Field oriented vector AC Drive

SIEDrive

ADV100

..... Quick start up guide

Specification and installation

GEFRAN

Information about this manual

The ADV100 Quick start guide is a handy-sized manual for mechanical installation, electrical connection and fast start-up.
The manual explaining the functions and a description of the parameters and the expansion card and fieldbus manuals can be found on the CD provided with the drive.

Software version
This manual is updated according the software version V 1.X.0.
Variation of the number replacing "X" have no influence on the functionality of the device.
The identification number of the software version is indicated on the identification plate of the drive or can be checked with the **Firmware ver.rel** - PAR 490 parameter, menu 2.6.

General information

Note ! In industry, the terms "Inverter", "Regulator" and "Drive" are sometimes interchanged. In this document, the term "Drive" will be used.

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 S.p.A 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.

Thank you for choosing this Gefran product.
We will be glad to receive any possible information which could help us improvingthis manual. The e-mail address is the following: techdoc@gefran.com.

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1 - Safety Precautions

1.1 Safety Precautions

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 passtrictement 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 le mode d'utilisation, la procédure et la condition d'exploitation. Si ces consignes ne sont pas strictement respectées, il y a des risques de détérioration ou de destruction des appareils.

Indicates that the presence of electrostatic discharge could damage the appliance. When handling the boards, always wear a grounded bracelet.

Indique que la présence de décharges électrostatiques est susceptible d'endommager l'appareil. Toujours porter un bracelet de mise à la terre lors de la manipulation des cartes.

Attention

Indicates a procedure, condition, or statement that should be strictly followed in order to optimize these applications.

Indique le mode d'utilisation, la procédure et la condition d'exploitation. Ces consignes doivent êtrerigoureusement 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

Qualified personnel

For the purpose of this Instruction Manual , a "Qualified person" is someone who is skilled to the installation, mounting, start-up and operation of the equipment and the hazards involved. This operator must have the following qualifications:

- trained in rendering first aid.
- trained in the proper care and use of protective equipment in accordance with established safety procedures.
- trained and authorized to energize, de-energize, clear, ground and tag circuits and equipment in accordance with established safety procedures.

Personne qualifiée

Aux fins de ce manuel d'instructions, le terme « personne qualifiée » désigne toute personne compétente en matière d'installation, de montage, de mise en service et de fonctionnement de l'appareil et au fait des dangers qui s'y rattachent. L'opérateur en question doit posséder les qualifications suivantes :

- *formation lui permettant de dispenser les premiers soins*
- *formation liée à l'entretien et à l'utilisation des équipements de protection selon les consigne de sécurité en vigueur*
- *formation et habilitation aux manoeuvres suivantes : branchement, débranchement, vérification des isolations, mise à la terre et étiquetage des circuits et des appareils selon les consignes de sécurité en vigueur*

Use for intended purpose only

The power drive system (electrical drive + application plant) may be used only for the application stated in the manual and only together with devices and components recommended and authorized by Gefran.

Utiliser uniquement dans les conditions prévues

Le système d'actionnement électrique (drive électrique + installation) ne peut être utilisé que dans les conditions d'exploitation et les lieux prévus dans le manuel et uniquement avec les dispositifs et les composants recommandés et autorisés par Gefran.

1.2 Safety precaution

The following instructions are provided for your safety and as a means of preventing damage to the product or components in the machines connected. This section lists instructions, which apply generally when handling electrical drives.

Specific instructions that apply to particular actions are listed at the beginning of each chapters.
Les instructions suivantes sont fournies pour la sécurité de l'utilisateur tout comme pour éviter l'endommagement du produit ou des composants à l'intérieur des machines raccordées. Ce paragraphe dresse la liste des instructions généralement applicables lors de la manipulation des drives électriques.
Les instructions spécifiques ayant trait à des actions particulières sont répertoriées au début de chaque chapitre.

Read the information carefully, since it is provided for your personal safety and will also help prolong the service life of your electrical drive and the plant you connect to it.
Lire attentivement les informations en matière de sécurité personnelle et visant par ailleurs à prolonger la durée de vie utile du drive tout comme de l'installation à laquelle il est relié.

1.3 General warnings

This equipment contains dangerous voltages and controls potentially dangerous rotating mechanical parts. Non-compliance with Warnings or failure to follow the instructions contained in this manual can result in loss of life, severe personal injury or serious damage to property.

Cet appareil utilise des tensions dangereuses et contrôle des organes mécaniques en mouvement potentiellement dangereux. L'absence de mise en pratique des consignes ou le non-respect des instructions contenues dans ce manuel peuvent provoquer le décès, des lésions corporelles graves ou de sérieux dégâts aux équipements.

Only suitable qualified personnel should work on this equipment, and only after becoming familiar with all safety notices, installation, operation and maintenance procedures contained in this manual. The successful and safe operation of this equipment is dependent upon its proper handling,installation, operation and maintenance.

Seul un personnel dûment formé peut intervenir sur cet appareil et uniquement après avoir assimilé l'ensemble des informations concernant la sécurité, les procédures d'installation, le fonctionnement et l'entretien contenues dans ce manuel. La sécurité et l'efficacité du fonctionnement de cet appareil dépendent du bon accomplissement des opérations de manutention, d'installation, de fonctionnement et d'entretien.

In the case of faults, the drive, even if disabled, may cause accidental movements if it has not been disconnected from the mains supply.

En cas de panne et même désactivé, le drive peut provoquer des mouvements fortuits s'il n'a pas été débranché de l'alimentation secteur.

Electrical Shock

The DC link capacitors remain charged at a hazardous voltage even after cutting off the power supply.

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 4.6.

Risque de décharge électrique

Les condensateurs de la liaison à courant continu restent chargés à une tension dangereuse même après que la tension d'alimentation a été coupée.

Ne jamais ouvrir l'appareil lorsqu'il est suns tension. Le temps minimum d'attente avant de pouvoir travailler sur les bornes ou bien àl'intérieur de l'appareil est indiqué dans la section 4.6.

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 probe 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 une sonde 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.

1.4 Instruction for compliance with UL Mark (UL requirements), U.S. and Canadian electrical codes

Short circuit ratings
ADV100 inverters must be connected to a grid capable of supplying a symmetrical short-circuit power of less than or equal to “xxxx A rms (at 480 V +10% V max).

The values of the “xxxx” A rms short-circuit current, in accordance with UL requirements (UL 508 c), for each motor power rating (Pn mot in the manual) are shown in the table below.

Short current rating	
Pn mot (kW)	SCCR (A) @480Vac
1,1...37,3	5000
39....149	10000

Note!

Drive will be protected by semiconductor Fuse type as specified in the instruction manual.

Branch circuit protection
In order to protect drive against over-current use fuses specified in **par. 5.1**.

Environmental condition
The drive has to be considered “Open type equipment”. Max surrounding air temperature equal to 40°C. Pollution degree 2.

Wiring of the input and output power terminals
Use UL listed cables rated at 75°C and round crimping terminals. Crimp terminals with tool recommended by terminal manufacturer.
Field wiring terminals shall be used with the tightening torque specified in **par. 7.1.1.**

Over-voltage control
In compliance with CSA-requirements Overvoltage at mains terminal is achieved installing an overvoltage protection device as for :
Type OVR 1N 15 320 from ABB or similar.

Minimum time required for safe DC-link voltage
Before removing drive cover in order to access internal parts, after mains disconnection wait for time as follow :

Drive size	Safe time (sec)
size 1.....4	300

Over-speed; over-load/current limit; motor overload
Drive incorporate over-speed, over-current/current limit, motor overload protection. Instruction manual specify degree of protection and detailed installation instruction.

2 - Introduction to the product

The new inverter series “SIEIDrive ADV100” represents an innovative concept in drive technology, as a result of the constant technological research and of the experience that the Gefran Group has acquired keeping a constant presence aside that of the major sector players.
The new range has been engineered and developed to satisfy the real needs of System Integrators and OEM’s in order to provide them the best innovations and economical competitiveness in the international markets.
Based on full mechanical modularity and on a powerful, intuitive and “fully open” programming platform, ADV100 offers absolute integration flexibility with high-end performance in any system architectures of the most advanced automation environments

• Modularity

An innovative concept of integrated technology that offers full modularity. Mountable side by side and with accessories specifically dedicated to system solutions, ADV100 has been engineered to make installation easy for any operator, both in existing systems and in specific machine solutions, always offering a real reduction of required space in the cabinet and the best manageability.

• Integrated Quality

ADV100 integrates (as standard on 4300 and higher sizes) the fundamental devices for an absolute quality level, such as the DC choke that ensures maximum reliability in any conditions of working and the input filter that renders the drive in compliance with the EMC normative EN61800-3.

• User-friendly.

Designed to ensure simple, fast management of the product in all installation and assembly scenarios, with easy access to extractible terminal strips to make each operation quick and immediate.

• Smart Connections

Dedicated accessories and fully removable terminals, ensure simple and fast installation and start-up in compliance with the EMC normative.

• Feedback

ADV120 models incorporate an encoder card for managing digital encoders.

• Serial Line

Integrated standard RS232 serial line with Modbus RTU protocol, for peer-to-peer connections.

• Cables shield

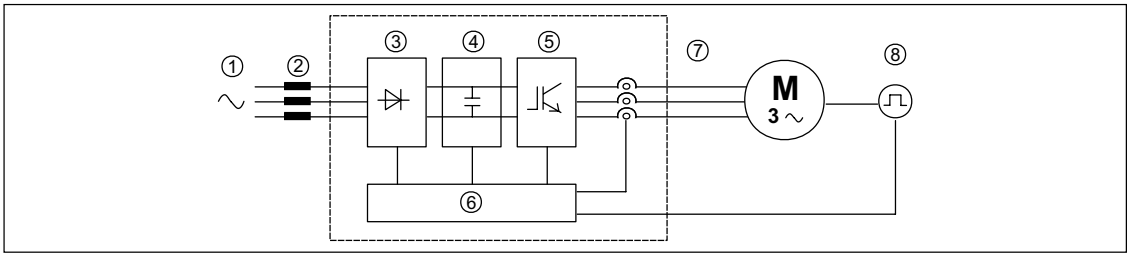
OMEGA clamp to grounding 360° of shielded cables. (optional).

• SD card

With ADV120-C models you can export and import drive configuration using the SD memory card (SD-ADL).

2.1 Identification of components

The inverter converts the constant frequency and voltage of an existing three-phase network into DC voltage, from which it obtains a new three-phase network with variable voltage and frequency. With this variable three-phase network the speed of three-phase asynchronous and synchronous motors can be controlled continuously.



1. **Mains supply voltage**
2. **Mains choke** (see chapter 5.2)
3. **Three-phase rectifier bridge**
   Converts AC voltage into DC voltage via a three-phase full wave bridge.
4. **Intermediate circuit**
   With pre-load resistor and levelling capacitors DC voltage (U_{DC}) =√2 x mains voltage (U_{LN})
5. **IGBT inverter bridge**
   Converts DC voltage into three-phase AC voltage with variable amplitude and frequency

6. **Configurable control section**

   Cards for controlling and regulating the closed and open-loop power section. Commands, references and reactions are connected to these.

7. **Output voltage**

   Three-phase AC voltage.

8. **Speed feedback encoder** (**see section 7.2.3 and Appendix**)

2.2 Product identification

The basic technical data of the inverter are included in the product code and data plate

Name of model (code)

ADV 120 - 1 040 - X X X - F - 4 - C

CANBus:
C = included

Rated voltage:
4 = 400Vca

EMI FILTER:
X = not included
F = included

Software:
X = standard

Braking unit:
X = not included
B = included

Keypad:
X = not included
K = included

Inverter power in kW:

040 = 4kW	220 = 22kW
055 = 5,5kW	300 = 30kW
075 = 7,5kW	370 = 37kW
110 = 11kW	450 = 45kW
150 = 15kW	550 = 55kW
185 = 18.5kW	750 = 75kW
	900 = 90kW

Mechanical dimensions of the drive:

1 = size 1	4 = size 4
2 = size 2	5 = size 5
3 = size 3	

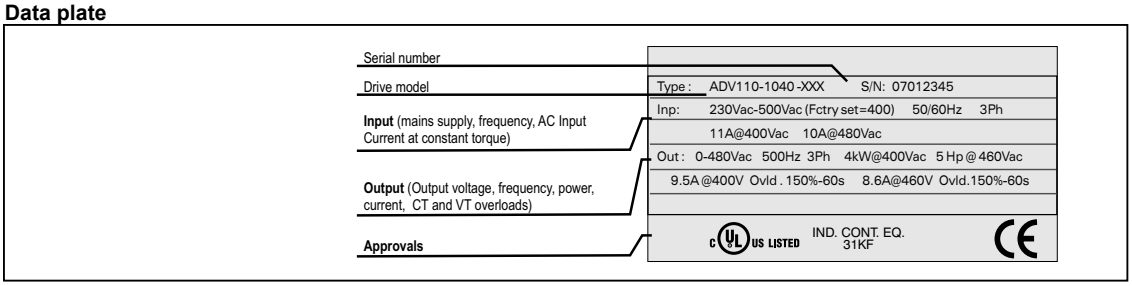
Regulation mode:
100 = BASIC, see Appendix
110 = FOC Sensorless
120 = FOC Closed loop

Inverter, ADV100 series

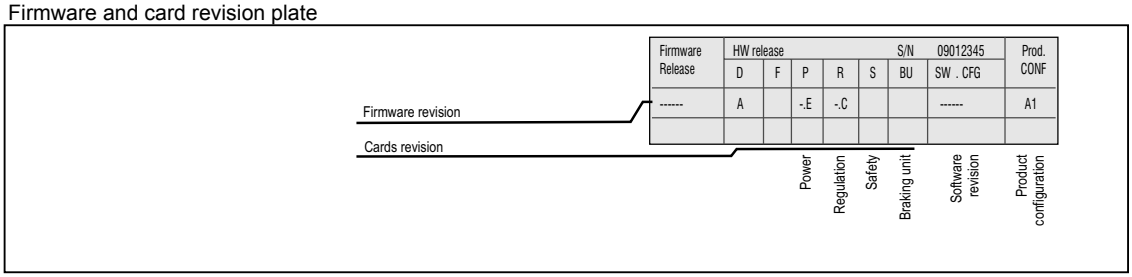
The inverter must be selected according to the rated current of the motor.
The rated output current of the drive must be higher than or equal to the rated current of the motor used.

The speed of the asynchronous motor depends on the number of pole pairs and frequency (plate and catalog data). If using a motor at speeds above the rated speed, contact the motor manufacturer for any related mechanical problems (bearings, unbalance, etc.). The same applies in case of continuous operation at frequencies of less than approx. 20 Hz (inadequate cooling, unless the motor is provided with forced ventilation).

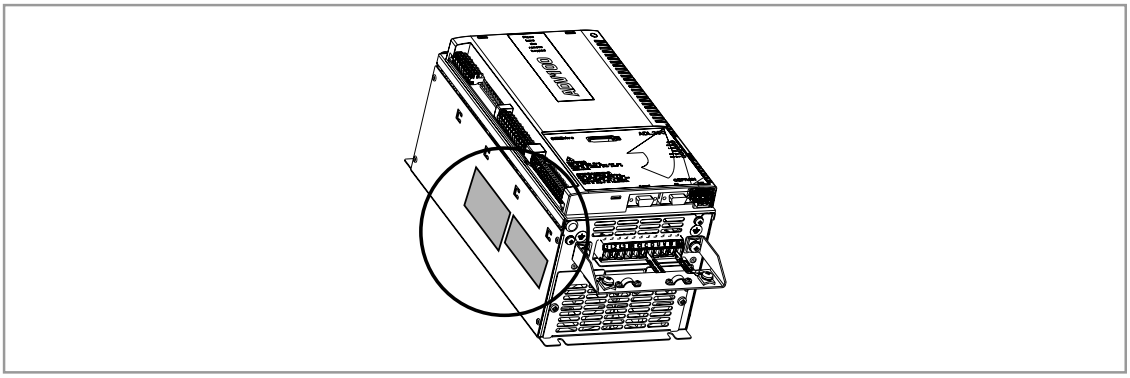
Data plate



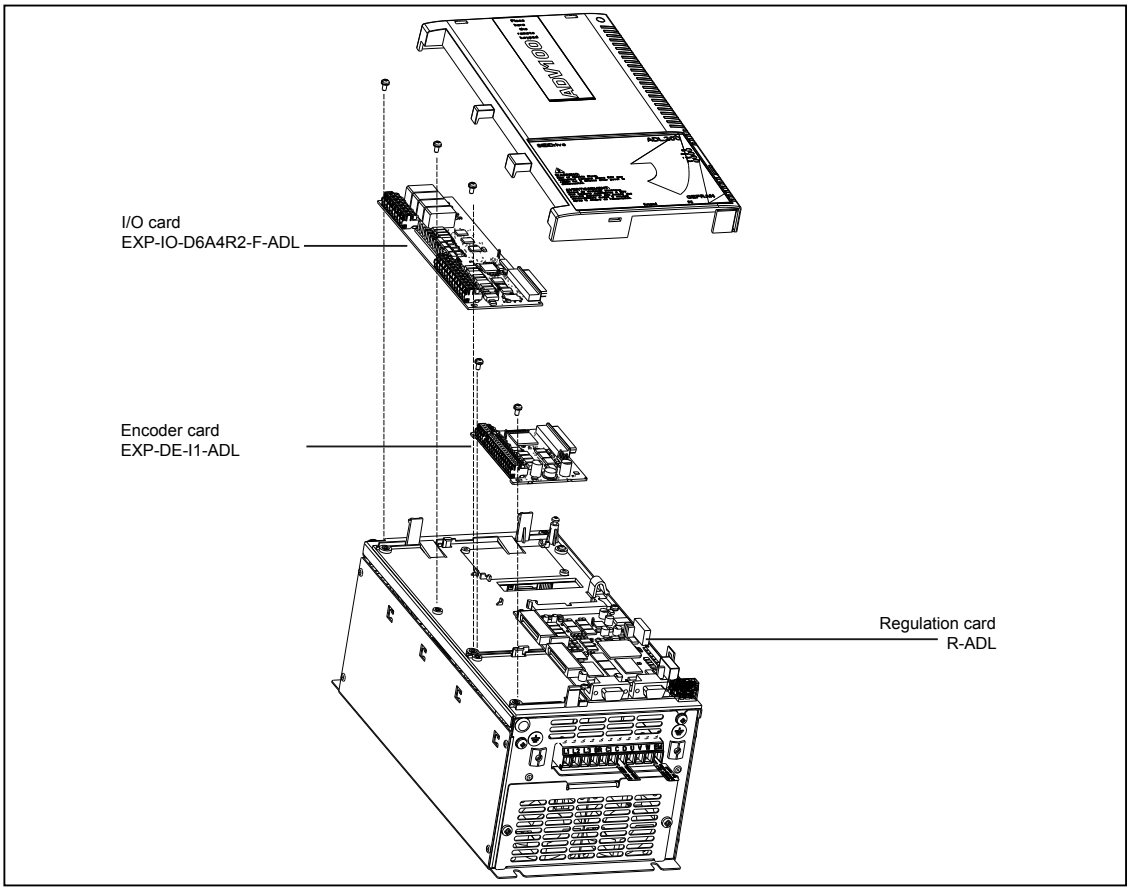
Firmware and card revision plate



Position of plates on the drive



2.3 Standard configurations



		Type / Description	Code	**ADV100** – ... – XXX – 4 Sensorless - Versione Basic	**ADV110** – ... – XXX – 4 Sensorless	**ADV110** – ... – XXX – F – 4 Sensorless + EMI Filter	**ADV120** – ... – XXX – 4 Sensorless + Encoder	**ADV120** – ... – XXX – F – 4 Sensorless + Encoder + EMI Filter	**ADV120** – ... – XXX – F – 4 – C Sensorless + Encoder + EMI Filter + CAN
Various		**KB-ADV100** Programming keypad with memory	S5P2T	○	○	○	○	○	○
		**SD-ADL** Adapter for SD card (data loading memory)	S574L	×	×	×	●	●	●
		**POWER SHIELD KIT** Power cable shielding kit (size 1-2)	S72610	○	○	○	○	○	○
		POWER SHIELD KIT Power cable shielding kit (size 3)	S72650	○	○	○	○	○	○
Regulation		**R-ADL** Basic regulation card	------	●	●	●	●	●	×
		RC-ADL Regulation card with integrated CAN	------	×	×	×	×	×	●
I/O card		**EXP-IO-D6A4R2-F-ADL** 1 enable input (Enable) + 6 digital inputs (DI) + 2 analog inputs (AI) + 2 analog outputs (AO) + 2 relay outputs (RO) The terminals of this card are not extractable.	S580L	○	●	●	●	●	●
		EXP-IO-D4-ADL 1 enable input (Enable) + 2 digital inputs (DI) + 2 digital outputs (DO)	S567L	○	○	○	○	○	○
		EXP-IO-D5R3-F-ADL 1 enable input (Enable) + 5 digital inputs (DI) + 3 relay outputs (RO). The terminals of this card are not extractable.	S5L08	○	○	○	○	○	○
		EXP-IO-D8R4-ADL 1 enable input (Enable) + 8 digital inputs (DI) + 4 relay outputs (RO)	S568L	○	○	○	○	○	○
		EXP-IO-D8A4R4-ADL 1 enable input (Enable) + 8 digital inputs (DI) + 2 analog inputs (AI) + 2 analog outputs (AO) + 4 relay outputs (RO)	S570L	○	○	○	○	○	○
		EXP-IO-D12A2R4-ADL 1 enable input (Enable) + 8 digital inputs (DI) + 4 digital outputs (DO) + 2 analog inputs (AI) + 4 relay outputs (RO)	S569L	○	○	○	○	○	○
		EXP-IO-D16R4-ADL 1 enable input (Enable) + 12 digital inputs (DI) + 4 digital outputs (DO) + 4 relay outputs (RO)	S566L	○	○	○	○	○	○
Encoder cards		**EXP-DE-I1-ADL** Digital encoder 2 Channels	S5L36	○	○	○	●	●	●
		EXP-DE-I1R1F2-ADL Digital encoder 3 Channels + Repeat + 2 Freeze	S5L04	○	○	○	○	○	○

● = standard, ○ = optional , × = not possible

Note!

All the optional I/O and encoder cards available for the ADV100 Basic versions or upon request are listed in the Appendix.

3 - Transport and storage

Caution

Correct transport, storage, erection and mounting, as well as careful operation and maintenance are essential for proper and safe operation of the equipment.

Protect the inverter against physical shocks and vibration during transport and storage. Also be sure to protect it against water (rainfall) and excessive temperatures.

Le bon accomplissement des opérations de transport, de stockage, d'installation et de montage, ainsi que l'exploitation et l'entretien minutieux, sont essentiels pour garantir à l'appareil un fonctionnement adéquat et sûr.

If the Drives have been stored for longer than two years, the operation of the DC link capacitors may be impaired and must be "reformed". Before commissioning devices that have been stored for long periods, connect them to a power supply for two hours with no load connected in order to regenerate the capacitors, (the input voltage has to be applied without enabling the drive).

En cas de stockage des variateurs pendant plus de deux ans, il est conseillé de contrôler l'état des condensateurs CC avant d'en effectuer le branchement. Avant la mise en service des appareils, ayant été stockés pendant long temps, il faut alimenter variateurs à vide pendant deux heures, pour régénérer les condensateurs : appliquer une tension d'alimentation sans actionner le variateur.

3.1 General

A high degree of care is taken in packing the ADV100 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 applieswhen 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. 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!

3.2 Permissible Environmental Conditions

Temperature:

storage _____ 20…+55°C (-4…+131°F)
transport _____ -20…+60°C (-4…+140°F)

Air humidity:

storage _____ 5% to 95 %, 1 g/m^3 to 29 g/m^3 (Class 1K3 as per EN50178)
transport _____ 95 % (3), 60 g/m^3 (4)

A light condensation of moisture may occur for a short time occasionally if the device is not in operation (class 2K3 as per EN50178)

Air pressure:

storage _____ [kPa] 86 a 106 (class 1K4 as per EN50178)
transport _____ [kPa] 70 a 106 (class 2K3 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).

Attention

Drive shall operate under environmental service conditions (climatic, mechanical, pollution, ...) defined in EN61800-2 as for "usual service conditions".

4 - Specification

4.1 Environmental Conditions

Installation location	Pollution degree 2 or lower (free from direct sunligth, vibration, dust, corrosive or inflammable gases, fog, vapour oil and dripped water, avoid saline environment)
Installation altitude	Max 2000m (6562 feet) above sea level. With 1.2% reduction in output current for every 100 m starting from 1000 m.
Mechanical conditions for installation	Vibrational stress: EN 60721-3-3 Class 3M1
Operating temperature	-10…+40°C (32°…104°F). Operation at temperatures of > 50°C is not allowed
Operating temperature (1)	+40 ... +50°C with derating, (+104 … +122°F with derating)
Air humidity (operating)	from 5 % to 85 % and from 1 g/m^3 to 25 g/m^3 with no humidity (or condensation)
Air pressure (operating) [kPa]	from 70 to 106

(1) In menu 4 - DRIVE CONFIG set the Ambient temperature parameter, PAR 564, to 1 (50°C).10 % derating of output current.

Attention

Drive shall operate under environmental service conditions (climatic, mechanical, pollution, ...) defined in EN61800-2 as for "usual service conditions".

4.2 Standards

Climatic conditions	EN 60721-3-3
Electrical safety	EN 50178, EN 61800-5-1, UL508C, UL840 degree of pollution 2 (PD2, OV3)
Vibration	EN 60068-2-6
EMC compatibility	EN 61800-3 (with internal or extenal filter)
Protection degree	IP20
Approvals	CE, UL, cULus *(in certification phase)*

4.3 Precision

4.3.1 Speed control

Speed control precision	FOC with Speed feedback : 0.01 % rated speed FOC open loop : ± 30 % rated slip V/F : ± 60 % rated slip

4.3.2 Speed control limits

Speed range (*)	± 32000 rpm
Speed format (*)	32 bit
Frequency range	± 2000 Hz
Max frequency	FVCL: 300Hz, FVOL : 150 Hz, VF : 500 Hz
Min frequency	0 Hz

(*) referred to Full scale speed, PAR:680.

4.3.3 Torque control

Torque resolution (*)	> 0.1 %
Torque control precision (*)	Flux vector CL with feedback: ± 5%
Direct torque control	yes
Current limitation	Limits ±, Mot/gen limits, Variable limits

(*) referred to rated torque

4.3.4 Current rating

Overload	150% 60 sec, 180% 0,5 sec.
Switching frequency mode	Constant : 4 kHz Variable : 8, 4 kHz, function of temperature and output frequency

4.4 Input electrical data

Input voltage, U_{LN} _____ three-phase network 230 V_{CA} (-15%) ... 500 V_{CA} (+5%)
Power supply system_____ TT, TN with EMI filter, IT without EMI filter (no UL)
Maximum line voltage unbalance _____ 3%
Input frequency _____ 50/60 Hz, ± 2%
Overvoltage threshold _____ 820 V_{CC}
Undervoltage threshold _____ @ 480V = 470 V_{CC} ; @ 400V = 390 V_{CC}; @ 230V = 225 V_{CC}
Choke _____ Sizes 1...3: Optional (DC or AC), size 4 : integrated (DC)
Total harmonic distortion (THD) _____ > 100% sizes 1040 ... 3220 (without choke)
< 50% sizes 4300 ... 5900 (with integrated choke)

Size	Effective input current In (@ In out)	
	@ 230 V@ 230 - 400 Vca (A)ac (A)	@ 480 Vca (A)0 Vca (A)
1040	11	10
1055	16	14
2075	20	18
2110	28	26
3150	40	38
3185	47	44
3220	53	49
4300	53	50
4370	64	60
4450	74	71
5550	100	92
5750	143	135
5900	171	165

4.5 Output electrical data

Maximum output voltage U2 _____ 0.98 x U_{LN} (U_{LN} = AC input voltage)
Maximum output frequency f2 _____ 500 Hz
IGBT braking unit _____ Standard internal (with external resistor); braking torque 150% MAX

Size	In Rated output current (fsw = default)		Pn mot (Recommended motor power ,fsw = default)		fsw Switching frequency		Derating factor			
	@U_{LN} = 400V_{CA}	@U_{LN} = 460V_{CA}	@U_{LN} = 400V_{CA}	@U_{LN} = 460V_{CA}	Default	Higher	Kv	Kt	Kf	Kalt
	(A)	(A)	(kW)	(Hp)			(1)	(2)	(3)	(4)
1040	9,5	8,6	4	5	4	6, 8, 10, 12	0,9	0,9	0,85; 0,7; 0,6; 0,5	1,2
1055	13	11,7	5,5	7,5	4	6, 8, 10, 12	0,9	0,9	0,85; 0,7; 0,6; 0,5	1,2
2075	16,5	14,9	7,5	10	4	6, 8, 10, 12	0,9	0,9	0,85; 0,7; 0,6; 0,5	1,2
2110	23	20,7	11	15	4	6, 8, 10, 12	0,9	0,9	0,85; 0,7; 0,6; 0,5	1,2
3150	31	27,9	15	20	4	6, 8, 10, 12	0,9	0,9	0,85; 0,7; 0,6; 0,5	1,2
3185	38	34,2	18,5	25	4	6, 8, 10, 12	0,9	0,9	0,85; 0,7; 0,6; 0,5	1,2
3220	46	41,4	22	30	4	6, 8, 10, 12	0,9	0,9	0,85; 0,7; 0,6; 0,5	1,2
4300	62	55,8	30	40	4	6, 8, 10, 12	0,9	0,9	0,85; 0,7; 0,6; 0,5	1,2
4370	75	67,5	37	50	4	6, 8, 10, 12	0,9	0,9	0,85; 0,7; 0,6; 0,5	1,2
4450	87	78	45	60	4	6, 8	0,9	0,9	0,85; 0,7	1,2
5550	105	94,5	55	75	4	6, 8	0,9	0,9	0,85; 0,7	1,2
5750	150	135	75	100	4	6, 8	0,9	0,9	0,85; 0,7	1,2
5900	180	162	90	125	4	6, 8	0,9	0,9	0,85; 0,7	1,2

(1) K_V : Derating factor for mains voltage at 460V_{AC}
(2) K_T : Derating factor for 50°C ambient temperature (1 % each °C above 40°C)
(3) K_F : Derating factor for higher switching frequency
(4) K_{ALT} : Derating factor for installation at altitudes above 1000 meters a.s.l.. Value to be applied at each 100 m increase above 1000 m
I.e.: Altitude 2000 m, K_{ALT} = 1,2 *10 = 12% di derating; I_N derated = (100 - 12) % = 88 % I_N

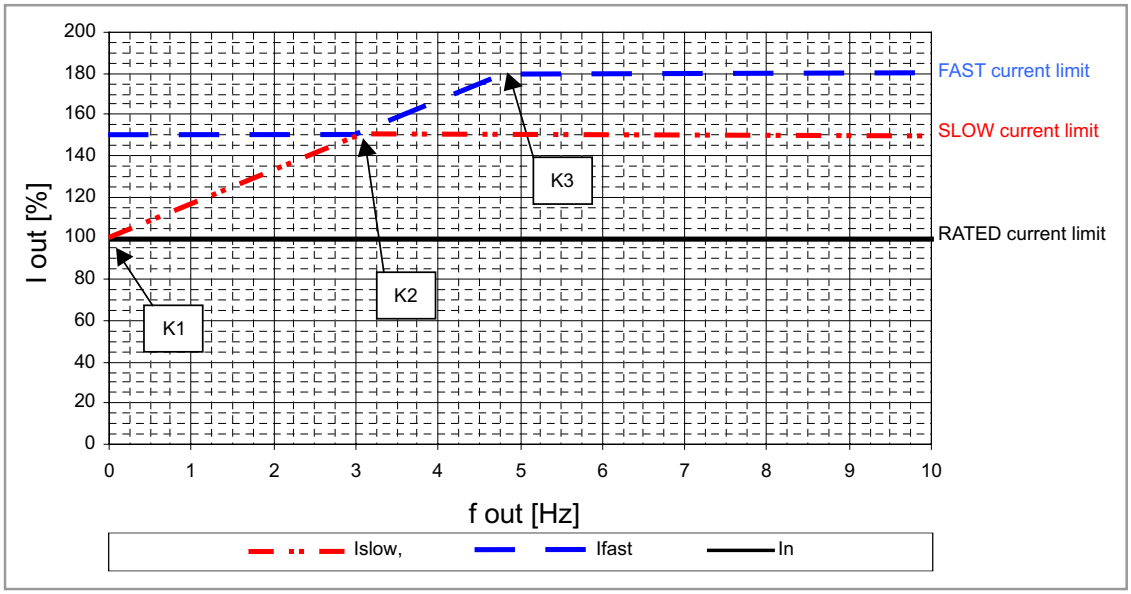
Size	Overload		OT
	150 % x In (1' each 5') (A)	180 % x In (0.5'' each 5') (A)	[°C]
1040	14,3	17,1	78
1055	19,5	23,4	80
2075	24,8	29,7	80
2110	34,5	41,4	85
3150	46,5	55,8	92
3185	57,0	68,4	85
3220	69,0	82,8	87
4300	93,0	111,6	87
4370	112,5	135,0	88
4450	130,5	156,6	90
5550	157,5	189,0	85
5750	225,0	270,0	90
5900	270,0	324,0	93

4.5.1 Current limits positions according to output frequency

- **k1** indicates the direct current (as a percentage with respect to the rated current) that the drive can deliver at a frequency of 0 Hz.
- **k2** indicates the frequency at which the drive can deliver the 150% limit. Between 0 Hz and k2 the limit follows a linear pattern and thus also determines the **k3** frequency at which the drive can deliver the 180% limit.
- **OT** (Drive overload temperature limit) below this temperature the 150% FAST current limit is also enabled for frequencies lower than k2; above this temperature only the slow current limit is enabled and this varies according to the output frequency and the ambient temperature (max 50°C).

The active current limit is always **FAST**; if fast I2t is loaded, the active current limit is **SLOW**. If SLOW I2t is loaded the active current limit is **RATED**.

Figure 4.5.1: CURRENT LIMITS - K1 = 100, K2 = 3, K3 (calculated = 4.8 Hz)



Size	In [A]	Overload 150 %	
		K1 [%]	K2 [Hz]
1040	9,5	100	3
1055	13	100	3
2075	16,5	100	3
2110	23	100	3
3150	31	100	5
3185	38	100	5
3220	46	100	3
4300	62	100	3
4370	75	100	3
4450	87	100	3
5550	105	100	3
5750	150	100	5
5900	180	100	5

4.5.2 Switching frequency

1) PAR 568 **Switching freq mode** = [0] Constant

PAR 562 Swit**ching frequency** = see chapter 4.5, default column "Switching frequency".
It is possible to set a fixed switching frequency (from 4 to 12 kHz depending on the size and with derating where applicable).

