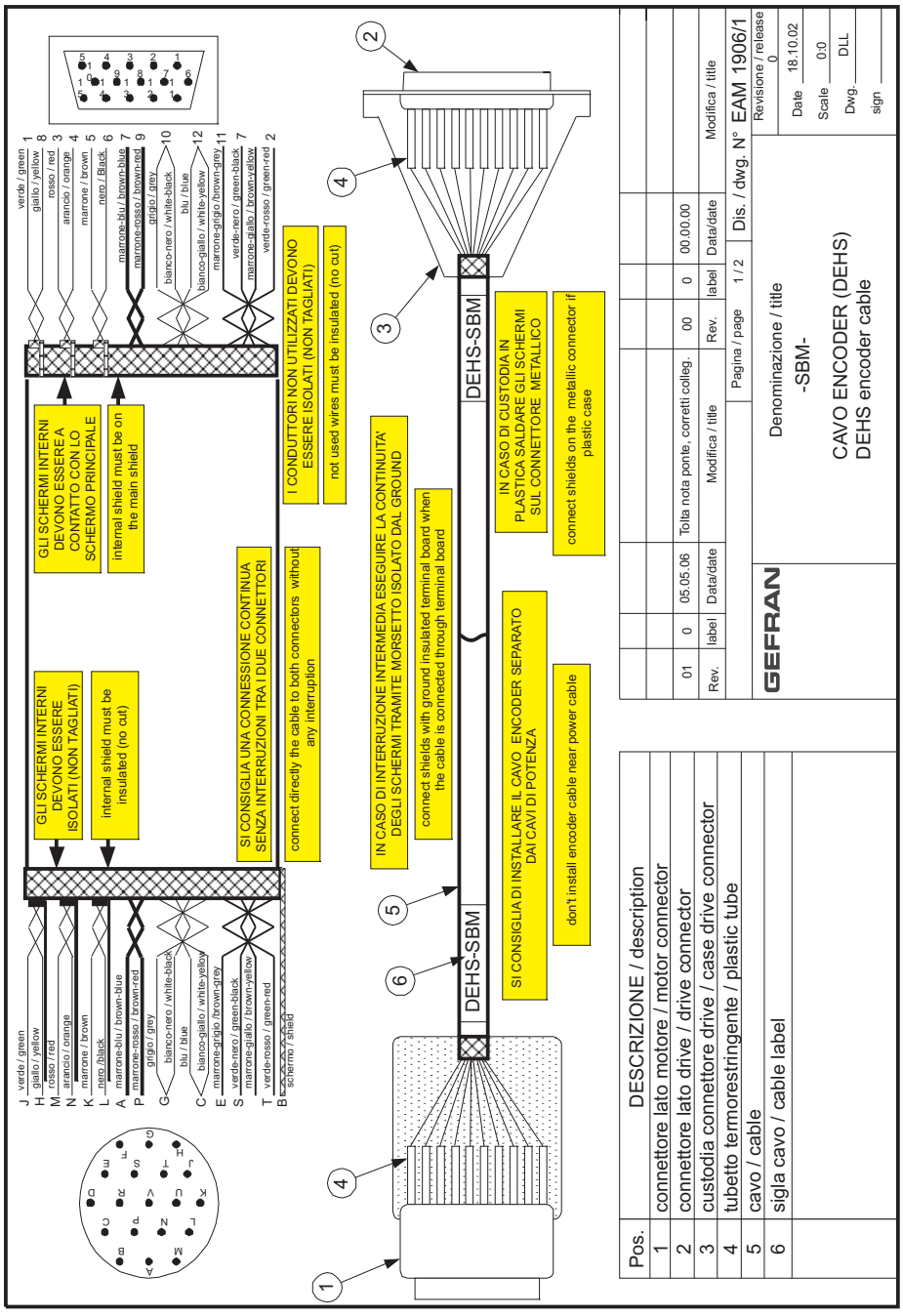


Figure 12.3: Cable SBM Motor Series / Absolute Encoder with SSi - EnDat Protocol

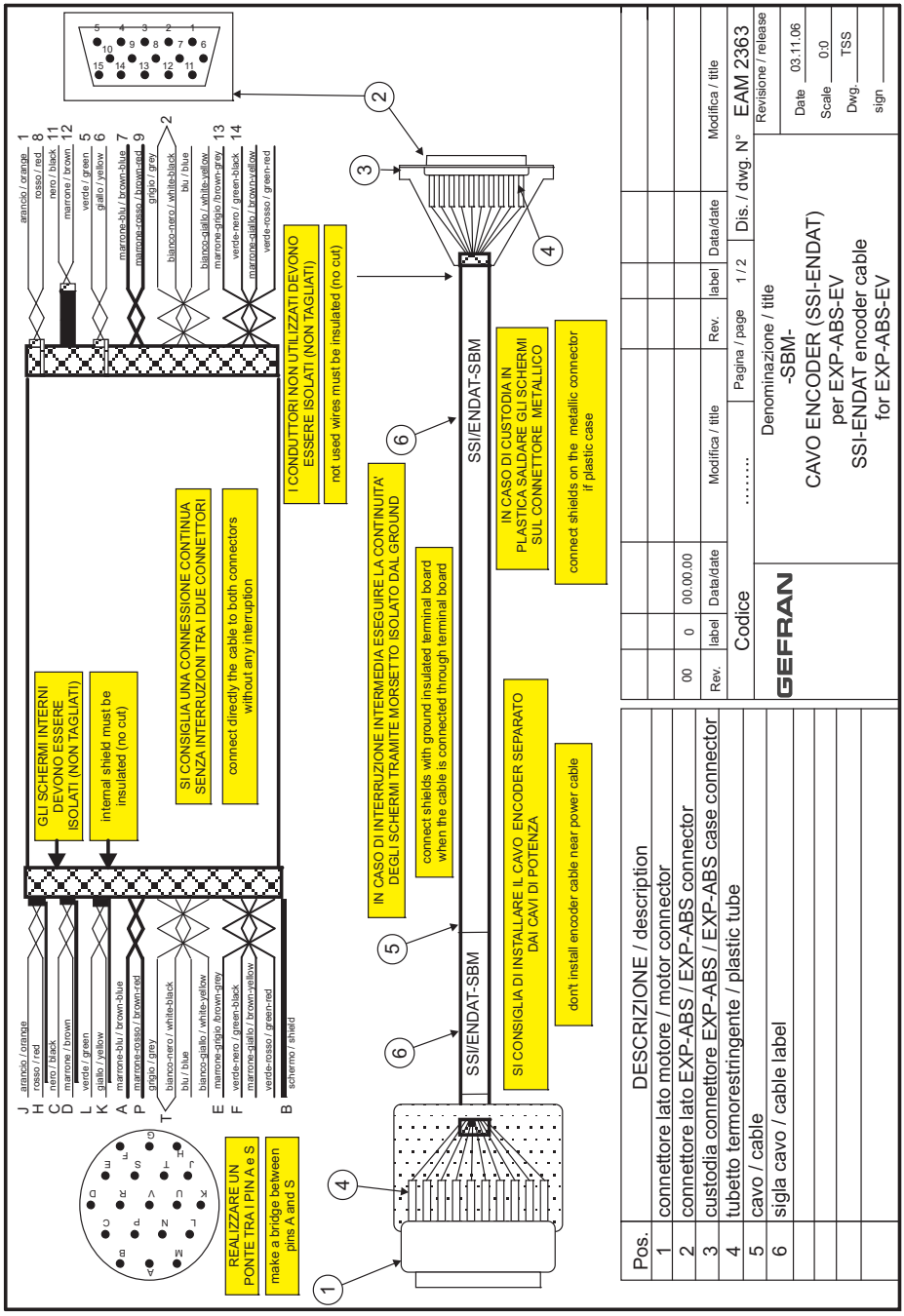


Figure 12.4: Cable SBM Motor Series / Resolver

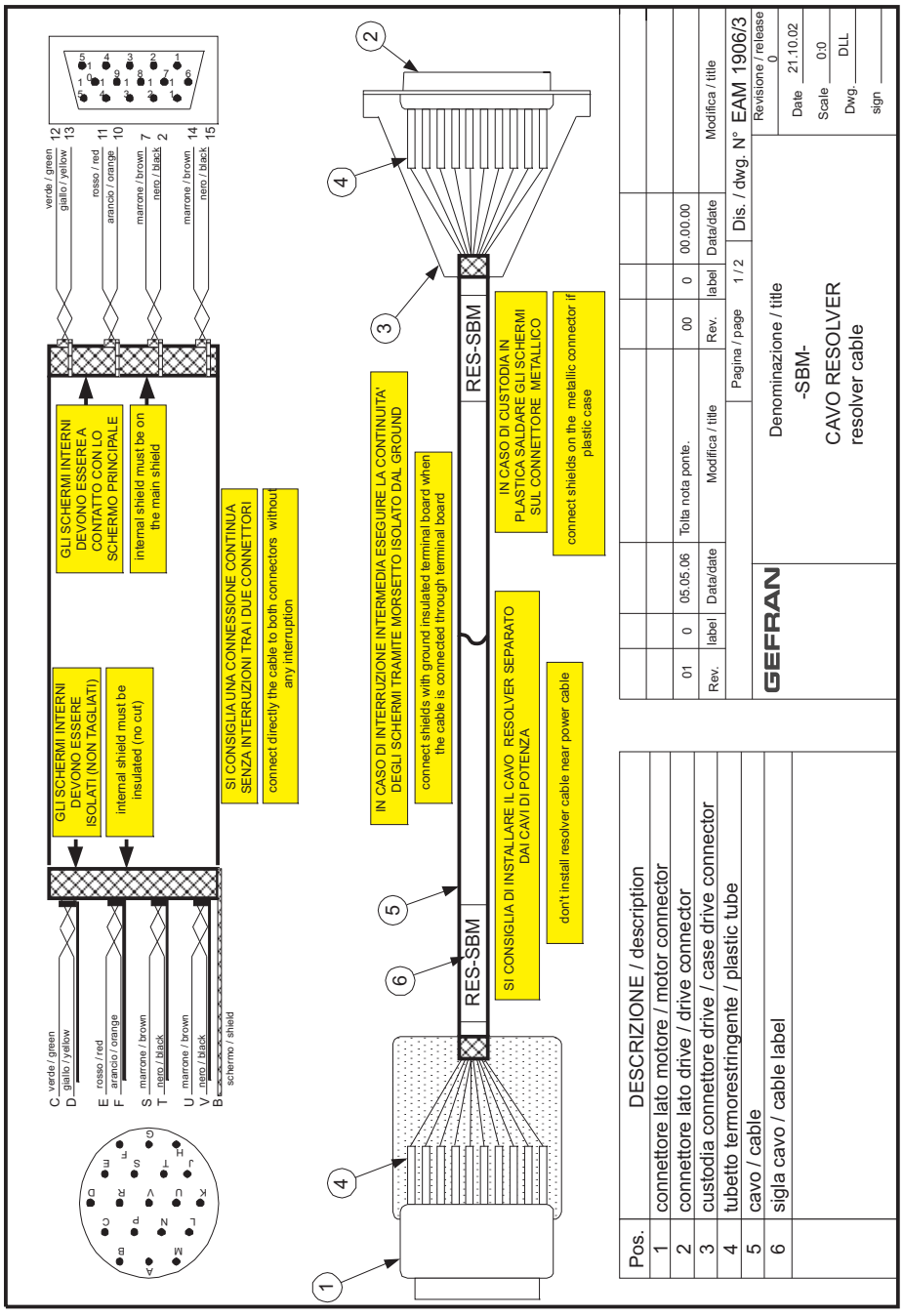


Figure 12.5: Cable SHJ Motor Series / Sinusoidal Encoder

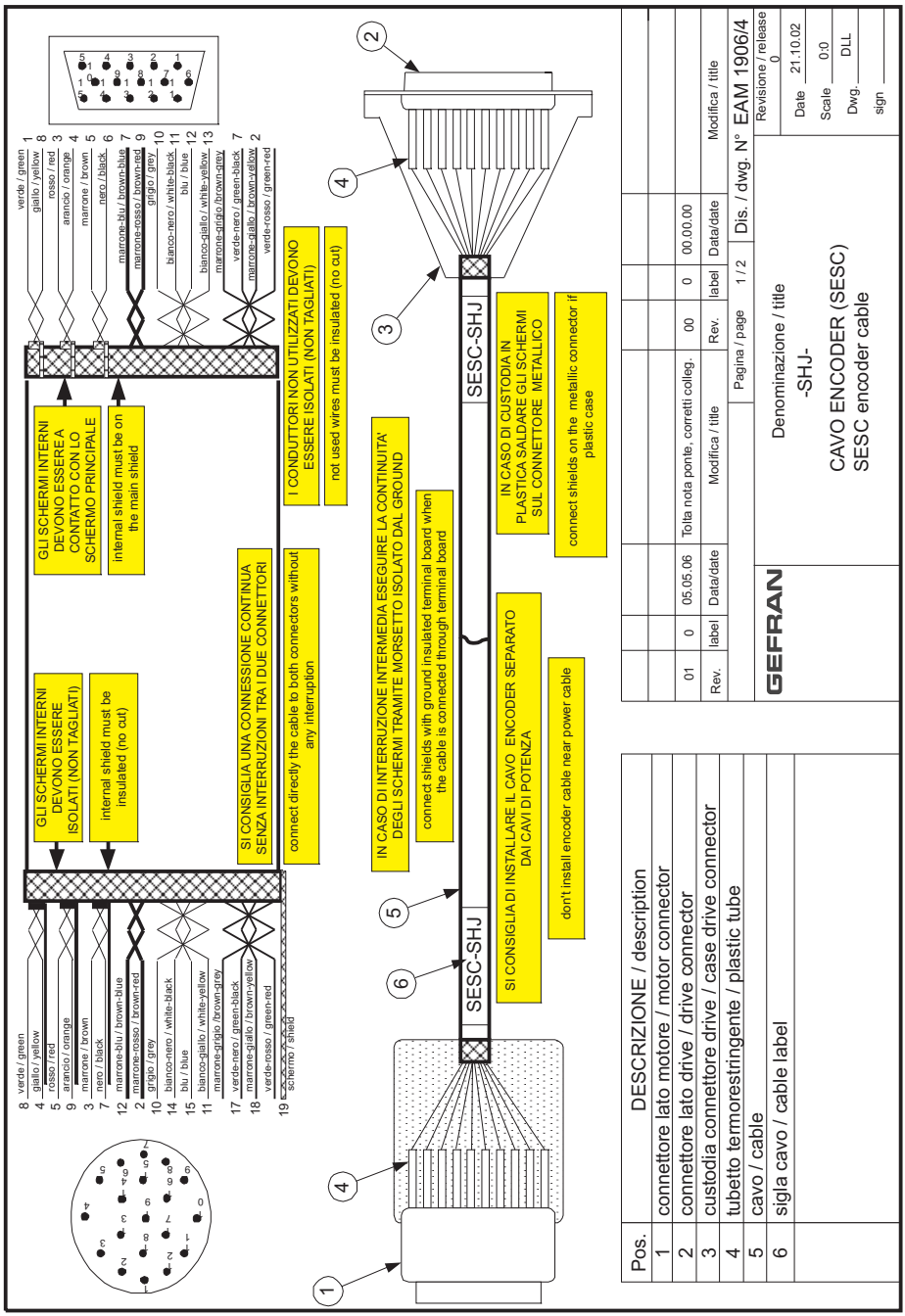


Figure 12.6: Cable SHJ Motor Series / Digital Encoder + Hall Sensors

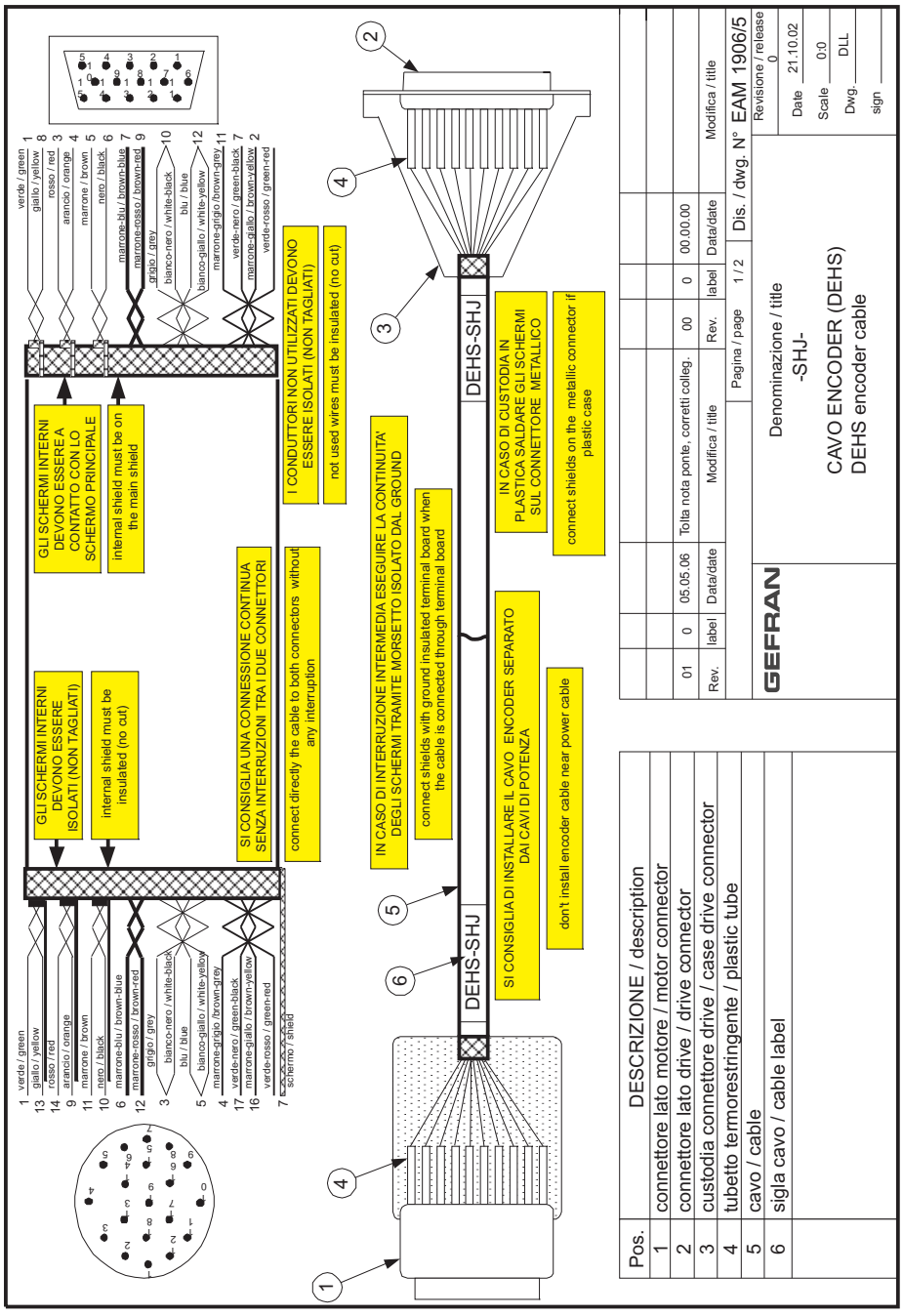


Figure 12.7: Cable SHJ Motor Series / Resolver

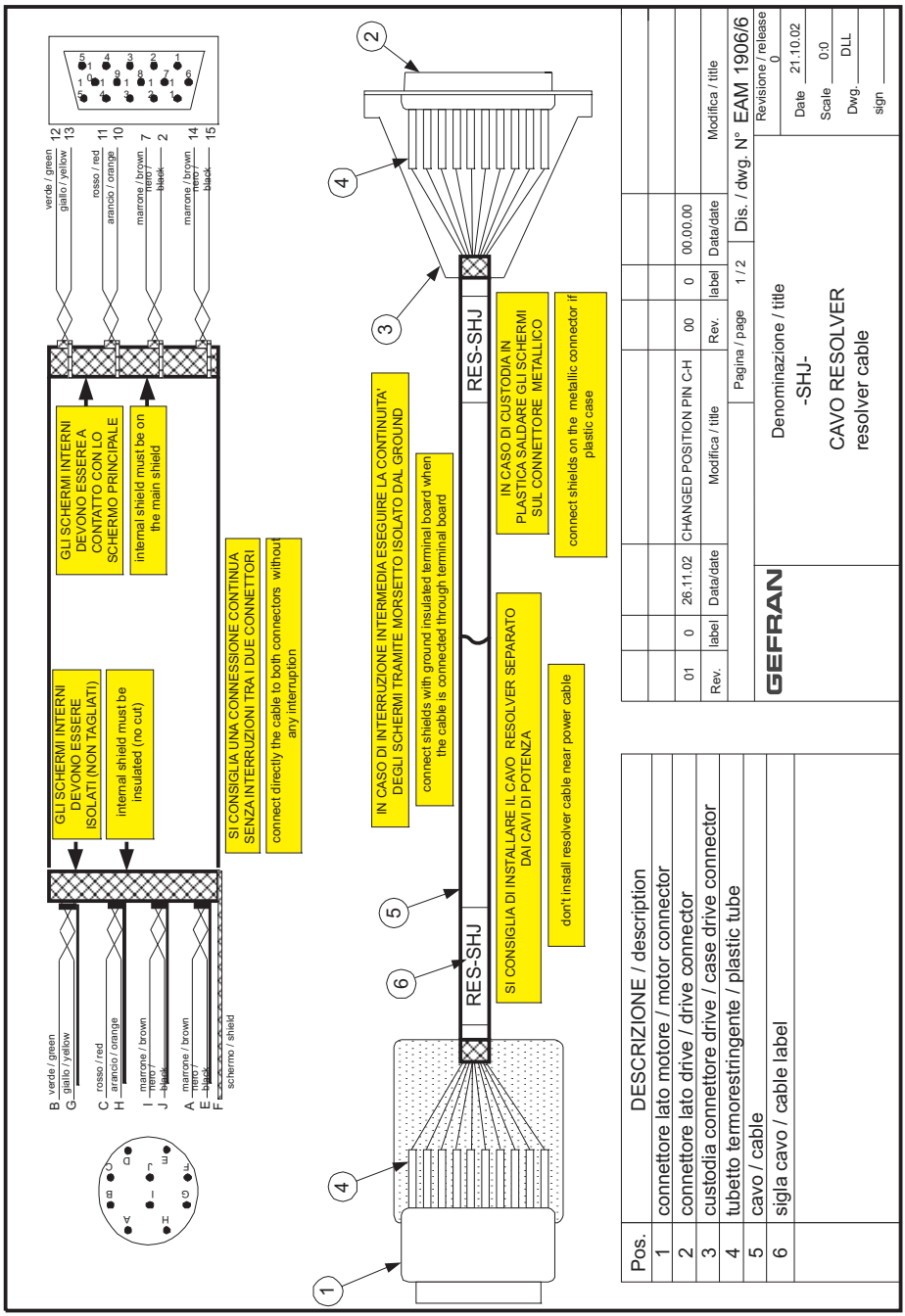


Figure 12.8: SBM 5-7 Motor Series Power Cable

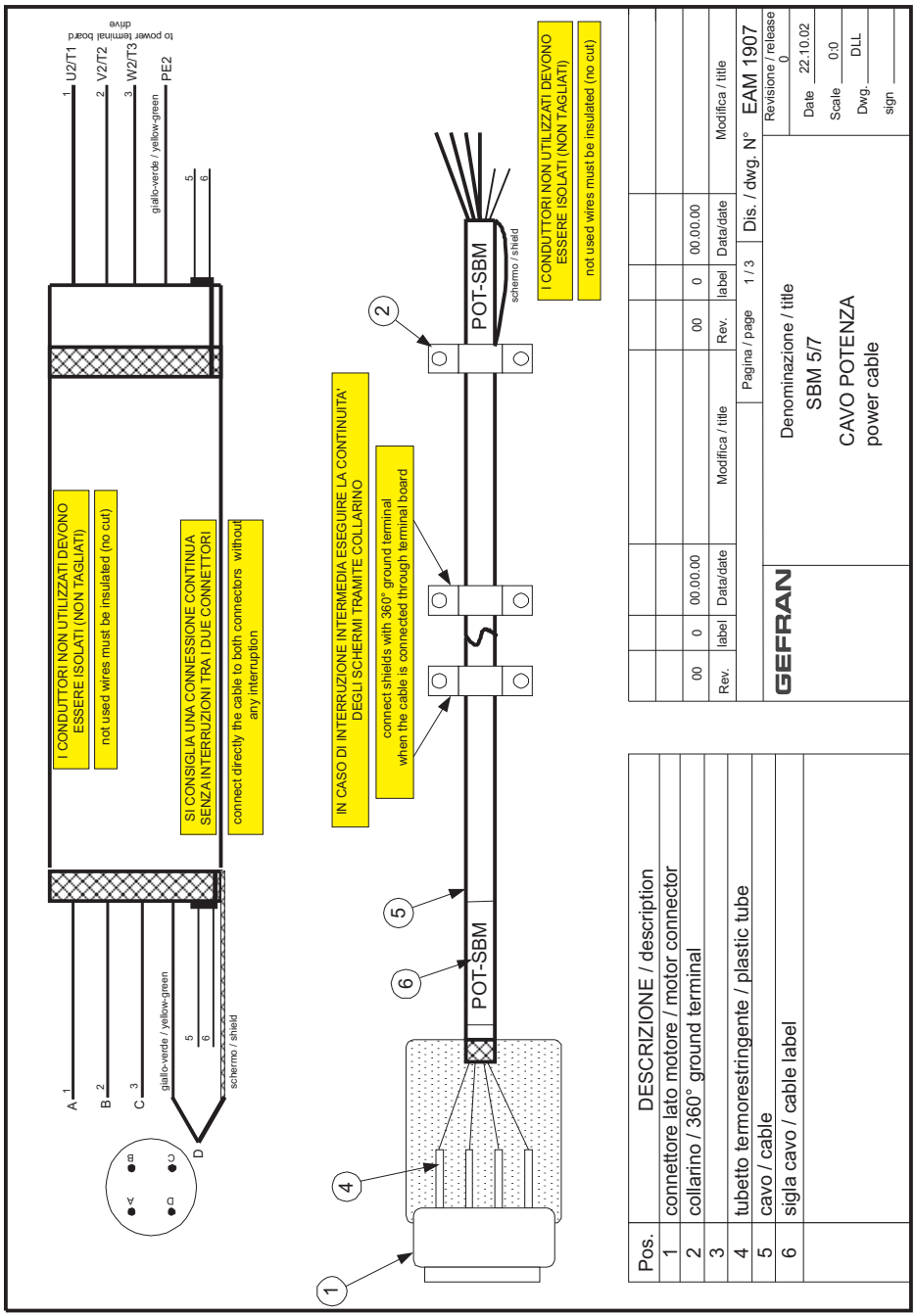
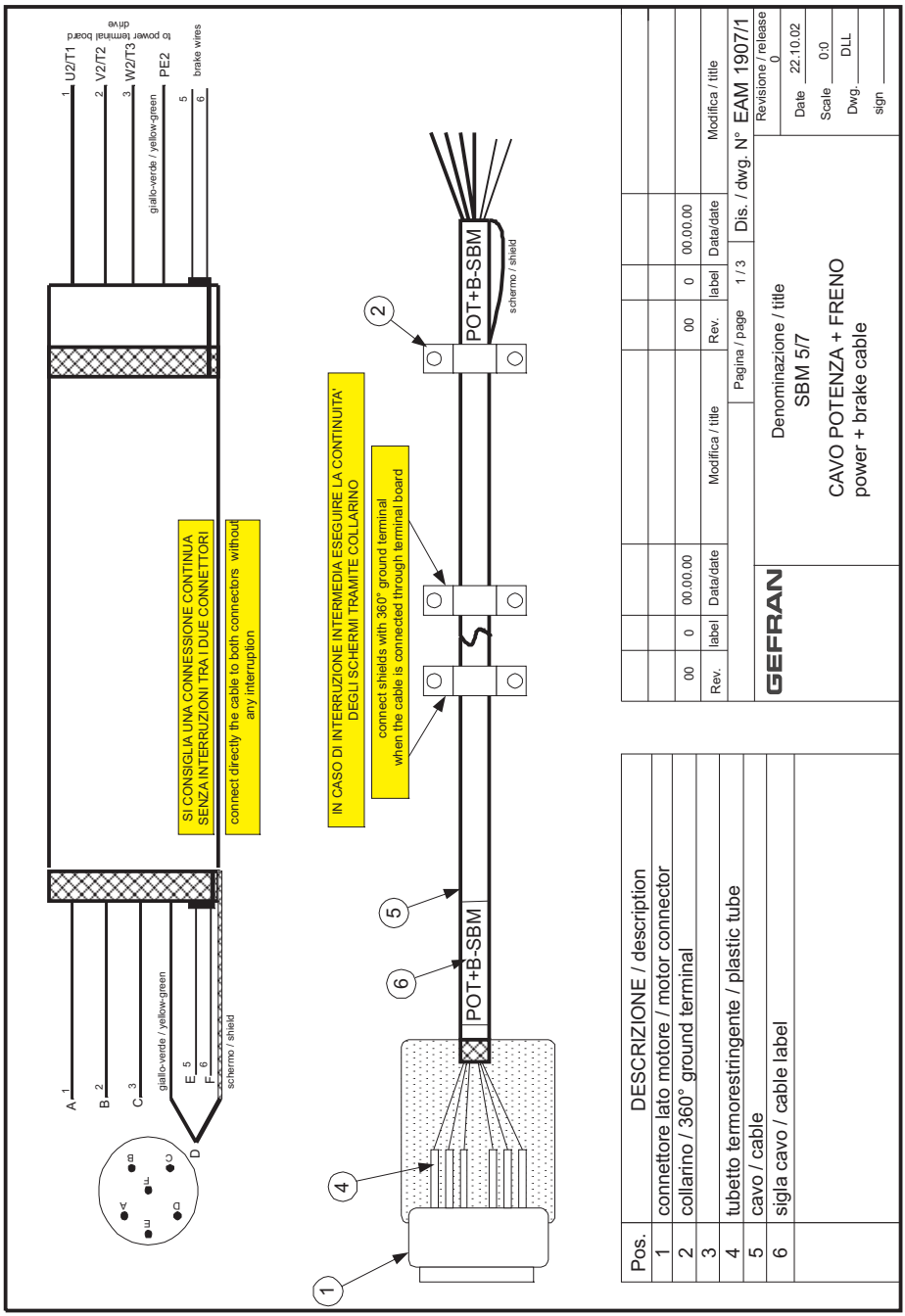


Figure 12.9: SBM 5-7 Motor Series Power + Brake Cable



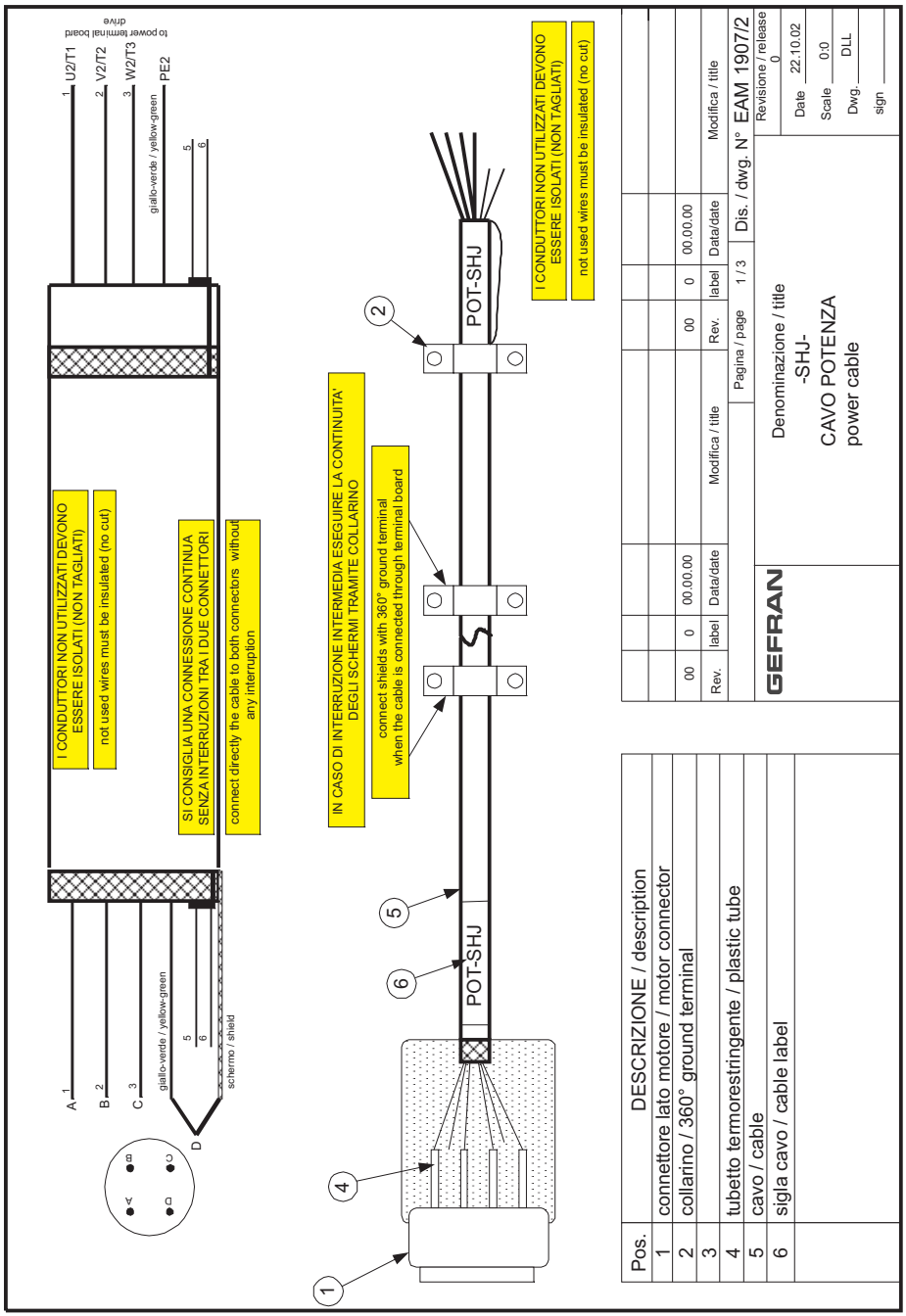
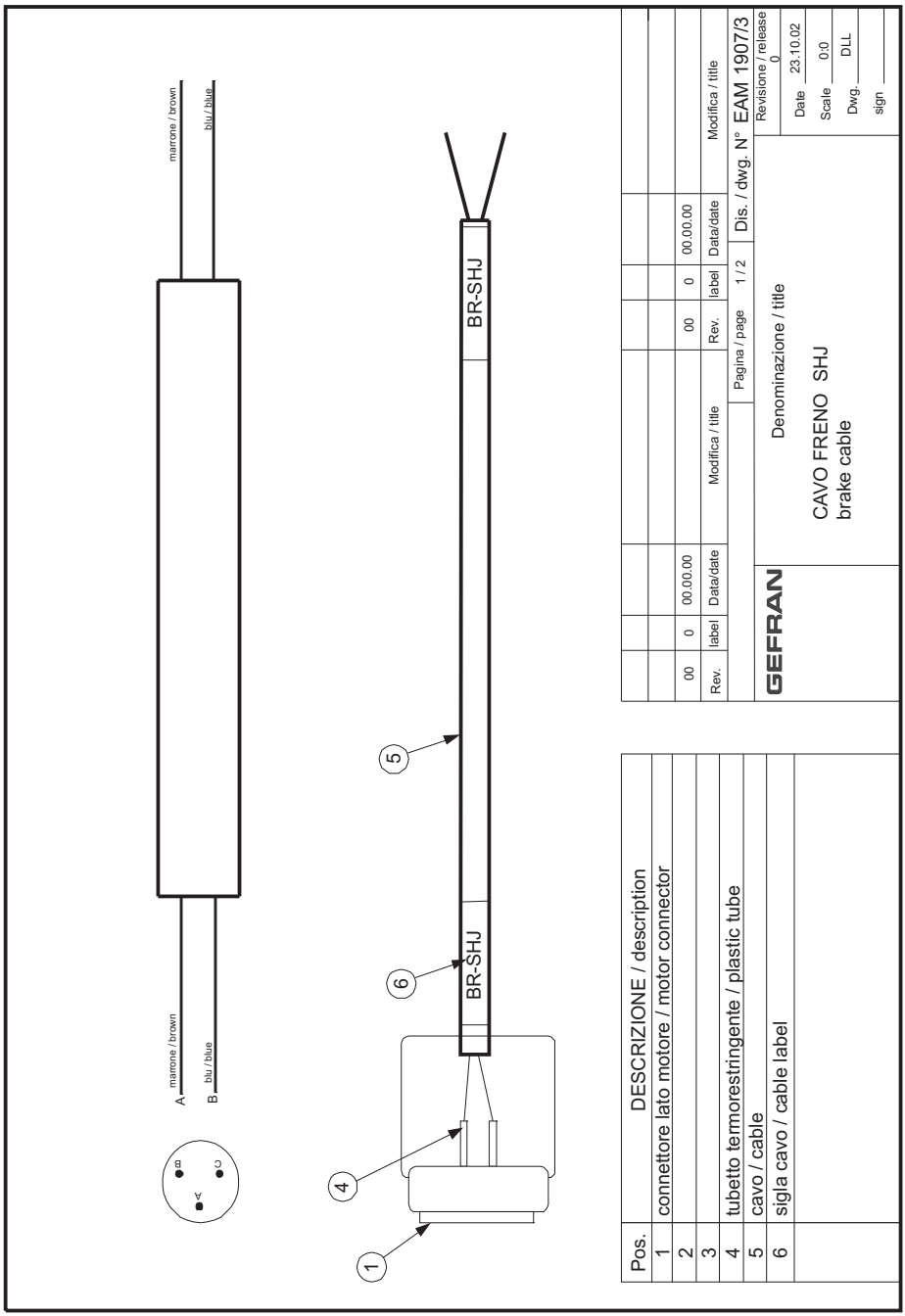

to power terminal board drive
U2/T1
V2/T2
W2/T3
PE2
giallo-verde / yellow-green
I CONDUTTORI NON UTILIZZATI DEVONO ESSERE ISOLATI (NON TAGLIATI)
not used wires must be insulated (no cut)
SI CONSIGLIA UNA CONNESSIONE CONTINUA SENZA INTERRUZIONI TRA I DUE CONNETTORI
connect directly the cable to both connectors without any interruption
A
B
C
D
giallo-verde / yellow-green
schermo / shield
IN CASO DI INTERRUZIONE INTERMEDIA ESEGUIRE LA CONTINUITA' DEGLI SCHERMI TRAMITE COLLARINO
connect shields with 360° ground terminal when the cable is connected through terminal board
POT-SHJ
POT-SHJ
I CONDUTTORI NON UTILIZZATI DEVONO ESSERE ISOLATI (NON TAGLIATI)
not used wires must be insulated (no cut)
Pos.
DESCRIZIONE / description
1 connettore lato motore / motor connector
2 collarino / 360° ground terminal
3
4 tubetto termorestringente / plastic tube
5 cavo / cable
6 sigla cavo / cable label
Rev. label Data/date Modifica / title
00 0 00.00.00
00 0 00.00.00
GEFRAN
Denominazione / title
-SHJ-
CAVO POTENZA
power cable
Pagina / page 1 / 3
Dis. / dwg. N° EAM 1907/2
Revisione / release 0
Date 22.10.02
Scale 0:0
Dwg. DLL
sign