2) PAR 568 **Switching freq mode** = [1] Variable

PAR 562 Swit**ching frequency =** no effect
The switching frequency is variable between two levels (hswf and lswf) which are defined by the heatsink temperature and output frequency:

hswf = Default switching frequency
lswf = Switching frequency when Fout or T reach the values showed in table

Size	fsw Switching frequency		F out	T
	Higher [kHz]	Lower [kHz]	[Hz]	[°C]
1040	8	4	3	70
1055	8	4	3	75
2075	8	4	3	70
2110	8	4	3	70
3150	8	4	3	70
3185	8	4	3	75
3220	8	4	3	75
4300	8	4	3	65
4370	8	4	3	70
4450	8	4	3	75
5550	8	4	3	70
5750	8	4	5	65
5900	8	4	5	65

4.6 Voltage level of the inverter for safe operations

The minimum time between the moment in which an ADV100 inverter is disabled from the mains and that in which an operator can operate on internal parts of the inverter, without the danger of electric shock, **is 5 minutes**.

Attention

This value takes into account the time to turn off an inverter supplied at 460 VAC + 10%, without any options (time indicated for disabled inverter condition).

4.7 Cooling

All inverters are fitted with internal fans (+ 24V) and threshold control (ON @ 55°C and OFF @ 45°C).

Size	Pv (Heat dissipation)	Fan capacity	
	@ULN=230...460VAC (*)	Heat sink (m^3/h)	Internal (m^3/h)
1040	120	32	-
1055	160	2 x 56	-
2075	200	2 x 56	-
2110	250	2 x 32	-
3150	300	2 x 80	32
3185	380	2 x 80	32
3220	460	2 x 80	32
4300	600	2 x 250	2 x 50
4370	900	2 x 250	2 x 50
4450	1000	2 x 250	2 x 50
5550	1290	2 x 285	1 x 170
5750	1760	2 x 355	2 x 170
5900	2150	2 x 355	2 x 170

(*) values that refer to operation at default switching frequency.

4.8 Weights and dimensions

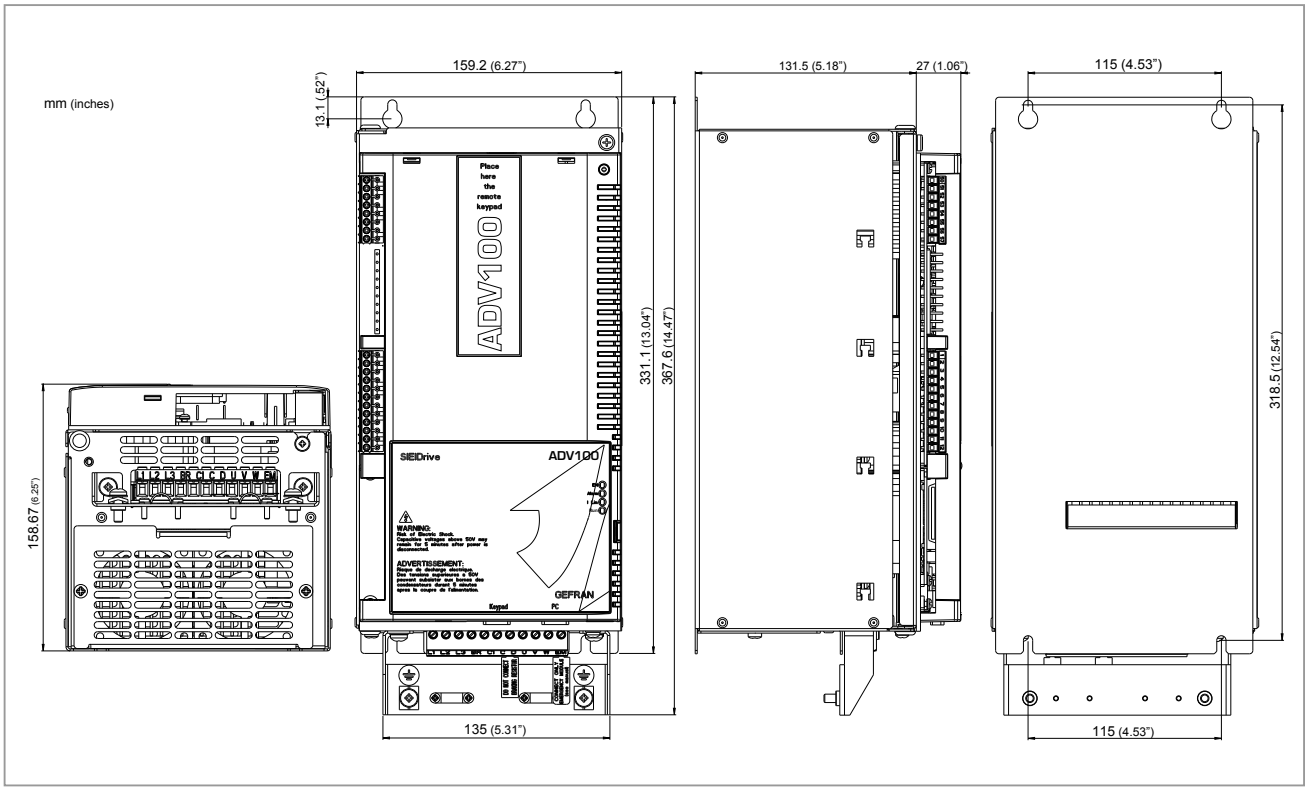


Figure 4.8.1: Size 1 dimensions

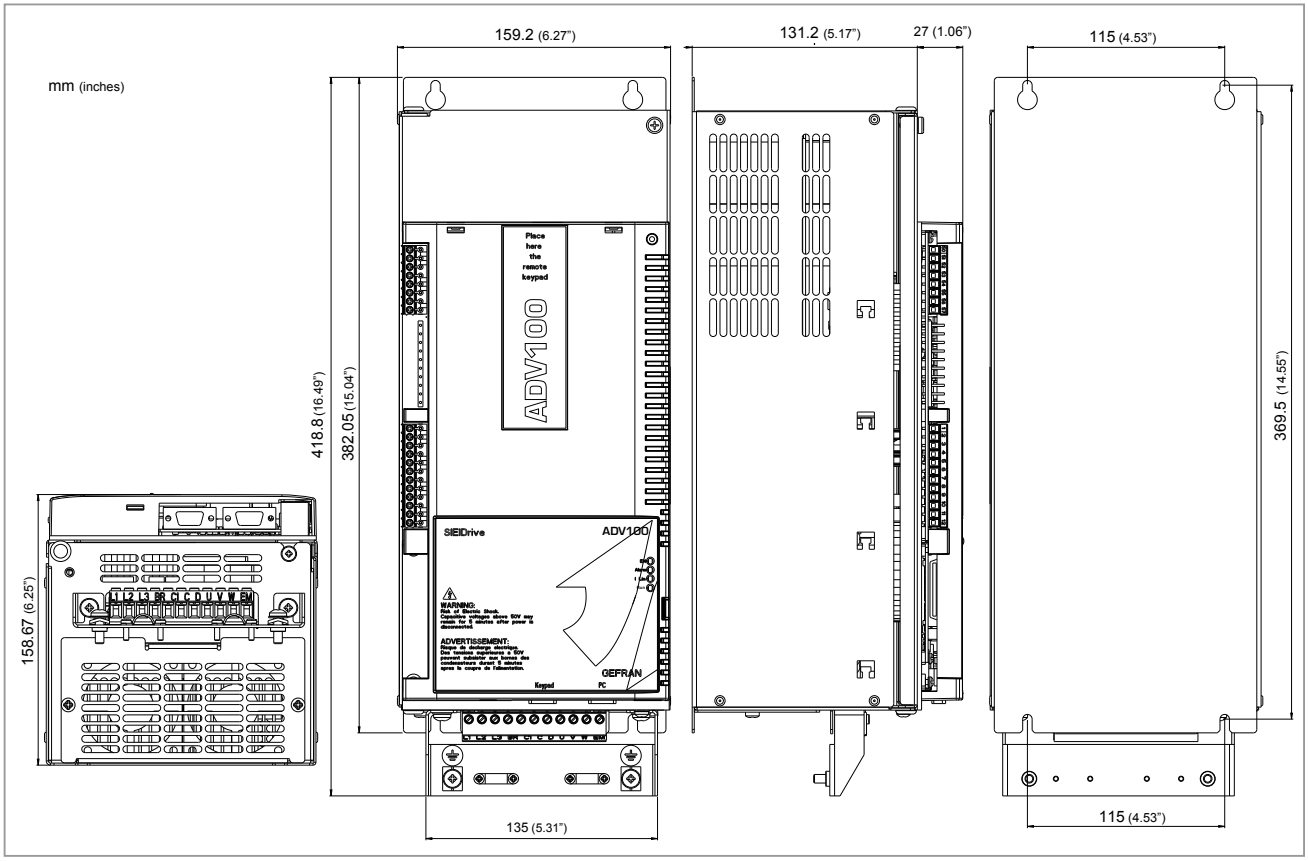


Figure 4.8.2: Size 2 dimensions

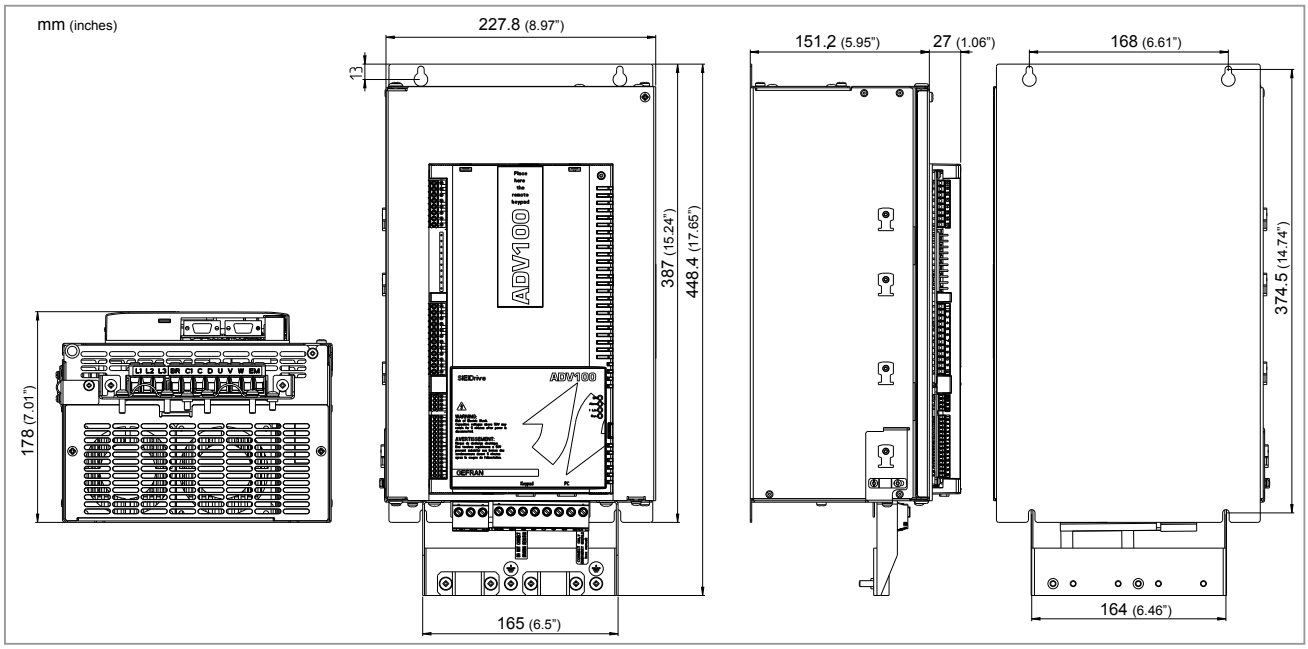


Figure 4.8.3: Size 3 dimensions

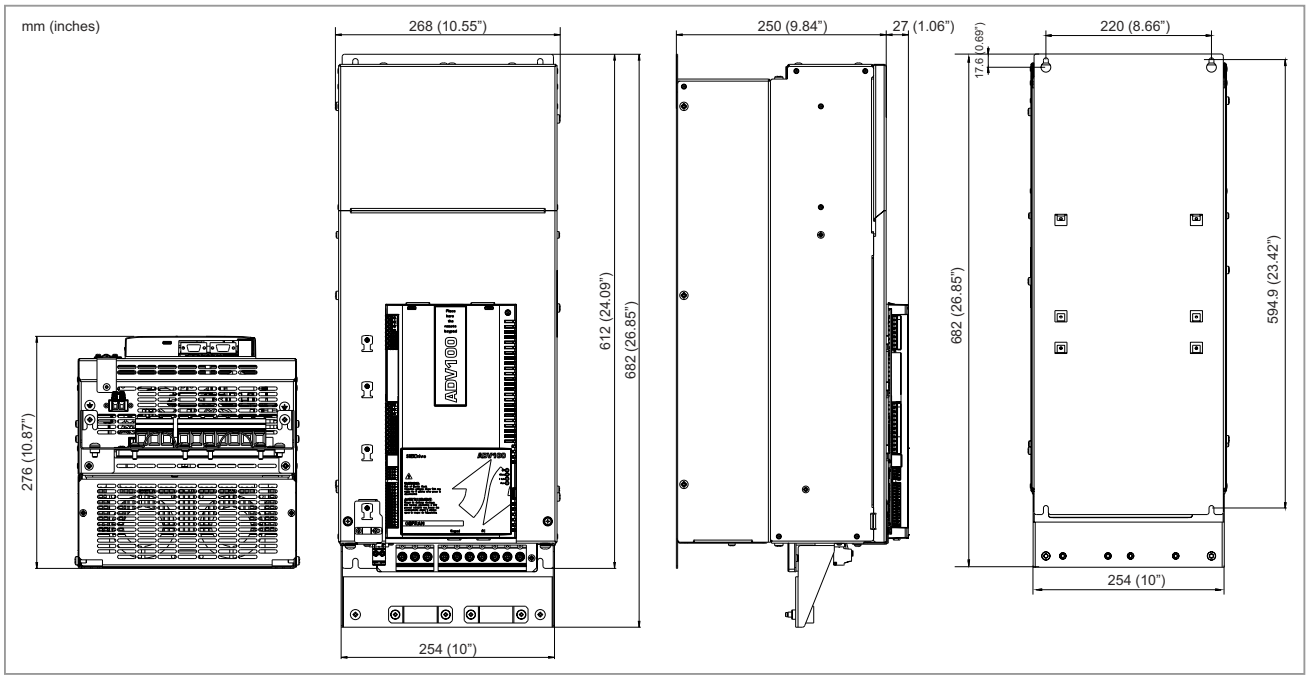


Figure 4.8.4: Size 4 dimensions

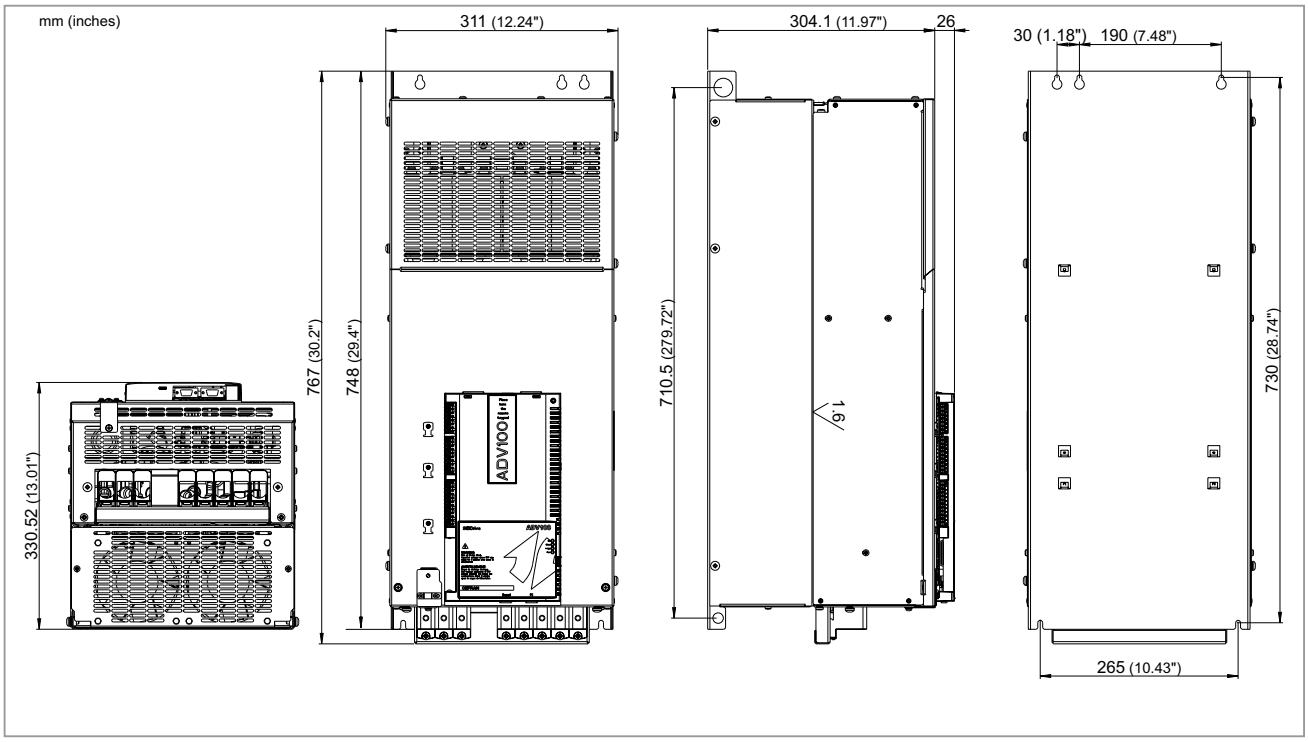


Figure 4.8.5: Size 5 dimensions

Size	Weight (kg)	Weight (lbs)
1040 - 1055	5,8	12,8
2075 - 2110	7,8	17,2
3150 ... 3220	10,5	23,15
4300 ... 4450	32	70,6
5550 ... 5900	60	132.28

Note! Weights referred to standard drive without keypad, no options, packaging not included.

5 - Options

5.1 Optional external fuses

5.1.1 Network side fuses (F1)

The inverter must be fused upstream on the network side.
Use fast-acting fuses only.

Size	F1 - External network side fuses				
	DC link capacitor hours of service life [h]	EUROPE		AMERICA	
		Type	Code	Type	Code
1040	15000	GRD2/20	F4D15	A70P20	S7G48
1055	15000	GRD2/25	F4D16	A70P25	S7G48
2075	15000	GRD2/25	F4D16	A70P25	S7G48
2110	15000	GRD3/35	F4D20	A70P35	S7G51
3150	15000	Z22GR63	F4M17	A70P60-4	S7I34
3185	15000	Z22GR63	F4M17	A70P60-4	S7I34
3220	15000	Z22GR80	F4M19	A70P80	S7G54
4300	50000	S00C+/üf1/80/80A/690V	F4EAF	A70P80	S7G54
4370	50000	S00C+/üf1/80/80A/690V	F4EAF	A70P80	S7G54
4450	50000	S00C+/üf1/80/100A/690V	F4G18	A70P100	S7G55
5550	50000	S00C+/üf1/80/125A/690V	F4EAJ	A70P150	S7G56
5750	50000	S00/üf1/80/160A/690V	F4EAL	A70P150	S7G56
5900	50000	S00/üf1/80/200A/690V	F4G23	A70P200	S7G58

Technical data for fuses, including dimensions, weights, power leakage, fuse carriers etc. are reported in the corresponding manufacturers' data sheets:
GRD... (E27), S00... Jean Müller, Eltville

A70... Ferraz

5.1.2 Fuses of the power section DC input side (F2)

Use the following fuses when a Line Regen converter is used (for more details refer to the converter instruction manual):

Taglia	F2 - External fuses for DC input side			
	EUROPA		AMERICA	
	Tipo	Codice	Tipo	Codice
1040	GRD2/20	F4D15	A70P20	S7G48
1055	GRD2/25	F4D16	A70P25	S7G48
2075	GRD3/35	F4D20	A70P35	S7G51
2110	GRD3/50	F4D21	A70P50	S7G53
3150	Z22GR63	F4M17	A70P60-4	S7I34
3185	Z22GR80	F4M19	A70P80	S7G54
3220	Z22GR80	F4M19	A70P80	S7G54
4300	Z22GR80	F4M19	A70P80	S7G54
4370	S00C+/uf1/80/100A/690V	F4G18	A70P100	S7G55
4450	S00C+/uf1/80/125A/690V	F4EAJ	A70P150	S7G56
5550	S00C+/uf1/80/160A/690V	F4EAL	A70P150	S7G56
5750	S00/uf1/80/200A/690V	F4G23	A70P200	S7G58
5900	S00/uf1/80/250A/690V	F4G28	A70P250	S7G59

The technical data of the fuses, e.g. dimensions, weights, heat dissipation, auxiliary contactors, are reported in the corresponding manufacturer data sheets.
GRD... (E27), S... Jean Müller, Eltville

A70... Ferra

5.2 Input chokes

The three-phase mains choke is strongly recommended in order to:

- limit the RMS input current of the ADV100 inverter.
- increase the life of intermediate circuit capacitors and reliability of input diodes.
- reduce the harmonic current distortion absorbed by the mains to typical values of 70% (at the rated current).

Mains chokes are optional from size 1040 to size 3220; on bigger sizes the choke is integrated in the DC link.

5.2.1 AC input chokes

Size	THD (%)	I_N (@400V/50Hz, with AC input chokes) (A)	Model	Code
1040	< 70 %	9	LR3y-2040	S7AAG
1055		13	LR3y-2055	S7AB5
2075		16	LR3y-2075	S7AB6
2110		22	LR3y-3110	S7AB7
3150		30	LR3y-3150	S7AB8
3185		38	LR3-022	S7FF4
3220		45	LR3-022	S7FF4

To reduce the line current THD even more (< 35%), use DC chokes wired between terminals C1 and C.

Size	THD (%)	I_N (@400V/50Hz, with AC input chokes) (A)	Model	Code
1040	< 35 %	8	LDC-004	S7AI10
1055		12	LDC-005	S7AI11
2075		15	LDC-007	S7AI12
2110		20	LDC-011	S7AI13
3150		28	LDC-015	S7AI14
3185		35	LDC-022	S7AI15
3220		40	LDC-022	S7AI15

Note! Refer to the Gefran Accessories catalogue (1S9I09) for choke weights and dimensions.

5.3 AC output chokes

Output chokes are used to reduce dv/dt of power modules (IGBT). Voltage fronts can cause damage to motor isolation systems or, if the motor cables are long (normally more than 100 m) or highly capacitive, they can cause drive malfunctions and repeated signalling of overcurrent (OC) or desaturation (DESAT) conditions. The output chokes are listed in the table below:

Sizes	Mains inductance (mH)	Rated current (A)	Saturation current (A)	Type	Code
1040	1,4	9,5	20	LU3-003	S7FG2
1055	0,87	16	34	LU3-005	S7FG3
2075	0,51	27	57	LU3-011	S7FG4
2110	0,51	27	57	LU3-011	S7FG4
3150	0,43	32	68	LU3-015	S7FM2
3185	0,33	42	72	LU3-022	S7FH3
3220	0,23	58	100	LU3-030	S7FH4
4300	0,23	58	100	LU3-030	S7FH4
4370	0,18	76	130	LU3-037	S7FH5
4450	0,12	120	205	LU3-055	S7FH6
5550	0,07	180	310	LU3-090	S7F10
5750	0,07	180	310	LU3-090	S7F10
5900	0,07	180	310	LU3-090	S7F10

Note! With the inverter operated at the rated current and a frequency of 50 Hz, the output chokes cause a voltage drop of approx. 2% of the output voltage.

Refer to the Gefran Accessories catalogue (1S9I09) for choke weights and dimensions.

5.4 External EMC filter (optional)

The **ADV100** inverter from size 4300 and higher is provided with an internal filter as standard,. Optional external filters capable of enhancing system performance are listed in the table below.

Sizes	Type	Code	EN 61800-3 : Category / Environment / Motor cable length
1040	EMI FTF-480-16	S7GHO	C2/1°/30m
1055	EMI FTF-480-16	S7GHO	C2/1°/30m
2075	EMI FTF-480-30	S7GHP	C2/1°/30m
2110	EMI FTF-480-30	S7GHP	C2/1°/30m
3150	EMI FTF-480-42	S7GOA	C2/1°/30m
3185	EMI FTF-480-55	S7GOB	C2/1°/30m
3220	EMI FTF-480-55	S7GOB	C2/1°/30m
4300	EMI FTF-480-75	S7GOC	C2/1°/30m
4370	EMI FTF-480-75	S7GOC	C2/1°/30m
4450	EMI FTF-480-100	S7GOD	C2/1°/30m
5550	EMI FTF-480-130	S7GOE	C3/2°/100m
5750	EMI FTF-480-180	S7GOF	C3/2°/100m
5900	EMI FTF-480-180	S7GOF	C3/2°/100m
1040 ... 5900	ECF3	F4ZZ2	C4/2°/100m

5.5 External braking resistors (optional)

Recommended combinations for use with internal braking unit.

Size	List and technical data of standard external resistors							
	Resistor type	Code	Q.ty	Max. overload, 1" - service 10% E_{BR} (kJ)	Max. overload, 30" - service 25% E_{BR} (kJ)	P_{NBR} (W)	R_{BR} (Ω)	Housing
1040	RFPD 750 DT 100R	S8SY4	1	7,5	38	750	100	IP44
1055	RFPD 750 DT 68R	S8T0CD	1	7,5	38	750	68	IP44
2075	RFPD 900 DT 68R	S8SY5	1	9	48	900	68	IP44
2110	RFPD 1100 DT 40R	S8SY6	1	11	58	1100	40	IP44
3150	RFPD 1900 D 28R	S8SZS	1	19	75	1900	28	IP44
3185	BRT4K0-15R4	S8T00G	1	40	150	4000	15,4	IP20
3220	BRT4K0-15R4	S8T00G	1	40	150	4000	15,4	IP20
4300	BRT4K0-11R6	S8T00H	1	40	150	4000	11,6	IP20
4370	BRT4K0-11R6	S8T00H	1	40	150	4000	11,6	IP20
4450	BRT8K0-7R7	S8T00I	1	40	150	8000	7,7	IP20
5550	BRT8K0-7R7	S8T00I	1	40	150	8000	7,7	IP20
5750 ... 5900	External braking unit (BUy series, optional)							

P_{NBR} Braking resistor rated power

R_{BR} Braking resistor ohmic value

E_{BR} Maximum energy that can be dissipated on the resistor

Warning!

Braking resistors may be subject to unexpected overloads due to faults.

Resistors MUST be protected using thermal cutouts. These devices must not interrupt the circuit in which the resistor is inserted but their auxiliary contact must cut off the power supply to the power section of the drive. If the resistor requires a protection contact, this must be used together with that of the thermal cutout.

A la suite de pannes, les résistances de freinage peuvent être sujettes à des surcharges imprévues. La protection des résistances au moyen de dispositifs de protection thermique est absolument capitale. Ces dispositifs ne doivent pas interrompre le circuit qui abrite la résistance, mais leur contact auxiliaire doit couper l'alimentation du côté puissance du drive. Si la résistance prévoit un contact de protection, ce dernier doit être utilisé conjointement à celui du dispositif de protection thermique.

Note!

Refer to the Gefran Accessories catalogue (1S9I09) for resistor weights and dimensions.

6 - Mechanical installation

Caution

The Drive must be mounted on a wall that is constructed of heat resistant material. While the Drive is operating, the temperature of the Drive's cooling fins can rise to a temperature of 158° F (70°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 70°C (158° F).

Because the ambient temperature greatly affects Drive life and reliability, do not install the Drive in any location that exceeds the allowable temperature.

Étant donné que la température ambiante influe sur la vie et la fiabilité du drive, on ne devrait pasinstaller le drive dans des places ou la temperature permise est dépassée.

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).

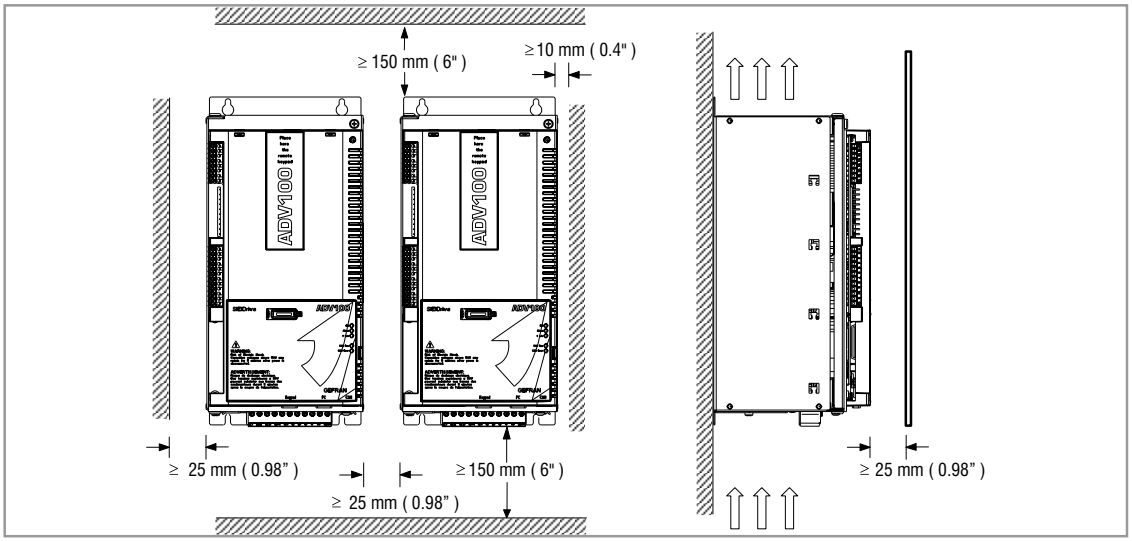
Protect the device from impermissible environmental conditions (temperature, humidity, shock etc.).

Protéger l'appareil contre des effets extérieurs non permis (température, humidité, chocs etc.).

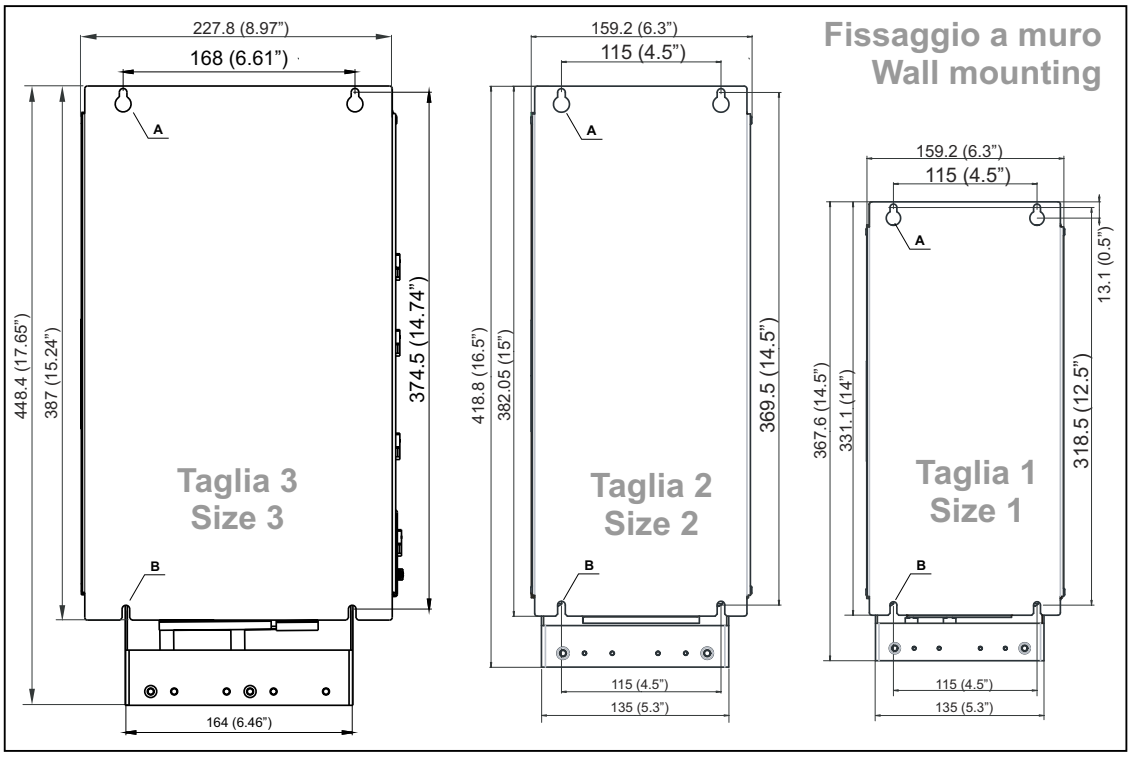
6.1 Maximum inclination and assembly clearances

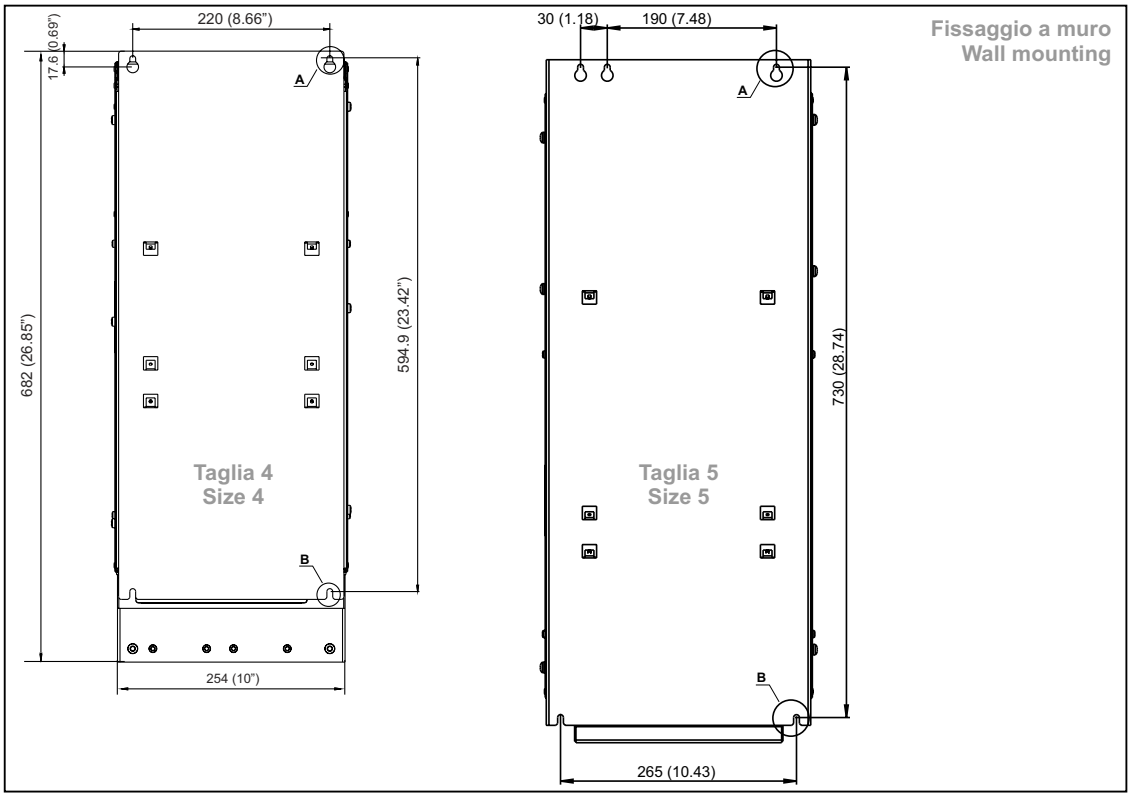
The inverters must be mounted in such a way that air can flow freely around them, see paragraph **4.7** Cooling.