Figure 12.11: SHJ Motor Series Brake Cable



Pos.	DESCRIZIONE / description
1	connettore lato motore / motor connector
2	
3	
4	tubetto termorestringente / plastic tube
5	cavo / cable
6	sigla cavo / cable label

Rev.	label	Data/date	Modifica / title
00	0	00.00.00	

Rev.	label	Data/date	Modifica / title
00	0	00.00.00	

GEFRAN

Pagina / page 1 / 2

Denominazione / title

CAVO FRENO SHJ
brake cable

Dis. / dwg. N° EAM 1907/3

Revisione / release 0

Date 23.10.02

Scale 0:0

Dwg. DLL

sign

Appendix - Field bus and serial interface

1.0 Integrated CANopen Interface

CiA : CAN in Automation, user international group.

CAN : Controller Area Network.

CANopen is a communication profile for CAL-based industrial systems. The reference document is the CANopen CAL-Base COMMUNICATION PROFILE for Industrial Systems; CiA Draft Standard 301 Version 3.0. Issue October 1996 by CAN in Automation e. V.
The CAN protocol (ISO 11898) is CAN2.0A with an 11-bit identifier.
The integrated CANopen interface is developed as a “Minimum Capabilty Device”.
The data exchange is cyclic; the Master unit reads the Slave input data and writes the Slave output data; the Baud Rates for the interface are those foreseen by the CANopen specification.

1.1 CANopen Functions

This chapter describes the controlled functions of the CANopen communication profile. The main features are:

1) The “Minimum Boot-up” is managed; the “Extended Boot-up (CAL)” is not managed.
2) The SYNC function is implemented.
3) The PDO asynchronous assignment and RTR are managed.
4) The Node Guarding is managed.
5) The emergency message is managed (“EMERGENCY”).
6) The Dynamic ID distribution function (DBT slave) is not managed.
7) A “Pre-Defined Master/Slave connection” is implemented to simplify the Master tasks during the initialization phase. “Inhibit-Times” (in units of 100 uS) can be modified up to a value of 1 min.
8) The high-resolution synchronization is not supported.
9) “TIME STAMP” is not managed.
10) On the access of the structured parameters, the OFFhex option subindex (access to the whole object) is not managed.
11) In order to obtain a higher efficiency level, only the “Expedited” data transfer (max. 4 Bytes) of the SDO services is managed.

PDO: Process Data Object, service messages without confirmation used for the real time data transfer from/to the device.

DBT: Distributor. It is a service element of the CAN Application Layer in the CAN Reference Model; the DBT has the task to assign COB-ID to the COBs used by the CMS.

SDO: Service Data Object, service messages with confirmation used for the acyclic data transfer from/to the device.

1.1.1 Pre-defined Master/Slave Connection

The “Pre-defined Master/Slave connection” allows a peer-to-peer communication between one Master and 127 Slaves; the Broadcast address is zero.

1.1.2 NMT Services (Network Management)

The NMT “mandatory” services are:

- Enter_Pre-Operational_State CS = 128
- Reset_Node CS = 129
- Reset_Communication CS = 130

Being that the “Minimum Boot-up” is used, also the following NMT services are managed:

- Start_Remote_Mode CS = 1

NMT: Network Management. It is a service element of the CAN Application Layer in the CAN Reference Model; it initializes, configures and controls the errors of a CAN network.

CS: Command Specifier; it defines the NMT service.

COB = Communication Object (CAN Message). It is a transport unit inside a CAN network. The data must be sent in network inside a COB.

COB-ID = COB-Identifier. It identifies a COB inside the network. It also states the COB priority.

- Stop_Remote_Mode CS = 2

The COB-ID * of an initialization NMT service is always at 0; CS is the Command Specifier defining the NMT service.

1.1.3 Initialization

The XVy drive supports the Node Guarding mechanism. The Node Guarding configuration can be performed through the master via the standard Object Dictionary elements (1006h, 100Ch, 100Dh).
The drive checks the master functioning conditions through the Life Guarding. If the check fails, the drive enables the "Buss Loss" alarm. The Life Guarding threshold can be calculated as follows:

Value/*Condition*

60ms
Default. No parameterization of the Node Guarding.

SYNC_PERIOD (*)
LIFE_TIME_FACTOR
Use of the synchronous mode. If not stated by the master, the LIFE_TIME_FACTOR default value is equal to 3.

NODE_GUARDING_PERIOD (*)
LIFE_TIME_FACTOR
NODE_GUARDING_PERIOD set by the master
If not otherwise stated, the LIFE_TIME_FACTOR value is equal to 3

1.1.4 Communication Object

This chapter describes the communication objects of the CANopen protocol; they are managed by the interface card. The managed communication objects are:
1) 1 SDO reception Server.
2) 1 SDO transmission Server.
3) 2 reception PDOs.
4) 2 transmission PDOs.
5) 1 Emergency Object.
6) 1 Node Guarding - Life Guarding.
7) 1 SYNC object.

The following table lists the used communication objects with their priority level and the Message Identifier; the “Resulting COB-ID” is obtained by adding the Node-ID (card address) to the number.

OBJECT	PRIORITY	MESSAGE ID
1st SDO rx	6	1536
1st SDO tx	6	1408
1st PDO rx	2	512
1st PDO tx	2	384
2nd PDO rx	2	768
2nd PDO tx	2	640
EMERGENCY	1	220
NODE GUARDING	not used	1792
SYNC	0	128

Table 1.4.1: Communication Objects

Node Guarding has no priority because it is a special NMT service; it has the Message-ID because it is not a Broadcast service.

1.1.5 Object Dictionary Elements

The Object Dictionary is accessible from a master CANopen and from the keypad configurator.
The following table shows the communication objects used and accessibility with master CANopen, keypad configurator.

Index (hex)	IPA Parameter	Name
1000		Device Type
1001		Error Register
1002		Manufacturer status register
1005		COB-ID SYNC Message
1006	40902	Communication cycle period
1008		Manufacterer Device Name
1010		Store parameter
1009		Manufacterer Hardware Version
100A		Manufacterer Software Version
100C	40903	Guard Time
100D	40904	Life Time Factor
100F		Number of PDOs supported
1014	40905	COB-ID Emergency
1018		Identity object
1400	40910, 40915	1st Receive PDO
1401	40911, 40916	2nd Receive PDO
1402	40912, 40917	3rd Receive PDO
1600		**Receive PDO1 mapping parameter**
1601		**Receive PDO2 mapping parameter**
1602		**Receive PDO3 mapping parameter**
1A00		**Transmit PDO1 mapping parameter**
1A01		**Transmit PDO2 mapping parameter**
1A02		**Transmit PDO3 mapping parameter**
1800	40920, 40925, 40930	1st Transmit PDO
1801	40921, 40926, 40931	2nd Transmit PDO
1802	40922, 40927, 40932	3rd Transmit PDO

Table 1.5.1: Objects used by the CANopen communication profile

The objects shown in bold in the table allow writing of the parameters assigned with the exchange of data in the PDO.
The allocation criterion is variable, and depends on the size (in bytes) of the parameter exchanged.

NOTE! It is possible to save the objects permanently to the drive flash memory:

1) via configurator, only for objects with parameter reference (e.g.: index 1000 -> IPA 40902)
2) with the SAVE function from CANopen (object index 1010).

1.1.6 Rx PDO Entries

The structure of the PDO Communication Parameter (index 1400h, 1401h) is:
1) Subindex 0 (Number of supported entries) = 2
2) The structure of Subindex 1 (COB-ID used by the PDO) is:

- Bit 31 (valid/invalid PDO) can be set via SDO.
- Bit 30 (RTR Remote Transmission Request) = 0 because this function is not supported.
- Bit 29 = 0 because the 11-bit ID is used (CAN 2.0A).
- Bits 11-28 are not used.
- Bit 0-10 COB-ID (see table 1.4.1).

3) Cyclic-synchronous Subindex 2 (Transmission Type), or synchronous according to the master performed setting (1 if SYNC has been foreseen, 254...255 if asynchronous). If not stated, the synchronous mode is active.

1.1.7 Tx PDO Entries

The structure of the PDO Communication Parameter (index 1800h, 1801h) is:

1) Subindex 0 (Number of supported entries) = 3
2) The structure of Subindex 1 (COB-ID used by the PDO) is:

- Bit 31 (valid/invalid PDO) can be set via SDO.
- Bit 30 (RTR Remote Transmission Request) = 0 because this function is not supported.
- Bit 29 = 0 because the 11-bit ID is used (CAN 2.0A).
- Bits 11-28 are not used.
- Bit 0-10 COB-ID (see table 1.4.1).

3) Cyclic-synchronous Subindex 2 (Transmission Type), or synchronous according to the master performed setting (1 if SYNC has been foreseen, 254...255 if asynchronous). If not stated, the synchronous mode is active.
4) Inhibit time

1.1.8 SDO Entries

Only the “Expedited” data transfer mode (max. 4 Bytes) is used.
The structure of the SDO Communication Parameter is:

1) Subindex 0 (Number of supported entries) = 3 because the device is a Server of the SDO service.
2) The structure of the Subindex 1 and 2 (COB-ID used by the SDO) is:

- Bit 31 (valid/invalid SDO); it is equal to 1 because just the Default SDOs are used.
- Bit 30 reserved = 0.
- Bit 29 = 0 because the 11-bit ID is used (CAN 2.0A).
- Bits 11-28 are not used.
- Bit 0-10 COB-ID (see table 1.4.1).

The element “node ID of SDO’s client resp. server” is not supported because just the Default SDOs are used.

1.1.9 COB-ID SYNC Entries

The structure of the 32 bits contained in the COB-ID SYNC communication parameter is:

- Bit 31 = 1 because the CANopen interface card is a “consumer” of SYNC messages.
- Bit 30 = 0 because the interface card does not create SYNC messages.

- Bit 29 = 0 because the 11-bit ID is used (CAN 2.0A).
- Bits 11-28 are not used.
- Bit 0-10 COB-ID (see table 1.4.1).

1.1.10 COB-ID Emergency

The structure of the 32 bits contained in the COB-ID Emergency Message communication parameter is:

- Bit 31 = 0 because the CANopen interface card is not a “consumer” of Emergency messages.
- Bit 30 = 0 because the interface card creates Emergency messages.
- Bit 29 = 0 because the 11-bit ID is used (CAN 2.0A).
- Bits 11-28 are not used.
- Bit 0-10 COB-ID (see table 1.4.1).

1.2 CANopen Management

The user interface of the CANopen protocol is performed via the drive parameters. The parameters are controlled via hierarchical menus. All the writing parameters referring to the field bus are active only after the drive reset. Here following is a list of drive parameters useful to control the CANopen protocol.

Fieldbus menu

The CANopen protocol can be enabled by setting the IPA 40000 **Field Bus Type** parameter as "Can Open". The other parameters of this menu are:

IPA	Par. Name	Type	Default value	Attr.
40100	Bus Address	1 byte unsigned	0	Write
40001	Bus Baude Rate	4 bytes unsigned	0	Write
40110	CC Enabling	Enum	Enabled	Write
40111	PDC Enabling	Enum	Enabled	Write
40114	FB Fail Casue	4 bytes unsigned	0	Read only

- **Bus Address** = address of the node;
- **Bus Baude Rate** = network baud rate. The baudrate is stated directly in baud (ex. 125kb = 125000);
- **PDC Enabling** and **CC Enabling**” = allow the user to enable/disable the corresponding channels. With the PDC channel it is possible to exchange up to 8 parameters

The **FB Fail Cause** parameter defines the error cause. Presently the following causes are provided:

Cod.	Meaning
1	Protocol incorrect
18..24	Configuration error on M2S reception channel
25..31	Configuration error on S2M transmission channel
32	Too many bytes on M2S reception channel
33	Too many bytes on S2M transmission channel
34-35	errored IPA for PLC allocation
36	More than 4 words allocated as Fast250 us on M2S

37	More than 4 words allocated as Fast250 us on S2M
100	Baud rate not correct
101	Node address not correct
103	Non expedited SDO type not supported
104	SDO length not correct
105	Error on NMT messages
106	NMT code not supported
107	Can line on “Bus-off” status
108	Impossible to be operational (can never happen)
111	RPDO dimension exceeded
112	TPDO dimension exceeded

1.3 Process Data Channel Control

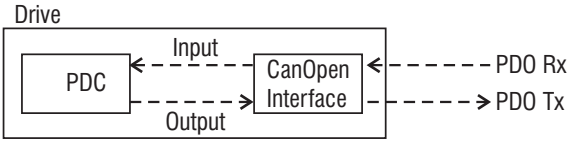
This function allows to allocate the drive parameters or application variables to the Process Data Channel data.
As for the CANopen protocol, the PDC is performed via the PDO messages ((Process data Object).
The CANopen protocol uses a number of words for the Process Data Channel (abbr. PDC Process Data Channel), which can always be set.
The fieldbus Process Data Channel configuration is the following:

Data 0 **Data...** **Data n**

The drive can both read and write the Process Data Channel data.
A datum can be made both of 2 and 4 bytes. The word "data" refers to any quantity of bytes included between 0 and 8, if the byte total number required is not higher than 16.

Example
It is possible to have:
- from 0 to 12 data with 2 bytes
- 1 datum with 4 bytes + from 0 to 10 data with 2 bytes
- 2 data with 4 bytes + from 0 to 8 data with 2 bytes
- 3 data with 4 bytes + from 0 to 6 data with 2 bytes
- 4 data with 4 bytes + from 0 to 4 data with 2 bytes
- 5 data with 4 bytes + from 0 to 2 data with 2 bytes
- 6 data with 4 bytes

The data exchanged via the PDC can be of two types: drive parameters and variables of an MDPIc application. The use of the MDPIc variables is described in par. 7.5.3.3
The composition of the PDC input and output data is defined via suitable parameters as described in the paragraphs 1.3.1 and 1.3.2.
The master writes the data defined as PDC input and reads the data defined as PDC output.



1.3.1 PDC Input Configuration (FB XXX MS Parameter)

The configuration of the PDC input channel can be performed via 12 menus with the same structure.

IPA	Par. Name	Typo	Default value	Attr.	Unit
40190	FB Assign M->S 1	Enum	Not assign	Writing	
40200	FB IPA M->S 1	2 bytes unsigned	0	Writing	--
40210	FB Format M->S 1	Enum	16 bit int	Writing	--
40220	FB Exp M->S 1	2 bytes unsigned	16 bit integer	Writing	

This structure refers to the first input parameter. The structure is repeated 12 times for the 12 possible input parameters. The following parameter indexes are 40201..40221, 40202..40222 etc.
The **FB Assign M->S 1** parameter can be selected as follows:

- **Parameter:** the PDC corresponding datum is combined to a parameter identified by **FB IPA M->S 1**. The parameters are entered into engineering units and are exchanged in an asynchronous way. The **FB Format M->S 1** parameter sets the parameter writing format. The format can be different from the parameter original one.
  The **FB Exp M->S 1** parameter defines the 10th power which the parameter is multiplied by before being transferred to the drive.

  A practical example for the parameter use:
  The **Els Ratio 0 - IPA 32001**, parameter, with a float format is written by the master. It must be written with an integer format, signed and three decimal digits. Set the parameters as follows:
  40200 **FB IPA M->S 1** @ 32001
  40210 **FB Format M->S 1** @ “16 bit integer”
  40220 **FB Exp M->S 1** @ 3
  In this way the master must write:
  1000 to set the value 1.000
  -1234 to set the value -1.234.

- **Direct Access:** the PDC corresponding datum is combined to a parameter identified by **FB IPA M->S 1.1**.
  The parameters are entered into internal counts and are exchanged in an asynchronous way (one every 8 msec). The writing format identified by the **FB Format M->S 1** parameter (see the table in the **FIELDBUS** menu) must coincide with the drive internal format.
  As for parameters with a float internal format, it is possible to choose "32 bit integer" and the conversion into a float format between the received datum and the internal datum is performed automatically.

- **Filling**: the corresponding PDC datum is not associated with any parameter, but a number of bytes is inserted equal to 0 corresponding to the parameter **FB Format M->S 1**.

- **Fast Access parameter (250 us)**: the corresponding PDC datum is associated with a parameter identified by **FB IPA M->S 1**.
  The parameters are emitted in internal counts and exchanged synchronously (every 250 usec). The write format identified by

parameter **FB Format M->S 1** (see **FIELDBUS** menu table) must match that within the drive.
With this data exchange mode, up to 4 words from the 12 available can be assigned.

Before establishing the Profibus communication between the Master and the drive, it is necessary to assign the drive parameters to the Process Channel. These parameters can be activated by resetting the drive.

1.3.2 PDC Output Configuration (FB XXX SM Parameter)

The output configuration of the PDC channel can be performed via 12 menus with the same structure.