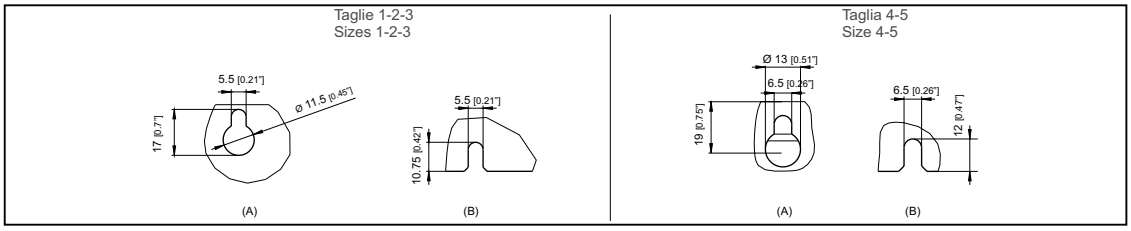
Maximum angle of inclination	30° (referred to vertical position)
Minimum top and bottom distance	150 mm
Minimum free space to the front	25 mm
Minimum distance between drives	sizes 1-2-3: 25 mm; sizes 4-5: none
Minimum distance to the side with the cabinet	25 mm



6.2 Fastening positions







	Recommended screws for fastening
Size 1 (ADV...-1...)	4 x M5 x 12 mm screws + Grover (spring-lock) washer + flat washer
Size 2 (ADV...-2...)	4 x M5 x 12 mm screws + Grover (spring-lock) washer + flat washer
Size 3 (ADV...-3...)	4 x M5 x 12 mm screws + Grover (spring-lock) washer + flat washer
Size 4 (ADV...-4...)	4 x M6 x 16 mm screws + Grover (spring-lock) washer + flat washer
Size 5 (ADV...-5...)	5 x M6 x 16 mm screws + Grover (spring-lock) washer + flat washer

Note!

Other dimensions **see chapter 4.8** Weights and dimensions.

7 - Wiring Procedure

Warning!

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.

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.

Warning!

The drive must always be grounded. If the drive is not connected correctly to ground, extremely hazardous conditions may be generated that may result in death or serious injury.

Le drive doit toujours être raccordé au système de mise à la terre. Un mauvais raccordement du drive au système de mise à la terre peut se traduire par des conditions extrêmement dangereuses susceptibles d'entraîner le décès ou de graves lésions corporelles.

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 4.6.

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 4.6.

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.

Caution

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.

Operation with Residual Current Device (Differential switch)

If an RCD (also known as an RCCB or ELCB) is installed, it must have a high leakage current (≥ 300 mA).

RCD: Residual Current Device
RCCB: Residual Current Circuit Breaker
ELCB: Earth Leakage Circuit Breaker

Note:

The residual current operated circuit-breakers used must provide protection against direct-current components in the fault current and must be suitable for briefly suppressing power pulse current peaks. It is recommended to protect the frequency inverter by fuse separately.

The regulations of the individual country (e.g. VDE regulations in Germany) and the regional power suppliers must be observed!

Les RCD utilisés doivent assurer la protection contre les composants à courant continu présents dans le courant de défaut et doivent être capables de supprimer des crêtes de courant en peu de temps. Il est recommandé de protéger séparément l'onduleur au moyen de fusibles.

Respecter la réglementation des pays concernés (par exemple, les normes VDR en Allemagne) et des fournisseurs locaux d'énergie électrique.

Caution

Functioning of the Drive without a ground connection is not permitted. To avoid disturbances, the armature of the motor must be grounded using a separate ground connector from those of other appliances.

Défense de faire fonctionner le drive sans qu'il y ait eu raccordement de mise à la terre préalable. Pour éviter les perturbations, la carcasse du moteur doit être mise à la terre à l'aide d'un raccord de mise à la masse séparé de ceux des autres appareils.

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 lesnormes CSA et UL et dimensionné pour l'épaisseur du cable correspondant. Le connecteur doit êtrefixé 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.

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 directede l'entrée avec la sortie du convertisseur (Bypass).

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 del'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

If the Drives have been stored for longer than two years, the operation of the DC link capacitors may be impaired and must be "reformed". Before commissioning devices that have been stored for long periods, connect them to a power supply for two hours with no load connected in order to regenerate the capacitors, (the input voltage has to be applied without enabling the drive).

En cas de stockage des variateurs pendant plus de deux ans, il est conseillé de contrôler l'état des condensateurs CC avant d'en effectuer le branchement. Avant la mise en service des appareils, ayant été stockés pendant long temps, il faut alimenter variateurs à vide pendant deux heures, pour régénérer les condensateurs : appliquer une tension d'alimentation sans actionner le variateur.

7.1 Power section

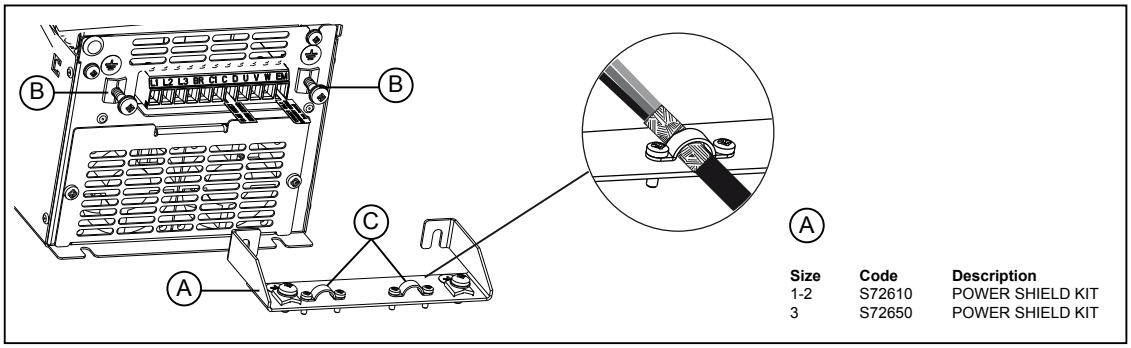
7.1.1 Cable cross-sections

Size	Terminals: L1 - L2 - L3 - BR - C1 - C - D - U - V - W				
	Maximum cable cross-section (flexible conductor)		Recommended stripping	Recommended terminal	Tightening torque (min)
	(mm^2)	AWG	(mm)	(mm)	(Nm)
1040	4	10	10	None / pin	0,5 ... 0,6
1055	4	10	10	None / pin	0,5 ... 0,6
2075	6	8	10	None / pin	1,2 ... 1,5
2110	6	8	10	None / pin	1,2 ... 1,5
3150	16	6	14	None / pin	1,5 ... 1,7
3185	16	6	14	None / pin	1,5 ... 1,7
3220	16	6	14	None / pin	1,5 ... 1,7
	Terminals: L1 - L2 - L3 - BR1 - BR2 - C - D - U - V - W				
4300	35	2	18	None / pin	2,4 ... 4,5
4370	35	2	18	None / pin	2,4 ... 4,5
4450	35	2	18	None / pin	2,4 ... 4,5
5550	95 (BR1/BR2=50)	4/0 (BR1/BR2=1/0)	23 (BR1/BR2=27)	None / pin	14 (BR1/BR2=10)
5750	95	4/0	23	None / pin	14
5900	95	4/0	23	None / pin	14

Note! The power terminal strip is extractable on all mechanical sizes.

Size	Terminals: ⏚ on structural work (PE1: line ground – PE2: motor ground)				
	Cable cross-section		Lock screw diameter	Recommended terminal	Tightening torque (min)
	(mm^2)	AWG	(mm)	(mm)	(Nm)
1040	4	10	M5	Eyelet	6
1055	4	10	M5	Eyelet	6
2075	6	8	M5	Eyelet	6
2110	6	8	M5	Eyelet	6
3150	16	6	M5	Eyelet	6
3185	16	6	M5	Eyelet	6
3220	16	6	M5	Eyelet	6
4300	16	6	M5	Eyelet	6
4370	16	6	M5	Eyelet	6
4450	16	6	M5	Eyelet	6
5550	50	1/0	M6	Eyelet	10
5750	50	1/0	M6	Eyelet	10
5900	50	1/0	M6	Eyelet	10

7.1.2 Connection of shielding (recommended)



Size	Code	Description
1-2	S72610	POWER SHIELD KIT
3	S72650	POWER SHIELD KIT

Loosen the two screws (B), put the metal support (A) (optional) in place and screw down tightly. Fasten the power cable shield to the omega sections (C) as illustrated in the figure.

7.1.3 EMC guide line

Attention

The converters are protected in order to be used in industrial environments where, for immunity purposes, large amounts of electromagnetic interference can occur. Proper installation practices will ensure safe and trouble-free operation. If you encounter problems, follow the guidelines which follow.

- Check for all equipment in the cabinet are well grounded using short, thick grounding cable connected to a common star point or busbar. Better solution is to use a conductive mounting plane and use that as EMC ground reference plane.
- Flat conductors, for EMC grounding, are better than other type because they have lower impedance at higher frequencies.
- Make sure that any control equipment (such as a PLC) connected to the inverter is connected to the same EMC ground or star point as the inverter via a short thick link.
- Connect the return ground from the motors controlled by the drives directly to the ground connection (⏚) on the associated inverter.
- Separate the control cables from the power cables as much as possible, using separate trunking, if necessary at 90º to each other.
- Whenever possible, use screened leads for the connections to the control circuitry
- Ensure that the contactors in the cubicle are suppressed, either with R-C suppressors for AC contactors or 'flywheel' diodes for DC contactors fitted to the coils. Varistor suppressors are also effective. This is important when the contactors are controlled from the inverter relay.
- Use screened or armored cables for the motor connections and ground the screen at both ends using the cable clamps

Note!

For further information regarding electro-magnetic compatibility standards, according to Directive 2004/108/EEC, conformity checks carried out on Gefran appliances, connection of filters and mains inductors, shielding of cables, ground connections, etc., consult the "Electro-magnetic compatibility guide" on the CD attached to this drive.

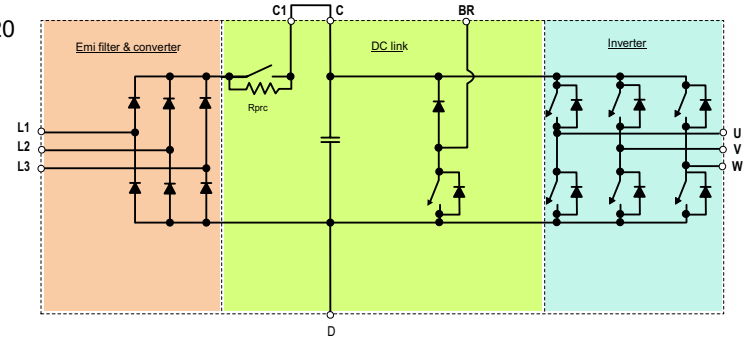
7.1.4 Block diagram of power section

This type is equipped with an EMI input filter (only on ≥ 4300 sizes), an AC/DC converter, a system for pre-loading DC capacitors, a DC/AC converter, a power supply unit and an integrated braking unit ((only on ADV1..-…-KBX models).

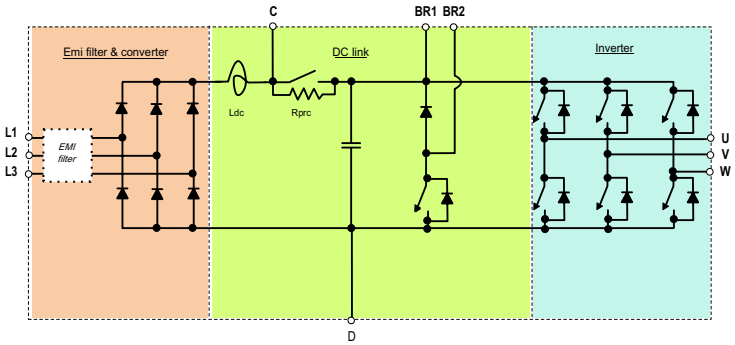
A specific external resistor must be connected to perform the braking function.
The connection of the external braking resistor depends on the drive size:

- for 4 to 22 kW drives, connect the resistor between terminals C (or C1) and BR
- for 30 to 90 kW drives, connect the resistor between terminals BR1 and BR2.

1040 - 3220



≥ 4300



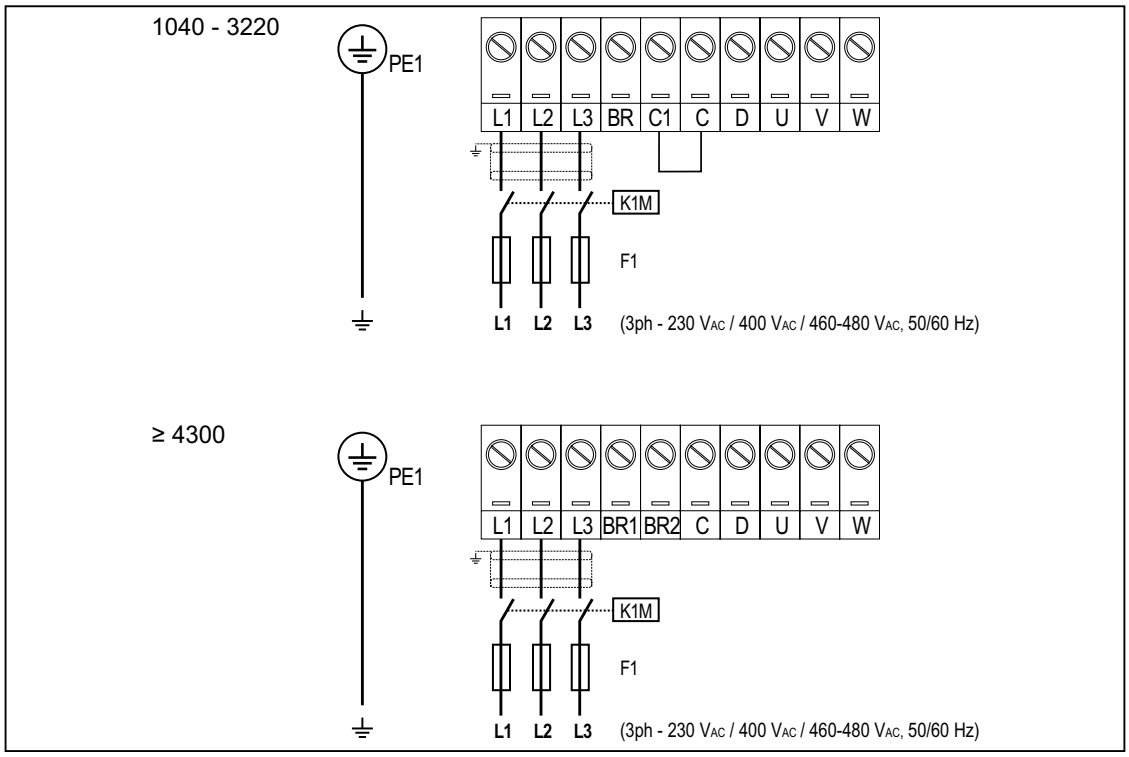
7.1.5 Internal EMC filter

ADV100 series inverters from 4300 size and higher are equipped with an internal EMI filter able to guarantee the performance levels required by EN 61800-3 standard (according to 2nd environment, category C3) with a maximum of 20 meters of shielded motor cable (up to 30 metres for size 5 and above).

Taglia	EN 61800-3 : Category / Environment / Motor cable length	Switching frequency
4300 ... 4450	C3/2°/20m	Default
5550 ... 5900	C3/2°/30m	Default

NB ! For additional requirements, use the optional filters described in chapter 5.3 External EMC filter.

7.1.6 Power line connection



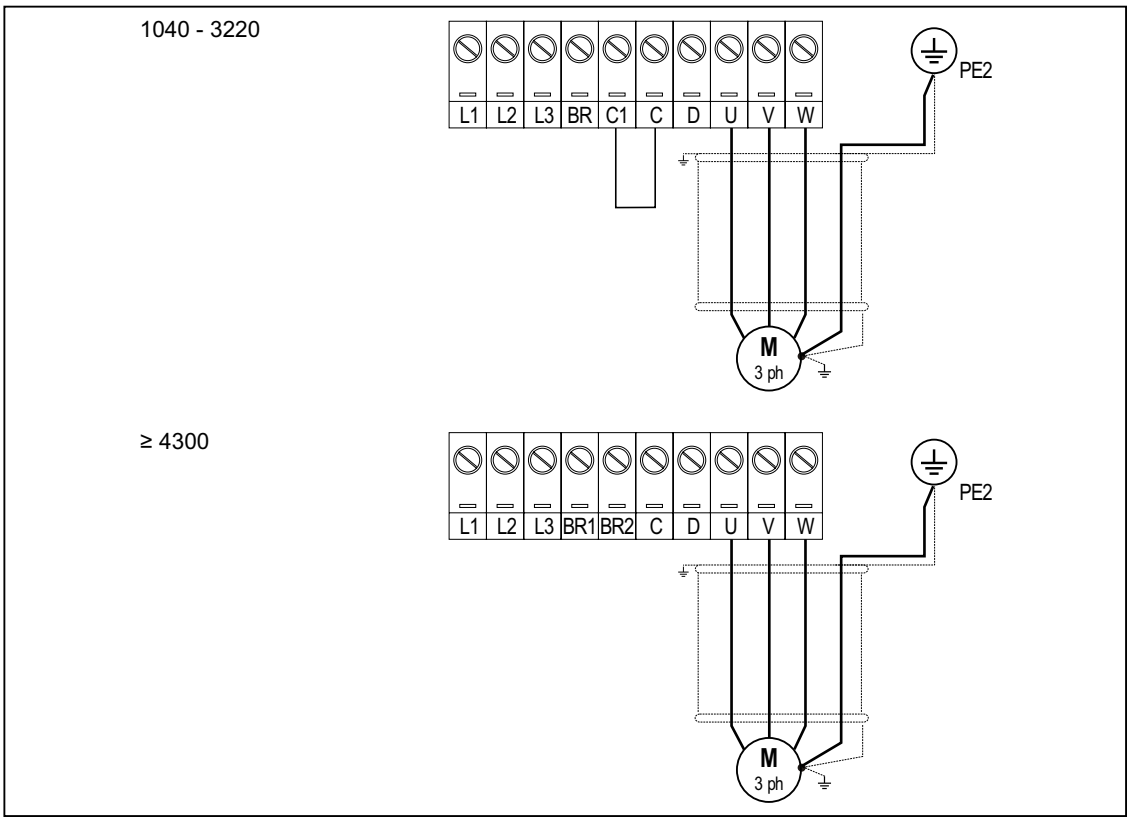
Note! Recommended combination F1 fuses: see paragraph 5.1.1.

7.1.7 Connection of AC and DC chokes (optional)

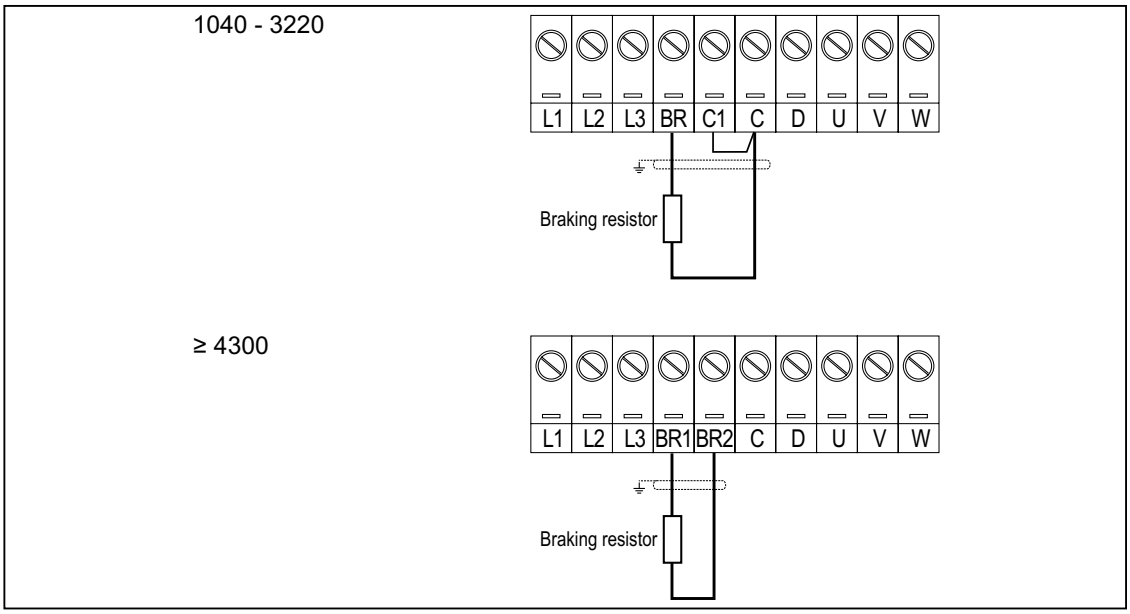
The drive can use both a three-phase choke on the AC power line and, for 4 to 22 kW drives only, a DC choke between terminals C1 and C. Refer to chapter 5.2 for the recommended connections.
If no DC choke is used on 4 to 22 kW drives, terminals C1 and C must be bridged.

Attention If no DC choke is used, terminals C1 and C must be bridged.

7.1.8 Motor connection



7.1.9 Connection of braking resistor (optional)



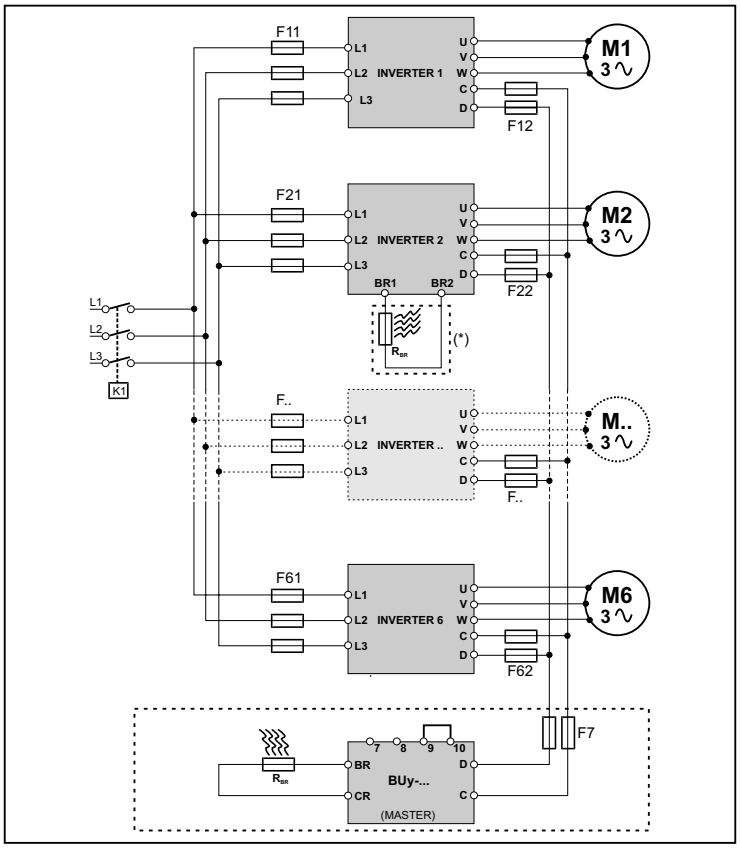
Note!

The braking resistor is connected using standard terminals up to size ADV1..-3220. Optional terminals are required for sizes ADV1..-4300 … 5550 and none for bigger sizes.

From size ADV1..-5750 upwards an optional BUy braking unit connected to terminals C and D can be used. For further details reference should be made to the BUy manual.

Recommended combination braking resistors: **see paragraph 5.4**.

7.1.10 Parallel connection on the AC (Input) and DC (Intermediate Circuit) side of several inverters



- The inverters used have to be all the same size.
- The mains power supply has to be simultaneous for all inverters, i.e. a single switch /line contactor has to be used.
- Such connection is suitable for a maximum of 6 inverters.
- If necessary dissipate braking energy; a single internal braking unit (with external resistor) has to be used or one (or several) external braking unit.
- Fast fuses (F12...F62) have to be fitted on the dc-link side (C and D terminals) of each inverters (see **chapter 5.1.2**).

Caution

(*) Do not connect if external braking units BUy.. is used.

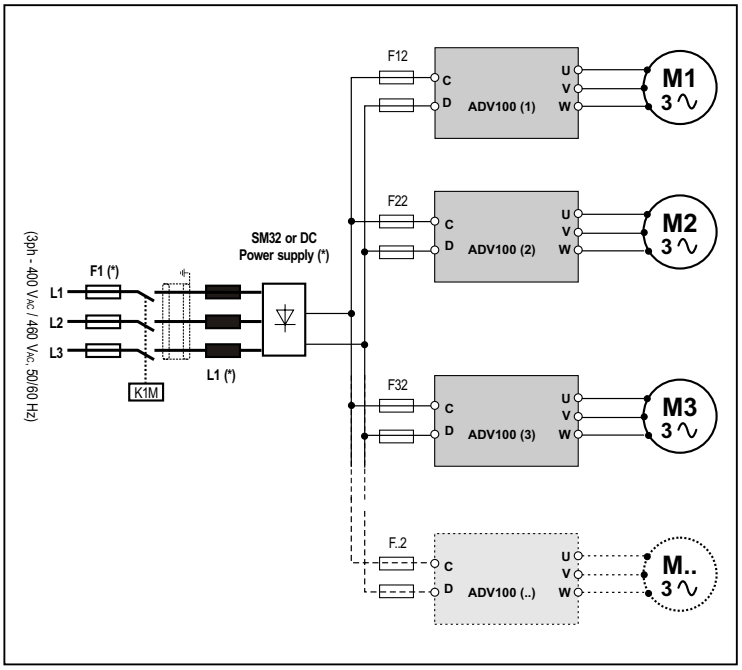
(*) Pas raccorder si l'unité de freinage extérieure BUy... est utilisée

7.1.11 DC connection

Caution

In the case of DC power supply, 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).

Regenerative converters must not be used to supply DC to the ADV100 drive ≥ 4300 sizes, as this could damage the integrated EMI filter.

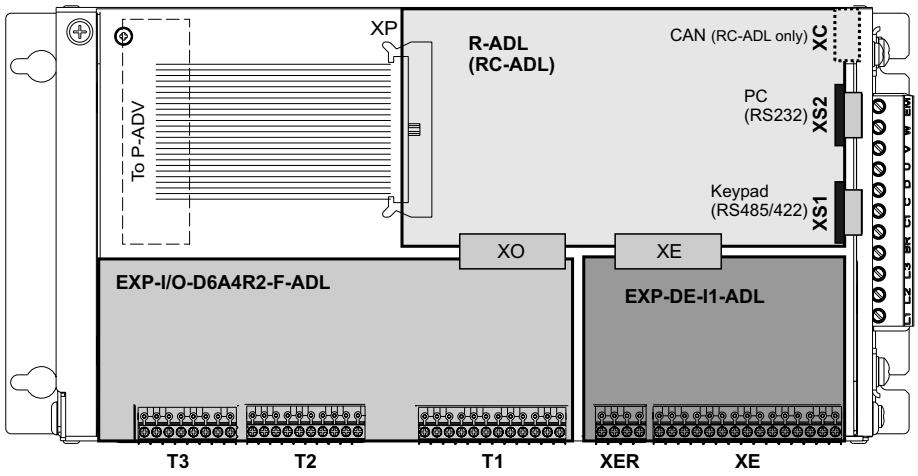


(*) Refer to SM32 or DC Power supply manual.

(**) Sizes 1..3: External DC power supply with pre-load

7.2 Regulation section

Figure 7.2.1: Identification of cards and terminals



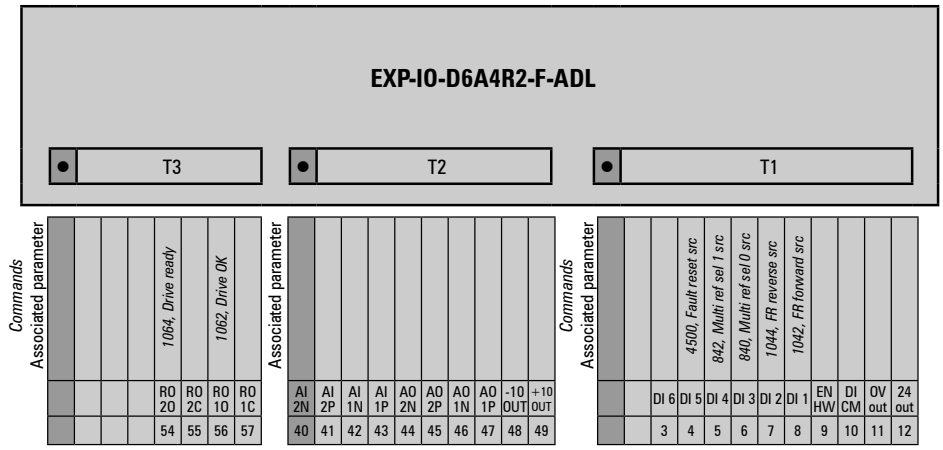
7.2.1 Cable cross-sections

Terminals	Maximum cable cross-section		Recommended stripping	Tightening torque (min)
	(mm^2)	(AWG)	(mm)	(Nm)
T3, T2, T1	0,2 ... 2,5 (1 cable) 0,2 ... 0,75 (2 cables)	26 ... 12 26 ... 19	5	0,4
XER, XE	0,2 ... 1,5 (1 cable) 0,2 ... 0,5 (2 cables)	26 ... 16 26 ... 19	5	0,25

7.2.2 Connection of I/O card (EXP-IO-D6A4R2-F-ADL)

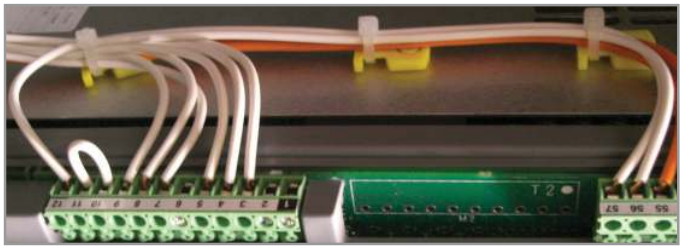
Figure 7.2.2: EXP-IO-D6A4R2-F-ADL card terminal strip and connection

1 enable input (Enable) + 6 digital inputs (DI) + 2 analog inputs (AI) + 2 analog outputs (AO) + 2 relay outputs (RO). The terminals of this card are not extractable.



Note! For electrical properties of analog, digital and relay inputs/outputs see Appendix.

Figura 7.2.3: Connection of shielding (recommended)



7.2.3 Connection of standard EXP-DE-I1-ADL feedback card (ADV120 series)

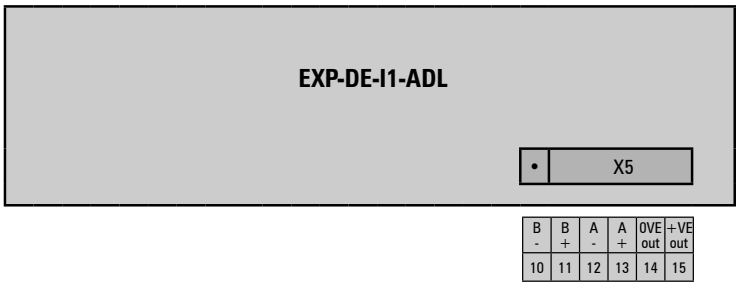
Note! This section describes the connections of standard card, for more information see Appendix.

All feedback card terminal strips are extractable.

Figure 7.2.4: Connection of shielding (recommended)

Note ! The encoder power supply must be adequate considering the cable length and the absorption rates as shown in table (1) at the end of this chapter.

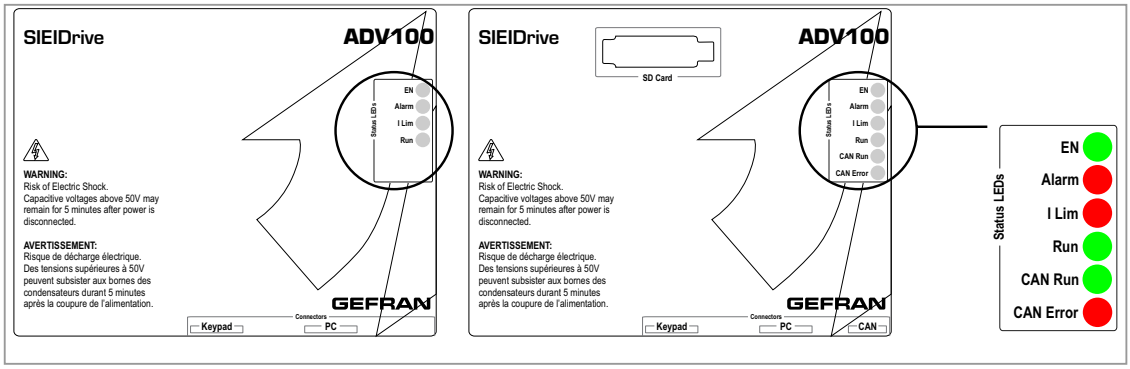
Digital Incremental Encoder. This is the default card supplied with drives ADV120-...- to control asynchronous motors in field-oriented flux vector mode (FOC).