IPA	Par. Name	Typo	Default value	Attr.	Unit
40290	FB Assign S->M 1	Enum	Not assign	Writing	--
40300	FB IPA S->M 1	2 bytes unsigned	0	Writing	--
40310	FB Format S->M 1	Enum	16 bit int	Writing	--
40320	FB Exp S->M 1	2 bytes unsigned	16 bit integer	Writing	--

This is the structure for the first output parameter. The structure is repeated 12 times for the 12 possible output parameters. The indexes of the following parameters are 40301..40321, 40302..40322 etc.
The **FB Assign S->M 1**, **FB IPA S->M 1** and **FB Format S->M 1** and **FB IPA S->M 1** parameters have the same meaning as those described in point 1.3.1.

1.3.3 Use of the PDC in MDPlc Applications

It is possible to configure both the PDC input and output data in order to allow the data direct access via the MDPlc application code.
For more details see the manual “Drive programming with MDPlc” on “XVy tools” cd-rom.

1.4 SDO Management

The SDO service is available only if the 40110 **CC Enabling** parameter is ON.
The drive parameters can be accessed via the “MSPA” Manufacturer Specific Profile Area (2000hex< index <5FFFhex).

As the drive parameter indexes (IPA) normally exceed the CANopen MSPA, the XVy drive is supplied with an offset value allowing the access to the drive parameters.
The index to be shown in the SDO command to access a drive parameter is obtained via the following rules:

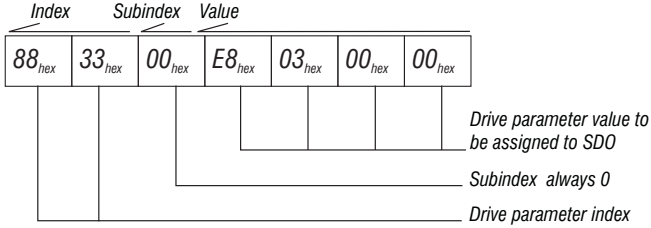
- Offset mode
SDO index = 2000 hex + IPA-OFFSET
The OFFSET value can also be accessed (and modified) via the 5FFF hex index of the CANopen Object Dictionary. The default value is 1000. The Subindex field has always to be set with 0, if not, an error message is displayed.

- Mode Mod. 100
SDO index = IPA/100 + 2000 hex (if parameters)
SDO index = IPA/100 + 4000 hex (direct access)
SDO subindex = IPA%100 (parameters and direct access)

The Data field must contain the value of the drive parameter.

Example (mod Offset):
Writing the value 1000 in the 23000 (**Speed Gain**) parameter.

Set, for example, the OFFSET value (5FFF hex index of the CANopen Object Dictionary) at 18000.
The required information is:
1) The SDO index resulting from the formula is
   2000 hex + 23000dec - 18000 dec = 13192 dec (3388 hex)
2) The value to be written is 1000, corresponding to 03E8 hex.



Example (mod 100):
Value 1000 written to parameter 23001 (**Position Gain**).

First of all set 40906 (**Cus OBJ Idx Mode**) to Mod.100
The following information is required:
1) The SDO index is
   2000 hex + 23001 dec /100 = 8422 dec (20E6 hex)
2) Sub-index: 23001 Mod. 100 = 1 dec (1 hex)
3) Value to be written 1000, corresponding to 03E8 hex.

In case an error occurs during the parameter reading or setting, the CANopen interface sends an Abort domain transfer message; the value of Application-error-codes has the following meanings:

Error class	Error code	Additional code (hex)	Meaning
6	0	0	Parameter doen't exist
8	0	22	Acces failed because of present device state
6	1	2	Read/Write only error
8	0	0	Generic error
6	9	32	Minimum value
6	9	31	Maximum value
5	4	0	SDO time_out
5	4	1	Invalid command
3	9	30	Invalid value

1.5 Alarms

Fieldbus alarms
The bus failure is signaled via the 26-"Field bus failure" alarm. As for CANopen, the possible failure causes are:
- "Bus-off" condition of the CAN line;
- th drive has not been enabled in the "Operational" mode;
- the "Life Guarding" threshold has been overcome.

This alarm becomes active only when the drive is enabled.
If ON, the 40115 **FB Alarm Watch** parameter enables the generation of the "Field bus failure" alarm also when the drive is disabled.

Drive alarm handling
Considering that the fieldus must function with different firmware application systems, the "drive alarm status" is not foreseen.
The "drive alarm status" is not therefore given any special treatment.
The XVy firmware provides a series of parameters capable of detecting the drive status.

Alarm reset
The alarm reset is one of the drive standard functions, i.e. each application provides the same parameter for this function. It is therefore possible to reset the alarms via the configuration channel on the firmware of all the different drives.The alarm reset can be performed by sending the value 1 to the parameter 18012.
The XVy firmware provides the "Virtual Digital Input" function, through which it is possible effect a bit-controlled alarm reset.

2.0 Modbus

Refer to “MODBUS RTU Protocol, chapters 1 and 2“ Instruction manual (SIEI code 1S5E68).

NOTE! Do not use address 0 in the Modbus protocol (**Drive Serial Add**, IPA 18031) since it is reserved for broadcast command.
Set **Serial Prot Type** (IPA 18032) as "Modbus".

2.1 Modbus Functions

The following functions are implemented on the drive:

Code	Function	Description
01 (*)	Read coil status	This function allows to require the ON or OFF condition of the Drive discrete parameters (Coil). The broadcast mode is not allowed.
02 (*)	Read input status	This function allows to require the ON or OFF condition of the Drive discrete parameters (input). The broadcast mode is not allowed.
03 (*)	Read holding registers	This function allows to require the value of 16-bit (word) registers containing Drive parameters. The broadcast mode is not allowed.
06	Preset single register	This function allows to set the value of a single 16-bit register. The broadcast mode is allowed.
16 (*)	Preset multiple registers	This function allows to set the value of a consecutive block made of 16-bit registers. The broadcast mode is allowed.

Note: For a detailed function description refer to “MODBUS RTU Protocol, chapter 3” Instruction manual
(*) Multiple request cannot be executed. Only one parameter can be accessed at the time.

NOTE! The 16-bit Drive parameter (word or integer type) is referred to as 16-bit Modbus register; a 32-bit Drive parameter (Dword, long or float type) covers therefore two Modbus registers.
For the float format, the first word is the most significative part of the 32-bit data. For the Dword or long format, the first word is the less significative part of the 32-bit data. Each word is the register. The registers require two bytes where the first one contains the most significative section.

2.2 Error Management

Refer to “MODBUS RTU Protocol, chapter 4” Instruction manual (SIEI code 1S5E68).

2.2.1 Exception codes

The protocol implemented on the drive foresees the following exception codes.

Code	Name	Meaning
00	ILLEGAL ADDRESS	Address is not valid.
01	ILLEGAL FUNCTION	The received function code does not correspond to a function allowed on the addressed slave.

02	ILLEGAL DATA ADDRESS	The address number, which the data field refers to, is not a register allowed on the addressed slave.
03	ILLEGAL DATA VALUE	The value to be allocated, which the data field refers to, is not allowed for this register.
04	SLAVE FAIL	The Slave cannot execute the requested command
05	SLAVE ACK	The Slave has accept and is executing the requested command
06	SLAVE BUSY	The Slave is busy
07	NAK - NEGATIVE ACKNOWLEDGEMENT	The function can not be performed with the present operating conditions or attempt to write an only-reading parameter.

IMPORTANT! The settings of **Serial Baud Rate** (IPA 20024) is enabled with the drive start-up; it is therefore required to store it and to switch the drive off.

2.3 System Configuration

To use the Modbus protocol within the drive, the user must configure the **Serial Prot type** (IPA 18032) = [1] Modbus protocol and the address **DriveSerial Add** (IPA 18031) which cannot be = 0 (DRIVE CONFIG/ COMM CONFIG menu).
The serial port configuration is managed by the DRIVE CONFIG / Comm Config menu (parameters: **Drive Serial Add** (IPA 18031), **Serial Baud Rate** (IPA 20024), **Serial Line Conf** (IPA 20025), **Serial Del Time** (IPA 20026) and **Serial Prot Type**“ (IPA 18032).
In order to communicate with the drive through the GF-eXpress configurator in Modbus Protocol, it is necessary to set “Modbus” in the “Communication setup” on Target windows.

2.4 Appendix - Register and Coil Modbus Tables

In the drive the **register number** and **parameter index** (IPA) are the same.

2.5 Modbus example

The following functions are implemented :

03 Read Output register :

This function is used to read the parameters . It is possible to read 16-bits parameters (word & int) and 32bit parameters (dword & float) . Only one parameter can be accessed on each request :
16 bit parameters are read by reading the register corresponding to the IPA, while 32 bits parameters are accessed by reading 2 registers starting from the one corresponding to the IPA of the drive . It is not possible to read more than two registers .

Example with int (word is the same) :
reading 18710 **Heatsink Temp** .

The following bytes should be sent through the RS-485 line :

01,03,49,15,00,01,83,92

With this meaning :

01 is the address of the drive (as in 18031 **Drive Serial Add**). Each drive must have a unique address, starting from 1, because 0 is reserved.

03 is the function number Read Output register

49 , 15 is the register number corresponding to IPA 18710 . This is 0x4915 in hex, MSB first .

Modbus addresses start from 1 , so this is 18710-1 in hex .

00 , 01 is the number of 16 bit registers to read .

83 , 92 is the calculated CRC16 of the message

The drive should answer in a similar way (temperature may be different):
01, 03, 02, 00, 1D, 78, 4D
If the heatsink temperature is 29°C.
If the answer looks different or there is no answer at all , see the section "Errors" below .

Example with dword :

If we want to read the status of the alarms, IPA 24000 **Alarm Status** , this is the message to send :
01, 03, 5D, BF, 00, 02 , E6 , 43

This is the answer of the drive (no active alarms) :
01, 03, 04, 00, 00, 00, 00, FA, 33
Dwords are exchanged in this order : LSW MSW . In each word : MSB , LSB .

Example with float :

Let's try to read 18735 **Out Current**:
01, 03, 49, 3E, 00, 02, B3 , 9B

This is the answer (drive is not running) :
01, 03, 04, 00, 00, 00, 00, FA, 33

If for instance the current is 40:
01, 03, 04, 87, D7, 42, 1F, 13, D7

The binary format of the floating point numbers is beyond the scope of this document.

06 Preset single register :

This function sets single 16 bit parameter . Please do not use on a 32 bit parameter .

To set for example 23000 **Speed Gain** to 100, send the following string
01, 06, 59, D7 , 00, 64 , 2A , 85

The drive will answer :
01, 06, 59, D7, 00, 64, 2A, 85
If everything is ok .
Please note that this function can be used in broadcast mode (address 0):
00, 06, 59, D7 , 00, 64 ,2B,54

In this case the drive does not answer , but will apply the value anyway .

16 Preset multiple registers :

This function is used to set parameters . Only one parameter can be set on each request . It is not possibile to set multiple parameters .

Example with int :

writing to 23000 **Speed Gain** , value is 100
01, 10, 59, D7 , 00, 01, 2,00,64 ,7C , 99

It is necessary to write the register address , the number of registers (1 for 16 bit parameters) , the number of data bytes (2 for 16 bit parameters) and then the data .

The drive answers in this way :
01, 10, 59, D7, 00, 01, A3, 6D

Example with dword:

writing to 20162 DIG_IN_NEG
01, 10, 4E, C1 , 00, 02, 4,00,00,00,00,43,90

For 32 bits parameters , number of registers is 2 and number of data bytes is 4 .
Answer :
01, 10, 4E, C1, 00, 02, 07, 1C

The byte order is the same as in function 03 .

Example with float:

writing to 21200 **Speed Ref 1**
01, 10, 52, CF , 00, 02, 4,00,00,00,00,5A,DC

Sets speed ref 1 to 0 .

The answer is :
01, 10, 52, CF, 00, 02, 61, 4F

3.0 DeviceNet Interface (XVy-DN)

This chapter describes the software for connecting of XVy drives to DeviceNet networks.
It is intended for design engineeres and technicians responsible for the maintenance, commissioning and operation of DeviceNet systems.
A basic knowledge of DeviceNet is assumed and may be found in the following manuals:

- DeviceNet Specifications. Volume 1 - DeviceNet Communication Model and Protocol (Issued by ODVA).
- DeviceNet Specifications. Volume 2 - DeviceNet Device Profiles and Object Library (Issued by ODVA)

3.1 DeviceNet General Description

DeviceNet is a profile of communication for industrial systems based on CAN.
As protocol CAN (ISO 11898) is used CAN2.0A with the 11 bit identifier.
TheXVy-DN driver is developed as “Slave UCMM Capable Device” for operating only in “Predefined Master/Slave Connection Set”.
The data transfer is carried out cyclically; the Master unit reads the data supplied by the Slaves and writes the Slave reference data; the Baud Rate supported by the SBI card are:

- 125 kbit
- 250 kbit
- 500 kbit .

The physical support is given by the RS485 serial line; a maximum of 64 Slaves can be connected to the Bus.

3.2 Connection

The CAN terminals allows to connect the XVy drive to DeviceNet network. Refer to chapter 4.3.6 of this manual for more details.

3.3 Leds

The DeviceNet connection leds are behind the CAN connector.

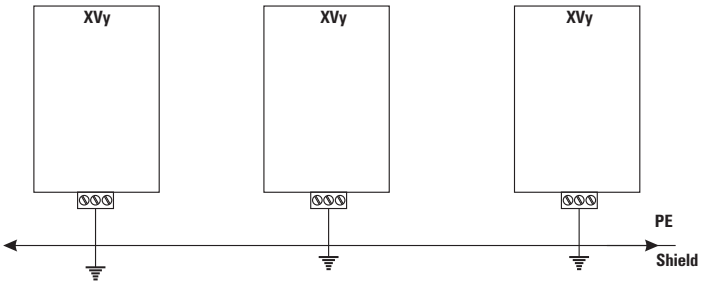
Name	Colour	Function
CAN	Green	The led is ON when the connection is powered (pin C1, C5)
AL	Red	DeviceNet connection status see next table
OP	Green	DeviceNet connection status see next table

Table 3.3.1: AL-OP leds status codification

OP	AL	Meaning
ON	ON	Card power-up
BLINK	BLINK	Self test and Duplicate MAC-ID check is running
BLINK	OFF	Master configuration and/or I/O Polling wait not active
ON	OFF	I/O Polling active, operative status
OFF	BLINK	Minor fault (DUP MAC-ID fail, bus-off, bus-loss)
OFF	ON	Major fault (configuration error, internal error)
OFF	OFF	DeviceNet not configurated

3.4 Interface

For the connection to the Bus please use a shielded twisted cable recommended by DeviceNet specification.
The connection among the single cards is accomplished by a shielded cable as shown in the following figure:



3.5 DeviceNet Function

In this chapter are described the functions of DeviceNet managed by the driver. The main characteristics of the card are:

1. XVy-DN operates only as Slave in “Predifined Master/Slave Connection Set”.
2. Within the “Predefined Master/Slave Connection Set” the driver is a “UCMM Capable Device”.
3. The “Explicit Messaging” is managed.
4. The “Polling” for the fast cyclical data exchange Master/Slave is managed.
5. The detection mechanism of the “Duplicate MAC ID” is implemented.

Regarding the “Explicit Messaging” the fragmentation of the data frame, with a total of max. 32 byte, is managed.

Connection sizes

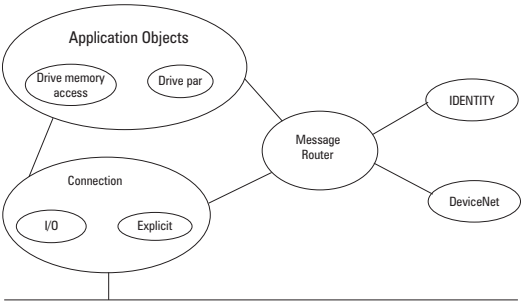
CONNECTION INSTANCE	PRODUCED	CONSUMED
Polled I/O	Depending on frame setting	
Explicit messaging	32	32

3.6 Object description

Hereafter you find the description of the objects managed by the XVy-DN driver.

3.6.1 Object Model

The following figure shows the XVy-DN “Object Model”.



The following table shows:

1. The object classes of XVy-DN driver.
2. If the class is mandatory.
3. The number of instances included in every class.

See “DeviceNet Specifications” for the Standard classes.

Object	Optional/Required	# of Instances
Identity	Required	1
Message Router	Required	1
DeviceNet	Required	1
Connection	Required	1 I/O, 3 Explicit
Parameter	Optional	many
Drive Parameter Access	Optional	many
Drive memory Access	Optional	many

3.6.2 How Objects Affect Behavior

The “Affect Behaviour” of the objects is reported in the following table:

Object	Effect on Behavior
Identity	Supports “Reset Service”
Message Router	No effect
DeviceNet	Port attributes configuration
Connection	Contains the number of logical ports
Parameter	Drive parameters read/write
Drive Parameter Access	Drive parameters read/write
Drive Memory Access	Drive parameters read/write

3.6.3 Defining Object Interface

The object interface of the XVy-DN driver is the following:

Object	Interface
Identity	Message router
Message Router	Explicit Messaging Connection Instance
DeviceNet	Message router
Connection	Message router
Parameter	Message router
Drive Parameter Access	Message router
Drive memory Access	Message router

3.7 Data transfert via Explicit Messaging

The data transfer via Explicit Messaging is made through two new objects: one for accessing the Drive parameters, the other to direct access the drive memory.

3.7.1 Drive Parameter Access

For read/write of Drive parameters, the Drive Parameter Access object is defined with the following properties:
- Class ID: Fh.
- Class Attribute: Revision
- Instance Attribute: This instance does not have attributes.

3.7.1.1 Class Code

Class code: F hex

3.7.1.2 Class attributes

Number	Need in implementation	Access Rule	Name	DeviceNet Data Type	Description of Attribute	Semantics of values
1	Optional	Get	Revision	UINT	Revision of this object	

dn345

3.7.1.3 Instance Attributes

Number	Need in implementation	Access Rule	Name	DeviceNet Data Type	Description of Attribute	Semantics of values
This instance does not provide attributes						

dn350

3.7.1.4 Common Services

This object has no common services.

3.7.1.5 Object Specific Services

Service Code	Need in implementation		Service Name	Description of Service
	Class	Instance		
0_{hex}	n/a	Required	Get_Attribute_Single	Read drive parameter value
10_{hex}	n/a	Required	Set_Attribute_Single	Writes drive parameter value

dn356

3.7.1.6 Behavior

This object is the interface between the DeviceNet and all drive parameters.
The Drive parameter is accessed via the parameter index itself.

For example, reading a parameter (IPA 24000:
- Run a Get_Attribute_Single from class Fh,
- instance = 24000 (5DC0 hex)
- class 1 attribute
- the drive responds with 4 bytes (Dword format).

For example, writing a parameter (IPA 23000):
- Run a Set_Attribute_Single from class Fh,
- instance = 23000 (53D8 hex)
- class 1 attribute
- to set value 20, select “Word 2 byte” (parameter format is INT, 16 bit)
- the drive does not respond if there is an error (timeout).

byte	VALUE	XX	Low byte - Low word drive parameter drive
			High byte - Low word drive parameter drive
			Low byte - High word drive parameter drive
			High byte - High word drive parameter drive

dn357

The number of bytes in the “Value” field depends on the length of drive parameter;

Example:
if the type of drive parameter is “Integer” the length of VALUE is 2 bytes.

3.7.2 Drive Parameter Access

For read/write of Drive parameters, the Drive Parameter Access object is defined with the following properties:
- Class ID: 66h.
- Class Attribute: Revision
- Instance Attribute: This instance does not have attributes.

3.7.2.1 Class Code

Class code: 66 hex

3.7.2.2 Class attributes

Number	Need in implementation	Access Rule	Name	DeviceNet Data Type	Description of Attribute	Semantics of values
1	Optional	Get	Revision	UINT	Revision of this object	

dn345

3.7.2.3 Instance Attributes

Number	Need in implementation	Access Rule	Name	DeviceNet Data Type	Description of Attribute	Semantics of values
This instance does not provide attributes						

dn350

3.7.2.4 Common Services

This object has no common services.

3.7.2.5 Object Specific Services

Service Code	Need in implementation		Service Name	Description of Service
	Class	Instance		
32_{hex}	n/a	Required	Get_Drive_Value	Read drive parameter value
33_{hex}	n/a	Required	Set_Drive_Value	Writes drive parameter value
34_{hex}	n/a	Required	Get_Typed_Drive_Value	Read drive parameter value indicating the data type
35_{hex}	n/a	Required	Set_Typed_Drive_Value	Writes drive parameter value indicating the data type

dn355

3.7.2.6 Behavior

This object is the interface between the DeviceNet network and all Drive parameters. The access to the Drive parameter is carried out by the parameter index; if the parameter does not exist or may not be accessed for any reason (for example: try to write a read only parameter) an error code will be returned. Drive parameters in text format cannot be accessed.
In the following are repeted patterns of how the data frame of data has to be composed for reading/writing Drive parameters.

A) Write Drive Parameter

In this example the writing of a Drive parameter is shown; the cases of positive or wrong writing are distinguished.

A-1) Write Drive Parameter Request

The data frame for writing a drive parameter is composed as follows:

DATA TYPE	FIELD	VALUE	MEANING
Byte	Service Code	33hex	Set Drive Parameter - Object Specific Service
See Note [1]	Class ID	66hex	Drive Parameter Access Class Object
	Instance ID	XXXX	Drive Parameter Index in format Low byte-High byte
Byte [2]	VALUE	XX	Low byte-Low word drive parameter value
		XX	High byte-Low word drive parameter value
		XX	Low byte-High word drive parameter value
		XX	High byte-High word drive parameter value

dn360

1) Byte or Word depending on the type of allocation executed by the Master.
2) The number of bytes of the "Value"-field depends on the length of the Drive parameter; i.e.: if the Drive parameter type is "Integer" the length of VALUE is 2 bytes.

A-2) Write drive parameter - Reply OK

If the Drive parameter is written correctly, the response is:

DATA TYPE	FIELD	VALUE	MEANING
Byte	Service Code	33hex OR 80hex	Set Drive Parameter Reply code- Object Specific Service.
Word	Result	0000	Result field equal to zero means writing correctly executed.

dn365

A-3) Write drive parameter - Reply Error

If the writing of the drive parameter has been rejected, the response is

the following:

DATA TYPE	FIELD	VALUE	MEANING
Byte	Service Code	33hex OR 80hex	Set Drive Parameter Reply code- Object Specific Service.
Word	Result	XXXX [1]	Drive specific error code.

dn370

1) For error codes see table 3.7.1. .

B) Read Drive Parameter

In this example is shown the reading of a Drive parameter; the cases of positive or wrong reading are distinguished.

B-1) Read Drive Parameter Request

The data frame for the Drive parameter reading is composed as follows:

DATA TYPE	FIELD	VALUE	MEANING
Byte	Service Code	32hex	Get Drive Parameter - Object Specific Service.
See Note [1)]	Class ID	66hex	Drive Parameter Access Class Object.
See Note [1)]	Instance ID	XXXX	Drive Parameter Index in format Lowbyte-High byte.

dn375

1) Byte or Word depending on the type of allocation executed by the Master.

B-2) Read drive parameter - Reply OK

If the Drive parameter is read correctly, the response is:

DATA TYPE	FIELD	VALUE	MEANING
Byte	Service Code	32hex	Get Drive Parameter Reply code- Object Specific Service.
Word	Result	0	Result field equal to zero means reading correctly executed.
Byte [1)]	VALUE	XX	Low byte-Low word drive parameter value.
			High byte-Low word drive parameter value.
			Low byte-High word drive parameter value.
			High byte-High word drive parameter value.

dn380

1) The number of bytes of the Value-field depends on the length of the Drive parameter; i.e. if the Drive parameter type is “Integer” the length of VALUE is 2 bytes.

B-3) Read drive parameter - Reply Error

If Drive parameter reading is rejected, the response is the following:

DATA TYPE	FIELD	VALUE	MEANING
Byte	Service Code	32hex	Get Drive Parameter Reply code- Object Specific Service.
Word	Result	XXXX [1]	Drive specific error code.

dn385

1) For error codes see table 3.7.1. .

C) Write Typed Drive Parameter

In this example the writing of a Drive parameter is shown; the cases of positive or wrong writing are distinguished.
In this case, it is shown the parameter IPA number, the value and the data type used in the data transmission.
The optional data type conversion is automatically executed by the firmware.

C-1) Write Drive Parameter Request

The data frame for writing a drive parameter is composed as follows:

DATA TYPE	FIELD	VALUE	MEANING
Byte	Service Code	35hex	Set Drive Parameter - Object Specific Service
See Note 1)	Class ID	66hex	Drive Parameter Access Class Object
	Instance ID	XXXX	Drive Parameter Index in format Low byte-High byte
Byte 2)	DATA TYPE	XX	Value data type
Byte 3)	VALUE	XX	Low byte-Low word drive parameter value
		XX	High byte-Low word drive parameter value
		XX	Low byte-High word drive parameter value
		XX	High byte-High word drive parameter value

dn390

1) Byte or Word depending on the type of allocation executed by the Master.
2) The coding of the possible data type is listed in table 3.7.2.
3) The number of bytes of the "Value"-field depends on the length of the Drive parameter; i.e.: if the Drive parameter type is "Integer" the length of VALUE is 2 bytes.

C-2) Write drive parameter - Reply OK

If the Drive parameter is written correctly, the response is:

DATA TYPE	FIELD	VALUE	MEANING
Byte	Service Code	33hex	Set Drive Parameter Reply code- Object Specific Service.
Word	Result	0000	Result field equal to zero means writing correctly executed.

dn395

C-3) Write drive parameter - Reply Error

If the writing of the drive parameter has been rejected, the response is the following:

DATA TYPE	FIELD	VALUE	MEANING
Byte	Service Code	33hex	Set Drive Parameter Reply code- Object Specific Service.
Word	Result	XXXX 1	Drive specific error code.

dn400

1) For error codes see table 3.7.1. .

D) Read Drive Parameter

In this example is shown the reading of a Drive parameter; the cases of positive or wrong reading are distinguished.
In this case, it is shown the parameter IPA number, the value and the data type used in the data transmission.
The optional data type conversion is automatically executed by the firmware.

D-1) Read Drive Parameter Request

The data frame for the Drive parameter reading is composed as follows:

DATA TYPE	FIELD	VALUE	MEANING
Byte	Service Code	36hex	Get Drive Parameter - Object Specific Service.
See Note [1]	Class ID	66hex	Drive Parameter Access Class Object.
	Instance ID	XXXX	Drive Parameter Index in format Lowbyte-High byte.
Byte [2]	DATA TYPE	XX	Value data type

dn405

For parameter format see table 3.7.2.

1) Byte or Word depending on the type of allocation executed by the Master.
2) The coding of the possible data type is listed in table 3.7.2.

D-2) Read drive parameter - Reply OK

If the Drive parameter is read correctly, the response is:

DATA TYPE	FIELD	VALUE	MEANING
Byte	Service Code	32hex	Get Drive Parameter Reply code- Object Specific Service.
Word	Result	0	Result field equal to zero means reading correctly executed.
Byte [1]	VALUE	XX	Low byte-Low word drive parameter value.
			High byte-Low word drive parameter value.
			Low byte-High word drive parameter value.
			High byte-High word drive parameter value.

dn380

1) The number of bytes of the Value-field depends on the length of the Drive parameter; i.e. if the Drive parameter type is “Integer” the length of VALUE is 2 bytes.

D-3) Read drive parameter - Reply Error

If Drive parameter reading is rejected, the response is the following:

DATA TYPE	FIELD	VALUE	MEANING
Byte	Service Code	32hex	Get Drive Parameter Reply code- Object Specific Service.
Word	Result	XXXX [1]	Drive specific error code.

dn385

1) For error codes see table 3.7.1. .

Table 3.7.1: Error codes for the parameter access

RESULT	VALUE	MEANING
DB_E_ OK	0	No error
DB_E_ NO_IPA	-1	Parameter not exist
DB_E_SYSERR	-2	Generic error
DB_E_TYPE	-3	Type not supported
DB_E_READONLY	-4	Attempt to write a read only parameter
DB_E_NOTWRITENOW	-5	Attempt to write a parameter when not allowed
DB_E_MINVAL	-6	Value exceed minimum value
DB_E_MAXVAL	-7	Value exceed maximum value
DB_E_CNFCONFLICT	-8	Attempt to assign a currently invalid value
DB_E_CONSTANTLIMITS	-9	Attempt to access a parameter using currently invalid type

Table 3.7.2: Parameter format

FORMAT	VALUE	MEANING
DB_T_VOID	0	Return the value in the original format
DB_T_INT	1	16 bit signed
DB_T_WORD	2	16 bit unsigned
DB_T_LONG	3	32 bit signed
DB_T_DWORD	4	32 bit unsigned
DB_T_FLOAT	6	Float in IEEE 744 format

3.8 Polling Function

This type of DeviceNet-function is used for a fast cyclic exchange of Drive-parameters between Master and XVy drive.
The characteristics of the Polling-function are:

1. The data frame length is configurable through specific drive parameter (see chapter 10, FIELDBUS menu) and can vary from 1 to 10 word for both directions (Slave->Master and Master->Slave).
2. The card, as it is a Slave, during the Polling consumes Output data and produces Input data as response.

The configuration of the Drive parameters transferred via Polling is set by using configuration parameter allocated in the drive (see chapter 10, FIELDBUS menu).

3.9 XVy-DN Interface configuration

The DeviceNet interface configuration is performed via the drive parameters. The parameters are controlled via hierarchical menus. All the writing parameters referring to the DeviceNet interface are active only after the drive reset. Here following is a list of drive parameters useful to control the DeviceNet interface

3.9.1 Fieldbus Menu

The XVy-DN communication card can be enabled by setting the IPA 40000 **Field Bus Type** parameter as "Devicenet". The other parameters of this menu are:

IPA	Par. Name	Type	Default val.	Attr.
40100	Bus Address	1 byte unsigned	0	writing
40001	Bus Baude Rate	4 bytes unsigned	0	writing
40110	CC Enabling	Enum	Enabled	writing
40111	PDC Enabling	Enum	Enabled	writing
40114	FB Fail Casue	4 bytes unsigned	0	read only

- **Bus Address** (IPA 40100) = address of the node; admitted values 1 ... 63.
- **Bus Baude Rate** (IPA 40001) = network baud rate. The baudrate is stated directly in kbaud (ex. 125kb = 125); admitted values 125, 250, 500.
- **PDC Enabling** (IPA 40111) and **CC Enabling** (IPA 40110) = allow the user to enable/disable the corresponding channels. With the PDC channel it is possible to exchange up to 8 parameters.
- **FB Fail Casue** (IPA 40114) = error cause. See the following table

3.9.2 Error Codes

Cod.	Meaning
1	Protocol incorrect
18..24	Configuration error on M2S reception channel
25..31	Configuration error on S2M reception channel
32	Too many bytes on M2S reception channel
33	Too many bytes on S2M transmission channel
34-35	Errored IPA for PLC allocation
36	More than 4 words allocated as Fast250 us on M2S

37	More than 4 words allocated as Fast250 us on S2M
100	Baud-rate value not correct
101	Node address not correct
107	CAN line in “Bus-off” state
108	Dnet internal error
109	MAC-ID duplicated (there is already a node with the same address)
110	Software key for authorisation invalid or expired

3.10 Alarms

3.10.1 XVy-DN Alarms

The XVy-DN interface provides two possible alarms:
Alarm (A 26) **FieldBus Failure**, is automatically enabled if there is no communication on the bus at a PDC level (polling I/O). This alarm becomes active only when the drive is enabled.
If ON, the **FB Alarm Watch** parameter (IPA 40115) enables the generation of the "Field bus failure" alarm also when the drive is disabled.

3.10.2 Drive alarm handling

Considering that the card must function on different firmware application systems, the "drive alarm status" is not foreseen.
The "drive alarm status" is not therefore given any special treatment.
The XVy-EV firmware, provides a series of parameters capable of detecting the drive status. Refer to chapter 10, Alarms and Fieldbus menu for more information.

3.10.3 Alarm reset

The alarm reset is one of the drive standard functions, i.e. each application provides the same parameter for this function. It is therefore possible to reset the alarms via the configuration channel on the firmware of all the different drives.The alarms can be reset by sending the value 1 to the 18012 parameter.
The reset of the bit-controlled alarms can be performed also via the "Virtual Digital Input" function.

3.11 Process Data Channel Control

This function allows to allocate the drive parameters or application variables to the Process Data Channel data.
The XVy-DN interface uses a number of words for the Process Data Channel (abbr. PDC Process Data Channel), which can always be set.
The Process Data Channel configuration for the XVy-DN interface is the following:

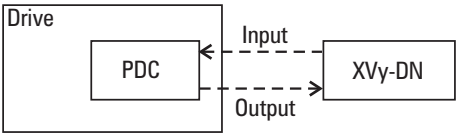
DATUM 0 DATUM... DATUMn

The Slave can both read and write the Process Data Channel data.
The DeviceNet data read by the Slave are defined as input data; the data written in DeviceNet by the Slave are defined as output data.
A datum can be made both of 2 and 4 bytes. The word "data" refers to any quantity of bytes included between 0 and 10, if the byte total number required is not higher than 20.

Example
It is possible to have:
- from 0 to 10 data items of 2 byte
- 1 datum of 4 bytes + from 0 to 8 data items of 2 bytes
- 2 data items of 4 bytes + from 0 to 6 data items of 2 bytes
- 3 data items of 4 bytes + from 0 to 4 data items of 2 bytes
- 4 data items of 4 bytes + from 0 to 2 data items of 2 bytes
- 5 data items of 4 bytes

The data exchanged via the PDC can be of two types:
-drive parameters
-variables of an MDPlc application

The composition of the PDC input and output data is defined via suitable parameters as described in the paragraphs 3.11.1 and 3.11.2.
The master cyclically writes the data defined as PDC input and cyclically reads the data defined as PDC output.



3.11.1 PDC Input Configuration (SYS_FB_XXX_MS parameter)

See section 1.3.1, Appendix.

3.11.2 PDC Output Configuration (SYS_FB_XXX_SM Parameter)

See section 1.3.1, Appendix.

3.11.3 Configuration of the Virtual Digital I/Os

The XVy-EV firmware, provides the "Virtual Digital I/O" function, which allows to exchange discrete signals between the master and the slave and vice versa. See the chapter 10 (DIGITAL INPUTS / VIRT DIG INPUTS e DIGITAL OUTPUTS / VIRT DIG OUTPUTS.menu) for a detailed description of these parameters.
Other application firmware, for example MDPlc, does not provide the "Virtual Digital I/O" function.

3.11.4 Use of the PDC in MDPlc Applications

It is possible to configure both the PDC input and output data in order to allow the data direct access via the MDPlc application code.
For more details see the manual “Drive programming with MDPlc” on “XVy tools” cd-rom.

4.0 Fieldbus : Parameter List and Conversion

Parameters can be read/written via fieldbus by setting the appropriate **FB Assign X->X x , FB IPA X->X x, FB Format X->X x, FP Exp X->X x** parameters (see chapter 10, FIELDBUS menu).

For **Direct** access or **Fast** access you must know the internal format of the datum to be exchanged and the relation between the counts read and the engineering values (1).