B -	B +	A -	A +	0VE out	+VE out
10	11	12	13	14	15

7.3 LEDs

Up to 6 LEDs indicating the drive status are located on the front of the ADV100 drive.



LEDs	Colour	Meaning of LEDs
EN	Green	Lit during IGBT modulation
Alarm	Red	Lit when the drive signals an alarm condition
ILim	Red	Lit when the drive is operating at its current limit
Run	Green	Flashes (freq. 1 sec) if no errors or faults have occurred. If on or off, indicates an error condition (software hangup)
CAN Run	Green	Lit when the CANopen interface is in the operational condition
CAN Error	Red	Lit when the CANopen interface is in the alarm condition

7.4 Connection diagrams

Note! This chapter describes the typical wiring diagrams with reference to ADV100 1.X drives with standard configuration.

7.4.1 Regulation potentials, digital I/O

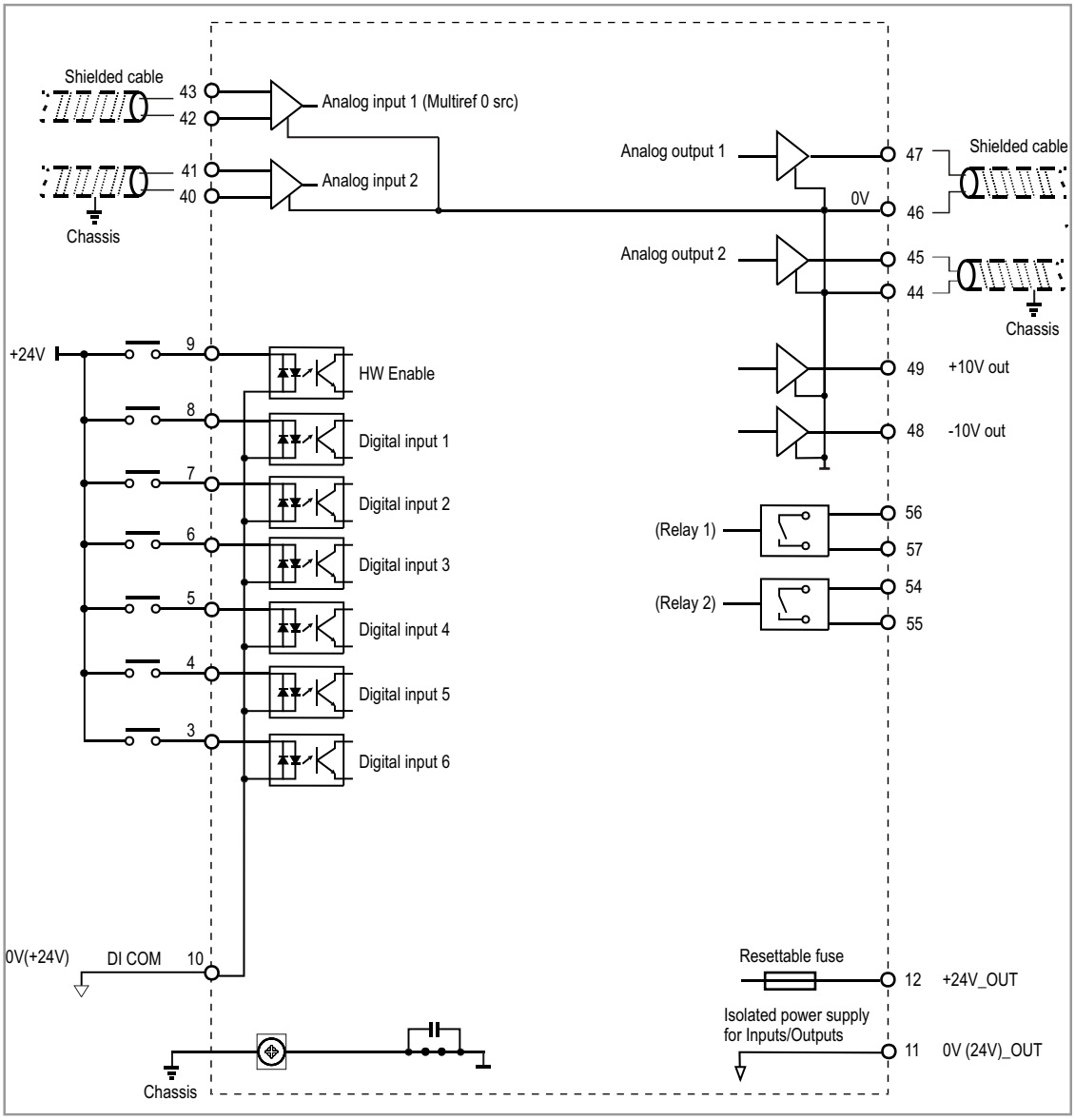


Figure 7.4.1: Potentials of the control section, Digital I/O PNP connection

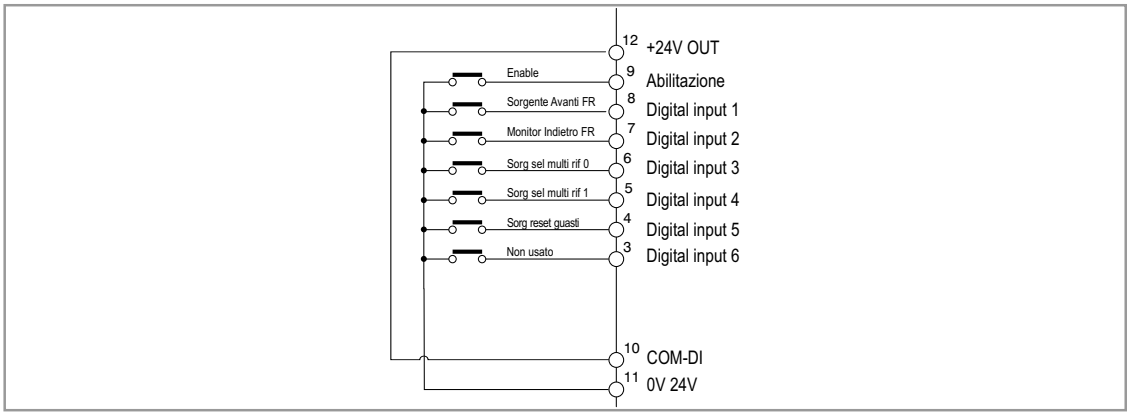


Figure 7.4.2: Connections for Controls Opto-insulated from the Inverter (NPN) - Internal supply

7.4.2 Typical connection diagram

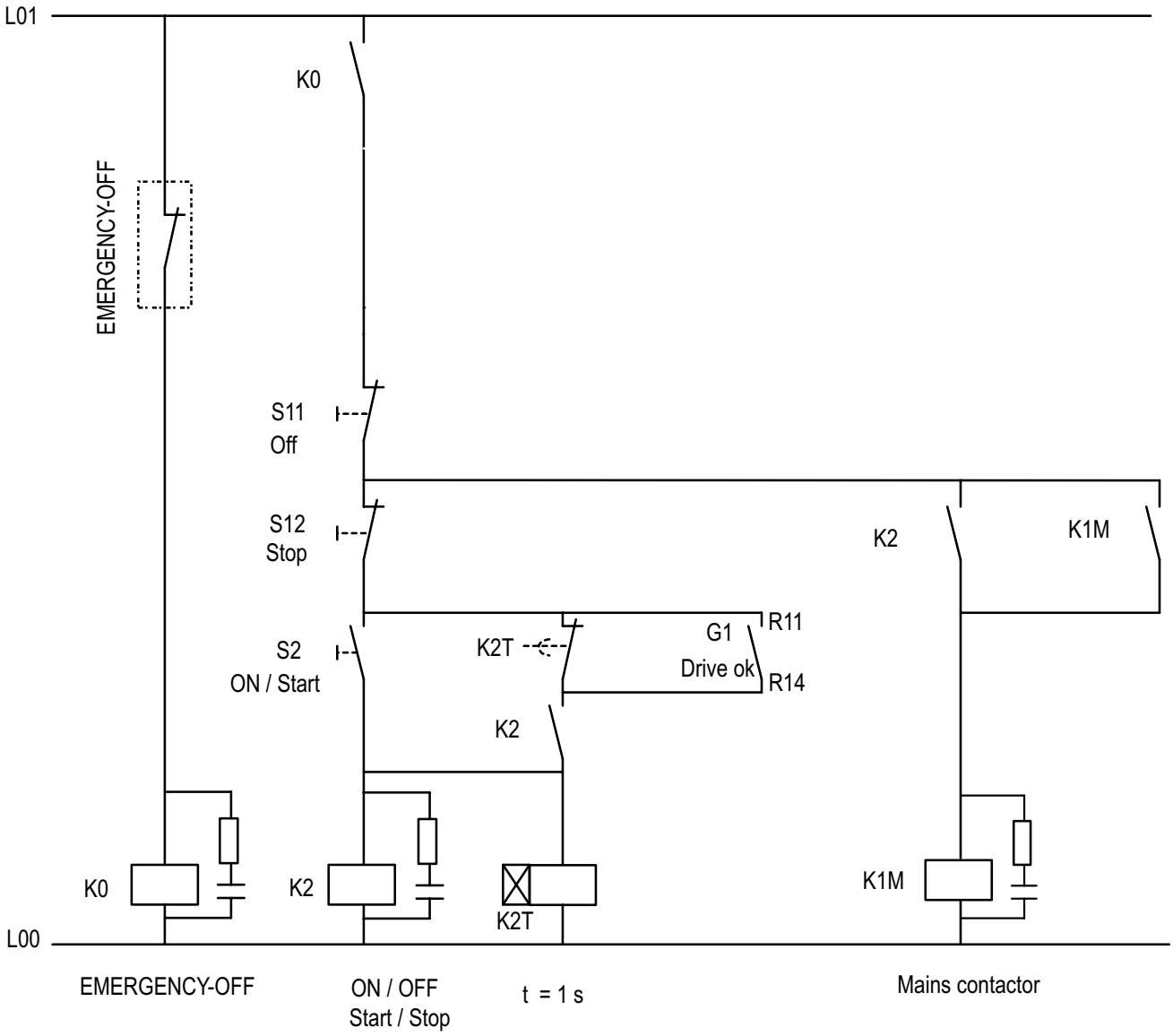


Figure 7.4.3: Auxiliary control circuits

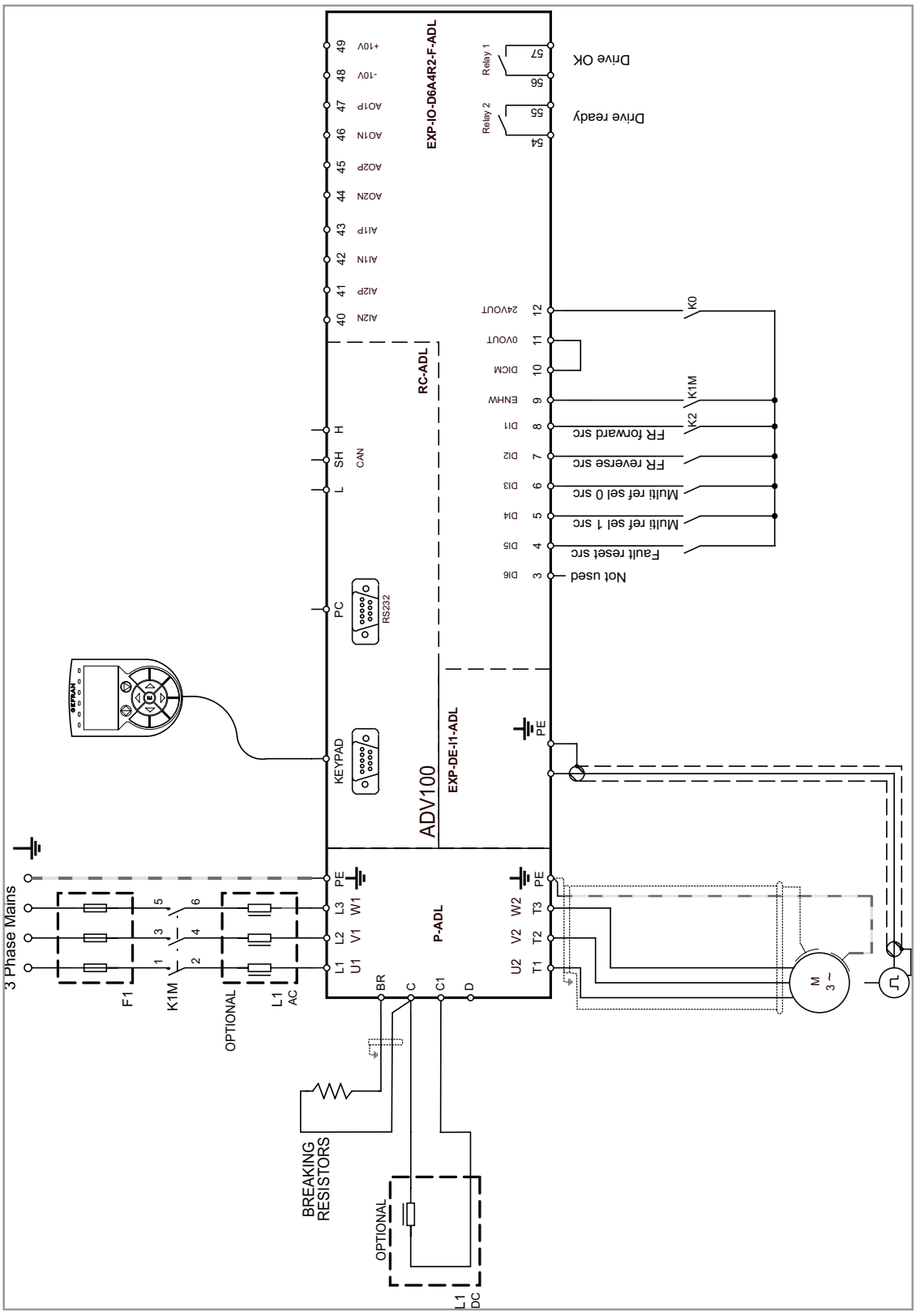


Figure 7.4.4: Typical connection diagram, sizes ADV120-1040-F-C ... ADV120-3220-F-C

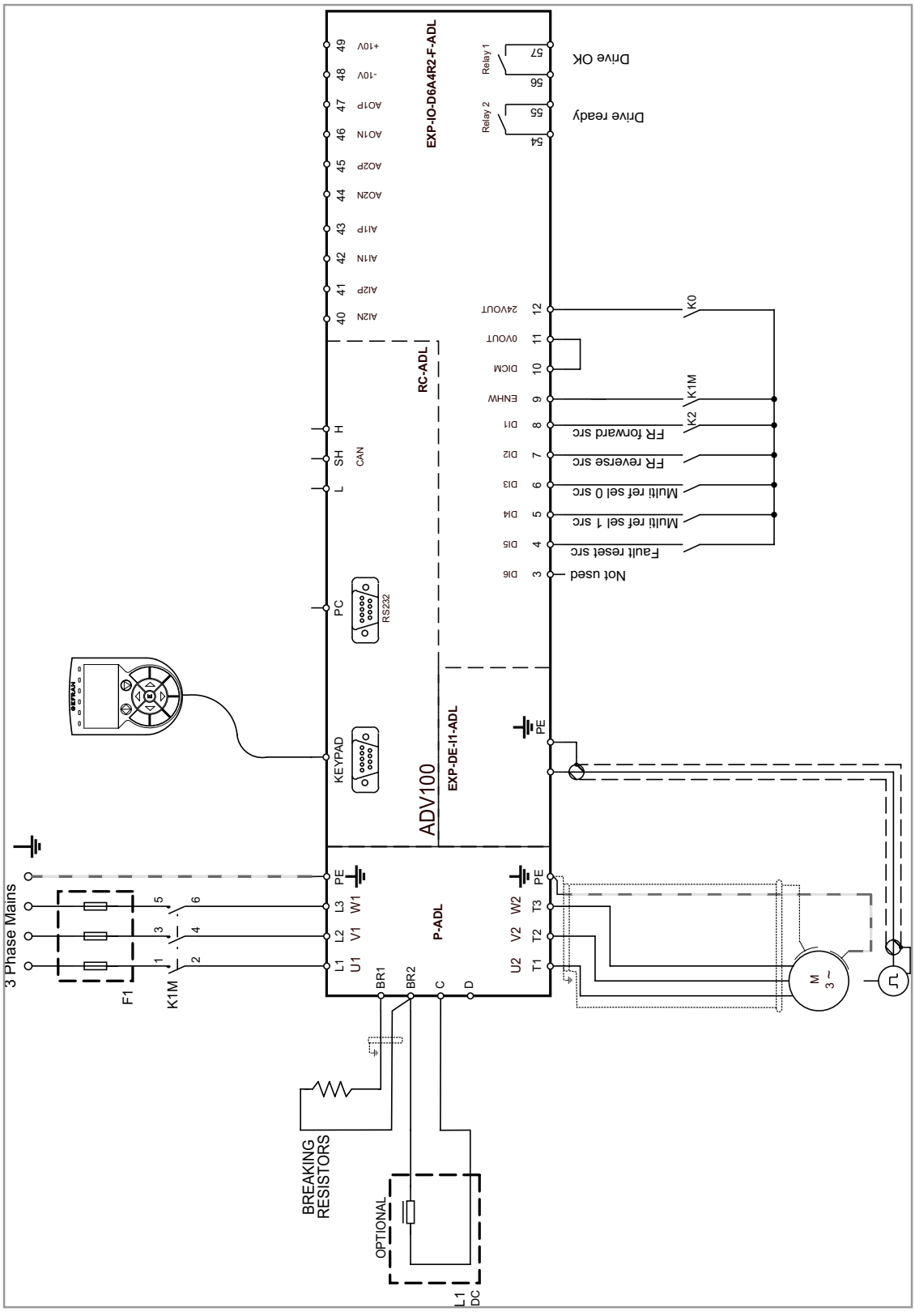
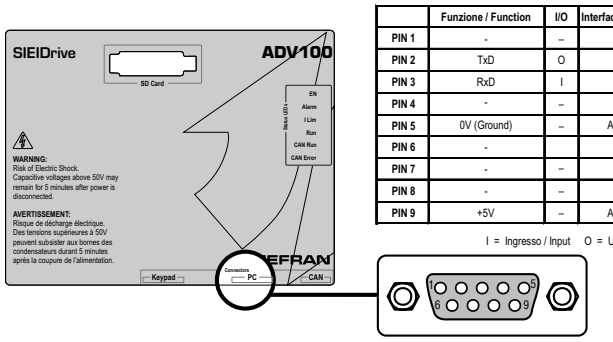


Figure 7.4.5: Typical connection diagram, sizes ≥ ADV120-4300-F-C

7.5 Serial interface (PC connector)



	Funzione / Function	I/O	Interfaccia elettr./ Elect. Interface
PIN 1	-	–	–
PIN 2	TxD	O	RS232
PIN 3	RxD	I	RS232
PIN 4	-	–	–
PIN 5	0V (Ground)	–	Alimentazione / Supply
PIN 6	-		–
PIN 7	-	–	–
PIN 8	-	–	–
PIN 9	+5V	–	Alimentazione / Supply

I = Ingresso / Input O = Uscita / Output

The ADV100 drive is provided with a port as standard (9-pin D-SUB receptacle connector) for connection of the RS232 serial line used for drive-PC point-to-point communication (with the GF-eXpress configuration software).

Note!

The port **is not galvanically isolated**. The **PC-OPT-ADL option must be used If galvanic separation is required.**

7.5.1 Drive/RS232 port point-to-point connection

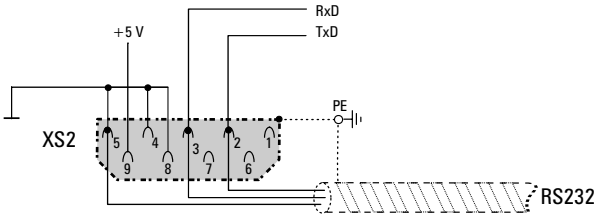


Figure 7.5.1: Serial connection (not isolated)

The serial connection must consist of a twin pair with two symmetrical conductors, spiral wound with a common shield, plus the ground connection cable, connected as shown in the figure (a 3-wire RS232 cable, not cross-over, is recommended). The maximum transmission speed is 38.4 kBaud.
For connection of the RS232 serial line to the PC, see the figure below.

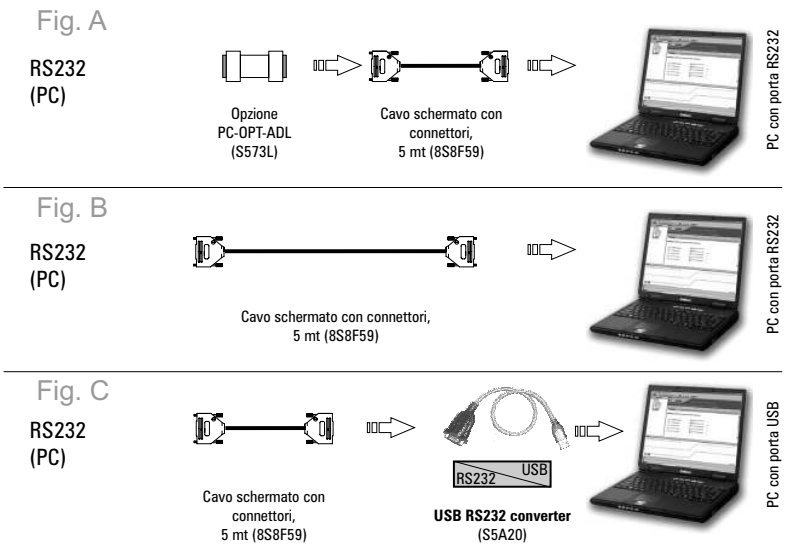


Figure 7.5.2: RS232 connection to the PC

Connection to a PC with RS232 port and PC-OPT-ADL option (isolated)

The following are required for connection:

- optional PC-OPT-ADL card (for galvanic isolation), code S573L
- a shielded cable (code 8S8F59) for connection to the RS232 PC port of the drive to the RS232 connector of the PC, see figure 7.5.1-A.

Connection to a PC with RS232 port (not isolated)

The following are required for connection:

- a shielded cable (code 8S8F59) for connection to the RS232 PC port of the drive to the RS232 connector of the PC, see figure 7.5.1-B.

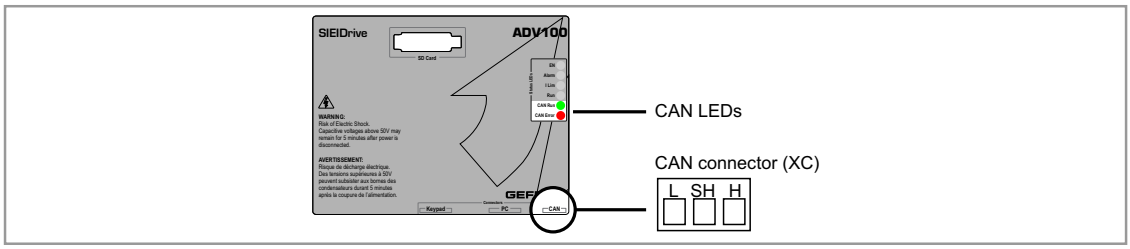
Connection to a PC with USB port (not isolated)

The following are required for connection:

- an optional **USB/RS232** adapter, code S5A20 (including the cable for USB connection)
- a shielded cable (code 8S8F59) for connection to the RS232 PC port of the drive to the USB/RS232 adapter, see figure 7.5.1-C.

7.6 CAN interface

CANopen is a communication profile for CAL-based industrial systems (refer to the CANopen CAL-Base COMMUNICATION PROFILE for Industrial Systems; CiA Draft Standard 301 Version 4.2 Date 13 February 2002 by CAN in Automation e. V.).
The ADV100 can be requested with the interface for connection to CAN networks at the time of ordering (ADV120-...-C models). The drive also implements the DS402 profile according to CANopen Device Profile Drives and Motion Control v4.02 specifications. The CAN protocol (ISO 11898) used is CAN2.0A with 11-bit identifier. The integrated CANopen interface has been developed as a Minimum Capability Device. Data are exchanged cyclically; the master reads the data made available by the slaves and writes the reference data to the slaves.
The interface is provided with functional isolation (> 1 kV).
Connection is via the CAN (XC) connector and no power supply is required.



Terminal	Name	Function	Cable cross-section
L	CAN_L	CAN_L bus line (low dominant)	0,2 ... 2.5 mm² AWG 26 ... 12
SH	CAN_SHLD	CAN shielding	
H	CAN_H	CAN_H bus line (high dominant)	

LEDs		Meaning	
CAN Run (green)	**CAN Err (red)**		
Off	Off	Stop	
On	Off	Pre-operational	
On	On	Operational	

A shielded twin-pair (of the type described in the CANopen specifications) must be used for connection to the bus, and must be laid separately from the power cables, at a distance of at least 20 cm. Cable shielding must be grounded at the two ends. If the cable shielding is grounded at different points of the system, use equipotential connection cables to reduce the current flow between the drive and the CANbus master.

Note!

As regards terminations: the first and last termination on the network must have a 120 ohm resistor between pins L and H.

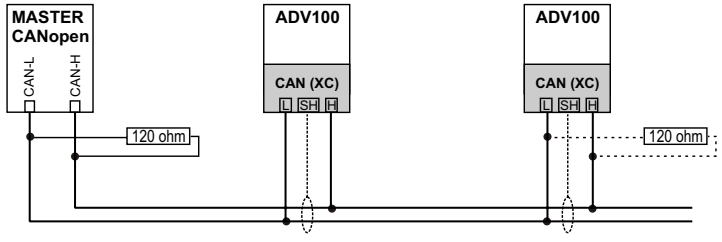
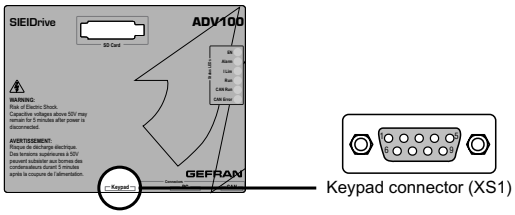


Figure 7.6.1: CANbus connection

7.7 Keypad interface (keypad connector)



Several devices can be connected to the multifunction keypad connector (9-pin D-SUB receptacle connector XS1) and are automatically recognised and managed.

Optional KB-ADV100 keypad (default connection)

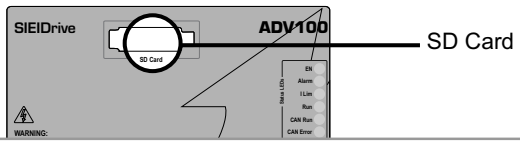
- The keypad is supplied with a 40 cm-long cable, for longer distances, a 1:1 non-crossover cable must be used (9 shielded cables, e.g. code 8S8F59, length 5 m).
- Very long cables (max. 15 m) must be of good quality with low voltage loss (max. 0.3 ohm/m).

Caution

The connections have no galvanic isolation!

7.8 Saving data on the Memory Card

With the **ADV120-C** drive, data can be saved on a normal Secure Digital-type memory card. In order to use the memory card, the specific adapter (SD-ADL) must be connected by inserting it into the dedicated slot on the front of the drive. For further information, see chapter 8.9.



7.9 Braking

There are various possible types of braking:

- Internal Braking Unit
- Injection of direct current from the Inverter into the motor (D.C. braking)

There are two essential differences between the two braking methods:

- A braking unit can be used for speed reduction (e.g.: from 1000 to 800 rpm), whereas D.C. braking can only be usedfor braking to standstill.
- The energy in the drive is converted into heat in both cases. This conversion takes place in a braking resistor encased in the braking unit. With D.C. braking, the energy is converted into heat in the motor itself, resulting in a further rise in motor temperature.

7.9.1 Braking unit (standard internal)

Frequency-regulated asynchronous motors during hyper-synchronous or regenerative functioning behave as generators, recovering energy that flows through the inverter bridge, in the intermediate circuit as continuous current.
This leads to an increase in the intermediate circuit voltage.
Braking units (BU) are therefore used in order to prevent the DC voltage rising to an impermissible value. When used, these activate a braking resistor that is connected in parallel to the capacitors of the intermediate circuit. The feedback energy is converted to heat via the braking resistor (R_{BR}), thus providing very short deceleration times and restricted four-quadrant operation.

ADV110-...-.BX and ADV120-...-.BX configurations include an internal braking unit.

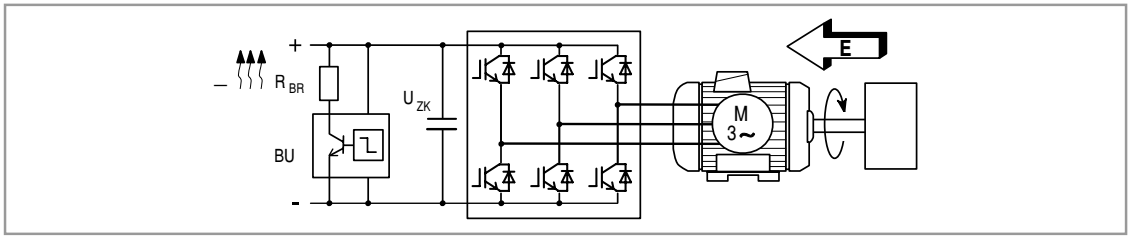


Figure 7.9.1: Operation with braking unit (circuit diagram)

Note!

When the internal braking unit is present the protection must consist of fast-acting fuses! Follow the relative assembly instructions.

A twisted cable must be used for the connection of the braking resistor (terminals BR and C or BR1 and BR2). If the resistor includes a thermal protection device (Klixon), this must be connected to the "External fault" input of the drive.

Table 7.9.1: Technical data of the internal braking unit

Size	I_{RMS} (A)	I_{PK} (A)	R_{BR} (Ω)
1040	5,7	8	100
1055	8,5	12	67
2075	8,5	12	67
2110	15,5	22	36
3150	22	31	26
3185	37	53	15
3220	37	53	15
4300	57	80	10
4370	57	80	10
4450	76	107	7,5
5550	76	107	7,5
≥ 5750	External braking unit (BUy series, optional)		

I_{RMS} Braking unit rated current, duty cycle = 50%
I_{PK} Peak current that can be delivered for max 60 seconds
R_{BR} Minimum braking resistance value

Table 7.9.2: Braking unit intervention threshold

Size	V_{BR} @ 480 V		V_{BR} @ 400 V		V_{BR} @ 230V	
	ON	OFF	ON	OFF	ON	OFF
1040 ... 5900	800 Vcc	790 Vcc	670 Vcc	660 Vcc	395 Vcc	385 Vcc

Warning!

Braking resistors may be subject to unexpected overloads due to faults.

Resistors MUST be protected using thermal cutouts. These devices must not interrupt the circuit in which the resistor is inserted but their auxiliary contact must cut off the power supply to the power section of the drive. If the resistor requires a protection contact, this must be used together with that of the thermal cutout.

A la suite de pannes, les résistances de freinage peuvent être sujettes à des surcharges imprévues. La protection des résistances au moyen de dispositifs de protection thermique est absolument capitale. Ces dispositifs ne doivent pas interrompre le circuit qui abrite la résistance, mais leur contact auxiliaire doit couper l'alimentation du côté puissance du drive. Si la résistance prévoit un contact de protection, ce dernier doit être utilisé conjointement à celui du dispositif de protection thermique.

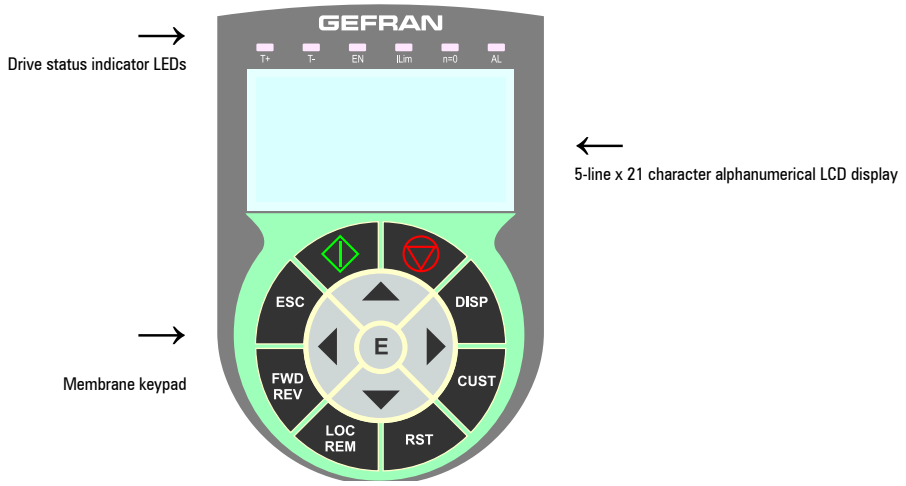
Note!

For the combination of recommended braking resistors **refer to chapter 5.4**.

8. Use of the keypad

This chapter describes the optional KB-ADV100 keypad and methods of use for displaying and programming inverter parameters.

8.1 Description



The programming keypad is used to display the status and diagnostics parameters during operation. It has a strip of magnetic material on the back so that it can be attached to the front of the drive or other metal surface (e.g. door of the electrical panel). The keypad can be used remotely from distances of up to 15 m. A 70 cm-long connection cable is supplied as standard. Up to 5 sets of parameters can be saved using the KB-ADV100 keypad and sent to other drives.

8.1.1 Membrane keypad

This section describes the keys on the membrane keypad and their functions

Symbol	Reference	Description
	**Start**	Starts the motor
	**Stop**	Stops the motor
ESC	Escape	Returns to the higher level menu or submenu. Exits a parameter, a list of parameters, the list of the last 10 parameters and the FIND function. Can be used to exit a message that requires use of this.
FWD REV	**Forward/ Reverse**	Returns to the higher level menu or submenu.
LOC REM	**Local/Remote**	Changes the method of use from local to remote and vice versa. Is active only if the drive is not enabled.
RST	Reset	Resets alarms, only if the causes have been eliminated.
CUST	Custom	Displays the last 10 parameters that have been modified. To exit these functions, press the ◀ key.
DISP	Display	Displays a list of drive functioning parameters.
E	Enter	Enters the submenu or selected parameter, or selects an operation. It is used when modifying parameters to confirm the new value that has been set.
▲	Up	Moves the selection up in a menu or list of parameters. During modification of a parameter, increases the value of the digit under the cursor.
▼	Down	Moves the selection down in a menu or list of parameters. During modification of a parameter, decreases the value of the digit under the cursor.
◀	Left	Returns to the higher level menu. During modification of a parameter, moves the cursor to the left.
▶	Right	Accesses the submenu or parameter selected. During modification of a parameter, moves the cursor to the right.

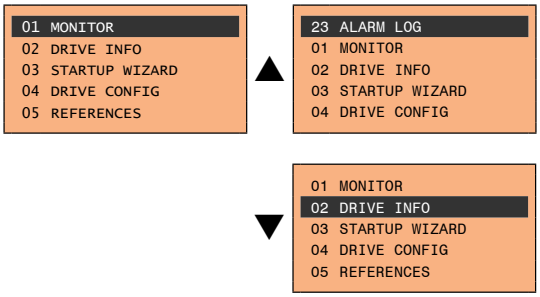
8.1.2 Meaning of LEDs

LEDs	Colore	Significato dei Led
T+	Yellow	The LED is lit, when the drive operates with a positive torque
T-	Yellow	The LED is lit, when the drive operates with a negative torque
EN	Green	The LED is lit during IGBT modulation (drive operating)
ILIM	Red	When this LED is lit the drive has reached a current limit condition. During normal functioning, this LED is off.
N=0	Yellow	The LED is lit when motor speed is 0.
AL	Red	The LED is lit when the drive signals that an alarm has been triggered

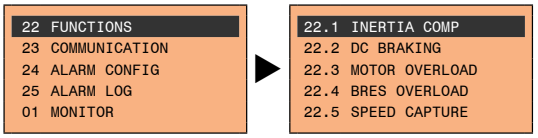
8.2 Navigation

8.2.1 Scanning of the first and second level menus

1st level



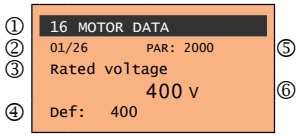
1st level 2nd level



Note!

This example is only visible in Expert mode..

8.2.2 Display of a parameter



(1) Reference to the menu where the parameter is to be found (in this case menu 16 - MOTOR DATA)

(2) Position of the parameter in the menu structure (01)

(3) Description of the parameter (Rated voltage)

(4) Depends on the type of parameter:

- Numeric parameter: displays the numeric value of the parameter, in the format required, and unit of measurement.
- Binary selection: the parameter may assume only 2 states, indicated as **On** - **Off** or 0 - 1.
- LINK type parameter: displays the description of the parameter set from the selection list.
- ENUM type parameter: displays the description of the selection
- Command: displays the method of execution of the command

(5) Parameter number

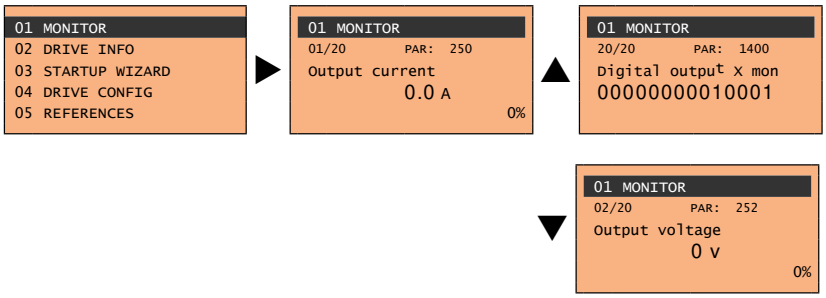
(6) In this position, the following may be displayed:

- Numeric parameter: displays the default, minimum and maximum values of the parameter. These values are displayed in sequence pressing the ► key.
- LINK type parameter: displays the number (PAR) of the parameter set.

- ENUM type parameter: displays the numeric value corresponding to the current selection.
- Command: in the case of an error in the command, indicates that **ESC** must be pressed to terminate the command.
- Messages and error conditions:

Param read only	attempt to modify a read-only parameter
Password active	the parameter protection password is active
Drive enabled	attempt to modify a non-modifiable parameter with the drive enabled
Input value too high	the value entered too high
Input value too low	the value entered too low
Out of range	attempt to insert a value outside the min. and max. limits

8.2.3 Scanning of the parameters



8.2.4 List of the last parameters modified

Pressing the **CUST** key, a list containing the last 10 parameters modified is accessed. One parameter is displayed at a time and the list can be scrolled using the ▲ and ▼ keys.
To exit this list, press the ► key.

8.2.5 "FIND" function

Pressing the **FIND** key activates the function that makes it possible to access any parameter simply by entering the parameter software number (PAR).
When the parameter reached by the "**FIND**" command is displayed, it is possible to navigate all the parameters forming part of the same group using the ▲ and ▼ keys. Pressing the ► key returns to the "**FIND**" function.
To exit, press the ► key.

8.3 Parameter modification

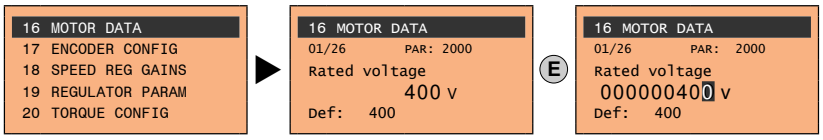
To enter parameter modification mode, press the **E** key when the parameter to be modified is displayed.
To save the value of the parameter, following modification, press the **E** key again.

Note! To save permanently, see paragraph 8.4.

To exit modification mode without saving the value, press the **ESC** key.
The operations to be carried out to modify the value depend on the type of the parameter, as described below.

Note! For further information about the type of parameters displayed, see paragraph 8.2.2.

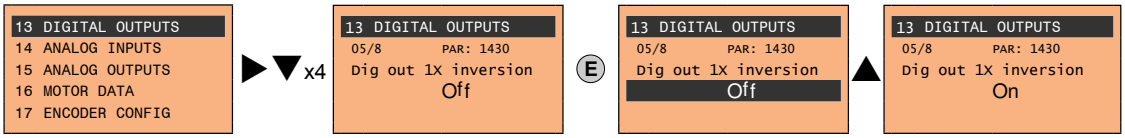
- **Numeric parameters**



When **E** is pressed to access modification mode, the cursor is activated on the digit corresponding to the unit.
Using the ◄ and ► keys, the cursor can be moved to all the digits, including trailing zeros that are normally not displayed.
With the ▲ and ▼ keys, the digit under the cursor is increased or decreased.
Press **E** to confirm the modification or **ESC** to cancel.

- **Binary parameters (BIT type)**

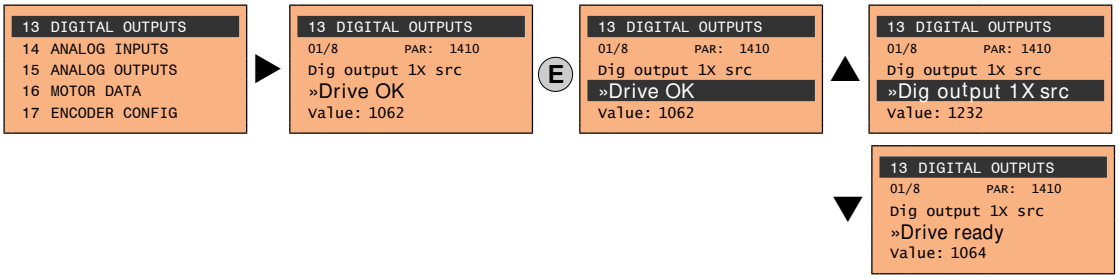
The parameter may assume only two states which are indicated as **On**-**Off** or 0-1.



Press **E** to activate modification mode. The entire line is displayed in reverse. Use the ▲ and ▼ keys to move from one state to another. Press **E** to confirm the modification or **ESC** to cancel.

- **LINK parameters**

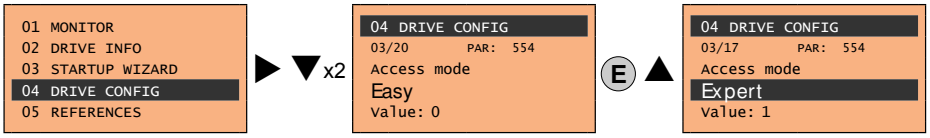
The parameter may assume the number of another parameter as value.



Press **E** to activate modification mode. The entire line is displayed in reverse. The elements of the list of parameters associated with this parameter can be scrolled using the ▲ and ▼ keys.
Press **E** to confirm the modification or **ESC** to cancel.

- **ENUM parameters**

The parameter may assume only the values contained in a selection list.



Press **E** to activate modification mode. The entire line is displayed in reverse. The elements of the selection list can be scrolled using the ▲ and ▼ keys.
Press **E** to confirm the modification or **ESC** to cancel.

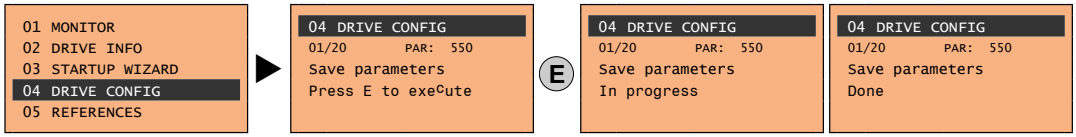
- **Execution of commands**

A parameter can be used to carry out a number of operations on the drive. For an example, see paragraph 8.4: in this case the request "**Press E to execute**" is displayed.
To execute the command, press **E**. During execution of the command, the "**In progress**" caption is displayed to indicate that the operation is in course. At the end of execution, if the result is positive, the "**Done**" caption is displayed for few seconds. If execution has failed, an error message is displayed.

8.4 How to save parameters

There are two ways of saving parameters in the non-volatile memory of the drive:

1) By pressing the **SAVE** key on the keypad.
2) Menu 04 DRIVE CONFIG, parameter 04.01 **Save parameters**, PAR : 550. This is used to save changes to parameter settings so that they are maintained even after power-off.

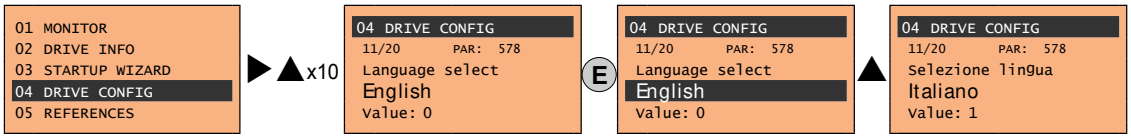


To exit, press the ◄ key.

8.5 Configuration of the display

6.5.1 Language selection

Menu 04 DRIVE CONFIG, parameter 04.14 **Language select**, PAR: 578,
default=English. This is used to set one of the languages available: English, Italian, French, German, Spanish, Polish, Romanian, Russian (*), Turkish and Portuguese.



Press **E** to confirm the modification or **ESC** to cancel.

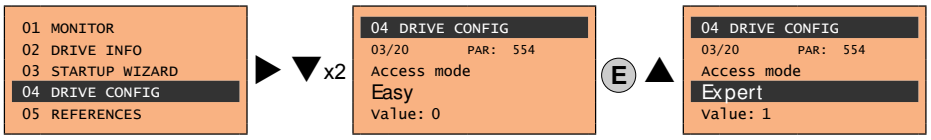
(*) nota:

The Cyrillic font must be selected for texts in this language to be displayed correctly:

1. Hold the E key down while switching the drive on
2. Press the ► or ◄ key to select the "Cyrillic" font
3. Press E to confirm and proceed to the opening menu.

8.5.2 Selection of Easy/Expert mode

Menu 04 DRIVE CONFIG, parameter 04.03 **Access mode**, PAR: 570.
Enables two methods of access to be configured:
Easy (default) only the main parameters are displayed
Expert for advanced users, all the parameters are displayed



8.5.3 Startup display

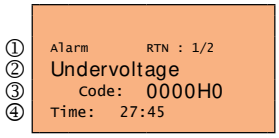
Menu 04 DRIVE CONFIG, parameter 04.12 **Startup display**, PAR: 574.
This is used to set the parameter that will be displayed automatically at drive power-on.
Entering the value -1 (default), the function is disabled and the main menu is displayed at power-on.

8.5.4 Back-lighting of the display

Menu 04 DRIVE CONFIG, parameter 04.13 **Display backlight**, PAR: 576. Sets lighting of the display:
On the light of the display always stays on.
Off (default) the light switches off approx. 3 minutes after the last key is pressed.

8.6 Alarms

The alarms page is displayed automatically when an alarm occurs.



(1) **Alarm**: identifies the alarm page.
RTN: indicates that the alarm has been reset; if the alarm is still active, nothing is displayed.
x/y: **x** indicates the position of this alarm in the list of alarms and **y** the number of alarms (the alarm with lowest x is the most recent)

(2) Description of the alarm

(3) Sub-code of the alarm, provides other information in addition to the description

(4) Moment the alarm occurred in machine time.

The list of alarms is scrolled using the ▲ and ▼ keys.

Note!

For further information, see **chapter 10.1**.

8.6.1 Alarm reset

- **If the alarm page is displayed:**

  Pressing the **RST** key, the alarms are reset and all alarms that have been reset are eliminated from the list. If, after this operation, the list of alarms is empty, the alarm page is closed. If the list is not empty, press the ► key to exit the alarms page.

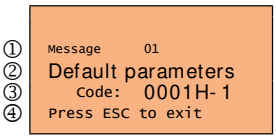
- **If the alarm page is not displayed:**

  Press the **RST** key to reset the alarms. If active alarms are still present following reset, the alarm page is opened.

8.7 Messages

Operator messages are displayed with this page.
There are two types of messages:
- timed (closed automatically after a certain number of seconds),
- permanent (continue to be displayed until the operator presses the **ESC** key).

Several concurrent messages are enqueued and presented to the operator in sequence, starting from the most recent.



(1) **Message**: identifies a message.

xx indicates how many messages are enqueued. The queue may contain a maximum of 10 messages and the message with the highest number is the most recent.

(2) Description of the message

(3) Sub-code of the message. Provides extra information in addition to the description.

(4) "**Press ESC to exit**" is displayed if the message requires acknowledgment.

When a message is closed, the next message is displayed until the queue is empty.

Note!

For further information, see chapter 10.3.

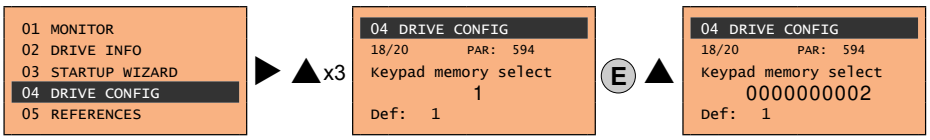
8.8 Saving and recovery of new parameter settings

Drive parameters can be saved on the keypad in 5 different memory areas. This function is useful for obtaining various sets of parameters, for safety backup or transferring parameters from one drive to another.

8.8.1 Selection of the keypad memory

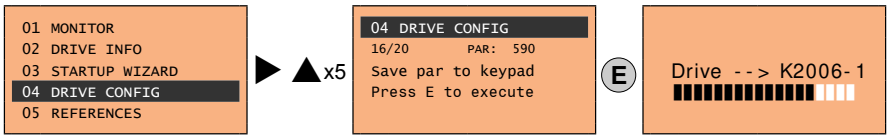
Note!

This example is only visible in Expert mode.

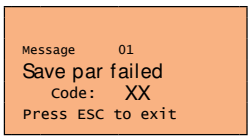


Menu 04 DRIVE CONFIG, parameter 04.16 **Keypad memory select**, PAR: 594. The keypad features 5 memory areas dedicated to saving parameters.
The memory to be used is selected using the **Keypad memory select** parameter. Subsequent saving and recovery operations will be carried out on the memory selected.

8.8.2 Saving of parameters on the keypad



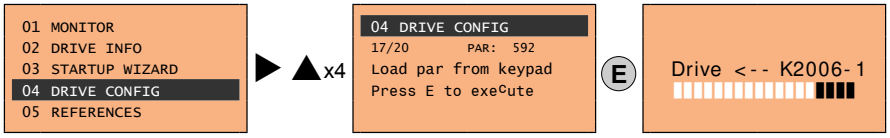
Menu 04 DRIVE CONFIG, parameter 04.16 **Save par to keypad**, PAR: 590. This is used to transfer the parameters from the drive to the selected keypad memory. To start the operation, press the **E** key.
During transfer, a bar is displayed which indicates progress of the operation.
Instead of the letter **X**, the number of the currently selected keypad memory is displayed.
At the end of transfer, if this has been completed successfully, the "**Done**" caption is displayed for a few seconds with subsequent return to the initial page.
If an error occurs during transfer, the following message is displayed:



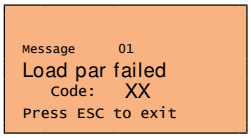
The code **XX** indicates the type of error, see **paragraph 10.3**. To exit the error message, press the **ESC** key.

8.8.3 Load parameters from keypad

Menu 04 DRIVE CONFIG, parameter 04.17 **Load par from keypad**, PAR: 592. This is used to transfer the parameters from the selected memory of the keypad to the drive.



To start the operation, press the **E** key. During transfer, a bar is displayed which indicates progress of the operation.
Instead of the letter **X**, the number of the currently selected keypad memory is displayed.
At the end of transfer, if this has been completed successfully, the "**Done**" caption is displayed for a few seconds with subsequent return to the initial page.
If an error occurs during transfer, the following message is displayed:



The code **XX** indicates the type of error, see **paragraph 10.3**. To exit the error message, press the **ESC** key.

8.8.4 Transfer of parameters between drives

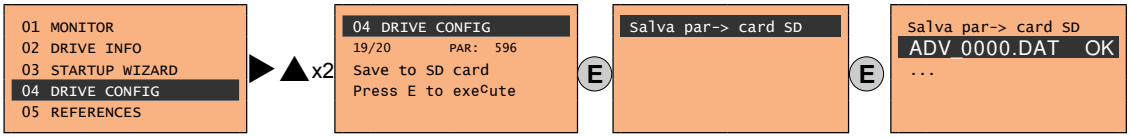
Transfer the parameters of the source drive to the keypad memory as indicated in paragraph 8.8.2, then connect the keypad to the drive where the new setting is to be saved and follow the procedure described in paragraph 8.8.3.

Caution

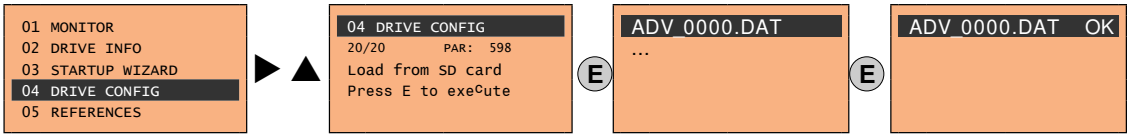
To prevent possible damage to equipment, it is advisable to disconnect and connect the keypad with the drive off.

8.9 Saving and recovery of new parameter settings on memory card

To save drive parameters on the memory card (SD-Secure Digital): Menu 04 DRIVE CONFIG, parameter 04.19 **Save to SD card**, PAR:



To transfer (recover) parameters from the memory card (SD-Secure Digital) to the drive: Menu 04 DRIVE CONFIG, parameter 04.20 **Load from SD card**, PAR 598:



9 - Commissioning via keypad

Warning!

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.
ADV100 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 (⏚) must be fixed type and doubled for redundancy.
Il faut toujours connecter le variateur à la terre ⏚ (PE). Le courant de dispersion vers la terre est supérieur à 3,5 mA sur les variateurs et sur les filtres à courant alterné. 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 (⏚) doit avoir une double connexion pour la redondance.

Only permanently-wired input power connections are allowed. This equipment must be grounded (IEC 536 Class 1, NEC and other applicable standards).
If a Residual Current-operated protective Device (RCD) is to be used, it must be an RCD type B. Machines with a three phase power supply, fitted with EMC filters, must not be connected to a supply via an ELCB (Earth Leakage Circuit-Breaker - see DIN VDE 0160, section 5.5.2 and EN50178 section 5.2.11.1).
The following terminals can carry dangerous voltages even if the inverter is inoperative:
- the power supply terminals L1, L2, L3, C1, C, D.
- the motor terminals U, V, W.
This equipment must not be used as an 'emergency stop mechanism' (see EN 60204, 9.2.5.4).

Seuls des branchements électriques permanents par câble en entrée sont admis. Mettre l'appareil à la masse (IEC 536 Classe 1, NEC et autres normes applicables).
S'il s'avère nécessaire d'utiliser un dispositif protecteur de courant résiduel (RCD), il convient de choisir un RCD de type B. Les machines à alimentation triphasée et dotées de filtres EMC ne doivent pas être raccordées au bloc d'alimentation par le biais d'un disjoncteur ELCB (Earth Leakage Circuit-Breaker – cf. DIN VDE 0160, paragraphe 5.5.2 et EN50178 paragraphe 5.2.11.1).
Les bornes suivantes peuvent recevoir des tensions dangereuses, même si l'onduleur est désactivé :
- bornes d'alimentation L1, L2, L3, C1, C, D.
- bornes du moteur U, V, W.
Ne pas utiliser cet appareil en tant que « dispositif d'arrêt d'urgence » (cf. EN 60204, 9.2.5.4)

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.

According to the EEC standards the ADV100 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.

Selon les normes EEC, les drives ADV100 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.

ADV100 operate at high voltages.

L'ADV100 fonctionne à des tensions élevées.

When operating electrical devices, it is impossible to avoid applying hazardous voltages to certain parts of the equipment.

L'actionnement de dispositifs électriques fait qu'il est impossible d'éviter l'application de tensions dangereuses sur certaines parties de l'appareil.

Wherever faults occurring in the control equipment can lead to substantial material damage or even grievous bodily injury (i.e. potentially dangerous faults), additional external precautions must be taken or facilities provided to ensure or enforce safe operation, even when a fault occurs (e.g. independent limit switches, mechanical interlocks, etc.).

Adopter des mesures de précaution supplémentaires à l'extérieur du drive (par exemple, des interrupteurs de fin de course, des interrupteurs mécaniques, etc.) ou fournir des fonctions aptes à garantir ou à mettre en place un fonctionnement sécurisé en cas de survenue d'une panne de l'appareil de commande susceptible d'occasionner des dégâts matériels d'envergure, voire même des lésions corporelles graves (par exemple, des pannes potentiellement dangereuses).

Certain parameter settings may cause the inverter to restart automatically after an input power failure.

Certaines configurations de paramètres peuvent provoquer le redémarrage automatique de l'onduleur après une coupure de l'alimentation.

This equipment is suitable for use in a circuit capable of delivering not more than 10,000 symmetrical amperes (rms), for a maximum voltage of 480 V.

Cet appareil est conçu pour une utilisation sur un circuit d'alimentation en mesure de délivrer 10.000 ampères symétriques (rms) maximum pour une tension maximale de 480V.

This equipment must not be used as an 'emergency stop mechanism' (see EN 60204, 9.2.5.4).

Ne pas utiliser cet appareil en tant que « dispositif d'arrêt d'urgence » (cf. EN 60204, 9.2.5.4).

Never open the device or covers while the AC Input power supplyis switched on. Minimum time to wait before working on the terminals or inside the device is listed **in section 4.6**.

Ne jamais ouvrir l'appareil lorsqu'il est suns tension. Le temps minimum d'attente avant de pouvoir travailler sur les bornes ou bien àl'intérieur de l'appareil est indiqué dans la section 4.6.

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.

Caution

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

To the output of the drive (terminals U, V, W) :
- no voltage should be connected to the output of the drive
- the parallel connection of several drives are not permissible.
- the direct connection of the inputs and outputs (bypass) are not permissible.
- capacitative load (e.g. Var compensation capacitors) should not be connected.

à la sortie du convertisseur (bornes U, V et W) :
- aucune tension ne doit être appliquée
- aucune charge capacitive ne doit être connectée
- il n'est paspermis de raccorder la sortie de plusieurs convertisseurs en parallèle
- I n'est paspermis d'effectuer une connexion directede l'entrée avec la sortie du convertisseur (Bypass).

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 del'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.

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.

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.

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 10kΩ/V).

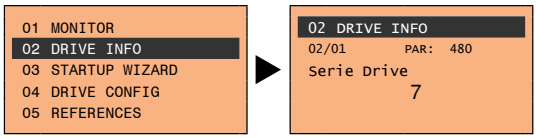
9.1 Asynchronous motor startup wizard

The ADV100 can operate with regulation modes: Voltage/Frequency (SSC) , Sensorless (open loop) and field-oriented vector control (closed loop).

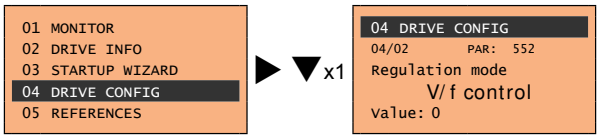
Note!

Before starting, check the factory settings:

Menu 02 DRIVE INFO, parameter 02.1 **Drive series**, PAR: 482, default=7.



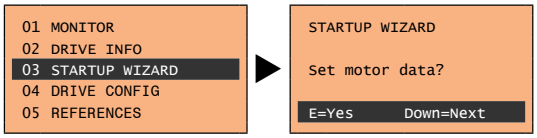
Menu 04 DRIVE CONFIG, parameter 04.2 **Regulation mode**, PAR: 552, default=V/f control.



The STARTUP WIZARD is a guided procedure used for quick start-up of the drive that helps to set the main parameters.
It consists of a series of questions, relating to the various sequences for entering and calculating the parameters necessary for correct drive pplication operation. The order of these sequences is as follows:

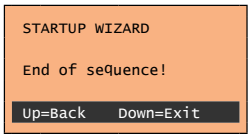
• **Basic connections**	**See step 1**
• **Setting motor parameters**	**See step 2**
• **Self-tuning with rotating motor**	**See step 3A**
• **Self-tuning with motor at stand-still or coupled to the load**	**See step 3B**
• **Setting the maximum speed reference value**	**See step 4**
• **Setting ramp parameters**	**See step 5**
• **Saving parameters**	**See step 6**
• **Speed test**	**See step 7**

The format of the function selection page is as follows:



Pressing the **E** key, the function to be programmed is accessed.
Press the ▼ (Down) key to move to the next function skipping the current function.
Press the ▲ (Up) key to return to the previous function.
To terminate the sequence of functions and return to the menu, press the **ESC** key.

The end of the start-up sequence is indicated with the page:



Press the ▼(Down) key to exit the sequence and return to the menu.

Note !

In the procedures described below, the settings have been made using the ADV1..-2075 drive and a 10 Hp (7.36 kW) asynchronous motor.

Step 1 - Electrical connections

Make the connections as described in paragraph 7.4.2.

Checks to be performed before powering the drive

- Check that the supply voltage is correct and that the input terminals on the drive (L1, L2 and L3) are connected correctly.
- Check that the output terminals on the drive (U, V and W) are connected to the motor correctly.
- Check that all the drive control circuit terminals are connected correctly. Check that all control inputs are open.

Powering the drive

- After completing all the checks described above, power the drive and proceed to step 2.

Step 2 - Setting motor parameters

Set the rating data of the motor connected: rated voltage, rated frequency, rated current, rated speed, rated power, power factor (cosφ).

Motor & Co.

Type: ABCDE		IEC 34-1 / VDE 0530	
Motor: 3 phase	50 Hz	Nr	12345-91
Rated voltage	380 V	I nom	19.0 A
Rated power	10 Hp	Power factor	0.83
Rated speed (n_n)	720 rpm		
IP54	Iso Kl F	S1	
Made in			

The self-tuning procedure is described below using the data of an imaginary motor by way of example.

Set the plate data of the motor connected, according to the procedures described on the previous pages.

Rated voltage [V]: the rated voltage of the motor indicated on the data plate.

Rated current [A]: motor rated current; approximately, the value should not be less than 0.3 times the rated current of the drive, output current class 1 @ 400 V on the data plate of the drive.

Rated speed [rpm]:	rated speed of the motor; this value must reflect the speed of the fully loaded motor at rated frequency. If slip is indicated on the motor data plate, set the Rated speed parameter as follows: Rated speed = Synchronous speed - Slip (e.g. for a 4-pole motor Rated speed = 1500 - 70 = 1430).
Rated frequency [Hz]:	rated frequency of the motor, as shown on the data plate.
Pole pairs:	Number of motor pole pairs. The number of motor pole pairs is calculated using the plate data and the following formula: P = 60 [s] x f [Hz] / nN [rpm] Where: P = motor pole pairs, f = motor rated frequency (e.g. 50); nN = motor rated speed (e.g. 1450)
Rated power [kW]:	Motor rated power; for a motor data plate with an HP power value, set the rated power kW = 0.736 x the motor power HP value.
Rated power factor:	Leave the default rated power factor if the data are not available on the data plate.

Note! When data entry is complete the **Take parameters** command is executed automatically (menu 16 MOTOR DATA, PAR: 2020). The motor data entered during the STARTUP WIZARD procedure are saved in a RAM memory to enable the drive to perform the necessary calculations.

These data are lost if the device is switched off. To save the motor data follow the procedure described in step 9.

At the end of the procedure proceed to step 3

Step 3 - Autotune of the motor

The drive carries out the motor autotune procedure (real measurement of motor parameters).
Autotune may last a few minutes.

Note ! If this operation generates an error message (example Error code 1), check the connections of the power and control circuits (see Step 1 - Connections), check motor data settings (see Step 2 – Motor data setting) and then repeat the Autotune procedure (or, alternatively, select a different type of procedure (Rotation or Still)

(3A)

```
STARTUP WIZARD
Run autotune rot ?
E=Yes      Down=Next
```

▼

(3B)

```
STARTUP WIZARD
Run autotune still ?
E=Yes      Down=Next
```

Step 3A - Self-tuning with rotating motor (Autotune rotation)

Use this procedure when the motor is not coupled or the transmission does not represent more than 5% of the load.
This procedure obtains the most accurate data.

Note ! Autotuning can be cancelled at any time by pressing 

```
STARTUP WIZARD
Run autotune rot
E=Yes      Down=Next
```

(E)

```
STARTUP WIZARD
Close Enable input
Esc=Abort
```

Connect terminal 9 (Enable) to terminal 12 (+24Vdc). To interrupt this operation, press the **ESC** key.

```
SEQ
SEQ. 01      PAR 2022
Autotune rotation
Press E to execute
```

```
Autotune
Progress:          5%
Press ESC to abort
```

```
Autotune
Done
```

```
Autotune
Open Enable input
```

Note ! At the end of the self-tuning procedure there is a request to open the Enable contact (terminals 7 – S3); the **Take tune parameters** command (menu 16 MOTOR DATA, PAR: 2078) is automatically executed.

The calculated parameters are saved in a RAM memory to enable the drive to perform the necessary calculations. These data are lost if the device is switched off. To save the motor data follow the procedure described in Step 6.

When the Enable contact is opened the drive proposes Step 4 to proceed with the wizard.

Step 3B - Self-tuning with motor at stand-still or coupled to the load (Autotune still)

Use this procedure when the motor is coupled to the transmission and cannot rotate freely.

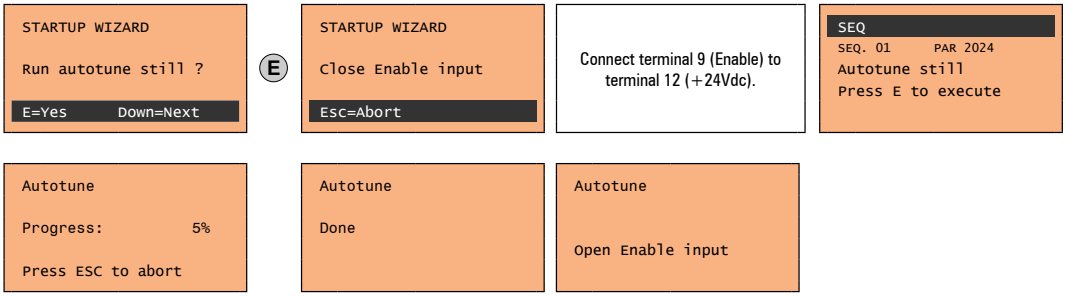
Caution

May cause limited rotation of the shaft.

Peut entraîner une rotation de l'arbre limitée.

Note !

Autotuning can be cancelled at any time by pressing ▽



Note !

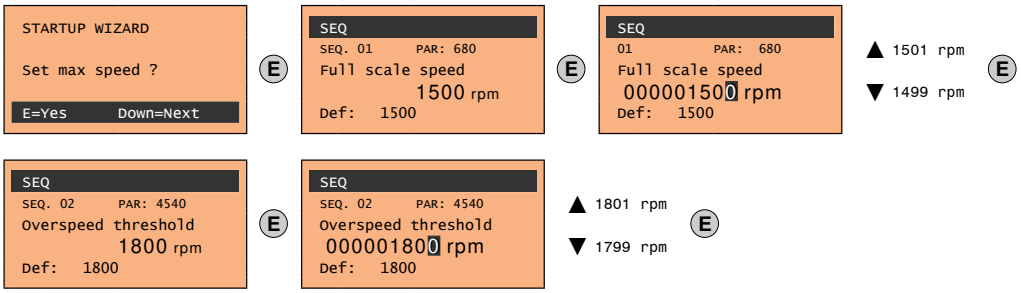
At the end of the self-tuning procedure there is a request to open the Enable contact (terminals 9 – 12); the **Take tune parameters** command (menu 16 MOTOR DATA, PAR: 2078) is automatically executed.

The calculated parameters are saved in a RAM memory to enable the drive to perform the necessary calculations. These data are lost if the device is switched off. To save the motor data follow the procedure described in Step 6.

When the Enable contact is opened the drive proposes Step 4 to proceed with the wizard

Step 4 - Setting the maximum speed reference value (Set max speed)

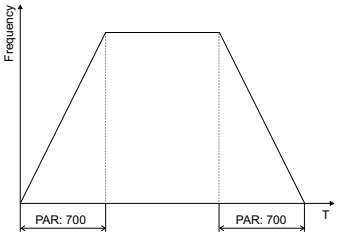
This step is used to define the maximum motor speed value that can be reached with each single reference signal (analog or digital).

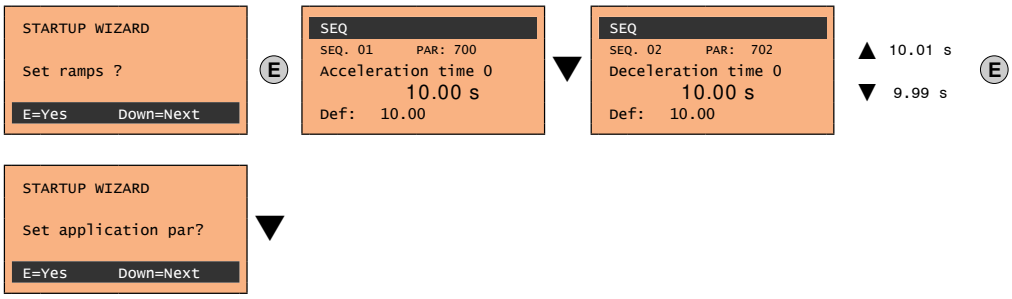


After setting the speed, proceed to Step 5 to set the acceleration and deceleration ramp parameters.