Key

IPA	Description	External format	Internal format	Conversion reference (1)	R/W	Write with drive enabled
18102	Curr Deriv Gain	16 bit integer	16 bit integer	--	yes	yes
18123	Max Pos Error	floating point	32 bit integer	F01	yes	yes

IPA Parameter number. For further information about the parameter see Chapter 11 - Index of Parameters
Description Parameter name
External format External parameter format
Internal format Internal parameter format
Conversion reference Reference to the equation for conversion, see the following table
R/W Accessing parameters: R= Read, W= Write

Table 4.1 : Conversion formulas

Code	(1) Conversion reference
F01	[mech.deg] = **IPA 18753 Pos Conv Fact** * [cnts]
F02	[ms/krpm] = **IPA 21111 Max Ramp Rate** / [cnts]
F03	[%] = 100 * **IPA 18790 Torque Conv Fact** * [cnts] / **IPA 18800 Base Torque**
F04	[rpm] = **IPA 18752 Rpm Conv Fact** * [cnts]
F05	[par] = [cnts] / 1638
F06	[Kg*m2] = 0.5092958178*10-5 * *EncPulses* * **IPA 18790 Torque Conv Fact** * [cnts]
F07	[msec] = (-0.125 / log(1-[cnts]/2^15))
F08	[Arms] = **IPA 18700 Arms Conv Fact** * [cnts]
F09	[V] = [cnts] / 32.768
F10	[Nm] = **IPA 18790 Torque Conv Fact** * [cnts]
F11	[par] = sqrt(abs[cnts])
F12	[par] = [cnts]
F13	[par] = [cnts] * (100/16384) - 100
F14	[Vrms]=(612.3724/32768) * [cnts]
F15	[mech.deg] = 360/24576 * [cnts]
F16	[el.deg] = 360 / 65536 * [cnts]
F17	[h] = [cnts] / 3600
F18	[%] = [cnts] / 16384
F19	[V] = 10.81 / 32768 * [cnts]
F20	[V] = 172.96 / 32768 * [cnts]
F21	[par] = [cnts] / 8192
F22	[V] = 12.5 / 2047 * [cnts]
F23	[s] = [cnts] / 125
F24	[s] = [cnts] / 256
F25	[%] = [cnts]
F26	If **IPA 32020 Els Ratio / Slip** = Ratio -> [float] = ([cnts] - 0.5) * **IPA 32000 Els PPR Master** * **IPA 32090 Els Ratio Range** * **IPA 32010 Els Mec Ratio** * **IPA 32012 ElsMec Ratio Mul** / (2^31 * *EncPulses* * **IPA 32013 ElsMec Ratio Div**) If **IPA 32020 Els Ratio / Slip** = Slip -> (([cnts] - 0.5) * **IPA 32000 Els PPR Master** * **IPA 32090 Els Ratio Range** * **IPA 32010 Els Mec Ratio** * **IPA 32012 ElsMec Ratio Mul** / (2^31 * *EncPulses* * **IPA 32013 ElsMec Ratio Div**) - 1) * 100

PDC configuration - Direct Access, example in read mode:

- set (FIELDBUS menu / FB 1st S->M PAR) :
IPA 40290 **FB Assign S->M1** = 3 (Direct Acc Par)
IPA 40300 **FB IPA S->M 1** = 18123
IPA 40310 **FB Format S->M 1** = 3 (32 Bit Integer)
IPA 40320 **FP Exp S->M 1**= 0

- on the drive read the value of the parameter to be sent to the PLC, for example (POSITION menu) :
IPA 18123 **Max Pos Error** = 10000 [mech. deg]

- on the drive read the value of the conversion parameter (FIELDBUS / UNITS menu) :
IPA 18753 **Pos Conv Fact** = 10

- the value sent from the drive to the PDC, for example 1000 [cnts], is converted in the PLC, using the conversion formula F01 (see table 4.1, reference to the following pages):

Max Pos Error [mech.deg] = **Pos Conv Fact** * **Max Pos Error** [cnts] = 10 * 1000 = 10000 [mech.deg]

PDC configuration - Direct Access, example in write mode:

- set (FIELDBUS menu / FB 1st M->S PAR) :
IPA 40190 **FB Assign M->S 1** = 3 (Direct Acc Par)
IPA 40200 **FB IPA M->S 1** = 18123
IPA 40210 **FB Format M->S 1** = 3 (32 Bit Integer)
IPA 40220 **FP Exp M->S 1**= 0

- on the drive read the value of the conversion parameter (FIELDBUS / UNITS menu):
IPA 18753 **Pos Conv Fact** = 10

The value in counts must be entered to the PLC. Next convert the value to be written, for example IPA 18123 **Max Pos Error** = 1000 [mech.deg] in [counts], using the formula derived from **F01** in reverse (see table 4.1, reference to the following pages):

Max Pos Error [cnts] = **Max Pos Error** [mech.deg] / **Pos Conv Fact** = 1000 / 10 = 100 counts

The PLC must send 100 [counts] to the PDC.

The parameter reading on the drive will be in degrees (POSITION menu) :
IPA 18123 **Max Pos Error** = 1000 [mech. deg]

IPA	Description	External format	Internal format	Conversion reference (1)	R/W	Write with drive enabled
18101	Curr Integr Gain	16 bit integer	16 bit integer	--	yes	yes
18102	Curr Deriv Gain	16 bit integer	16 bit integer	--	yes	yes
18123	Max Pos Error	floating point	32 bit integer	F01	yes	yes
18131	P Loss Prop Gain	16 bit integer	16 bit integer	--	yes	yes
18132	P Loss Int Gain	16 bit integer	16 bit integer	--	yes	yes
18134	P Loss Ramp	floating point	16 bit integer	F02	yes	no
18135	P Loss Trq Lim	floating point	16 bit integer	F03	yes	no
18136	P Loss Spd 0 Thr	floating point	32 bit integer	F04	yes	no
18137	PL Next Factor	floating point	16 bit integer	F05	no	
18138	PL Mains Status	boolean	bool -> 16 bit integer	--	yes	yes
18150	Inertia	floating point	16 bit integer	F06	yes	yes
18151	Inertia Filter	floating point	16 bit integer	F07	yes	no
18330	Tuning Status	ENUM	16 bit unsigned integer	--	no	
18412	BR Ovld Factor	16 bit unsigned integer	16 bit unsigned integer	--	no	
18708	Sys Tsk Exe T	32 bit integer	32 bit unsigned integer	--	no	
18709	MaxSys Tsk Exe T	32 bit integer	32 bit unsigned integer	--	yes	no
18710	Heatsink Temp	16 bit integer	16 bit integer	--	no	
18711	Intake Air Temp	16 bit integer	16 bit integer	--	no	
18712	Reg Card Temp	16 bit integer	16 bit integer	--	no	
18720	Slow Tsk Exe T	32 bit integer	32 bit unsigned integer	--	no	
18721	MaxSl Tsk Exe T	32 bit integer	32 bit unsigned integer	--	yes	no
18722	Inp Phase Exe T	16 bit unsigned integer	16 bit unsigned integer	--	no	
18723	Fst Tsk Exe T	16 bit unsigned integer	16 bit unsigned integer	--	no	
18724	Out Phase Tsk T	16 bit unsigned integer	16 bit unsigned integer	--	no	
18725	Aux Phase Exe T	16 bit unsigned integer	16 bit unsigned integer	--	no	
18726	MaxIn Ph Exe T	16 bit unsigned integer	16 bit unsigned integer	--	yes	no
18727	MaxFst Tsk Exe T	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
18728	MaxOut Ph Exe T	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
18729	MaxAux Ph Exe T	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
18732	Act Pos Trq Lim	floating point	16 bit integer	F03	no	
18735	Out Current	floating point	16 bit integer	F08	no	
18736	DC Link Voltage	floating point	16 bit integer	F09	no	
18739	Act Torque	floating point	16 bit integer	F10	no	
18740	Abs Act Module	16 bit integer	32 bit integer	F11	no	
18741	Inc Data Act Mod	16 bit integer	32 bit integer	F11	no	
18742	Out Frequency	floating point	floating point	--	no	
18746	Act Neg Trq Lim	floating point	16 bit integer	F03	no	
18748	Ramp Reference	floating point	32 bit integer	F04	no	
18749	Speed Reference	floating point	32 bit integer	F04	no	
18751	Load Def Err IPA	16 bit unsigned integer	16 bit unsigned integer	--	no	
18754	Act Pos Spd Lim	floating point	32 bit integer	F04	no	
18755	Act Neg Spd Lim	floating point	32 bit integer	F04	no	
18756	Enc Position	floating point	32 bit integer	F01	no	
18757	Enc Revolution	floating point	32 bit integer	F12	no	
18762	Abs Sin Offset	16 bit integer	16 bit integer	--	no	
18763	Abs Cos Offset	16 bit integer	16 bit integer	--	no	
18764	Abs Gain Err	floating point	16 bit integer	F13	no	
18765	Meas Motor Spd	floating point	32 bit integer	F04	no	
18766	Abs Meas Noise	16 bit integer	16 bit integer	--	no	
18767	Abs Max Noise	16 bit integer	16 bit integer	--	yes	no
18770	DSP Exe Time	16 bit integer	16 bit integer	--	no	
18771	MaxDSP Exe T	16 bit integer	16 bit integer	--	yes	no
18773	Quadrature Volt	floating point	16 bit integer	F14	no	
18774	Direct Volt	floating point	16 bit integer	F14	no	
18776	Act Torque Eng	floating point	16 bit integer	F10	no	
18777	Motor Speed	floating point	32 bit integer	F04	no	
18780	Bkg Tsk Exe T	32 bit integer	16 bit unsigned integer	--	no	
18781	MaxBkg Tsk Exe T	16 bit unsigned integer	16 bit unsigned integer	--	yes	no
18782	Act Out Power	floating point	floating point	--	no	
18805	Torque Current	floating point	16 bit integer	F04	no	
18806	Flux Current	floating point	16 bit integer	F04	no	
18807	Act Out Curr Lim	floating point	16 bit integer	F04	no	
19002	Inc Data Pos	floating point	32 bit integer	F01	no	
19003	Inc Data N Rev	32 bit integer	32 bit integer	--	no	
19004	Inc Pulses / Rev	32 bit unsigned integer	32 bit integer	--	no	
19005	Inc B Data Count	16 bit integer	16 bit integer	--	no	
19006	Inc A Data Count	16 bit integer	16 bit integer	--	no	
19011	XER/EXP Turn Pos	floating point	32 bit integer	F01	no	
19012	XER/EXP Rev	32 bit integer	32 bit integer	--	no	

IPA	Description	External format	Internal format	Conversion reference (1)	R/W	Write with drive enabled
19013	XER/EXP Puls Rev	32 bit unsigned integer	32 bit integer	--	no	
19017	Abs Turn Pos	floating point	32 bit integer	F01	no	
19018	Abs Rev	32 bit integer	32 bit integer	--	no	
19019	Abs Sin Meas	16 bit integer	16 bit integer	--	no	
19020	Abs Cos Meas	16 bit integer	16 bit integer	--	no	
19022	XE Hall Pos	floating point	16 bit integer	F15	no	
19026	XE Hall Rev	32 bit integer	32 bit integer	--	no	
19027	XE Hall Meas	16 bit unsigned integer	16 bit unsigned integer	--	no	
19028	XE Hall N Error	16 bit integer	16 bit integer	--	no	
19030	ABS1 Al Bit En	ENUM	16 bit integer	--	yes	no
19031	EXP ABS1 Pos	floating point	32 bit integer	F01	no	
19032	EXP ABS1 Sw Rev	32 bit integer	32 bit integer	--	no	
19033	EXP ABS1 Hw Rev	16 bit integer	16 bit integer	--	no	
19034	ABS1 Rx N Err	16 bit unsigned integer	16 bit integer	--	no	
19035	ABS1 Alarm Bit	ENUM	16 bit integer	--	no	
19040	Enc Err Simul	floating point	32 bit integer	F01	no	
19095	XER/EXP Ind Pos	floating point	32 bit integer	F01	no	
19096	Index Position	floating point	32 bit integer	F01	no	
19113	Actual Pos Error	floating point	32 bit integer	F01	no	
19607	Drive Ovld Fact	16 bit unsigned integer	16 bit unsigned integer	--	no	
20000	Drive Max Curr	floating point	16 bit integer	F08	yes	no
20003	Full Scale Speed	floating point	32 bit integer	F04	yes	yes
20005	DO Reset at Fail	32 bit unsigned integer	32 bit unsigned integer	--	yes	yes
20006	DO Set at Fail	32 bit unsigned integer	32 bit unsigned integer	--	yes	yes
20013	Phasing Err	floating point	16 bit integer	F16	no	
20014	Act Enc Pos Loss	floating point	32 bit integer	F16	no	
20015	Act Mot El Angle	floating point	16 bit integer	F16	no	
20016	Enc Warning Case	ENUM	32 bit unsigned integer	--	no	
20018	Enc W->A Mask	32 bit unsigned integer	32 bit unsigned integer	--	no	
20021	Enable I-O Keys	ENUM	bool -> 16 bit integer	--	yes	yes
20023	Control Mode	ENUM	16 bit unsigned integer	--	yes	yes
20044	Load Def Counter	32 bit unsigned integer	32 bit unsigned integer	--	no	
20045	Tot Life Hours	floating point	32 bit integer	F17	no	
20046	Act Life Hours	floating point	32 bit unsigned integer	F17	no	
20047	Power Fail Count	32 bit unsigned integer	32 bit unsigned integer	--	no	
20048	Save Param Count	32 bit unsigned integer	32 bit unsigned integer	--	no	
20049	SW Reset Count	32 bit unsigned integer	32 bit unsigned integer	--	no	
20085	Speed Draw Ratio	floating point	16 bit integer	F18	yes	no
20086	Speed Draw Out	floating point	32 bit integer	F04	no	
20087	P Loss Active	ENUM	bool -> 16 bit integer	--	no	
20088	P Loss NoRes Thr	floating point	32 bit integer	F04	yes	no
20089	Speed Draw In	floating point	32 bit integer	F04	no	
20092	Act SpdDrw Ratio	floating point	16 bit integer	F18	no	
20100	Digital Input 0	ENUM	16 bit unsigned integer	--	no	
20101	Digital Input 1	ENUM	16 bit unsigned integer	--	yes	yes
20102	Digital Input 2	ENUM	16 bit unsigned integer	--	yes	yes
20103	Digital Input 3	ENUM	16 bit unsigned integer	--	yes	yes
20104	Digital Input 4	ENUM	16 bit unsigned integer	--	yes	yes
20105	Digital Input 5	ENUM	16 bit unsigned integer	--	yes	yes
20106	Digital Input 6	ENUM	16 bit unsigned integer	--	yes	yes
20107	Digital Input 7	ENUM	16 bit unsigned integer	--	yes	yes
20150	Exp Dig Inp 0	ENUM	16 bit unsigned integer	--	yes	yes
20151	Exp Dig Inp 1	ENUM	16 bit unsigned integer	--	yes	yes
20152	Exp Dig Inp 2	ENUM	16 bit unsigned integer	--	yes	yes
20153	Exp Dig Inp 3	ENUM	16 bit unsigned integer	--	yes	yes
20154	Exp Dig Inp 4	ENUM	16 bit unsigned integer	--	yes	yes
20155	Exp Dig Inp 5	ENUM	16 bit unsigned integer	--	yes	yes
20156	Exp Dig Inp 6	ENUM	16 bit unsigned integer	--	yes	yes
20157	Exp Dig Inp 7	ENUM	16 bit unsigned integer	--	yes	yes
20162	Dig Inp Rev Mask	32 bit unsigned integer	32 bit unsigned integer	--	yes	yes
20163	Dig Inp Status	16 bit unsigned integer	16 bit unsigned integer	--	no	
20164	Exp Dig Inp Stat	16 bit unsigned integer	16 bit unsigned integer	--	no	
20170	Virt Dig Inp 0	ENUM	16 bit unsigned integer	--	yes	yes
20171	Virt Dig Inp 1	ENUM	16 bit unsigned integer	--	yes	yes
20172	Virt Dig Inp 2	ENUM	16 bit unsigned integer	--	yes	yes
20173	Virt Dig Inp 3	ENUM	16 bit unsigned integer	--	yes	yes
20174	Virt Dig Inp 4	ENUM	16 bit unsigned integer	--	yes	yes
20175	Virt Dig Inp 5	ENUM	16 bit unsigned integer	--	yes	yes
20176	Virt Dig Inp 6	ENUM	16 bit unsigned integer	--	yes	yes

IPA	Description	External format	Internal format	Conversion reference (1)	R/W	Write with drive enabled
20177	Virt Dig Inp 7	ENUM	16 bit unsigned integer	--	yes	yes
20178	Virt Dig Inp 8	ENUM	16 bit unsigned integer	--	yes	yes
20179	Virt Dig Inp 9	ENUM	16 bit unsigned integer	--	yes	yes
20180	Virt Dig Inp 10	ENUM	16 bit unsigned integer	--	yes	yes
20181	Virt Dig Inp 11	ENUM	16 bit unsigned integer	--	yes	yes
20182	Virt Dig Inp 12	ENUM	16 bit unsigned integer	--	yes	yes
20183	Virt Dig Inp 13	ENUM	16 bit unsigned integer	--	yes	yes
20184	Virt Dig Inp 14	ENUM	16 bit unsigned integer	--	yes	yes
20185	Virt Dig Inp 15	ENUM	16 bit unsigned integer	--	yes	yes
20186	Virt DI Status	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
20187	Virt DI at Start	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
20188	Virt DI at Dis	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
20189	Virt DI at Reset	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
20200	Digital Output 0	ENUM	16 bit unsigned integer	--	yes	yes
20201	Digital Output 1	ENUM	16 bit unsigned integer	--	yes	yes
20202	Digital Output 2	ENUM	16 bit unsigned integer	--	yes	yes
20203	Digital Output 3	ENUM	16 bit unsigned integer	--	yes	yes
20204	Digital Output 4	ENUM	16 bit unsigned integer	--	yes	yes
20205	Digital Output 5	ENUM	16 bit unsigned integer	--	yes	yes
20250	Exp Dig Out 0	ENUM	16 bit unsigned integer	--	yes	yes
20251	Exp Dig Out 1	ENUM	16 bit unsigned integer	--	yes	yes
20252	Exp Dig Out 2	ENUM	16 bit unsigned integer	--	yes	yes
20253	Exp Dig Out 3	ENUM	16 bit unsigned integer	--	yes	yes
20254	Dig Out Reverse	32 bit unsigned integer	32 bit unsigned integer	--	yes	yes
20255	Dig Out Status	16 bit unsigned integer	16 bit unsigned integer	--	no	
20256	Exp Dig Out Stat	16 bit unsigned integer	16 bit unsigned integer	--	no	
20257	Exp Dig Out 4	ENUM	16 bit unsigned integer	--	yes	yes
20258	Exp Dig Out 5	ENUM	16 bit unsigned integer	--	yes	yes
20259	Exp Dig Out 6	ENUM	16 bit unsigned integer	--	yes	yes
20260	Exp Dig Out 7	ENUM	16 bit unsigned integer	--	yes	yes
20270	Virt Dig Out 0	ENUM	16 bit unsigned integer	--	yes	yes
20271	Virt Dig Out 1	ENUM	16 bit unsigned integer	--	yes	yes
20272	Virt Dig Out 2	ENUM	16 bit unsigned integer	--	yes	yes
20273	Virt Dig Out 3	ENUM	16 bit unsigned integer	--	yes	yes
20274	Virt Dig Out 4	ENUM	16 bit unsigned integer	--	yes	yes
20275	Virt Dig Out 5	ENUM	16 bit unsigned integer	--	yes	yes
20276	Virt Dig Out 6	ENUM	16 bit unsigned integer	--	yes	yes
20277	Virt Dig Out 7	ENUM	16 bit unsigned integer	--	yes	yes
20278	Virt Dig Out 8	ENUM	16 bit unsigned integer	--	yes	yes
20279	Virt Dig Out 9	ENUM	16 bit unsigned integer	--	yes	yes
20280	Virt Dig Out 10	ENUM	16 bit unsigned integer	--	yes	yes
20281	Virt Dig Out 11	ENUM	16 bit unsigned integer	--	yes	yes
20282	Virt Dig Out 12	ENUM	16 bit unsigned integer	--	yes	yes
20283	Virt Dig Out 13	ENUM	16 bit unsigned integer	--	yes	yes
20284	Virt Dig Out 14	ENUM	16 bit unsigned integer	--	yes	yes
20285	Virt Dig Out 15	ENUM	16 bit unsigned integer	--	yes	yes
20286	Virt DO Status	16 bit unsigned integer	16 bit unsigned integer	--	no	
20289	Virt DO at Reset	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
20290	Virt DO at Fail	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
20300	Analog Inp 0 Sel	ENUM	16 bit unsigned integer	--	yes	yes
20301	Analog Inp 1 Sel	ENUM	16 bit unsigned integer	--	yes	yes
20310	An Inp 0 Read	floating point	16 bit integer	F19	no	
20311	An Inp 1 Read	floating point	16 bit integer	F19	no	
20320	An Inp 0 Offset	floating point	16 bit integer	F20	yes	yes
20321	An Inp 1 Offset	floating point	16 bit integer	F20	yes	yes
20330	An Inp 0 D_B Pos	floating point	16 bit integer	F20	yes	yes
20331	An Inp 1 D_B Pos	floating point	16 bit integer	F20	yes	yes
20340	An Inp 0 D_B Neg	floating point	16 bit integer	F20	yes	yes
20341	An Inp 1 D_B Neg	floating point	16 bit integer	F20	yes	yes
20350	An Inp 0 Scale	floating point	16 bit integer	F21	yes	yes
20351	An Inp 1 Scale	floating point	16 bit integer	F21	yes	yes
20360	An Inp 0 Value	floating point	16 bit integer	F20	no	
20361	An Inp 1 Value	floating point	16 bit integer	F20	no	
20400	Analog Out 0 Sel	ENUM	16 bit unsigned integer	--	yes	yes
20401	Analog Out 1 Sel	ENUM	16 bit unsigned integer	--	yes	yes
20402	Exp Analog Out 0	ENUM	16 bit unsigned integer	--	yes	yes
20403	Exp Analog Out 1	ENUM	16 bit unsigned integer	--	yes	yes
20410	An Out 0 Write	floating point	16 bit integer	F22	no	
20411	An Out 1 Write	floating point	16 bit integer	F22	no	

IPA	Description	External format	Internal format	Conversion reference (1)	R/W	Write with drive enabled
20412	ExAn Out 0 Write	floating point	16 bit integer	F22	no	
20413	ExAn Out 1 Write	floating point	16 bit integer	F22	no	
20420	An Out 0 Scale	floating point	16 bit integer	F21	yes	yes
20421	An Out 1 Scale	floating point	16 bit integer	F21	yes	yes
20422	ExAn Out 0 Scale	floating point	16 bit integer	F21	yes	yes
20423	ExAn Out 1 Scale	floating point	16 bit integer	F21	yes	yes
20430	An Out 0 Offset	floating point	16 bit integer	F22	yes	yes
20431	An Out 1 Offset	floating point	16 bit integer	F22	yes	yes
20432	ExAn Out 0 Offset	floating point	16 bit integer	F22	yes	yes
20433	ExAn Out 1 Offset	floating point	16 bit integer	F22	yes	yes
20440	An Out 0 Value	floating point	16 bit integer	F22	no	
20441	An Out 1 Value	floating point	16 bit integer	F22	no	
20442	ExAn Out 0 Value	floating point	16 bit integer	F22	no	
20443	ExAn Out 1 Value	floating point	16 bit integer	F22	no	
20500	Start Status	ENUM	16 bit unsigned integer	--	no	
20600	Brake Enable	ENUM	16 bit unsigned integer	--	yes	yes
20601	Brake OFF Delay	floating point	16 bit unsigned integer	F23	yes	yes
20602	Brake ON Delay	floating point	16 bit unsigned integer	F23	yes	yes
20603	Brake ON Spd Thr	floating point	32 bit integer	F04	yes	yes
21000	Jog Speed Limit	floating point	32 bit integer	F04	yes	yes
21001	Jog Reference	floating point	16 bit integer	F04	yes	yes
21003	CW Jog Acc	floating point	32 bit integer	F02	yes	yes
21004	CCW Jog Acc	floating point	32 bit integer	F02	yes	yes
21005	CW Jog Dec	floating point	32 bit integer	F02	yes	yes
21006	CCW Jog Dec	floating point	32 bit integer	F02	yes	yes
21102	CW Acc Ramp	floating point	16 bit integer	F02	yes	no
21103	CCW Acc Ramp	floating point	16 bit integer	F02	yes	no
21104	CW Dec Ramp	floating point	16 bit integer	F02	yes	no
21105	CCW Dec Ramp	floating point	16 bit integer	F02	yes	no
21110	Ramp Exp Factor	16 bit integer	16 bit integer	--	yes	no
21115	Fast Stop Dec	floating point	32 bit integer	F02	yes	yes
21116	End Run Dec	floating point	32 bit integer	F02	yes	yes
21200	Speed Ref 1	floating point	32 bit integer	F04	yes	yes
21201	Speed Ref 2	floating point	32 bit integer	F04	yes	yes
21204	Pos Speed Limit	floating point	32 bit integer	F04	yes	no
21205	Neg Speed Limit	floating point	32 bit integer	F04	yes	no
21206	Speed Thr	floating point	32 bit integer	F04	yes	yes
21207	Speed Reach Wnd	floating point	32 bit integer	F04	yes	yes
21208	Speed Zero Thr	floating point	32 bit integer	F04	yes	yes
21209	Speed Zero Delay	floating point	16 bit unsigned integer	F23	yes	yes
21210	Ramp Enable	ENUM	16 bit unsigned integer	--	yes	yes
21211	Speed Thr Wnd	floating point	32 bit integer	F04	yes	yes
21212	Ramp Output	floating point	32 bit integer	F04	no	
21213	Speed Thr Delay	floating point	16 bit unsigned integer	F23	yes	yes
21301	Multi Speed 1	floating point	32 bit integer	F04	yes	yes
21302	Multi Speed 2	floating point	32 bit integer	F04	yes	yes
21303	Multi Speed 3	floating point	32 bit integer	F04	yes	yes
21304	Multi Speed 4	floating point	32 bit integer	F04	yes	yes
21305	Multi Speed 5	floating point	32 bit integer	F04	yes	yes
21306	Multi Speed 6	floating point	32 bit integer	F04	yes	yes
21307	Multi Speed 7	floating point	32 bit integer	F04	yes	yes
21310	Multi Spd Index	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
21311	Multi Speed Conf	ENUM	16 bit unsigned integer	--	yes	yes
21401	M Ramp 1 CW Acc	floating point	32 bit integer	F02	yes	yes
21402	M Ramp 2 CW Acc	floating point	32 bit integer	F02	yes	yes
21403	M Ramp 3 CW Acc	floating point	32 bit integer	F02	yes	yes
21411	M Ramp 1 CCW Acc	floating point	32 bit integer	F02	yes	yes
21412	M Ramp 2 CCW Acc	floating point	32 bit integer	F02	yes	yes
21413	M Ramp 3 CCW Acc	floating point	32 bit integer	F02	yes	yes
21421	M Ramp 1 CW Dec	floating point	32 bit integer	F02	yes	yes
21422	M Ramp 2 CW Dec	floating point	32 bit integer	F02	yes	yes
21423	M Ramp 3 CW Dec	floating point	32 bit integer	F02	yes	yes
21431	M Ramp 1 CCW Dec	floating point	32 bit integer	F02	yes	yes
21432	M Ramp 2 CCW Dec	floating point	32 bit integer	F02	yes	yes
21433	M Ramp 3 CCW Dec	floating point	32 bit integer	F02	yes	yes
21440	Multi Ramp Index	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
21441	Multi Ramp Conf	ENUM	16 bit unsigned integer	--	yes	yes
22000	Torque Ref 1	floating point	16 bit integer	F10	yes	yes
22001	Torque Ref 2	floating point	16 bit integer	F03	yes	yes

IPA	Description	External format	Internal format	Conversion reference (1)	R/W	Write with drive enabled
22002	Torque Mode	ENUM	16 bit unsigned integer	--	yes	yes
22003	Trq Lim Config	ENUM	16 bit unsigned integer	--	yes	yes
22004	Max Pos Torque	floating point	16 bit integer	F03	yes	yes
22005	Max Neg Torque	floating point	16 bit integer	F03	yes	yes
22007	Torque Thr	floating point	16 bit integer	F03	yes	yes
22009	Trq Speed Limit	floating point	32 bit integer	F04	yes	yes
22010	Torque Thr Delay	floating point	16 bit unsigned integer	F23	yes	yes
22011	Torque Reduction	floating point	16 bit integer	F03	yes	yes
22012	Max Torque	floating point	16 bit integer	F03	no	
22013	FastLink Trq En	ENUM	bool -> 16 bit integer	--	yes	yes
22014	FastLink Trq Ref	floating point	16 bit integer	F03	no	
22015	FL Trq Scale	floating point	16 bit integer	F24	yes	yes
22501	Motor Pot Output	floating point	32 bit integer	F25	no	
22502	Motor Pot Up Lim	floating point	floating point	--	yes	yes
22503	Motor Pot Lo Lim	floating point	floating point	--	yes	yes
22504	Motor Pot Acc	32 bit integer	32 bit integer	--	yes	yes
22505	Motor Pot Dec	32 bit integer	32 bit integer	--	yes	yes
22506	Motor Pot Init	floating point	floating point	--	yes	yes
22507	Motor Pot En	ENUM	bool -> 16 bit integer	--	yes	yes
22508	Motor Pot Reset	ENUM	bool -> 16 bit integer	--	yes	yes
22509	Motor Pot Mode	ENUM	bool -> 16 bit integer	--	yes	yes
22510	Motor Pot Memo	ENUM	bool -> 16 bit integer	--	yes	yes
22511	Motor Pot Dir	ENUM	bool -> 16 bit integer	--	yes	yes
23000	Speed Gain	16 bit integer	16 bit integer	--	yes	yes
23001	Position Gain	16 bit integer	16 bit integer	--	yes	yes
23002	Position I Gain	16 bit integer	16 bit integer	--	yes	yes
23003	Acc Gain	16 bit integer	16 bit integer	--	yes	yes
23010	Gain Mult Fct	ENUM	16 bit integer	--	yes	yes
24000	Alarm Status	32 bit unsigned integer	32 bit unsigned integer	--	no	
24101	Alarm Delay Mask	32 bit unsigned integer	32 bit unsigned integer	--	yes	yes
24102	Alarm Delay	floating point	16 bit unsigned integer	F23	yes	yes
24120	Warning Status	32 bit unsigned integer	32 bit unsigned integer	--	no	
29004	Act Ctrl Mode	ENUM	16 bit unsigned integer	--	no	
29103	RX Rev	32 bit integer	32 bit integer	--	no	
29104	RX Pos	32 bit integer	32 bit integer	--	no	
29106	TX Rev	32 bit integer	32 bit integer	--	no	
29107	TX Pos	32 bit integer	32 bit integer	--	no	
29108	RX Rev Aux	32 bit integer	32 bit integer	--	no	
29109	RX Pos Aux	32 bit integer	32 bit integer	--	no	
29110	TX Rev Aux	32 bit integer	32 bit integer	--	no	
29111	TX Pos Aux	32 bit integer	32 bit integer	--	no	
30000	Unit Per Rev	floating point	floating point	--	yes	yes
30001	Unit Per Div	floating point	floating point	--	yes	yes
30002	Multi Pos Enable	boolean	bool -> 16 bit integer	--	yes	yes
30004	Multi Pos Index	16 bit integer	16 bit integer	--	no	
30010	Pos CW Acc	floating point	32 bit integer	F02	yes	yes
30011	Pos CCW Acc	floating point	32 bit integer	F02	yes	yes
30012	Pos CW Dec	floating point	32 bit integer	F02	yes	yes
30013	Pos CCW Dec	floating point	32 bit integer	F02	yes	yes
30014	Position Speed	floating point	32 bit integer	F04	yes	yes
30015	Position Torque	floating point	16 bit integer	F03	yes	yes
30016	Actual Position	floating point	floating point	--	no	
30017	Min Preset Value	floating point	floating point	--	yes	yes
30018	Max Preset Value	floating point	floating point	--	yes	yes
30020	CW Home Pos Acc	floating point	32 bit integer	F02	yes	yes
30021	CCW Home Pos Acc	floating point	32 bit integer	F02	yes	yes
30022	CW Home Pos Dec	floating point	32 bit integer	F02	yes	yes
30023	CCW Home Pos Dec	floating point	32 bit integer	F02	yes	yes
30024	Home Max Spd	floating point	32 bit integer	F04	yes	yes
30025	Home Spd Ref	floating point	16 bit integer	F04	yes	yes
30027	Home Fine Spd	floating point	32 bit integer	F04	yes	yes
30028	Home Pos Offset	floating point	floating point	--	yes	yes
30036	Home Src Direc	ENUM	16 bit unsigned integer	--	yes	yes
30037	Zero Sensor En	ENUM	16 bit unsigned integer	--	yes	yes
30038	Zero Index En	ENUM	16 bit unsigned integer	--	yes	yes
30039	Inside Index Src	ENUM	16 bit unsigned integer	--	yes	yes
30040	Zero Sensor Edge	ENUM	16 bit unsigned integer	--	yes	yes
30041	Home Pos Offs En	ENUM	16 bit unsigned integer	--	yes	yes
30042	Start On Edge	ENUM	16 bit unsigned integer	--	yes	yes

IPA	Description	External format	Internal format	Conversion reference (1)	R/W	Write with drive enabled
30043	Stop By Ramp	ENUM	16 bit unsigned integer	--	yes	yes
30044	Pos Reach Behav	ENUM	16 bit unsigned integer	--	yes	yes
30045	Startup Zero Pos	boolean	bool -> 16 bit integer	--	yes	yes
30050	Pos Abs Thr	floating point	floating point	--	yes	yes
30051	Positon Thr	floating point	floating point	--	yes	yes
30052	Pos 0 Thr Offset	floating point	floating point	--	yes	yes
30053	Pos Thr Close 1	floating point	floating point	--	yes	yes
30054	Pos Thr Close 2	floating point	floating point	--	yes	yes
30055	Max Prs Abs Val	floating point	floating point	--	yes	yes
30056	Min Prs Abs Val	floating point	floating point	--	yes	yes
30057	Back Lash Window	floating point	floating point	--	yes	yes
30058	Pos Window	floating point	floating point	--	yes	yes
30059	Pos Window Time	floating point	16 bit unsigned integer	F23	yes	yes
30060	Pos Window Tout	floating point	16 bit unsigned integer	F23	yes	yes
30081	Destination Pos	floating point	floating point	--	no	
30090	Preset Index	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
30091	Positioning Mode	ENUM	16 bit unsigned integer	--	yes	yes
30093	Position Config	32 bit unsigned integer	32 bit unsigned integer	--	no	
30094	Pos Stop dec	floating point	32 bit integer	F02	yes	yes
30096	Pos An Wind Del	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
30097	Pos An Stdy Wind	floating point	floating point	--	yes	yes
30098	Pos An Filter	floating point	floating point	--	yes	yes
30099	Pos An Mode	ENUM	bool -> 16 bit integer	--	yes	yes
30100	Pos Preset 0	floating point	floating point	--	yes	yes
30101	Pos Preset 1	floating point	floating point	--	yes	yes
30102	Pos Preset 2	floating point	floating point	--	yes	yes
30103	Pos Preset 3	floating point	floating point	--	yes	yes
30104	Pos Preset 4	floating point	floating point	--	yes	yes
30105	Pos Preset 5	floating point	floating point	--	yes	yes
30106	Pos Preset 6	floating point	floating point	--	yes	yes
30107	Pos Preset 7	floating point	floating point	--	yes	yes
30108	Pos Preset 8	floating point	floating point	--	yes	yes
30109	Pos Preset 9	floating point	floating point	--	yes	yes
30110	Pos Preset 10	floating point	floating point	--	yes	yes
30111	Pos Preset 11	floating point	floating point	--	yes	yes
30112	Pos Preset 12	floating point	floating point	--	yes	yes
30113	Pos Preset 13	floating point	floating point	--	yes	yes
30114	Pos Preset 14	floating point	floating point	--	yes	yes
30115	Pos Preset 15	floating point	floating point	--	yes	yes
30116	Pos Preset 16	floating point	floating point	--	yes	yes
30117	Pos Preset 17	floating point	floating point	--	yes	yes
30118	Pos Preset 18	floating point	floating point	--	yes	yes
30119	Pos Preset 19	floating point	floating point	--	yes	yes
30120	Pos Preset 20	floating point	floating point	--	yes	yes
30121	Pos Preset 21	floating point	floating point	--	yes	yes
30122	Pos Preset 22	floating point	floating point	--	yes	yes
30123	Pos Preset 23	floating point	floating point	--	yes	yes
30124	Pos Preset 24	floating point	floating point	--	yes	yes
30125	Pos Preset 25	floating point	floating point	--	yes	yes
30126	Pos Preset 26	floating point	floating point	--	yes	yes
30127	Pos Preset 27	floating point	floating point	--	yes	yes
30128	Pos Preset 28	floating point	floating point	--	yes	yes
30129	Pos Preset 29	floating point	floating point	--	yes	yes
30130	Pos Preset 30	floating point	floating point	--	yes	yes
30131	Pos Preset 31	floating point	floating point	--	yes	yes
30132	Pos Preset 32	floating point	floating point	--	yes	yes
30133	Pos Preset 33	floating point	floating point	--	yes	yes
30134	Pos Preset 34	floating point	floating point	--	yes	yes
30135	Pos Preset 35	floating point	floating point	--	yes	yes
30136	Pos Preset 36	floating point	floating point	--	yes	yes
30137	Pos Preset 37	floating point	floating point	--	yes	yes
30138	Pos Preset 38	floating point	floating point	--	yes	yes
30139	Pos Preset 39	floating point	floating point	--	yes	yes
30140	Pos Preset 40	floating point	floating point	--	yes	yes
30141	Pos Preset 41	floating point	floating point	--	yes	yes
30142	Pos Preset 42	floating point	floating point	--	yes	yes
30143	Pos Preset 43	floating point	floating point	--	yes	yes
30144	Pos Preset 44	floating point	floating point	--	yes	yes
30145	Pos Preset 45	floating point	floating point	--	yes	yes