Step 5 - Setting ramp parameters (Set ramps)

Set the acceleration and deceleration times for the profile of ramp 0 :





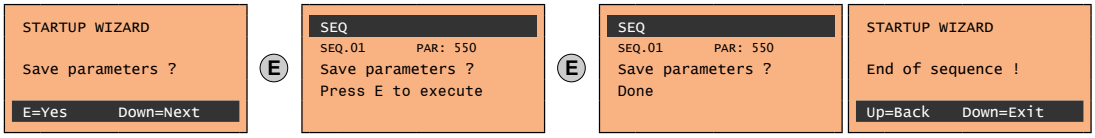
Note !

After setting the acceleration and deceleration ramps, the parameters that have been set manually and calculated using the self-tuning procedures can be saved permanently in a non-volatile flash memory.

To save the parameters proceed to Step 6.

Step 6 – Save parameters

To save the new parameter settings, so that they are maintained also after power-off, proceed as follows:



(1) (2) (3) (4)

(1) Press the **E** key to start the save parameters procedure.

(2) Press **E to confirm**

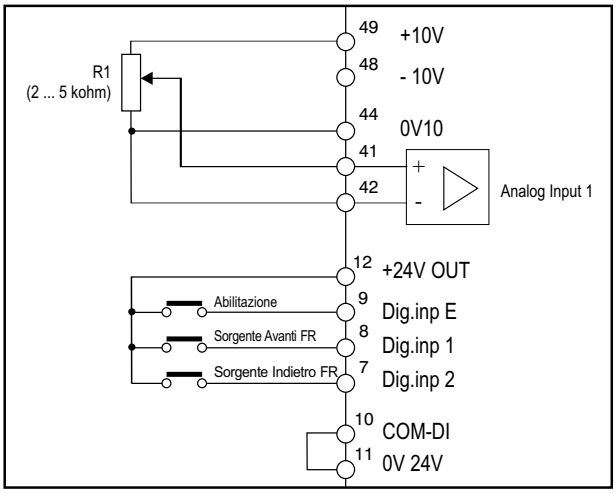
(3) End of procedure

(4) When the parameters have been saved correctly the drive displays this screen to show that the startup wizard is complete.

Step 7 - Speed tests

In this step the basic settings in order to perform a functional test of the drive-motor system are described. This functional test uses **factory settings as far as the analog and digital commands of the drive are concerned**. The preset regulation mode is V/f.

• Basic connections for the speed test



After making the connections described in the previous section, proceed as follows to start the motor rotating:

1. Make sure the analog signal or potentiometer are set to the minimum value.
2. Close the **Enable** contact (terminals 12 – 9)
3. Close the **FR forward src (PAR 1042)** contact, terminals 12 – 8. The drive starts magnetizing the motor
4. Increase the reference signal gradually using the potentiometer or analog signal
5. If the motor rotates anti-clockwise with the **FR forward src (PAR 1042)** command and a positive analog reference, stop the drive, disconnect the power supply and invert two phases between U, V and W.
6. Press the **DISP** key to check that the voltage, current and output frequency values are correct in relation to the type of motor and the set speed reference value.
7. If all the parameters are correct, increase the analog reference to the full scale value and check that the output voltage is the same as that on the motor data plate, that the current is approximately equal to the magnetizing current (for a standard asynchronous motor this is usually between 25% and 40% of the rated current) and that the output frequency is 50 Hz.
8. If the motor does not reach its maximum speed, self-tuning of the analog input may be necessary‘: set the input signal to its maximum value and set the **An inp 1 gain tune** parameter (PAR: 1508) to 1.
9. If the motor still rotates with a reference of zero, eliminate the condition by self-tuning the analog input offset: set the input signal to its minimum value and set 1 for **An inp 1 offset tune** (PAR: 1506).
10. To reverse the direction of rotation, keep closed the **FR forward src (PAR 1042)** contact (terminals 12 – 8) and close the **FR reverse src (PAR 1044)** contact (terminals 12 – 7). The motor will start the deceleration ramp until reaching the zero speed, after which it will reverse the direction of rotation and move to the set speed with the acceleration ramp.
11. To stop the drive, open the **FR forward src (PAR 1042)** contact (terminals 12 – 8): the motor will start the deceleration ramp and the speed will move to zero, but the motor will remain magnetized. To interrupt magnetization, open the **Enable** contact (terminals 12 – 9).
12. If the **Enable** contact is opened while the motor is running, the inverter bridge is immediately disabled and the motor stops due to inertia.

Note !

Once you have verified the correct operation of the drive-motor system, the application can be customized by changing some of the parameters.

• Summary of parameters

The parameters used and/or modified in the Startup Wizard procedures are listed below.

Menu	PAR	Description	
16.1	2000	**Rated voltage**	Motor rated voltage
16.2	2002	**Rated current**	Motor rated current
16.3	2004	**Rated speed**	Motor rated speed
16.4	2006	**Rated frequency**	Motor rated frequency
16.5	2008	**Pole pairs**	Number of pole pairs

16.6	**2010**	**Rated power**	Motor rated power
16.9	**2022**	**Autotune rotation**	Self-tuning with motor rotating
16.10	**2024**	**Autotune still**	Self-tuning with motor at stand-still or coupled to the load
5.24	**680**	**Full scale speed**	Maximum speed setting
6.1	**700**	**Acceleration time 0**	Acceleration time 0
6.2	**702**	**Deceleration time 0**	Deceleration time 0
4.1	**550**	**Save parameters**	Save parameters in the non-volatile memory

9.2 First customized start-up

In this section a startup test is performed, using a standard configuration, to check drive functioning and command connections.

A programming sequence has to be run to achieve a first simple customisation in order to be able to set the drive for the requested application.

Note ! **The main sections to be used, depending on the desired configuration, are described below.**

• Typical connection diagrams

Auxiliary control circuits _____ see chapter 7.4.2, **figure** 7.4.3
Typical connection diagram, connection through terminals strip _____ see chapter 7.4.2, **figure** 7.4.4/5
Potentials of the control section, Digital I/O PNP connection _____ see chapter 7.4.1, **figure** 7.4.1
Other inputs connections (NPN-PNP) _____ see chapter 7.4.1, **figure** 7.4.2

• Digital inputs

The table on **chapter 7.2.2** shows the default settings for the analog and digital inputs and outputs.

Note ! Digital input settings can only be edited from the Expert parameters, see **chapter 8.5.2**.

• Selecting the regulation mode

First set the regulation mode in the **Regulation mode** parameter (04 DRIVE CONFIG menu, PAR: 552) :

0 **V/f control.** This is the simplest and least advanced control mode. This mode can also be used to control several motors connected in parallel using a single drive.

1 **Open loop field-oriented vector control (sensorless).** In this mode, once the motor parameter self-tuning procedure has been performed, it is possible to create a mathematical model on which to perform all the necessary calculations in order to obtain high performance levels, especially high motor torque levels, even at very low speeds without the use of feedback, and achieve significant dynamic performance.

2 **Closed loop field-oriented vector control.** This mode can be used to obtain maximum drive-motor efficiency in terms of speed precision, dynamic system response and motor torque regulation. It requires feedback by a digital encoder keyed to the motor shaft and connected to the relative optional expansion card mounted in the drive.

• Selecting the type of reference

After setting the regulation mode, the source of the speed reference must be set in the **Ramp ref 1 src** parameter (05 REFERENCES menu, PAR: 610). This source can be selected from among those listed in the L_MLTREF selection list:

1 **Analog input 1X mon** parameter (PAR: 1600) to use the signal applied to terminals 1 – 2 of analog input 1 (14 - ANALOG INPUTS menu).

2 **Dig ramp ref 1** parameter (05 - REFERENCES menu, PAR: 600) to set a digital speed inside the drive.

3 **Multi ref out mon** parameter (07 - MULTI REFERENCE menu, PAR: 852) to select the digital speeds using the digital inputs of the drive.

4 **Mpot output mon** parameter (08 - MOTOPOTENTIOMETER menu, PAR: 894) to use the internal motor potentiometer of the drive. If sending the command from the operator keypad, to use the motor potentiometer function enter the **Mpot setpoint** parameter (PAR: 870) modify mode and press the Up (▲) and Down (▼) keys.

5 **Jog output mon** parameter (09 - JOG FUNCTION menu, PAR: 920) to use one of the drive's internal jog speeds.

Signals from expansion cards, the serial line or fieldbus can also be set as speed references (see the detailed description of parameters).

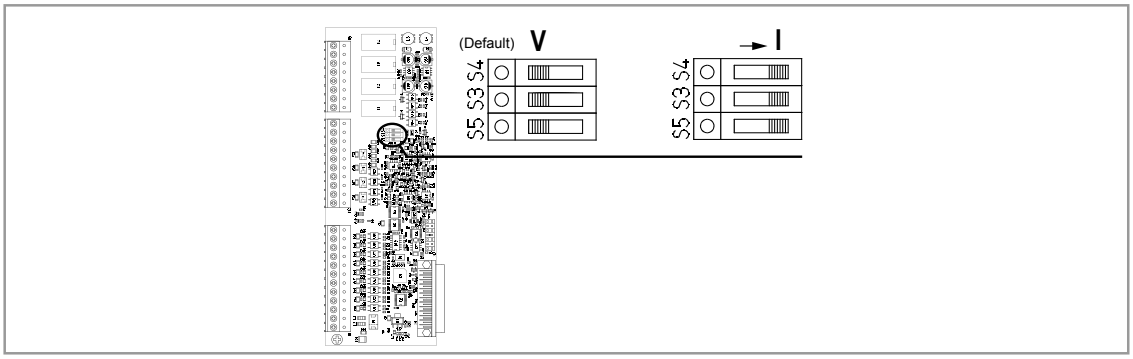
• Setting the type of analog reference

If the analog input has been selected, choose the type of signal to use in the **Analog inp 1X type** parameter (14 - ANALOG INPUTS menu, PAR.1602):

0 ± 10V

1 0-10V

In addition to programming the Analog inp 1X type (PAR.1602) the position of switches S5-S4-S3 on the I/O card must also be checked.



• Ramps setting

The acceleration and deceleration ramps can be set in **Acceleration time 0** (06 - RAMPS menu, PAR: 700) and **Deceleration time 0** (PAR: 702).

The signal available on the analog input can be adjusted using **Analog inp 1X scale** parameter (14 - ANALOG INPUTS menu, PAR: 1604), **An inp 1Xoffset tune** parameter (PAR: 1606) and **An inp 1X gain tune** parameter (PAR: 1608).

To use a digital speed to control the drive, enter it in the **Dig ramp ref 1** parameter (05 - REFERENCES menu, PAR: 600).

The ramps are the same used with the reference signal from the analog input.

• Multispeed

To use more than one digital speed, use the multi-speed function.

First select the source of the speed signals **Multi ref 0 src** and **Multi ref 1 src** (07 - MULTI REFERENCE menu, PAR: 832 e 834) from the L_MLTREF selection list.

Next define which digital inputs are to perform switching between the various speeds; use the **Multi ref sel .. src** parameters (PAR: from 840 to 846) to select the signals to use from the L_DIGSEL2 selection list. Set the desired speeds in the **Multi reference 0...7** parameters (PAR: from 800 to 814).

Also in this case the ramps can be set in the **Acceleration time 0** parameter (06 - RAMPS menu, PAR: 700) and **Deceleration time 0** parameter (PAR: 702) parameters.

• Motor potentiometer

To use the motor potentiometer, the signals to increase or decrease the reference must be defined: set the **Mpot up src** parameter (08 - MOTOPOTENTIOMETER menu, PAR: 884) and **Mpot down src** parameter (PAR: 886) parameters respectively to increase and decrease the reference using selection list L_DIGSEL2.
Set the motor potentiometer ramps using **Mpot acceleration** (PAR: 872) and **Mpot deceleration** parameters (PAR: 874).

• Jog

Finally, for Jog mode, select the control terminal in the **Jog cmd + src** parameter (09 - JOG FUNCTION menu, PAR: 916), using a signal from selection list L_DIGSEL2.
The Jog speed must be written in the **Jog setpoint** parameter (PAR: 910), while the acceleration and deceleration ramps can be set, respectively, in **Jog acceleration** (PAR: 912) and **Jog deceleration** parameters (PAR: 914).

• Speed limits

After selecting the reference, set the speed limits in the following parameters (05 - REFERENCES menu):

- **Full scale speed** (PAR: 680). Setting of the maximum motor speed, which usually coincides with the rated speed indicated on the motor data plate.
- **Speed ref top lim** (PAR: 670). Upper speed limit: the maximum setting is 200% of the **Full scale speed**.
- **Speed ref bottom lim** (PAR: 672). Lower speed limit: the maximum setting is -200% of the **Full scale speed**.
- **Overspeed threshold** (24 - ALARM CONFIG menu, PAR: 4540). Overspeed alarm limit.

• Input and Output terminals

The default setting of the input terminals is as follows:

- Terminal 9	Digital input E	Enable
- Terminal 8	Digital input 1	**FR forward src**, PAR 1042
- Terminal 7	Digital input 2	**FR reverse src**, PAR 1044
- Terminal 6	Digital input 3	**Multi ref sel 0 src**
- Terminal 5	Digital input 4	**Multi ref sel 1 src**
- Terminal 4	Digital input 5	**Fault reset src**
- Terminal 12	+ 24V OUT	I/O supply

The default configuration of the terminals dedicated to digital outputs are as follows:

- Terminal 56	Relay 1 output	**Drive OK** (relè 1)
- Terminal 57	COM relay 1	Common relay 1
- Terminal 54	Relay 2 output	**Drive ready** (relè 2)
- Terminal 55	COM relay 2	Common relay 2
- Terminal 52	Relay 3 output	**Ritardo velocità = 0**
- Terminal 53	COM relay 3	Common relays 3/4
- Terminal 50	Relay 4 output	**Ritardo riferim = 0**
- Terminal 51	COM relay 4	Power supply relays 3/4

Signals for the digital outputs can be programmed using the **Digital output 1...4 src** parameters (13 - DIGITAL OUTPUTS menu, PAR: from 1410 to 1416) using the settings in the L_DIGSEL1 selection list.

The drive also includes two analog outputs which are not factory-set. These outputs must be enabled by setting **Analog out 1X src** (15 - ANALOG OUTPUTS menu, PAR: 1850) and **Analog out 2X src** parameters (PAR: 1852) with a signal selected from selection list L_ANOUT.

The signal available on analog outputs is ± 10V.

The analog output signal can be adjusted using **Analog out 1X scale** (PAR: 1858) and **Analog out 2X scale** parameters (PAR:1860).

• Keypad

Use the **LOC / REM** key with the Enable input open (terminal 9 on terminal strip T2) to control running, to stop and reverse the direction of rotation of the motor using the operator keypad on the drive. Use the potentiometer or an analog signal to control speed.
For information on how to use a digital speed reference, see the example on **ADV100 Functions description and parameters list manual,** chapter **A.3 .** The reference can have a positive or negative value, making it possible to reverse the direction of rotation of the motor.

When the Enable input is closed, to enable motor running press **START.** The motor starts the acceleration ramp and moves to the speed set in the FWD direction. With the motor running you can adjust the speed using the **Dig ramp ref 1** parameter (PAR: 600) and the acceleration/deceleration ramps using **Acceleration time 0** (PAR: 700) and **Deceleration time 0** (PAR: 702).

To change the direction of rotation press **FWD/REV**.
To stop the motor with the deceleration ramp, press **STOP**.
If the Enable contact is opened the inverter bridge is immediately disabled and the motor stops for inertia

To return to control using the terminal strip commands and analog speed reference:
1. Stop the motor
2. Open the Enable terminal
3. Press **LOC / REM** key.

Note ! For more customizations and any information that is not included in this initial customization guide, see the description of the parameters in this manual.

10 - Troubleshooting

10.1 Alarms

Note ! To reset alarms, see **paragraph 8.6.1**.

In the following table, the Code is visible only from serial line

Code	Error message shown on the display	Sub-code	Description
0	**No alarm**		**Condition:** No alarm present
1	**Overvoltage**		**Condition: DC link overvoltage alarm due to energy recovered from the motor.** The voltage arriving at the drive power section is too high compared to the maximum threshold relating to the PAR 560 **Mains voltage** parameter setting.
			Solution: - Extend the deceleration ramp. - Use a braking resistor between terminals BR and C to dissipate the recovered energy
2	**Undervoltage**		**Condition:** DC link undervoltage alarm. The voltage arriving at the drive power section is too low compared to the minimum threshold relating to the 560 Mains voltage parameter setting due to:. - the mains voltage being too low or overextended voltage drops. - poor cable connections (e.g. loose contactor terminals, inductance, filter, etc.).
			Solution: Check the connections.
3	**Ground fault**		**Condition:** Ground short circuit alarm
			Solution: - Check drive and motor wiring. - Check that the motor is not grounded.
4	**Overcurrent**		**Condition: Instantaneous overcurrent protection intervention alarm.** This may be due to the incorrect setting of current regulator parameters or a short circuit between phases or ground fault on the drive output.
			Solution: - Check the current regulator parameters - Check wiring towards the motor
5	**Desaturation**		**Condition: Instantaneous overcurrent in the IGBT bridge alarm.**
			Solution: Switch the drive off and then switch it on again. If the alarm persists, contact the technical service centre.
6	**MultiUndervolt**		**Condition:** The number of attempted automatic restarts after the **Undervoltage** alarm has exceeded the set **PAR 4650 UVRep attempts** value in the **PAR 4652 UVRep delay** time.
			Solution: Too many Undervoltage alarms. Adopt the proposed solutions for the Undervoltage alarm.
7	**MultiOvercurr**		**Condition:** 2 attempted automatic restarts after the Overcurrent alarm within 30 seconds. If more than 30 seconds pass after the Overcurrent alarm was generated, the attempt counter is reset.
			Solution: Too many Overcurrent alarms. Adopt the proposed solutions for the Overcurrent alarm.
8	**MultiDesat**		**Condition:** 2 attempted at automatic restarts after the Desaturation alarm within 30 seconds. If more than 30 seconds pass after the Desaturation alarm was generated, the attempt counter is reset.
			Solution: Too many **Desaturation** alarms. Adopt the proposed solutions for the **Desaturation** alarm.
9	**Heatsink OT**		**Condition:** Heatsink temperature too high alarm
			Solution: - Verify the correct operation of the cooling fan. - Check that the heatsinks are not clogged
10	**HeatsinkS OTUT**		**Condition:** Heatsink temperature too high or too low alarm The temperature has exceeded the upper or lower limit set for the linear temperature transducer. Solution:
			Solution: - Verify the correct operation of the cooling fan. - Check that the heatsinks are not clogged - Check that the openings for the cabinet cooling air are not blocked.
11	**Intakeair OT**		**Condition:** Intake air temperature too high alarm.
			Solution: Check correct fan operation
12	**Motor OT**		**Condition:** Motor overtemperature alarm. Possible causes: - Load cycle too heavy - The motor is installed in a place where the ambient temperature is too high - If the motor is provided with a blower: the fan is not working - If the motor is not provided with a blower: the load is too high at slow speeds. Cooling the fan on the motor shaft is not sufficient for this load cycle. - The motor is used at less than the rated frequency, causing additional magnetic losses.
			Solution: - Change the processing cycle. - Use a cooling fan to cool the motor.

Code	Error message shown on the display	Sub-code	Description
13	Drive overload		**Condition:** Drive overload alarm. The overload threshold of the accumulator of the I^2t drive thermal image has been exceeded.
			Solution: Check that the size of the drive is suitable for the application.
14	Motor overload		**Condition:** Motor overload alarm. The current absorbed during operation is greater than that specified on the motor data plate. The overload threshold of the accumulator of the I^2t motor thermal image has been exceeded.
			Solution: - Reduce the motor load. - Increase the size of the motor.
15	Bres overload		**Condition:** Braking resistor overload alarm. The current absorbed by the resistor is greater than the rated current. The overload threshold of the accumulator of the I^2t braking resistor thermal image has been exceeded.
			Solution: Increase the Watt value of the braking resistor
16	Phase loss		**Condition:** Power phase loss alarm.
			Solution: Check the mains voltage and whether any protections upstream of the drive have been tripped.
17	Opt Bus fault		**Condition:** Error in the configuration stage or communication error.
		XXX0H-X	If the first digit to the left of "H" in the alarm sub-code is equal to 0, the error relates to a communication problem.
		XXXXH-X	If the first digit to the left of "H" in the alarm sub-code is other than 0, the error relates to a configuration problem.
			Solution: For configuration errors, check the configuration of the Bus communication, Bus type, Baudrate, address. parameter setting For communication errors verify wiring, resistance of terminations, interference immunity, timeout settings. For more details reference should be made to the datasheet of the bus being used.
18	Opt 1 IO fault		**Condition:** Error in the communication between Regulation and I/O expansion card in slot 1
			Solution: Check that it has been inserted correctly.
19	Opt 2 IO fault		**Condition:**
			Solution:
20	Opt Enc fault		**Condition:** Error in the communication between Regulation and Encoder feedback card.
			Solution: Check that it has been inserted correctly.
21	External fault		**Condition:** External alarm present. A digital input has been programmed as an external alarm, but the +24V voltage is not available on the terminal.
			Solution: Check that the terminal screws are tight
22	Speed fbk loss		**Condition:** Speed feedback loss alarm. The encoder is not connected, not connected properly or not powered: verify encoder operation by selecting the **PAR 260 Motor speed** parameter in the MONITOR menu.
			Solution: See parameter 2172 **SpdFbkLoss code** for information about the cause of the alarm and chapter 10.2 **Speed fbk loss** [22] alarm
23	Overspeed		**Condition:** Motor overspeed alarm. The motor speed exceeds the limits set in the **PAR 670 Speed ref top lim** and **PAR 672 Speed ref bottom lim** parameters.
			Solution: - Limit the speed reference. - Check that the motor is not driven in overspeed during rotation.
24	Speed ref loss		**Condition: Speed reference loss alarm;** occurs if the difference between the speed regulator reference and the actual motor speed is more than 100 rpm. This condition occurs because the drive is in the current limit condition. It is only available in the Flux Vect OL and Flux Vect OC mode.
			Solution: Check the drive load conditions.
25	Emg stop alarm		**Condition:** Emergency stop alarm. The Stop key on the keypad was pressed with the **Stop key mode** parameter set to **EmgStop&Alarm** in case of Remote->Terminal Strip or Remote->Digital or Local->Terminal Strip mode.
			Solution: Eliminate the reason for which the Stop key on the keypad was pressed and reset the drive.
26	Power down		**Condition:** The drive was enabled with no supply voltage at the power section.
			Solution: Emergency stop alarm. The Stop key on the keypad was pressed with the **Stop key mode** parameter set to **EmgStop&Alarm** in case of Remote->Terminal Strip or Remote->Digital or Local->Terminal Strip mode.
27 ... 32	Not Used 1... 6		
33 ... 40	Plc1 fault ... Plc8 fault		**Condition:** Enabled application developed in the IEC 61131-3 environment has found the conditions for generating this specific alarm to be true. The meaning of the alarm depends on the type of application. For more information, refer to the documentation concerning the specific application..
		XXXXH-X	The XXXXH-X code indicates the reason for the error: make a note of this to discuss it with the service centre.
			Solution: Refer to the documentation concerning the enabled application.
41	Watchdog		**Condition:** this condition can occur during operation when the watchdog micro protection is enabled; the alarm is included in the list of alarms and alarm log. After this alarm: - the drive automatically runs a reset - motor control is not available.
		XXXXH-X	The XXXXH-X code indicates the reason for the error: make a note of this to discuss it with the service centre.
			Solution: If the alarm is the consequence of a change in the drive configuration (parameter setting, option installation, PLC application download) remove it. Turn the drive off and then on again.

Code	Error message shown on the display	Sub-code	Description
42	Trap error	**Condition:** this condition can occur during operation when the trap micro protection is enabled; the alarm is included in the list of alarms and alarm log. After this alarm: - the drive automatically runs a reset - motor control is not available.	
		XXXXH-X	The XXXXH-X (SubHandler-Class) code indicates the reason for the error: make a note of this to discuss it with the service centre.
		Solution: If the alarm was a consequence of a variation to the drive configuration (parameter setting, installation of an option, downloading of a PLC application), remove it. Switch the drive off and then switch it on again.	
43	System error	**Condition:** this condition can occur during operation when the operating system protection is enabled; the alarm is included in the list of alarms and alarm log. After this alarm: - the drive automatically runs a reset - motor control is not available.	
		XXXXH-X	The XXXXH-X (Error-Pid) code indicates the reason for the error: make a note of this to discuss it with the service centre.
		Solution: If the alarm was a consequence of a variation to the drive configuration (parameter setting, installation of an option, downloading of a PLC application), remove it. Switch the drive off and then switch it on again.	
44	User error	**Condition:** this condition can occur during operation when the software protection is enabled; the alarm is included in the list of alarms and alarm log. After this alarm: - the drive automatically runs a reset - motor control is not available.	
		XXXXH-X	The XXXXH-X (Error-Pid) code indicates the reason for the error: make a note of this to discuss it with the service centre.
		Solution: If the alarm was a consequence of a variation to the drive configuration (parameter setting, installation of an option, downloading of a PLC application), remove it. Switch the drive off and then switch it on again.	
45	Param error	**Condition:** if an error occurs during the enabling of the parameter database saved in the Flash memory; the alarm is included in the list of alarms and alarm log.	
		XXXH-X	Code XXXXH-X indicates the number of the parameter (Hex-Dec) that has caused the error: make a note of this to discuss it with the service centre.
		Solution: Set the parameter causing the error to the correct value and run **Save parameter**. Switch the drive off and then switch it back on again.	
46	Load default	**Condition:** this can occur during loading of the parameter database saved in the Flash memory it is normal if it appears in the following conditions: the first time the drive is switched on, when a new version of the firmware is downloaded, when the regulation is installed on a new size, when a new region is entered. If this message appears when the drive is already in use it means there has been a problem in the parameter database saved in the Flash memory. If this message is displayed the drive restores the default database, i.e. the one downloaded during production.	
		0001H-1	The database saved is not valid
		0002H-2	The database saved is not compatible
		0003H-3	The saved database refers to a different size and not to the current size
		0004H-4	The saved database refers to a different region and not to the current region
		Solution: Set the parameters to the desired value and execute **Save parameters**	
47	Plc cfg error	**Condition:** this can occur during loading of the MDPLC application The Mdplc application present on the drive is not run.	
		0004H-4	The application that has been downloaded has a different Crc on the DataBlock and Function table.
		0065H-101	The application that has been downloaded has an invalid identification code (Info).
		0066H-102	The applciation that has been downloaded uses an incorrect task number (Info).
		0067H-103	The application that has been downloaded has an incorrect software configuration.
		0068H-104	The application that has been downloaded has a different Crc on the DataBlock and Function table.
		0069H-105	A Trap error or System error has occurred. The drive has automatically executed a Power-up operation. Application not executed. See the Alarm List for more information about an error that has occurred.
		006AH-106	The application that has been downloaded has an invalid identification code (Task).
		006BH-107	The application that has been downloaded uses an incorrect task number (Task).
		006CH-108	The application that has been downloaded has an incorrect Crc (Tables + Code)
		Solution: Remove the MDPLC application or download a correct MDPLC application.	
48	Load par def plc	**Condition:** this can occur during loading of the parameter database saved in the Flash memory of the MDPLC application it is normal if it appears the first time the drive is switched on, after downloading a new application. If this message appears when the drive is already in use it means there has been a problem in the parameter database saved in the Flash memory. If this message appears the drive automatically runs the Load default command.	
		0001H-1	The database saved is not valid
		Solution: Set the parameters to the desired value and run Save parameter.	
49	Key failed	**Condition:** this can occur at drive power-on if the wrong enabling key is entered for a given firmware function	
		0001H-1	Incorrect PLC key. PLC application not available.
		Solution: Contact Gefran to request the key to enable the desired firmware function.	
50	Encoder error	**Condition:** this condition may occur when the drive is powered during encoder setup each time parameter 552 **Regulation mode** is set.	

Code	Error message shown on the display	Sub-code	Description
		100H-256	**Cause**: An error occurred during setup; the information received from the encoder is not reliable. If the encoder is used for feedback the **Speed fbk loss** alarm is also generated.
			Solution: Take the recommended action for the **Speed fbk loss** alarm.
		200H-512	**Cause**: The firmware on the optional encoder card is incompatible with that on the regulation card. The information received from the encoder is not reliable
			Solution: Contact Gefran in order to update the firmware on the optional encoder card.
51	No opt card	**Condition:** an optional card has been removed with respect to the configuration present when the last **Save parameters** command was executed or there is a fault on the optional card or on the regulation card.	
		Solution: If the user has removed the card on purpose, execute **Save parameters**. If the user has not removed the card, identify and replace the faulty card.	

10.2 Speed fbk loss alarm according to the type of feedback

Note !

For the correct interpretation of the cause of the alarm trigger, it is necessary to transform the hex code indicated in parameter 15.13 **SpdFbkLoss code,** PAR 2172 , in the corresponding binary and verify in the encoder table that the active bits and related description are used.

- **Speed fbk loss [22] alarm with digital incremental encoder**

Bit	Value	Name	Description
0	0x01	CHA	**Cause:** no impulses or disturbance on incremental channel A.
			Solution: Check the connection of the encoder-drive channel A, check the connection of the screen, check the encoder supply voltage, check parameter 2102 **Encoder supply**, check parameter 2104 **Encoder input config**.
1	0x02	CHB	**Cause:** no impulses or disturbance on incremental channel B.
			Solution: Check the connection of the encoder-drive channel B, check the connection of the screen, check the encoder supply voltage, check parameter 2102 **Encoder supply**, check parameter 2104 **Encoder input config**.
2	0x04	CHZ	**Cause:** no impulses or disturbance on incremental channel Z.
			Solution: Check the connection of the encoder-drive channel Z, check the connection of the screen, check the encoder supply voltage, check parameter 2102 **Encoder supply**, check parameter 2104 **Encoder input config**, check parameter 2110 **Encoder signal check**

10.2.1 Reset Speed fbk loss alarm

The reasons for activating the **Speed fbk loss** alarm and the information acquired by the encoder are shown in parameter 2172 **SpdFbkLoss code.**

If no card has been installed the **Speed fbk loss** [22] alarm is generated and no cause is displayed in parameter 2172 **SpdFbkLoss code**. Several causes may be present at the same time.
If no card is recognised, the system runs a routine that always returns **Speed fbk loss** [22] active without specifying a cause.

10.2.2 Encoder error alarm

Setup is performed each time the drive is turned on, regardless of the regulation mode that has been selected. If an error is detected during setup the **Encoder error** alarm is generated with the following codes:

Bit	Value	Name	Description
8	0x100	Setup error	**Cause:** An error occurred during setup. When this has been signalled the information obtained from the encoder is not reliable.
			Solution: Take the action recommended for **Speed fbk loss** [22] alarm according to the type of encoder.
9	0x200	Compatibility error	**Cause:** Firmware on option card incompatible with firmware on regulation card. When this has been signalled the information obtained from the encoder is not reliable.
			Solution: Contact Gefran in order to update the firmware on the optional card.

10.3 Messages

Note ! For more information see **chapter 8.7**.

Index	Error message shown on the display	Sub-code	Description
1	**Load default param**		**Condition:** may occur during loading of the parameter database saved in flash normally appears in the following conditions: at initial power-on when a new firmware version is downloaded, when the regulation is installed on a new size, when the region is changed. If this message is displayed when the drive is already operating, this means that a problem has occurred in the parameter database saved in Flash. If this message is displayed the drive restores the default database, i.e. the one downloaded.
		0001H-1	The database saved is not valid
		0002H-2	The database saved is not compatible
		0003H-3	The database saved refers to a different size from the current size
		0004H-4	The database saved refers to a different region from the current region
		Solution:	Set the parameters to the value required and perform **Save parameter**
2 3 4	**Option detect slot 1** **Option detect slot 2** **Option detect slot 3**	**Condition:**	at power-on, the drive recognizes the presence of an optional card in one of the three expansion slots. One of the three messages is shown on the display
		0H-0	None
		0004H-4	Can/DeviceNet
		00FFH-255	Unknown
		0608H-1544	Enc 1 EXP-DE-I1R1F2-ADL / EXP-DE-I1-ADL
		Solution:	
5	**Autotune**	**Condition:**	this may occur during the **Autotune** procedure
		0	No error
		1	The commands are not configured in Local mode.
			Solution: Execute the requested configuration
		2	The Commands local sel parameter has not been configured from the keypad
			Solution: Execute the requested configuration
		3	The motor plate data parameters have changed but the **Take parameters** command, PAR 2020, has not been executed
			Solution: Execute the **Take parameters** command.
		4	The motor is not connected
			Solution: Connect the motor
		5	While running self-tuning the ESC key was pressed or the enable contact was opened or an alarm occurred. The **Autotune** command was sent with the drive in the alarm condition
			Solution: Eliminate the reason for the alarm, remove the reason for the opening of the enable contact, reset alarms.
		6	A setting performed by the **Autotune** function produced a parameter value outside the min or max range.
			Solution: Check the motor plate data or drive and motor sizes have been combined incorrectly.
		7	The **Autotune** command was sent without being enabled.
			Solution: Close the enable contact before sending the **Autotune** command
		8 ... 21	A setting performed by **Autotune** has reached a measurement method limit
			Solution: Check the motor plate data or the drive and motor sizes have been combined incorrectly.
		Solution:	If the message appears with a value other than 0, follow the instructions supplied for each particular case and repeat **Autotune**. This should be performed using the wizard function available from the keypad (STARTUP WIZARD) and the Tool software on the PC. Pay attention to all motor plate data parmaeters, especially: - **Rated speed**, **Motor rated speed** in rpm. - **Rated frequency**, **Motor rated frequency** in Hz - **Pole pairs**, **Motor pole pairs** Take care not to set the **Rated speed** parameter to the synchronous speed. The value of the **Rated speed** parameter must be less than: [(**Rated frequency** * 60) / **Pole pairs**]. If the problem persists even after following the instructions supplied, confirm the values of the motor plate data parameters, execute the **Take parameters** command but not **Autotune**.
6	**Power config**	**Condition:**	may occur during recognition of power cards. If this message is displayed, it is not possible to drive the motor.
		0020H-32	The power card is configured for a drive that is incompatible with the regulation card
		0021H-33	The configuration of the power card is not compatible with the regulation card
		0017H-23	The configuration required is not available on the power card
		Solution:	Download the correct configuration on the power card
7	**Save par failed**	**Condition:**	during transfer of the parameters from the drive to the memory of the keypad
		0H-0	Communication error
		0025H-37	The data saved on the keypad are not valid
		0026H-38	Incompatible drive series
		0027H-39	Incompatible software version
		0028H-40	Incompatible drive size
		0029H-41	Error during saving of parameters on the drive
		Solution:	
8	**Load par failed**	**Condition:**	during transfer of the parameters from the memory of the keypad to the drive
9	**Load par incomplete**	**0H-0**	Communication error

Index	Error message shown on the display	Sub-code	Description
		0025H-37	The data saved on the keypad are not valid. No parameter is transferred from the keypad to the drive
		0026H-38	Incompatible drive series. No parameter is transferred from the keypad to the drive
		0027H-39	Incompatible software version. All the parameters present in the memory of the keypad have been transferred to the drive. The set of parameters transferred refers to a drive with a different firmware version; therefore, certain parameters may not be updated.
		0028H-40	Incompatible drive size. All the parameters present in the memory of the keypad (excluding those that depend on the size of the drive), have been transferred to the drive. The parameters that depend on size maintain their original value.
		0029H-41	Error during saving of parameters on the drive. All the parameters present in the memory of the keypad have been transferred to the drive. The transfer of one or more parameters has caused an "out of range" error, or one or more parameters does not exist. At the end of transfer, one or more parameters may not have been updated.
		002AH-42	PLC application release and version not compatible. All parameters in the keypad memory have been transferred to the drive. The transferred set of parameters relates to a drive with a PLC application in which the version and release of the application are different. As a result some of the PLC application parameters may not be updated.
		002BH-43	PLC application not compatible. All the parameters in the keypad memory except those relating to the PLC applciation have been transferred to the drive. The transferred set of parameters relates to a drive with a different PLC application. As a result none of the PLC application parameters are updated.
		Solution: Recover a set of parameters from a compatible drive (model and size)	
10	**Options config error**	**Condition:** may occur at drive start-up, during recognition of the optional cards installed	
		0001H-1	Non-permissible optional card in slot 1
		0002H-2	Non-permissible optional card in slot 2
		0004H-4	
		0010H-16	Conflict slot 1 with slot 2
		0020H-32	
		0040H-64	
		Solution: Remove the optional cards from the incorrect slots and insert them in the correct slots	
11	**Load def plc**	**Condition:** may occur during loading of the parameter database saved in the Flash of the Mdplc application Normally appears at initial power-on after downloading a new application. If this message is displayed when the drive is already operating, this means that a problem has occurred in the parameter database saved in Flash. If this message appears the drive restores the default database, i.e. the one that was downloaded.	
		0001H-1	The database saved is not valid
		Solution: Set the parameters to the value required and perform **Save parameter**	
12	**Plc cfg error**	**Condition:** may occur during loading of the Mdplc application The Mdplc application present on the drive is not run.	
		0004H-4	The application downloaded has a different Crc on DataBlock and Function table
		0065H-101	The application downloaded has an invalid identifier (Info)
		0066H-102	The application downloaded has an incorrect task number (Info)
		0067H-103	The application downloaded has an incorrect software configuration
		0068H-104	The application downloaded has a different Crc on DataBlock and Function table
		0069H-105	A Trap error or System error has occurred. The drive automatically performs a Power-up operation. The application is not run. See in Alarm List for further information regarding the error occurred
		006AH-106	The application downloaded has an incorrect identifier (Task)
		006BH-107	The application downloaded has an incorrect task number (Task)
		006CH-108	The application downloaded has an incorrect Crc (Tables + Code)
		Solution: Remove the Mdplc application or download a correct Mdplc application	
13	**Plc 1**	Reserved messages and dedicated to the PLC application. See the application manual.	
14	**Plc 2**		
15	**Plc 3**		
16	**Plc 4**		
17	**Option bus fault**	**Condition:** this may occur when the drive is turned on, during fieldbus card setup. Error during configuration or communication error.	
		XXX0H-X	If the first digit to the left of "H" in the alarm sub-code is 0, the error regards a communication problem.
		XXX0H-X	If the first digit to the left of "H" in the alarm sub-code is other than 0, the error regards a configuration problem.
		Solution: For configuration errors, check the configuration of the bus communication, type of bus, baudrate, address, parameter setting. For communication errors, check wiring, termination resistors, disturbance immunity, timeout settings. For further details, please refer to the user guide for the specific bus.	
18	**Key failed**	**Condition**: this may occur when powering the drive, if the incorrect enable key is inserted for a given firmware function.	
		0001H-1	Incorrect PLC key. PLC application not available.
		Solution: Ask Gefran to supply the correct key to enable the desired firmware function.	
19	**Key expiring**	**Condition:** this may occur at drive power-on if the incorrect enabling key was inserted for a given firmware function. At this stage the firmware function can still be used freely, but this time limit is about to expire.	
		xxxxH-x	Number of hours for which the function can still be used freely.
		Solution: Ask Gefran for the correct key to enable the desired firmware function.	

Index	Error message shown on the display	Sub-code	Description
20	**Param error**	**Condition**: if an error occurs during activation of the parameter database saved in flash; the alarm is inserted in the alarm list and alarm log.	
		XXX0H-X	The code XXXXH-X indicates the IPA of the parameter that has been set outside the range allowed when the database is enabled.
		Solution: Set the parameter causing the error to a value within the range and run **Save parameters**. Switch the drive off and then switch it back on again. If the IPA of the parameter is not shown in the manual, contact the service centre.	
21	**Encoder error**	**Condition:** this condition may occur when the drive is powered during encoder setup each time parameter **552 Regulation mode** is set.	
		100H-2564	**Cause**: An error occurred during setup; the information received from the encoder is not reliable. If the encoder is used for feedback the **Speed fbk loss** [22] alarm is also generated.
		Solution: Take the recommended action for the **Speed fbk loss**[22] alarm.	
		200H-512	**Cause**: The firmware on the optional encoder card is incompatible with that on the regulation card. The information received from the encoder is not reliable
		Solution: Contact Gefran in order to update the firmware on the optional encoder card.	
22	**Options cfg changed**	**Condition**: this may occur when powering the drive if an expansion card has been removed or replaced or the incorrect enable key is inserted for a given firmware function.	
		0064H-100	Card removed from slot 1
		0014H-20	Card removed from slot 2
		0003H-3	
		0078H-120	Card removed from slot 1 and from slot 2
		0067H-103	
		0017H-23	
		007BH-123	
		Solution: Check the hardware configuration, then press ESC. Save the parameters (**Save parameters**, menu 04.01 par 550) to save the new hardware configuration.	

NB! If any messages not included in this list are displayed, reference should be made to the manual of the application used by the drive.

11 - Parameters list

11.1 Legend

❶	❷	❸	❹	❺	❻	❼	❽	❾	❿
Menu	IPA	Description	EU	Type	Type FB	Def	Min	Max	Acc	Mod
22 - FUNCTIONS									***(Level 1 menu)***	
22.1 - FUNCTIONS/INERTIA COMP									***(Level 2 menu)***	
22.1.1	3100	Inertia comp	kgm2	FLOAT		0.0	0.0	100.0	ERWS	F S
22.1.2	3102	Inertia comp filter	ms	UINT16		30	1	100	ERW	F S
22.1.3	3104	Inertia comp mon	perc	FLOAT	16/32BIT	0.0	0.0	0.0	ER	F S
22.2 - FUNCTIONS/DC BRAKING										
22.2.1	3150	DC braking cmd src		LINK L_DIGSEL2	16BIT (*Selection list [*]*)	6000	0	16384	ERW	FVS

❶	Indexing of the menu and parameter	
❷	Parameter identifier	
❸	Parameter description	
❹	UM: unit of measure	
❺	Type of parameter BIT Boolean, from modbus seen as 16 bits ENUM Selection list, from modbus seen as 16 bits FLOAT Real, from modbus seen as 32 bits FBM2SIPA 16-bit unsigned integer. Only PAR of existing parameters accepted. FBS2MIPA 16-bit unsigned integer. Only PAR of existing parameters accepted. INT16 Integer with sign 16 bits, from modbus seen as 16 bits INT32 Integer with sign 32 bits, from modbus seen as 32 bits ILINK Selection list, from modbus seen as 16 bits LINK Selection list, from modbus seen as 16 bits UINT16 Integer without sign 16 bits , from modbus seen as 16 bits UINT32 Integer without sign 32 bits, from modbus seen as 32 bits	
❻	Format of data exchanged on Fieldbus (16BIT, 32BIT)	
❼	Default value	CALCF Value calculated as a number with floating point CALCI Value calculated as a whole number SIZE Value depending on the size of the drive
❽	Minimum value	
❾	Maximum value	
❿	Accessibility : E Expert R Read S Size (set value depending on the size of the device) W Write Z parameters that can be modified ONLY with the drive disabled	
[*]	Available in regulation mode: V = V/f Control S = Vect Flux OL F = Vect Flux CL	
	Selection lists: The "... src" format parameters are linked to a selection list. The source of the signal that will control the parameter can be selected from the list indicated. The lists are indicated in paragraph 11.3 of this manual.	

11.2 Parameters list (Easy - Expert)

Menu	IPA	Description	EU	Type	Type FB	Def	Min	Max	Acc	Mod
1 - MONITOR										
1.1	250	Output current	A	FLOAT	16/32BIT	0.0	0.0	0.0	R	FVS
1.2	252	Output voltage	V	FLOAT	16/32BIT	0.0	0.0	0.0	R	FVS
1.3	254	Output frequency	Hz	FLOAT	16/32BIT	0.0	0.0	0.0	R	FVS
1.4	628	Ramp setpoint	rpm	INT16	16/32BIT	0	0	0	R	FVS
1.5	664	Speed setpoint	rpm	INT16	16/32BIT	0	0	0	R	FVS
1.6	260	Motor speed	rpm	INT16	16/32BIT	0	0	0	R	FVS
1.7	270	DC link voltage	V	FLOAT	16/32BIT	0.0	0.0	0.0	ER	FVS
1.8	272	Heatsink temperature	degC	INT16	16BIT	0	0	0	ER	FVS
1.9	280	Torque current ref	A	FLOAT	16/32BIT	0.0	0.0	0.0	ER	F_S
1.10	282	Magnet current ref	A	FLOAT	16/32BIT	0.0	0.0	0.0	ER	F_S
1.11	284	Torque current	A	FLOAT	16/32BIT	0.0	0.0	0.0	ER	FVS
1.12	286	Magnet current	A	FLOAT	16/32BIT	0.0	0.0	0.0	ER	FVS
1.13	3212	Motor overload accum	perc	UINT16	16/32BIT	0	0	100	ER	FVS
1.14	368	Drive overload accum	perc	UINT16	16/32BIT	0	0	100	ER	FVS
1.15	3260	Bres overload accum	perc	UINT16	16/32BIT	0	0	100	ER	FVS
1.16	1066	Enable state mon		BIT	16BIT	0	0	1	R	FVS
1.17	1068	Start state mon		BIT	16BIT	0	0	1	R	FVS
1.18	1070	FastStop state mon		BIT	16BIT	0	0	1	R	FVS
1.19	1200	Digital input X mon		UINT16	16BIT	0	0	0	R	FVS
1.20	1400	Digital output X mon		UINT16		0	0	0	R	FVS
2 - DRIVE INFO										
2.1	480	Drive series		UINT16		7	0	0	R	FVS
2.2	482	Drive size		UINT16		0	0	0	RS	FVS
2.3	484	Drive family		ENUM		No power	0	0	RS	FVS
				0	No power					
				1	230V..480V					
				2	500V..575V					
				3	690V					
				4	230V					
2.4	486	Drive region		ENUM		EU	0	1	R	FVS
				0	EU					
				1	USA					
2.5	488	Drive cont current	A	FLOAT		CALCF	0.0	0.0	RZS	FVS
2.6	490	Firmware ver.rel		UINT16		0	0	0	R	FVS
2.7	496	Firmware type		UINT16		0	0	0	R	FVS
2.8	504	Application ver.rel		UINT16		0	0	0	ER	FVS
2.9	506	Application type		UINT16		0	0	0	ER	FVS
2.10	510	Time drive power on	h.min	UINT32		0	0	0	ER	FVS
2.11	512	Time drive enable	h.min	UINT32		0	0	0	ER	FVS
2.12	514	Number power up		UINT16		0	0	0	ER	FVS
2.13	516	Time fan on	h.min	UINT32		0	0	0	ER	FVS
2.14	520	Product S/N		UINT32		0	0	0	R	FVS
2.15	522	Regulation S/N		UINT32		0	0	0	R	FVS
2.16	524	Power S/N		UINT32		0	0	0	R	FVS
2.17	526	Power file ver.rel		UINT16		0	0	0	ER	FVS
2.18	530	Slot1 card type		ENUM		None	0	0	R	FVS
				0	None					
				257	I/O 1					
				1281	I/O 2					
				2305	I/O 3					
				3841	I/O 4					
				4865	I/O 5					
				5377	I/O 6					
				8	Enc 1					
				264	Enc 2					
				520	Enc 3					
				776	Enc 4					
				1032	Enc 5					
				4	Can/Dnet					
				255	Unknown					
2.19	532	Slot2 card type		ENUM		None	0	0	R	FVS
				0	None					
				257	I/O 1					
				1281	I/O 2					
				2305	I/O 3					
				3841	I/O 4					
				4865	I/O 5					
				5377	I/O 6					
				8	Enc 1					

Menu	IPA	Description	EU	Type	Type FB	Def	Min	Max	Acc	Mod
				264	Enc 2					
				520	Enc 3					
				776	Enc 4					
				1032	Enc 5					
				4	Can/Dnet					
				255	Unknown					
2.20	534	Slot3 card type		ENUM		None	0	0	R	FVS
				0	None					
				257	I/O 1					
				1281	I/O 2					
				2305	I/O 3					
				3841	I/O 4					
				4865	I/O 5					
				5377	I/O 6					
				8	Enc 1					
				264	Enc 2					
				520	Enc 3					
				776	Enc 4					
				1032	Enc 5					
				4	Can/Dnet					
				255	Unknown					
2.21	536	Slot1 card S/N		UINT32		0	0	0	R	FVS
2.22	538	Slot2 card S/N		UINT32		0	0	0	R	FVS
2.23	540	Slot3 card S/N		UINT32		0	0	0	R	FVS
2.24	546	Fw enc sl2 ver.rel		UINT16		0	0	0	R	FVS
2.25	548	Fw enc sl2 type		UINT16		0	0	0	R	FVS
3 - STARTUP WIZARD										
4 - DRIVE CONFIG										
4.1	550	Save parameters		BIT		0	0	1	RW	FVS
4.2	552	Regulation mode		ENUM		V/f control	0	3	RWZ	FVS
				0	V/f control					
				1	Flux vector OL					
				2	Flux vector CL					
				3	Autotune					
4.3	554	Access mode		ENUM		Easy	0	1	RW	FVS
				0	Easy					
				1	Expert					
4.4	556	Control mode select		ENUM		Ramp	0	2	ERWZ	F_S
				0	Torque					
				1	Speed					
				2	Ramp					
4.5	558	Application select		ENUM		None	0	2	ERWZ	FVS
							0	None		
				1	Application 1					
				2	Application 2					
4.6	560	Mains voltage		ENUM		400 V	SIZE	SIZE	ERWZS	FVS
				0	None					
				1	230 V					
				2	380 V					
				3	400 V					
				4	415 V					
				5	440 V					
				6	460 V					
				7	480 V					
				8	575 V					
				9	690 V					
4.7	562	Switching frequency		ENUM		SIZE	SIZE	SIZE	ERWS	FVS
				0	1 kHz					
				1	2 kHz					
				2	4 kHz					
				3	6 kHz					
				4	8 kHz					
				5	10 kHz					
				6	12 kHz					
				7	16 kHz					
4.8	564	Ambient temperature		ENUM		40 degC	0	1	ERWZ	FVS
				0	40 degC					
				1	50 degC					
4.9	568	Switching freq mode		ENUM		Constant	0	1	ERWZS	FVS
				0	Constant					
				1	Variable					
4.10	570	Password		UINT32		0	0	99999	ERW	FVS
4.11	572	Application key		UINT32		0	0	4294967295	ERW	FVS
4.12	574	Startup display		INT16		-1	-1	20000	ERW	FVS

Menu	IPA	Description	EU	Type	Type FB	Def	Min	Max	Acc	Mod
4.13	576	Display backlight		BIT		0	0	1	ERW	FVS
4.14	578	Language select		ENUM		English	0	9	RWZ	FVS
				0	English					
				1	Italian					
				2	French					
				3	German					
				4	Spanish					
				5	Polish					
				6	Romanian					
				7	Russian					
				8	Turkish					
				9	Portuguese					
4.15	580	Load default		BIT		0	0	1	RWZ	FVS
4.16	590	Save par to keypad		BIT		0	0	1	RW	FVS
4.17	592	Load par from keypad		BIT		0	0	1	RWZ	FVS
4.18	594	Keypad memory select		UINT16		1	1	5	ERW	FVS
4.19	596	Save to SD card		BIT		0	0	1	RW	FVS
4.20	598	Load from SD card		BIT		0	0	1	RWZ	FVS
5 - REFERENCES										
5.1	600	Dig ramp ref 1	rpm	INT16	16/32BIT	0	CALCI	CALCI	RW	FVS
5.2	602	Dig ramp ref 2	rpm	INT16	16/32BIT	0	CALCI	CALCI	ERW	FVS
5.3	604	Dig ramp ref 3	rpm	INT16	16/32BIT	0	CALCI	CALCI	ERW	FVS
5.4	610	Ramp ref 1 src		LINK	16/32BIT	852	0	16384	RW	FVS
				L_MLTREF						
5.5	612	Ramp ref 2 src		LINK	16/32BIT	602	0	16384	ERW	FVS
				L_MLTREF						
5.6	614	Ramp ref 3 src		LINK	16/32BIT	894	0	16384	ERW	FVS
				L_MLTREF						
5.7	616	Ramp ref invert src		LINK	16BIT	1050	0	16384	ERW	FVS
				L_DIGSEL2						
5.8	620	Ramp ref 1 mon	rpm	INT16		0	0	0	R	FVS
5.9	622	Ramp ref 2 mon	rpm	INT16		0	0	0	ER	FVS
5.10	624	Ramp ref 3 mon	rpm	INT16		0	0	0	ER	FVS
5.11	634	Ramp ref top lim	rpm	INT32		0	0	CALCI	ERWZ	FVS
5.12	636	Ramp ref bottom lim	rpm	INT32		0	0	CALCI	ERWZ	FVS
5.13	630	Reference skip set	rpm	INT16		0	0	CALCI	ERW	FVS
5.14	632	Reference skip band	rpm	INT16		0	0	CALCI	ERW	FVS
5.15	640	Dig speed ref 1	rpm	INT16	16/32BIT	0	CALCI	CALCI	ERW	FVS
5.16	642	Dig speed ref 2	rpm	INT16	16/32BIT	0	CALCI	CALCI	ERW	FVS
5.17	650	Speed ref 1 src		LINK	16/32BIT	640	0	16384	ERW	FVS
				L_MLTREF						
5.18	652	Speed ref 2 src		LINK	16/32BIT	642	0	16384	ERW	FVS
				L_MLTREF						
5.19	654	Speed ref invert src		LINK	16BIT	6000	0	16384	ERWZ	FVS
				L_DIGSEL2						
5.20	660	Speed ref 1 mon	rpm	INT16		0	0	0	ER	FVS
5.21	662	Speed ref 2 mon	rpm	INT16		0	0	0	ER	FVS
5.22	670	Speed ref top lim	rpm	INT32		CALCI	0	CALCI	ERWZ	FVS
5.23	672	Speed ref bottom lim	rpm	INT32		CALCI	CALCI	0	ERWZ	FVS
5.24	680	Full scale speed	rpm	INT16		CALCI	50	32000	RWZ	FVS
6 - RAMPS										
6.1	700	Acceleration time 0	s	FLOAT		10.0	0.01	1000.0	RW	FVS
6.2	702	Deceleration time 0	s	FLOAT		10.0	0.01	1000.0	RW	FVS
6.3	704	Acceleration time 1	s	FLOAT		10.0	0.01	1000.0	ERW	FVS
6.4	706	Deceleration time 1	s	FLOAT		10.0	0.01	1000.0	ERW	FVS
6.5	708	Acceleration time 2	s	FLOAT		10.0	0.01	1000.0	ERW	FVS
6.6	710	Deceleration time 2	s	FLOAT		10.0	0.01	1000.0	ERW	FVS
6.7	712	Acceleration time 3	s	FLOAT		10.0	0.01	1000.0	ERW	FVS
6.8	714	Deceleration time 3	s	FLOAT		10.0	0.01	1000.0	ERW	FVS
6.9	720	Ramp type		ENUM		Linear	0	3	ERWZ	FVS
				0	Linear					
				1	S-Shape					
				2	Bypass					
				3	Off					
6.10	722	Multi ramp sel 0 src		LINK	16BIT	6000	0	16384	ERW	FVS
				L_DIGSEL2						
6.11	724	Multi ramp sel 1 src		LINK	16BIT	6000	0	16384	ERW	FVS
				L_DIGSEL2						
6.12	726	Multi ramp sel mon		UINT16		0	0	3	ER	FVS
6.13	730	Accel jerk time 0	s	FLOAT		1.0	0.02	10.0	ERW	FVS
6.14	732	Decel jerk time 0	s	FLOAT		1.0	0.02	10.0	ERW	FVS
6.15	734	Accel jerk time 1	s	FLOAT		1.0	0.02	10.0	ERW	FVS
6.16	736	Decel jerk time 1	s	FLOAT		1.0	0.02	10.0	ERW	FVS
6.17	738	Accel jerk time 2	s	FLOAT		1.0	0.02	10.0	ERW	FVS

Menu	IPA	Description	EU	Type	Type FB	Def	Min	Max	Acc	Mod
6.18	740	Decel jerk time 2	s	FLOAT		1.0	0.02	10.0	ERW	FVS
6.19	742	Accel jerk time 3	s	FLOAT		1.0	0.02	10.0	ERW	FVS
6.20	744	Decel jerk time 3	s	FLOAT		1.0	0.02	10.0	ERW	FVS
6.21	750	Ramp in zero src		LINK L_DIGSEL2	16BIT	6000	0	16384	ERW	FVS
6.22	752	Ramp out zero src		LINK L_DIGSEL2	16BIT	6000	0	16384	ERW	FVS
6.23	754	Ramp freeze src		LINK L_DIGSEL2	16BIT	3480	0	16384	ERW	FVS
7 - REFERENCE										
7.1	800	Multi reference 0	rpm	INT16	16/32BIT	0	CALCI	CALCI	RW	FVS
7.2	802	Multi reference 1	rpm	INT16	16/32BIT	0	CALCI	CALCI	RW	FVS
7.3	804	Multi reference 2	rpm	INT16		0	CALCI	CALCI	RW	FVS
7.4	806	Multi reference 3	rpm	INT16		0	CALCI	CALCI	RW	FVS
7.5	808	Multi reference 4	rpm	INT16		0	CALCI	CALCI	RW	FVS
7.6	810	Multi reference 5	rpm	INT16		0	CALCI	CALCI	RW	FVS
7.7	812	Multi reference 6	rpm	INT16		0	CALCI	CALCI	RW	FVS
7.8	814	Multi reference 7	rpm	INT16		0	CALCI	CALCI	RW	FVS
7.9	816	Multi reference 8	rpm	INT16		0	CALCI	CALCI	ERW	FVS
7.10	818	Multi reference 9	rpm	INT16		0	CALCI	CALCI	ERW	FVS
7.11	820	Multi reference 10	rpm	INT16		0	CALCI	CALCI	ERW	FVS
7.12	822	Multi reference 11	rpm	INT16		0	CALCI	CALCI	ERW	FVS
7.13	824	Multi reference 12	rpm	INT16		0	CALCI	CALCI	ERW	FVS
7.14	826	Multi reference 13	rpm	INT16		0	CALCI	CALCI	ERW	FVS
7.15	828	Multi reference 14	rpm	INT16		0	CALCI	CALCI	ERW	FVS
7.16	830	Multi reference 15	rpm	INT16		0	CALCI	CALCI	ERW	FVS
7.17	832	Multi ref 0 src		LINK L_MLTREF	16/32BIT	1600	0	16384	RW	FVS
7.18	834	Multi ref 1 src		LINK L_MLTREF	16/32BIT	802	0	16384	RW	FVS
7.19	840	Multi ref sel 0 src		LINK L_DIGSEL2	16BIT	1214	0	16384	RW	FVS
7.20	842	Multi ref sel 1 src		LINK L_DIGSEL2	16BIT	1216	0	16384	RW	FVS
7.21	844	Multi ref sel 2 src		LINK L_DIGSEL2	16BIT	6000	0	16384	RW	FVS
7.22	846	Multi ref sel 3 src		LINK L_DIGSEL2	16BIT	6000	0	16384	ERW	FVS
7.23	850	Multi ref sel mon		UINT16		0	0	15	R	FVS
7.24	852	Multi ref out mon	rpm	INT16	16/32BIT	0	0	0	R	FVS
8 - MOTORPOTENTIOMETER										
8.1	870	Mpot setpoint	rpm	INT16	16/32BIT	0	CALCI	CALCI	R	FVS
8.2	872	Mpot acceleration	s	FLOAT		5.0	0.01	1000.0	RW	FVS
8.3	874	Mpot deceleration	s	FLOAT		5.0	0.01	1000.0	RW	FVS
8.4	876	Mpot top lim	rpm	INT16		1500	CALCI	CALCI	ERW	FVS
8.5	878	Mpot bottom lim	rpm	INT16		0	CALCI	CALCI	ERW	FVS
8.6	880	Mpot init cfg		ENUM		Zero	0	3	ERW	FVS
				0	Last Power Off					
				1	Zero					
				2	Lower Limit					
				3	Upper Limit					
8.7	882	Mpot preset cfg		ENUM		None	0	11	ERW	FVS
				0	None					
				1	Input=0					
				2	Input=low lim					
				3	Input&ref=0					
				4	Input&ref=low					
				5	Output=0					
				6	Output=low lim					
				7	Output&ref=0					
				8	Output&ref=low					
				9	Input=upp lim					
				10	Input&ref=upp					
				11	Freeze input					
8.8	884	Mpot up src		LINK L_DIGSEL2	16BIT	6000	0	16384	RW	FVS
8.9	886	Mpot down src		LINK L_DIGSEL2	16BIT	6000	0	16384	RW	FVS
8.10	888	Mpot invert src		LINK L_DIGSEL2	16BIT	6000	0	16384	ERW	FVS
8.11	890	Mpot preset src		LINK L_DIGSEL2	16BIT	6000	0	16384	ERW	FVS
8.12	892	Mpot mode		ENUM		Fine&Last val	0	3	ERW	FVS
				0	Ramp&Last val					

Menu	IPA	Description	EU	Type	Type FB	Def	Min	Max	Acc	Mod
				1	Ramp&Follow					
				2	Fine&Last val					
				3	Fine&Follow					
8.13	894	Monitor uscita Mpot	rpm	INT16	16/32BIT	0	0	0	ER	FVS
9 - JOG FUNCTION										
9.1	910	Jog setpoint	rpm	INT16		0	CALCI	CALCI	RW	FVS
9.2	912	Jog acceleration	s	FLOAT		5.0	0.01	1000.0	RW	FVS
9.3	914	Jog deceleration	s	FLOAT		5.0	0.01	1000.0	RW	FVS
9.4	916	Jog cmd + src		LINK	16BIT	6000	0	16384	RW	FVS
				L_DIGSEL2						
9.5	918	Jog cmd - src		LINK	16BIT	6000	0	16384	RW	FVS
				L_DIGSEL2						
9.6	920	Jog output mon	rpm	INT16	16/32BIT	0	0	0	ER	FVS
10 - MONITOR FUNCTION										
10.1	930	Reference 0 thr	rpm	INT16		30	0	CALCI	RW	FVS
10.2	932	Reference 0 delay	ms	UINT16		400	0	10000	RW	FVS
10.3	940	Speed 0 thr	rpm	INT16		30	0	CALCI	RW	FVS
10.4	942	Speed 0 delay	ms	UINT16		400	0	10000	RW	FVS
10.5	950	Speed threshold 1	rpm	INT32		0	CALCI	CALCI	RW	FVS
10.6	952	Speed threshold 2	rpm	INT32		0	CALCI	CALCI	RW	FVS
10.7	954	Speed threshold dly	ms	UINT16		0	0	50000	RW	FVS
10.8	960	Set speed ref src		LINK	16/32BIT	628	0	16384	ERW	FVS
				L_CMP						
10.9	962	Set speed error	rpm	INT16		100	0	CALCI	RW	FVS
10.10	964	Set speed delay	ms	UINT16		0	0	50000	RW	FVS
10.11	968	Dig set speed ref	rpm	INT16	16/32BIT	0	CALCI	CALCI	ERW	FVS
10.12	970	Speed threshold 3	rpm	INT32		0	0	CALCI	RW	FVS
10.13	972	Speed thr hysteresis	rpm	INT16		0	0	CALCI	RW	FVS
10.14	980	Current threshold	perc	INT16		100	0	200	RW	FVS
10.15	982	Current thr hysterr	perc	INT16		0	0	100	RW	FVS
11 - COMMANDS										
11.1	1000	Commands remote sel		ENUM		Terminal	0	1	RWZ	FVS
				0	Terminal					
				1	Digital					
11.2	1002	Commands local sel		ENUM		Keypad	0	1	ERWZ	FVS
				0	Terminal					
				2	Keypad					
11.3	1004	Enable/disable mode		ENUM		Stop/FS&Spd=0	0	3	ERW	FVS
				0	Off					
				1	Stop/FS&Spd=0					
				2	Stop&Spd=0					
				3	FS&Spd=0					
11.4	1006	Speed 0 disable dly	ms	UINT16		1000	0	10000	ERW	FVS
11.5	1008	Stop key mode		ENUM		Inactive	0	1	ERW	FVS
				0	Inactive					
				1	EmgStop&Alarm					
11.6	1010	Comando Safe Start		BIT		1	0	1	ERW	FVS
11.7	1012	Dig local/remote		ENUM	16BIT	Remote	0	1	ERW	FVS
				0	Local					
				1	Remote					
11.8	1014	Local/remote src		LINK	16BIT	1012	0	16384	ERW	FVS
				L_DIGSEL3						
11.9	1016	Terminal Start src		LINK	16BIT	1048	0	16384	ERW	FVS
				L_DIGSEL2						
11.10	1018	Digital Enable src		LINK	16BIT	6000	0	16384	ERW	FVS
				L_DIGSEL2						
11.11	1020	Digital Start src		LINK	16BIT	6000	0	16384	ERW	FVS
				L_DIGSEL2						
11.12	1022	FastStop src		LINK	16BIT	6000	0	16384	ERW	FVS
				L_DIGSEL2						
11.13	1024	Enable cmd mon		BIT	16BIT	0	0	1	R	FVS
11.14	1026	Start cmd mon		BIT	16BIT	0	0	1	R	FVS
11.15	1028	FastStop cmd mon		BIT	16BIT	0	0	1	R	FVS
11.16	1040	FR mode		ENUM		Normal	0	2	ERWZ	FVS
				0	Normal					
				1	Two wire					
				2	Three wire					
11.17	1042	FR forward src		LINK	16BIT	1210	0	16384	ERW	FVS
				L_DIGSEL2						
11.18	1044	FR reverse src		LINK	16BIT	1212	0	16384	ERW	FVS
				L_DIGSEL2						
11.19	1046	FR *stop src		LINK	16BIT	6000	0	16384	ERW	FVS