IPA	Description	External format	Internal format	Conversion reference (1)	R/W	Write with drive enabled
30146	Pos Preset 46	floating point	floating point	--	yes	yes
30147	Pos Preset 47	floating point	floating point	--	yes	yes
30148	Pos Preset 48	floating point	floating point	--	yes	yes
30149	Pos Preset 49	floating point	floating point	--	yes	yes
30150	Pos Preset 50	floating point	floating point	--	yes	yes
30151	Pos Preset 51	floating point	floating point	--	yes	yes
30152	Pos Preset 52	floating point	floating point	--	yes	yes
30153	Pos Preset 53	floating point	floating point	--	yes	yes
30154	Pos Preset 54	floating point	floating point	--	yes	yes
30155	Pos Preset 55	floating point	floating point	--	yes	yes
30156	Pos Preset 56	floating point	floating point	--	yes	yes
30157	Pos Preset 57	floating point	floating point	--	yes	yes
30158	Pos Preset 58	floating point	floating point	--	yes	yes
30159	Pos Preset 59	floating point	floating point	--	yes	yes
30160	Pos Preset 60	floating point	floating point	--	yes	yes
30161	Pos Preset 61	floating point	floating point	--	yes	yes
30162	Pos Preset 62	floating point	floating point	--	yes	yes
30163	Pos Preset 63	floating point	floating point	--	yes	yes
30164	Pos Return	floating point	floating point	--	yes	yes
30200	Pos Speed 0	floating point	32 bit integer	F04	yes	yes
30201	Pos Speed 1	floating point	32 bit integer	F04	yes	yes
30202	Pos Speed 2	floating point	32 bit integer	F04	yes	yes
30203	Pos Speed 3	floating point	32 bit integer	F04	yes	yes
30204	Pos Speed 4	floating point	32 bit integer	F04	yes	yes
30205	Pos Speed 5	floating point	32 bit integer	F04	yes	yes
30206	Pos Speed 6	floating point	32 bit integer	F04	yes	yes
30207	Pos Speed 7	floating point	32 bit integer	F04	yes	yes
30264	Pos Return Speed	floating point	32 bit integer	F04	yes	yes
30300	Pos CW Acc 0	floating point	32 bit integer	F02	yes	yes
30301	Pos CW Acc 1	floating point	32 bit integer	F02	yes	yes
30302	Pos CW Acc 2	floating point	32 bit integer	F02	yes	yes
30303	Pos CW Acc 3	floating point	32 bit integer	F02	yes	yes
30304	Pos CW Acc 4	floating point	32 bit integer	F02	yes	yes
30305	Pos CW Acc 5	floating point	32 bit integer	F02	yes	yes
30306	Pos CW Acc 6	floating point	32 bit integer	F02	yes	yes
30307	Pos CW Acc 7	floating point	32 bit integer	F02	yes	yes
30364	Pos Return Acc	floating point	32 bit integer	F02	yes	yes
30400	Pos CW Dec 0	floating point	32 bit integer	F02	yes	yes
30401	Pos CW Dec 1	floating point	32 bit integer	F02	yes	yes
30402	Pos CW Dec 2	floating point	32 bit integer	F02	yes	yes
30403	Pos CW Dec 3	floating point	32 bit integer	F02	yes	yes
30404	Pos CW Dec 4	floating point	32 bit integer	F02	yes	yes
30405	Pos CW Dec 5	floating point	32 bit integer	F02	yes	yes
30406	Pos CW Dec 6	floating point	32 bit integer	F02	yes	yes
30407	Pos CW Dec 7	floating point	32 bit integer	F02	yes	yes
30464	Pos Return Dec	floating point	32 bit integer	F02	yes	yes
30480	Pos CCW Acc 0	floating point	32 bit integer	F02	yes	yes
30481	Pos CCW Acc 1	floating point	32 bit integer	F02	yes	yes
30482	Pos CCW Acc 2	floating point	32 bit integer	F02	yes	yes
30483	Pos CCW Acc 3	floating point	32 bit integer	F02	yes	yes
30484	Pos CCW Acc 4	floating point	32 bit integer	F02	yes	yes
30485	Pos CCW Acc 5	floating point	32 bit integer	F02	yes	yes
30486	Pos CCW Acc 6	floating point	32 bit integer	F02	yes	yes
30487	Pos CCW Acc 7	floating point	32 bit integer	F02	yes	yes
30490	Pos CCW Dec 0	floating point	32 bit integer	F02	yes	yes
30491	Pos CCW Dec 1	floating point	32 bit integer	F02	yes	yes
30492	Pos CCW Dec 2	floating point	32 bit integer	F02	yes	yes
30493	Pos CCW Dec 3	floating point	32 bit integer	F02	yes	yes
30494	Pos CCW Dec 4	floating point	32 bit integer	F02	yes	yes
30495	Pos CCW Dec 5	floating point	32 bit integer	F02	yes	yes
30496	Pos CCW Dec 6	floating point	32 bit integer	F02	yes	yes
30497	Pos CCW Dec 7	floating point	32 bit integer	F02	yes	yes
30500	MPos 0 Progress	ENUM	16 bit integer	--	yes	yes
30501	MPos 1 Progress	ENUM	16 bit integer	--	yes	yes
30502	MPos 2 Progress	ENUM	16 bit integer	--	yes	yes
30503	MPos 3 Progress	ENUM	16 bit integer	--	yes	yes
30504	MPos 4 Progress	ENUM	16 bit integer	--	yes	yes
30505	MPos 5 Progress	ENUM	16 bit integer	--	yes	yes
30506	MPos 6 Progress	ENUM	16 bit integer	--	yes	yes

IPA	Description	External format	Internal format	Conversion reference (1)	R/W	Write with drive enabled
30507	MPos 7 Progress	ENUM	16 bit integer	--	yes	yes
30600	MPos 0 Dwell	32 bit integer	32 bit integer	--	yes	yes
30601	MPos 1 Dwell	32 bit integer	32 bit integer	--	yes	yes
30602	MPos 2 Dwell	32 bit integer	32 bit integer	--	yes	yes
30603	MPos 3 Dwell	32 bit integer	32 bit integer	--	yes	yes
30604	MPos 4 Dwell	32 bit integer	32 bit integer	--	yes	yes
30605	MPos 5 Dwell	32 bit integer	32 bit integer	--	yes	yes
30606	MPos 6 Dwell	32 bit integer	32 bit integer	--	yes	yes
30607	MPos 7 Dwell	32 bit integer	32 bit integer	--	yes	yes
30700	MPos 0 Event	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
30701	MPos 1 Event	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
30702	MPos 2 Event	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
30703	MPos 3 Event	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
30704	MPos 4 Event	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
30705	MPos 5 Event	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
30706	MPos 6 Event	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
30707	MPos 7 Event	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
30710	MPos 0 Next Pos	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
30711	MPos 1 Next Pos	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
30712	MPos 2 Next Pos	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
30713	MPos 3 Next Pos	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
30714	MPos 4 Next Pos	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
30715	MPos 5 Next Pos	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
30716	MPos 6 Next Pos	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
30717	MPos 7 Next Pos	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
30800	Pos Actual Event	16 bit unsigned integer	16 bit unsigned integer	--	no	
31000	Back Lash En	ENUM	16 bit unsigned integer	--	yes	yes
31001	Back Lash Dir	ENUM	16 bit unsigned integer	--	yes	yes
31002	Delta Pos	floating point	floating point	--	yes	yes
31003	Speed Comp	floating point	32 bit integer	F04	yes	yes
32000	Els PPR Master	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
32001	Els Ratio 0	floating point	32 bit integer	F26	yes	yes
32002	Els Ratio 1	floating point	32 bit integer	F26	yes	yes
32003	Els Ratio 2	floating point	32 bit integer	F26	yes	yes
32004	Els Ratio 3	floating point	32 bit integer	F26	yes	yes
32005	Actual Ratio	floating point	32 bit integer	F26	no	
32006	Els Ratio Index	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
32008	Els Delta Time	floating point	16 bit unsigned integer	F23	yes	yes
32009	Els Master Sel	ENUM	16 bit unsigned integer	--	yes	yes
32010	Els Mec Ratio	floating point	floating point	--	yes	yes
32011	Els FL Source	ENUM	16 bit integer	--	yes	yes
32012	ElsMec Ratio Mul	floating point	floating point	--	yes	yes
32013	ElsMec Ratio Div	floating point	floating point	--	yes	yes
32014	Els Delta Ratio	floating point	32 bit integer	F26	yes	yes
32015	FL Error	16 bit unsigned integer	16 bit unsigned integer	--	no	
32016	Els Control Mode	ENUM	bool -> 16 bit integer	--	yes	yes
32020	Els Ratio / Slip	ENUM	16 bit unsigned integer	--	yes	yes
32021	Els Slip Limit	16 bit integer	16 bit integer	--	yes	yes
32090	Els Ratio Range	ENUM	16 bit unsigned integer	--	yes	yes
32100	Els Max RB Speed	floating point	16 bit unsigned integer	F04	yes	yes
32101	Els RB Time	floating point	16 bit unsigned integer	F23	yes	yes
32102	Els RB Acc	floating point	16 bit unsigned integer	F02	yes	yes
32103	Els RB Dec	floating point	16 bit unsigned integer	F02	yes	yes
32104	Els RB Speed Ref	floating point	16 bit unsigned integer	F04	yes	yes
32105	Els RB Speed Sel	ENUM	16 bit unsigned integer	F04	yes	yes
32200	AnOut MaxPosErr	floating point	16 bit unsigned integer	F01	yes	yes
40113	Field Bus Status	ENUM	32 bit unsigned integer	--	no	
40114	FB Fail Cause	32 bit unsigned integer	32 bit unsigned integer	--	no	
40191	FB Assign M->S 2	ENUM	16 bit unsigned integer	--	yes	yes
40192	FB Assign M->S 3	ENUM	16 bit unsigned integer	--	yes	yes
40193	FB Assign M->S 4	ENUM	16 bit unsigned integer	--	yes	yes
40194	FB Assign M->S 5	ENUM	16 bit unsigned integer	--	yes	yes
40195	FB Assign M->S 6	ENUM	16 bit unsigned integer	--	yes	yes
40196	FB Assign M->S 7	ENUM	16 bit unsigned integer	--	yes	yes
40197	FB Assign M->S 8	ENUM	16 bit unsigned integer	--	yes	yes
40201	FB IPA M->S 2	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
40202	FB IPA M->S 3	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
40203	FB IPA M->S 4	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
40204	FB IPA M->S 5	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes

IPA	Description	External format	Internal format	Conversion reference (1)	R/W	Write with drive enabled
40205	FB IPA M->S 6	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
40206	FB IPA M->S 7	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
40207	FB IPA M->S 8	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
40211	FB Format M->S 2	ENUM	16 bit unsigned integer	--	yes	yes
40212	FB Format M->S 3	ENUM	16 bit unsigned integer	--	yes	yes
40213	FB Format M->S 4	ENUM	16 bit unsigned integer	--	yes	yes
40214	FB Format M->S 5	ENUM	16 bit unsigned integer	--	yes	yes
40215	FB Format M->S 6	ENUM	16 bit unsigned integer	--	yes	yes
40216	FB Format M->S 7	ENUM	16 bit unsigned integer	--	yes	yes
40217	FB Format M->S 8	ENUM	16 bit unsigned integer	--	yes	yes
40221	FB Exp M->S 2	16 bit integer	16 bit integer	--	yes	yes
40222	FB Exp M->S 3	16 bit integer	16 bit integer	--	yes	yes
40223	FB Exp M->S 4	16 bit integer	16 bit integer	--	yes	yes
40224	FB Exp M->S 5	16 bit integer	16 bit integer	--	yes	yes
40225	FB Exp M->S 6	16 bit integer	16 bit integer	--	yes	yes
40226	FB Exp M->S 7	16 bit integer	16 bit integer	--	yes	yes
40227	FB Exp M->S 8	16 bit integer	16 bit integer	--	yes	yes
40291	FB Assign S->M 2	ENUM	16 bit unsigned integer	--	yes	yes
40292	FB Assign S->M 3	ENUM	16 bit unsigned integer	--	yes	yes
40293	FB Assign S->M 4	ENUM	16 bit unsigned integer	--	yes	yes
40294	FB Assign S->M 5	ENUM	16 bit unsigned integer	--	yes	yes
40295	FB Assign S->M 6	ENUM	16 bit unsigned integer	--	yes	yes
40296	FB Assign S->M 7	ENUM	16 bit unsigned integer	--	yes	yes
40297	FB Assign S->M 8	ENUM	16 bit unsigned integer	--	yes	yes
40301	FB IPA S->M 2	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
40302	FB IPA S->M 3	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
40303	FB IPA S->M 4	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
40304	FB IPA S->M 5	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
40305	FB IPA S->M 6	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
40306	FB IPA S->M 7	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
40307	FB IPA S->M 8	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
40311	FB Format S->M 2	ENUM	16 bit unsigned integer	--	yes	yes
40312	FB Format S->M 3	ENUM	16 bit unsigned integer	--	yes	yes
40313	FB Format S->M 4	ENUM	16 bit unsigned integer	--	yes	yes
40314	FB Format S->M 5	ENUM	16 bit unsigned integer	--	yes	yes
40315	FB Format S->M 6	ENUM	16 bit unsigned integer	--	yes	yes
40316	FB Format S->M 7	ENUM	16 bit unsigned integer	--	yes	yes
40317	FB Format S->M 8	ENUM	16 bit unsigned integer	--	yes	yes
40321	FB Exp S->M 2	16 bit integer	16 bit integer	--	yes	yes
40322	FB Exp S->M 3	16 bit integer	16 bit integer	--	yes	yes
40323	FB Exp S->M 4	16 bit integer	16 bit integer	--	yes	yes
40324	FB Exp S->M 5	16 bit integer	16 bit integer	--	yes	yes
40325	FB Exp S->M 6	16 bit integer	16 bit integer	--	yes	yes
40326	FB Exp S->M 7	16 bit integer	16 bit integer	--	yes	yes
40327	FB Exp S->M 8	16 bit integer	16 bit integer	--	yes	yes
40916	PDO 2 RX TYPE	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
40917	PDO 3 RX TYPE	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
40926	PDO 2 TX TYPE	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
40927	PDO 3 TX TYPE	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
40931	PDO 2 TX INH	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
40932	PDO 3 TX INH	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
41001	PLC Enable Key	32 bit unsigned integer	32 bit unsigned integer	--	yes	yes
41199	FB Assign M->S10	ENUM	16 bit unsigned integer	--	yes	yes
41200	FB Assign M->S11	ENUM	16 bit unsigned integer	--	yes	yes
41201	FB Assign M->S12	ENUM	16 bit unsigned integer	--	yes	yes
41209	FB IPA M->S10	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
41210	FB IPA M->S11	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
41211	FB IPA M->S12	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
41219	FB Format M->S10	ENUM	16 bit unsigned integer	--	yes	yes
41220	FB Format M->S11	ENUM	16 bit unsigned integer	--	yes	yes
41221	FB Format M->S12	ENUM	16 bit unsigned integer	--	yes	yes
41229	FB Exp M->S10	16 bit integer	16 bit integer	--	yes	yes
41230	FB Exp M->S11	16 bit integer	16 bit integer	--	yes	yes
41231	FB Exp M->S12	16 bit integer	16 bit integer	--	yes	yes
41299	FB Assign S->M10	ENUM	16 bit unsigned integer	--	yes	yes
41300	FB Assign S->M11	ENUM	16 bit unsigned integer	--	yes	yes
41301	FB Assign S->M12	ENUM	16 bit unsigned integer	--	yes	yes
41309	FB IPA S->M10	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
41310	FB IPA S->M11	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes

IPA	Description	External format	Internal format	Conversion reference (1)	R/W	Write with drive enabled
41311	FB IPA S->M12	16 bit unsigned integer	16 bit unsigned integer	--	yes	yes
41319	FB Format S->M10	ENUM	16 bit unsigned integer	--	yes	yes
41320	FB Format S->M11	ENUM	16 bit unsigned integer	--	yes	yes
41321	FB Format S->M12	ENUM	16 bit unsigned integer	--	yes	yes
41329	FB Exp S->M10	16 bit integer	16 bit integer	--	yes	yes
41330	FB Exp S->M11	16 bit integer	16 bit integer	--	yes	yes
41331	FB Exp S->M12	16 bit integer	16 bit integer	--	yes	yes

Gefran worldwide

GEFRAN BENELUX
Lammerdries-Zuid, 14A
B-2250 OLEN
Ph. +32 (0) 14248181
Fax. +32 (0) 14248180
info@gefran.be

GEFRAN BRASIL ELETROELETRÔNICA
Avenida Dr. Altino Arantes,
377/379 Vila Clementino
04042-032 SÃO PAULO - SP
Ph. +55 (0) 1155851133
Fax +55 (0) 1132974012
gefran@gefran.com.br

GEFRAN DEUTSCHLAND
Philipp-Reis-Straße 9a
63500 SELIGENSTADT
Ph. +49 (0) 61828090
Fax +49 (0) 6182809222
vertrieb@gefran.de

SIEI AREG - GERMANY
Gottlieb-Daimler-Strasse 17/3
D-74385 Pleidelsheim
Ph. +49 7144 89 736 0
Fax +49 7144 89 736 97
info@sieiareg.de

GEFRAN ESPAÑA
Josep Pla, 163 2°-6ª
08020 BARCELONA
Ph. +34 934982643
Fax +34 932662713
comercial.espana@gefran.es

GEFRAN FRANCE
4, rue Jean Desparmet - BP 8237
69355 LYON Cedex 08
Ph. +33 (0) 478770300
Fax +33 (0) 478770320
commercial@gefran.fr

GEFRAN SUISSE SA
Rue Fritz Courvoisier 40
2302 La Chaux-de-Fonds
Ph. +41 (0) 329684955
Fax +41 (0) 329683574
office@gefran.ch

GEFRAN - UK Ltd.
7 Pearson Road, Central Park
TELFORD, TF2 9TX
Ph. +44 (0) 845 2604555
Fax +44 (0) 845 2604556
sales@gefran.co.uk

GEFRAN Inc.
8 Lowell Avenue
WINCHESTER - MA 01890
Toll Free 1-888-888-4474
Ph. +1 (781) 7295249
Fax +1 (781) 7291468
info@gefraninc.com

GEFRAN INDIA Pvt. Ltd.
Survey No: 182/1 KH, Bhukum,
Paud road, Taluka – Mulshi,
Pune - 411 042. MH, INDIA
Ph:+91-20-3939 4400
Fax: +91-20-3939 4401
gefran.india@gefran.in

GEFRAN INDIA Pvt. Ltd.
Head office (Pune office)
Survey No: 182/1 KH, Bhukum,
Paud road, Taluka – Mulshi,
Pune - 411 042. MH, INDIA
Ph:+91-20-3939 4400
Fax: +91-20-3939 4401
gefran.india@gefran.in

Branch office (Mumbai office)
Laxmi Palace, M.G. Road
Naupada, Thane (W)
400602 Mumbai
Ph. +91 22 2540 3384
Ph. +91 22 2542 6640
Fax +91 22 2542 7889
support.india@gefran.in

GEFRAN SIEI Electric Pte Ltd
Block B, Gr.Flr, No.155,
Fu Te Xi Yi Road,
Wai Gao Qiao Trade Zone
200131 Shanghai - CHINA
Ph. +86 21 5866 7816
Ph. +86 21 5866 1555
info@gefransiei.com.cn

GEFRAN SIEI Drives Technology
No.1265, Beihe Road,
Jiading District
201821 Shanghai - CHINA
Ph. +86 21 69169898
Fax +86 21 69169333
info@gefransiei.com.cn

GEFRAN

GEFRAN S.p.A.
Via Sebina 74
25050 Provaglio d'Iseo (BS)
ITALY
Ph. +39 030 98881
Fax +39 030 9839063
info@gefran.com
www.gefran.com

Drive & Motion Control Unit
Via Carducci 24
21040 Gerenzano (VA)
ITALY
Ph. +39 02 967601
Fax +39 02 9682653
infomotion@gefran.com

Technical Assistance :
technohelp@gefran.com

Customer Service :
motioncustomer@gefran.com
Ph. +39 02 96760500
Fax +39 02 96760278

Manuale XVy-EV -EN
Rev. 0.4 - 19.11.2010
1S3A43