Menu	IPA	Description	EU	Type	Type FB	Def	Min	Max	Acc	Mod
				L_DIGSEL2						
11.20	1048	FR start mon		BIT	16BIT	0	0	1	ER	FVS
11.21	1050	FR reverse mon		BIT	16BIT	0	0	1	ER	FVS
11.22	1052	FR cmd mon		UINT16		0	0	0	ER	FVS
12 - DIGITAL INPUTS										
12.1	1240	Dig inp 1X inversion		BIT		0	0	1	RW	FVS
12.2	1242	Dig inp 2X inversion		BIT		0	0	1	RW	FVS
12.3	1244	Dig inp 3X inversion		BIT		0	0	1	RW	FVS
12.4	1246	Dig inp 4X inversion		BIT		0	0	1	RW	FVS
12.5	1248	Dig inp 5X inversion		BIT		0	0	1	RW	FVS
12.6	1250	Dig inp 6X inversion		BIT		0	0	1	RW	FVS
12.7	1252	Dig inp 7X inversion		BIT		0	0	1	RW	FVS
12.8	1254	Dig inp 8X inversion		BIT		0	0	1	RW	FVS
12.9	1150	Dig input E dest		ILINK		0	0	0	ER	FVS
12.10	1270	Dig input 1X dest		ILINK		0	0	0	ER	FVS
12.11	1272	Dig input 2X dest		ILINK		0	0	0	ER	FVS
12.12	1274	Dig input 3X dest		ILINK		0	0	0	ER	FVS
12.13	1276	Dig input 4X dest		ILINK		0	0	0	ER	FVS
12.14	1278	Dig input 5X dest		ILINK		0	0	0	ER	FVS
12.15	1280	Dig input 6X dest		ILINK		0	0	0	ER	FVS
12.16	1282	Dig input 7X dest		ILINK		0	0	0	ER	FVS
12.17	1284	Dig input 8X dest		ILINK		0	0	0	ER	FVS
13 - DIGITAL OUTPUTS										
13.1	1410	Dig output 1X src		LINK L_DIGSEL1	16BIT	1062	0	16384	RW	FVS
13.2	1412	Dig output 2X src		LINK L_DIGSEL1	16BIT	1064	0	16384	RW	FVS
13.3	1414	Dig output 3X src		LINK L_DIGSEL1	16BIT	946	0	16384	RW	FVS
13.4	1416	Dig output 4X src		LINK L_DIGSEL1	16BIT	936	0	16384	RW	FVS
13.5	1430	Dig out 1X inversion		BIT		0	0	1	RW	FVS
13.6	1432	Dig out 2X inversion		BIT		0	0	1	RW	FVS
13.7	1434	Dig out 3X inversion		BIT		0	0	1	RW	FVS
13.8	1436	Dig out 4X inversion		BIT		0	0	1	RW	FVS
14 - ANALOG INPUTS										
14.1	1600	Analog input 1X mon	cnt	INT16	16/32BIT	0	-16384	16384	R	FVS
14.2	1602	Analog inp 1X type		ENUM 0 1 2	 -10V..+10V 0.20mA , 0.10V 4..20mA	-10V..+10V	0	2	RW	FVS
14.3	1604	Analog inp 1X scale		FLOAT		1.0	-10.0	10.0	RW	FVS
14.4	1606	An inp 1Xoffset tune		BIT		0	0	1	RW	FVS
14.5	1608	An inp 1X gain tune		BIT		0	0	1	RW	FVS
14.6	1612	Analog inp 1X top	cnt	INT16		16384	-32768	+32767	ERW	FVS
14.7	1614	Analog inp 1X bottom	cnt	INT16		-16384	-32768	+32767	ERW	FVS
14.8	1616	Analog inp 1X offset	cnt	INT16		0	-32768	+32767	ERW	FVS
14.9	1618	Analog inp 1X gain		FLOAT		1.0	-10.0	10.0	ERW	FVS
14.10	1620	Analog inp 1X thr	cnt	INT16		0	-16384	+16384	ERW	FVS
14.11	1622	An inp 1X deadband	perc	FLOAT		0.0	0.0	100.0	ERW	FVS
14.12	1624	An inp 1X alt value	cnt	INT16	16/32BIT	0	-16384	16384	ERW	FVS
14.13	1626	An inp 1X sign src		LINK L_DIGSEL2	16BIT	6000	0	16384	ERW	FVS
14.14	1628	An inp 1X altsel src		LINK L_DIGSEL2	16BIT	6000	0	16384	ERW	FVS
14.15	1632	Analog input 1X dest		ILINK		0	0	0	ER	FVS
14.16	1650	Analog input 2X mon	cnt	INT16	16/32BIT	0	-16384	16384	R	FVS
14.17	1652	Analog inp 2X type		ENUM 0 1 2	 -10V..+10V 0.20mA , 0.10V 4..20mA	-10V..+10V	0	2	RW	FVS
14.18	1654	Analog inp 2X scale		FLOAT		1.0	-10.0	10.0	RW	FVS
14.19	1656	An inp 2Xoffset tune		BIT		0	0	1	RW	FVS
14.20	1658	An inp 2X gain tune		BIT		0	0	1	RW	FVS
14.21	1662	Analog inp 2X top	cnt	INT16		16384	-32768	+32767	ERW	FVS
14.22	1664	Analog inp 2X bottom	cnt	INT16		-16384	-32768	+32767	ERW	FVS
14.23	1666	Analog inp 2X offset	cnt	INT16		0	-32768	+32767	ERW	FVS
14.24	1668	Analog inp 2X gain		FLOAT		1.0	-10.0	10.0	ERW	FVS
14.25	1670	Analog inp 2X thr	cnt	INT16		0	-16384	+16384	ERW	FVS
14.26	1672	An inp 2X deadband	perc	FLOAT		0.0	0.0	100.0	ERW	FVS
14.27	1674	An inp 2X alt value	cnt	INT16	16/32BIT	0	-16384	16384	ERW	FVS
14.28	1676	An inp 2X sign src		LINK	16BIT	6000	0	16384	ERW	FVS

Menu	IPA	Description	EU	Type	Type FB	Def	Min	Max	Acc	Mod
				L_DIGSEL2						
14.29	1678	An inp 2X altsel src		LINK L_DIGSEL2	16BIT	6000	0	16384	ERW	FVS
14.30	1682	Analog input 2X dest		ILINK		0	0	0	ER	FVS
15 - ANALOG OUTPUTS										
15.1	1850	Analog out 1X src		LINK L_ANOUT	16/32BIT	6000	0	16384	RW	FVS
15.2	1852	Analog out 2X src		LINK L_ANOUT	16/32BIT	6000	0	16384	RW	FVS
15.3	1858	Analog out 1X scale		FLOAT		1.0	-10.0	10.0	RW	FVS
15.4	1860	Analog out 2X scale		FLOAT		1.0	-10.0	10.0	RW	FVS
15.5	1866	Analog out 1X mon	cnt	INT16		0	0	0	ER	FVS
15.6	1868	Analog out 2X mon	cnt	INT16		0	0	0	ER	FVS
15.7	1874	An out 1X absolute		ENUM 0 1	 Disable Enable	Disable	0	1	ERW	FVS
15.8	1876	An out 2X absolute		ENUM 0 1	 Disable Enable	Disable	0	1	ERW	FVS
15.9	1882	Analog out 1X min	cnt	INT16		-16384	-32768	+32767	ERW	FVS
15.10	1884	Analog out 1X max	cnt	INT16		16384	-32768	+32767	ERW	FVS
15.11	1890	Analog out 2X min	cnt	INT16		-16384	-32768	+32767	ERW	FVS
15.12	1892	Analog out 2X max	cnt	INT16		16384	-32768	+32767	ERW	FVS
15.13	1898	Analog out 2X type		ENUM 0 1 2	 0..20mA 4..20mA -10V..+10V	-10V..+10V	0	2	ERW	FVS
16 - MOTOR DATA										
16.1	2000	Rated voltage	V	FLOAT		SIZE	50.0	690.0	RWZS	FVS
16.2	2002	Rated current	A	FLOAT		SIZE	1.0	2200.0	RWZS	FVS
16.3	2004	Rated speed	rpm	FLOAT		SIZE	10.0	32000.0	RWZS	FVS
16.4	2006	Rated frequency	Hz	FLOAT		SIZE	10.0	1000.0	RWZS	FVS
16.5	2008	Pole pairs		UINT16		SIZE	1	20	RWZS	FVS
16.6	2010	Rated power	kW	FLOAT		SIZE	0.1	1500.0	RWZS	FVS
16.7	2012	Rated power factor		FLOAT		SIZE	0.6	0.95	RWZS	FVS
16.8	2020	Take parameters		BIT		0	0	1	RWZ	FVS
16.9	2022	Autotune rotation		BIT		0	0	1	RWZ	FVS
16.10	2024	Autotune still		BIT		0	0	1	RWZ	FVS
16.11	2026	Autotune mode		ENUM 0 1	 Reduced Extended	Reduced	0	1	ERWZ	FVS
16.12	2028	Take status		ENUM 0 1	 Required Done	Required	0	0	R	FVS
16.13	2030	Autotune status		ENUM 0 1	 Required Done	Required	0	0	R	FVS
16.14	2050	Measured Rs	ohm	FLOAT		CALCF	0.0005	200.0	ERWS	FVS
16.15	2052	Measured DTL	V	FLOAT		0.0	0.0	100.0	ERWS	FVS
16.16	2054	Measured DTS	V/A	FLOAT		0.0	0.0	100.0	ERWS	FVS
16.17	2056	Measured Lsig	mH	FLOAT		CALCF	0.1	200.0	ERWS	FVS
16.18	2058	Measured ImN	A	FLOAT		CALCF	0.1	1500.0	ERWS	FVS
16.19	2060	Measured ImX	A	FLOAT		CALCF	0.0	0.0	ERWS	FVS
16.20	2062	Measured FlxN	Wb	FLOAT		CALCF	0.05	10.0	ERWS	FVS
16.21	2064	Measured FlxX	Wb	FLOAT		CALCF	0.0	0.0	ERWS	FVS
16.22	2066	Measured P1		FLOAT		0.5	0.0	1.0	ERWS	FVS
16.23	2068	Measured P2		FLOAT		9.0	3.0	18.0	ERWS	FVS
16.24	2070	Measured P3		FLOAT		0.87	0.0	1.0	ERWS	FVS
16.25	2072	Measured Rr	ohm	FLOAT		CALCF	0.0005	200.0	ERWS	FVS
16.26	2078	Take tune parameters		BIT		0	0	1	ERWZ	FVS
17 - ENCODER CONFIG										
17.1	2100	Encoder 1 pulses	ppr	UINT16		1024	128	16384	RWZ	FVS
17.2	2102	Encoder 1 supply	V	FLOAT		5.2	5.2	CALCF	ERWZ	FVS
17.3	2104	Encoder 1 input cfg		ENUM 0 1	 HTL TTL	TTL	0	1	ERWZ	FVS
17.4	2106	Encoder 1 repetition		ENUM 0 1 2 3	 No division Divide 2 Divide 4 Divide 8	No division	0	3	ERWZ	FVS
17.5	2108	Encoder 1 signal Vpp	V	FLOAT		1.0	0.8	1.2	ERWZ	FVS

Menu	IPA	Description	EU	Type	Type FB	Def	Min	Max	Acc	Mod
17.6	2110	Encoder1signal check		ENUM		Contr A-B	0	3	ERWZ	FVS
				0	Check disabled					
				1	Check A-B					
				2	Check A-B-Z					
				4	Check A-B-SE					
17.7	2112	Encoder 1 SSI bits		UINT16		25	13	25	ERWZ	FVS
17.8	2130	Encoder 1 direction		ENUM		Not inverted	0	1	RWZ	FVS
				0	Not inverted					
				1	Inverted					
17.9	2132	Encoder 1 mode		ENUM		None	CALCI	CALCI	ERWZ	FVS
				0	None					
				1	Digital FP					
				2	Digital F					
				3	Sinus					
				4	Sinus SINCOS					
				5	Sinus ENDAT					
				6	Sinus SSI					
				7	Sinus HIPER					
				8	Resolver					
17.10	2134	Encoder1speed filter	ms	FLOAT		2.0	0.1	20.0	ERW	FVS
17.11	2150	Encoder 1 speed	rpm	INT16	16/32BIT	0	0	0	ER	FVS
17.12	2162	Encoder 1 position	cnt	UINT16	16BIT	0	0	0	ER	FVS
17.13	2172	SpdFbkLoss code		UINT32		0	0	0	ER	FVS
18 - SPEED REG GAINS										
18.1	2200	Speed reg P1 gain	perc	INT16		100	0	1000	RW	F_S
18.2	2202	Speed reg I1 gain	perc	INT16		100	0	1000	RW	F_S
18.3	2204	Speed reg P2 gain	perc	INT16		100	0	1000	ERW	F_S
18.4	2206	Speed reg I2 gain	perc	INT16		100	0	1000	ERW	F_S
18.5	2216	Gain adapt src		LINK	16/32BIT	664	0	16384	ERW	F_S
				L_REF						
18.6	2218	Gain adp spd thr1_2	perc	FLOAT		0.0	0.0	100.0	ERW	F_S
18.7	2220	Gain adp spd band1_2	perc	FLOAT		0.0	0.0	100.0	ERW	F_S
18.8	2226	Gain 0 enable		ENUM		Disable	0	1	ERW	F_S
				0	Disable					
				1	Enable					
18.9	2228	Speed reg P0 gain	perc	INT16		100	0	1000	ERW	F_S
18.10	2230	Speed reg I0 gain	perc	INT16		100	0	1000	ERW	F_S
18.11	2232	Spd reg P gain Inuse	perc	INT16	16/32BIT	100	0	1000	ER	F_S
18.12	2234	Spd reg I gain Inuse	perc	INT16	16/32BIT	100	0	1000	ER	F_S
18.13	2236	Speed reg P gain	N/rpm	FLOAT		CALCF	0.0	500.0	ERWS	F_S
18.14	2238	Speed reg I time	ms	FLOAT		CALCF	1.0	5000.0	ERWS	F_S
18.15	2240	Inertia	kgm2	FLOAT		SIZE	0.001	100.0	RWZS	F_S
18.16	2242	Bandwidth	rad/s	FLOAT		SIZE	1.0	500.0	RWZS	F_S
19 - REGULATOR PARAM										
19.1	2250	Current reg P gain	V/A	FLOAT		CALCF	0.0	0.0	ERWS	F_S
19.2	2252	Current reg I time	ms	FLOAT		CALCF	0.01	10000.0	ERWS	F_S
19.3	2260	Flux reg P gain	A/Wb	FLOAT		CALCF	0.0	0.0	ERWS	FVS
19.4	2262	Flux reg I time	ms	FLOAT		CALCF	0.1	10000.0	ERWS	FVS
19.5	2264	Flux reg P gain OL	A/Wb	FLOAT		CALCF	0.0	0.0	ERWS	__S
19.6	2266	Flux reg I time OL	ms	FLOAT		CALCF	0.1	10000.0	ERWS	__S
19.7	2270	Voltage reg P gain	Wb/V	FLOAT		CALCF	0.0	0.0	ERWS	F_S
19.8	2272	Voltage reg I time	s	FLOAT		CALCF	0.1	100.0	ERWS	F_S
19.9	2280	Dead time limit	V	FLOAT		SIZE	0.0	50.0	ERWS	FVS
19.10	2282	Dead time slope	V/A	FLOAT		SIZE	0.0	200.0	ERWS	FVS
19.11	2290	Voltage base	V	FLOAT		CALCF	50.0	690.0	ERWS	F_S
19.12	2292	Voltage margin	perc	FLOAT		5.0	0.0	10.0	ERWS	F_S
19.13	2300	Minimum speed OL	rpm	INT16		30	0	CALCI	ERW	__S
19.14	2302	Min speed delay OL	ms	UINT16		200	0	5000	ERW	__S
19.15	2304	Speed filter OL	ms	FLOAT		5.0	0.1	20.0	ERWZ	__S
19.16	2306	Flux observe gain OL		FLOAT		250.0	10.0	5000.0	ERW	__S
19.17	2310	Flux weakening OL		ENUM		Enable	0	1	ERWZ	__S
				0	Disable					
				1	Enable					
19.18	2320	Magnetization time	ms	UINT16		256	128	4096	ERWZ	FVS
20 - TORQUE CONFIG										
20.1	2350	Torque curr lim Pos	A	FLOAT	16/32BIT	CALCF	0.0	CALCF	ERWS	FVS
20.2	2352	Torque curr lim Nega	A	FLOAT	16/32BIT	CALCF	0.0	CALCF	ERWS	FVS
20.3	2354	Torque curr lim sel		ENUM		Off	0	4	ERWZ	FVS
				0	Off					
				1	T clim +/-					
				2	T clim mot/gen					
				3	T lim pos/neg					

Menu	IPA	Description	EU	Type	Type FB	Def	Min	Max	Acc	Mod
				4	LimCop pos/neg					
20.4	2358	Torque lim sym/p src		LINK L_LIM	16/32BIT	6000	0	16384	ERWZ	F_S
20.5	2370	Torque lim neg src		LINK L_LIM	16/32BIT	6000	0	16384	ERWZ	F_S
20.6	2360	Torque lim Pos Inuse	A	FLOAT	16/32BIT	0.0	0.0	0.0	ER	FVS
20.7	2362	Torque lim Neg Inuse	A	FLOAT	16/32BIT	0.0	0.0	0.0	ER	FVS
20.8	2380	Dig torque ref 1	perc	FLOAT	16/32BIT	0.0	-300.0	300.0	ERW	F_S
20.9	2382	Torque ref 1 src		LINK L_VREF	16/32BIT	3104	0	16384	ERWZ	F_S
20.10	2384	Torque ref filter	ms	FLOAT		1.0	0.1	10.0	ERW	F_S
20.11	2386	Torque ref	perc	FLOAT	16/32BIT	0.0	0.0	0.0	ER	F_S
20.12	2366	Torque curr lim Red	A	FLOAT	16/32BIT	CALCF	0.0	CALCF	ERWS	FVS
20.13	2368	Torque clim Red src		LINK L_DIGSEL2	16BIT	6000	0	16384	ERW	FVS
21 - VF PARAMETERS										
21.1	2400	Voltage flux boost	perc	FLOAT		CALCF	0.0	15.0	RWS	V
21.2	2402	Voltage boost gain	V/A	FLOAT		CALCF	0.0	0.0	ERWS	V
21.3	2404	Voltage torque boost		ENUM 0 1	 Disable Enable	Enable	0	1	ERWZ	_V_
21.4	2406	Vf voltage	V	FLOAT		CALCF	10.0	690.0	ERWZS	V
21.5	2408	Vf frequency	Hz	FLOAT		CALCF	10.0	2000.0	ERWZS	V
21.6	2410	Vf voltage 1	V	FLOAT		CALCF	CALCF	CALCF	ERWZS	V
21.7	2412	Vf frequency 1	Hz	FLOAT		CALCF	0.0	CALCF	ERWZS	V
21.8	2414	Vf voltage 0	V	FLOAT		0.0	0.0	CALCF	ERWZS	V
21.9	2430	Vf shape		ENUM 0 1 2	 Linear Custom Quadratic	Linear	0	2	ERWZS	_V_
21.10	2440	Slip comp	Hz	FLOAT		CALCF	0.0	10.0	RWS	V
21.11	2442	Slip comp filter	ms	UINT16		200	50	5000	ERW	V
21.12	2444	Slip comp mode		ENUM 0 1	 Open loop Closed loop	Open loop	0	1	ERWZ	_V_
21.13	2446	Slip P gain	perc	FLOAT		1.0	0.0	100.0	ERWS	V
21.14	2448	Slip I gain	perc	FLOAT		1.5	0.0	100.0	ERWS	V
21.15	2460	Vfcurrent lim P gain	Hz/A	FLOAT		CALCF	0.0	1000.0	ERWS	V
21.16	2462	Vfcurrent lim I time	ms	FLOAT		CALCF	1.0	50.0	ERWS	V
21.17	2470	Damping gain	perc	UINT16		0	0	100	ERW	V
21.18	2472	Damping threshold 1	Hz	INT16		20	5	100	ERW	V
21.19	2474	Damping threshold 2	Hz	INT16		30	5	100	ERW	V
21.20	2480	Vf min frequency	Hz	FLOAT		1.0	0.2	5.0	ERW	V
21.21	2482	Vf min freq delay	ms	UINT16		800	0	5000	ERW	V
21.22	2490	Dig Vf scale		FLOAT	16/32BIT	1.0	0.0	1.0	ERWZ	V
21.23	2492	Vf scale src		LINK L_VREF	16/32BIT	3374	0	16384	ERW	_V_
22 - FUNCTIONS										
22.1 - FUNCTIONS/INERTIA COMP										
22.1.1	3100	Inertia comp	kgm2	FLOAT		0.0	0.0	100.0	ERWS	F_S
22.1.2	3102	Inertia comp filter	ms	UINT16		30	1	100	ERW	F_S
22.1.3	3104	Inertia comp mon	perc	FLOAT	16/32BIT	0.0	0.0	0.0	ER	F_S
22.2 - FUNCTIONS/DC BRAKING										
22.2.1	3150	DC braking cmd src		LINK L_DIGSEL2	16BIT	6000	0	16384	ERW	FVS
22.2.2	3152	DC brake mode		ENUM 0 1 2 3	 Off At Stop On Command OnCmd & AtStop	Off	0	3	ERW	FVS
22.2.3	3154	DC brake delay	s	FLOAT		0.5	0.00	30.0	ERW	FVS
22.2.4	3156	DC brake duration	s	FLOAT		1.0	0.01	30.0	ERW	FVS
22.2.5	3158	DC brake current	perc	FLOAT		50.0	0.0	150.0	ERW	FVS
22.2.6	3160	DC brake state		ENUM 0 1	16BIT Not active Active	Not active	0	1	ER	FVS
22.3 - FUNCTIONS/MOTOR OVERLOAD										
22.3.1	3200	Motor ovld enable		BIT		0	0	1	ERW	FVS
22.3.2	3202	Motor ovld factor	perc	FLOAT		150.0	100.0	300.0	ERWS	FVS
22.3.3	3204	Motor ovld time	s	FLOAT		30.0	10.0	300.0	ERWS	FVS
22.3.4	3206	Motor service factor	perc	FLOAT		100.0	25.0	200.0	ERWS	FVS

Menu	IPA	Description	EU	Type	Type FB	Def	Min	Max	Acc	Mod
22.4 - FUNCTIONS/BRES OVERLOAD										
22.4.1	3250	Bres control		BIT		0	0	1	ERWZ	FVS
22.4.2	3252	Bres value	ohm	FLOAT		SIZE	7.0	1000.0	ERWS	FVS
22.4.3	3254	Bres cont power	kW	FLOAT		SIZE	0.1	100.0	ERWS	FVS
22.4.4	3256	Bres overload factor		FLOAT		SIZE	1.5	10.0	ERWS	FVS
22.4.5	3258	Bres overload time	s	FLOAT		SIZE	0.5	50.0	ERWS	FVS
22.5 - FUNCTIONS/SPEED CAPTURE										
22.5.1	3350	Speed capture		ENUM		Disable	0	1	ERW	FV_
				0	Disable					
				1	Enable					
22.5.2	3364	Vf catch start freq	Hz	FLOAT		50.0	-500.0	500.0	ERWZ	_V_
22.5.3	3366	Vf catch enable dly	ms	UINT16		1000	10	10000	ERWZ	_V_
22.5.4	3368	Vf catch search time	s	FLOAT		2.0	1.0	20.0	ERW	_V_
22.5.5	3370	Vf catch P gain	perc	FLOAT		10.0	0.0	100.0	ERW	_V_
22.5.6	3372	Vf catch I time	ms	UINT16		200	200	1000	ERW	V
22.5.7	3376	Vf catch lastref dly	ms	UINT16		0	0	30000	ERWZ	V
22.6 - FUNCTIONS/POWER LOSS										
22.6.1	3400	Powerloss function		ENUM		Disable	0	1	ERWZ	FV_
				0	Disable					
				1	Enable					
22.6.2	3402	Powerloss accel time	s	FLOAT		10.0	0.01	100.0	ERW	FV_
22.6.3	3404	Powerloss decel times	s	FLOAT		2.0	0.01	100.0	ERW	FV_
22.6.4	3420	Powerloss P gain	A/V	FLOAT		CALCF	0.0	100.000	ERWS	FV_
22.6.5	3422	Powerloss I time	ms	FLOAT		CALCF	1.0	1000.0	ERWS	FV_
22.6.6	3438	Powerloss mode		ENUM		Ramp down	0	1	ERWZ	FV_
				0	Ramp down					
				1	Restart					
22.6.7	3440	Powerloss mains src		LINK	16BIT	6000	0	16384	ERWZ	FV_
				L_DIGSEL2						
22.7 - FUNCTIONS/PADS										
22.7.1	3700	Pad 1		INT32	32BIT	0	0	0	ERW	FVS
22.7.2	3702	Pad 2		INT32	32BIT	0	0	0	ERW	FVS
22.7.3	3704	Pad 3		INT32	32BIT	0	0	0	ERW	FVS
22.7.4	3706	Pad 4		INT32	32BIT	0	0	0	ERW	FVS
22.7.5	3708	Pad 5		INT32	32BIT	0	0	0	ERW	FVS
22.7.6	3710	Pad 6		INT32	32BIT	0	0	0	ERW	FVS
22.7.7	3712	Pad 7		INT32	32BIT	0	0	0	ERW	FVS
22.7.8	3714	Pad 8		INT32	32BIT	0	0	0	ERW	FVS
22.7.9	3716	Pad 9		INT32	32BIT	0	0	0	ERW	FVS
22.7.10	3718	Pad 10		INT32	32BIT	0	0	0	ERW	FVS
22.7.11	3720	Pad 11		INT32	32BIT	0	0	0	ERW	FVS
22.7.12	3722	Pad 12		INT32	32BIT	0	0	0	ERW	FVS
22.7.13	3724	Pad 13		INT32	32BIT	0	0	0	ERW	FVS
22.7.14	3726	Pad 14		INT32	32BIT	0	0	0	ERW	FVS
22.7.15	3728	Pad 15		INT32	32BIT	0	0	0	ERW	FVS
22.7.16	3730	Pad 16		INT32	32BIT	0	0	0	ERW	FVS
22.8 - FUNCTIONS/VDC CONTROL										
22.8.1	3450	Vdc control function		ENUM		Disable	0	1	ERWZ	FVS
				0	Disable					
				1	Enable					
22.8.2	3470	Vdc control P gain	A/V	FLOAT		CALCF	0.0	100.000	ERWS	FVS
22.8.3	3472	Vdc control I time	ms	FLOAT		CALCF	1.0	1000.0	ERWS	FVS
22.9 - FUNCTIONS/BRAKE CONTROL										
22.9.1	3170	Brake control funct		ENUM		Disable	0	1	ERWZ	FVS
				0	Disable					
				1	Enable					
22.9.2	3172	Brake open delay	s	FLOAT		0.20	0.0	60.0	ERW	FVS
22.9.3	3174	Brake close delay	s	FLOAT		0.20	0.0	60.0	ERW	FVS
22.10 - FUNCTIONS/VF ENERGY SAVE										
22.10.1	3320	Energysave enable		BIT		0	0	1	ERWZ	V
22.10.2	3322	Energysave spd band	rpm	INT16		2	0	100	ERW	V
22.10.3	3324	Energysave delay	s	FLOAT		3.0	0.1	120.0	ERW	V
22.10.4	3326	Energysave trqband 1	perc	FLOAT		10.0	0.0	100.0	ERWS	V
22.10.5	3328	Energysave trqband 2	perc	FLOAT		10.0	0.0	100.0	ERWS	V
22.10.6	3340	Energysave out		FLOAT	16/32BIT	0.0	0.0	1.0	ER	V

23 - COMMUNICATION

23.1 - COMMUNICATION /RS232

Menu	IPA	Description	EU	Type	Type FB	Def	Min	Max	Acc	Mod
23.1.1	3800	Drive address		UINT16		1	1	255	ERW	FVS
23.1.2	3802	Serial baudrate		ENUM		38400	0	2	ERW	FVS
				0	9600					
				1	19200					
				2	38400					
23.1.3	3810	Serial parameter		ENUM		None,8,1	0	3	ERW	FVS
				0	None,8,1					
				1	None,8,2					
				2	Even,8,1					
				3	Odd,8,1					
23.1.4	3804	Serial protocol		ENUM		Modbus	0	1	ERW	FVS
				0	Modbus					
				1	Jbus					
23.1.5	3806	Serial delay	ms	UINT16		0	0	1000	ERW	FVS
23.1.6	3808	Serial swap data		BIT		0	0	1	ERW	FVS
23.2 - COMMUNICATION/FIELDBUS CONFIG										
23.2.1	4000	Fieldbus type		ENUM		Off	0	3	RW	FVS
				0	Off					
				1	CanOpen					
				2	DeviceNet					
				10	DS402					
23.2.2	4004	Fieldbus baudrate		ENUM		500k	0	12	RW	FVS
				0	Auto					
				1	125k					
				2	250k					
				3	500k					
				4	1M					
				5	9600					
				6	19200					
				7	93750					
				8	187,5k					
				9	1,5M					
				10	3M					
				11	6M					
				12	12M					
23.2.3	4006	Fieldbus address		INT16		3	0	255	RW	FVS
23.2.4	4010	Fieldbus M->S enable		ENUM		Enable	0	1	ERWZ	FVS
				0	Disable					
				1	Enable					
23.2.5	4012	Fieldbus alarm mode		INT32		0	0	1	ERWZ	FVS
23.2.6	4014	Fieldbus state		ENUM		Stop	0	7	R	FVS
				0	Stop					
				1	PreOperational					
				2	Operational					
				3	Error					
				4	WaitPRM					
				5	WaitCFG					
				6	DataExchange					
				7	DPError					
23.3 - COMMUNICATION/FIELDBUS M2S										
23.3.1	4020	Fieldbus M->S1 ipa		FBM2SIPA		0	0	20000	RW	FVS
23.3.2	4022	Fieldbus M->S1 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count 16					
				2	Count 32					
				3	Fill 16					
				4	Fill 32					
				5	Mdplc 16					
				6	Mdplc 32					
				7	EU					
				8	Eu float					
				9	Par 16					
				10	Par 32					
23.3.3	4024	Fieldbus M->S1 mon		INT32	32BIT	0	0	0	ER	FVS
23.3.4	4026	Fieldbus M->S1 div		float		1.0	1.0	1000.0	ERW	FVS
23.3.5	4030	Fieldbus M->S2 ipa		FBM2SIPA		0	0	20000	RW	FVS
23.3.6	4032	Fieldbus M->S2 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count16					
				2	Count32					
				3	Fill16					
				4	Fill32					
				5	Mdplc16					
				6	Mdplc32					

Menu	IPA	Description	EU	Type	Type FB	Def	Min	Max	Acc	Mod
				7	EU					
				8	Eu float					
				9	Par16					
				10	Par32					
23.3.7	4034	Fieldbus M->S2 mon		INT32	32 BIT	0	0	0	ER	FVS
23.3.8	4036	Fieldbus M->S2 div		float		1.0	1.0	1000.0	ERW	FVS
23.3.9	4040	Fieldbus M->S3 ipa		FBM2SIPA		0	0	20000	RW	FVS
23.3.10	4042	Fieldbus M->S3 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count16					
				2	Count32					
				3	Fill16					
				4	Fill32					
				5	Mdplc16					
				6	Mdplc32					
				7	EU					
				8	Eu float					
				9	Par16					
				10	Par32					
23.3.11	4044	Fieldbus M->S3 mon		INT32	32 BIT	0	0	0	ER	FVS
23.3.12	4046	Fieldbus M->S3 div		float		1.0	1.0	1000.0	ERW	FVS
23.3.13	4050	Fieldbus M->S4 ipa		FBM2SIPA		0	0	20000	RW	FVS
23.3.14	4052	Fieldbus M->S4 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count16					
				2	Count32					
				3	Fill16					
				4	Fill32					
				5	Mdplc16					
				6	Mdplc32					
				7	EU					
				8	Eu float					
				9	Par16					
				10	Par32					
23.3.15	4054	Fieldbus M->S4 mon		INT32	32 BIT	0	0	0	ER	FVS
23.3.16	4056	Fieldbus M->S4 div		float		1.0	1.0	1000.0	ERW	FVS
23.3.17	4060	Fieldbus M->S5 ipa		FBM2SIPA		0	0	20000	RW	FVS
23.3.18	4062	Fieldbus M->S5 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count16					
				2	Count32					
				3	Fill16					
				4	Fill32					
				5	Mdplc16					
				6	Mdplc32					
				7	EU					
				8	Eu float					
				9	Par16					
				10	Par32					
23.3.19	4064	Fieldbus M->S5 mon		INT32	32 BIT	0	0	0	ER	FVS
23.3.20	4066	Fieldbus M->S5 div		float		1.0	1.0	1000.0	ERW	FVS
23.3.21	4070	Fieldbus M->S6 ipa		FBM2SIPA		0	0	20000	RW	FVS
23.3.22	4072	Fieldbus M->S6 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count16					
				2	Count32					
				3	Fill16					
				4	Fill32					
				5	Mdplc16					
				6	Mdplc32					
				7	EU					
				8	Eu float					
				9	Par16					
				10	Par32					
23.3.23	4074	Fieldbus M->S6 mon		INT32	32 BIT	0	0	0	ER	FVS
23.3.24	4076	Fieldbus M->S6 div		float		1.0	1.0	1000.0	ERW	FVS
23.3.25	4080	Fieldbus M->S7 ipa		FBM2SIPA		0	0	20000	RW	FVS
23.3.26	4082	Fieldbus M->S7 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count16					
				2	Count32					
				3	Fill16					
				4	Fill32					
				5	Mdplc16					
				6	Mdplc32					
				7	EU					

Menu	IPA	Description	EU	Type	Type FB	Def	Min	Max	Acc	Mod
				8	Eu float					
				9	Par16					
				10	Par32					
23.3.27	4084	Fieldbus M->S7 mon		INT32	32 BIT	0	0	0	ER	FVS
23.3.28	4086	Fieldbus M->S7 div		float		1.0	1.0	1000.0	ERW	FVS
23.3.29	4090	Fieldbus M->S8 ipa		FBM2SIPA		0	0	20000	RW	FVS
23.3.30	4092	Fieldbus M->S8 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count16					
				2	Count32					
				3	Fill16					
				4	Fill32					
				5	Mdplc16					
				6	Mdplc32					
				7	EU					
				8	Eu float					
				9	Par16					
				10	Par32					
23.3.31	4094	Fieldbus M->S8 mon		INT32	32 BIT	0	0	0	ER	FVS
23.3.32	4096	Fieldbus M->S8 div		float		1.0	1.0	1000.0	ERW	FVS
23.3.33	4100	Fieldbus M->S9 ipa		FBM2SIPA		0	0	20000	RW	FVS
23.3.34	4102	Fieldbus M->S9 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count16					
				2	Count32					
				3	Fill16					
				4	Fill32					
				5	Mdplc16					
				6	Mdplc32					
				7	EU					
				8	Eu float					
				9	Par16					
				10	Par32					
23.3.35	4104	Fieldbus M->S9 mon		INT32	32 BIT	0	0	0	ER	FVS
23.3.36	4106	Fieldbus M->S9 div		float		1.0	1.0	1000.0	ERW	FVS
23.3.37	4110	Fieldbus M->S10 ipa		FBM2SIPA		0	0	20000	RW	FVS
23.3.38	4112	Fieldbus M->S10 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count16					
				2	Count32					
				3	Fill16					
				4	Fill32					
				5	Mdplc16					
				6	Mdplc32					
				7	EU					
				8	Eu float					
				9	Par16					
				10	Par32					
23.3.39	4114	Fieldbus M->S10 mon		INT32	32 BIT	0	0	0	ER	FVS
23.3.40	4116	Fieldbus M->S10 div		float		1.0	1.0	1000.0	ERW	FVS
23.3.41	4120	Fieldbus M->S11 ipa		FBM2SIPA		0	0	20000	RW	FVS
23.3.42	4122	Fieldbus M->S11 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count16					
				2	Count32					
				3	Fill16					
				4	Fill32					
				5	Mdplc16					
				6	Mdplc32					
				7	EU					
				8	Eu float					
				9	Par16					
				10	Par32					
23.3.43	4124	Fieldbus M->S11 mon		INT32	32 BIT	0	0	0	ER	FVS
23.3.44	4126	Fieldbus M->S11 div		float		1.0	1.0	1000.0	ERW	FVS
23.3.45	4130	Fieldbus M->S12 ipa		FBM2SIPA		0	0	20000	RW	FVS
23.3.46	4132	Fieldbus M->S12 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count16					
				2	Count32					
				3	Fill16					
				4	Fill32					
				5	Mdplc16					
				6	Mdplc32					
				7	EU					
				8	Eu float					

Menu	IPA	Description	EU	Type	Type FB	Def	Min	Max	Acc	Mod
				9	Par16					
				10	Par32					
23.3.47	4134	Fieldbus M->S12 mon		INT32	32 BIT	0	0	0	ER	FVS
23.3.48	4136	Fieldbus M->S12 div		float		1.0	1.0	1000.0	ERW	FVS
23.3.49	4140	Fieldbus M->S13 ipa		FBM2SIPA		0	0	20000	RW	FVS
23.3.50	4142	Fieldbus M->S13 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count16					
				2	Count32					
				3	Fill16					
				4	Fill32					
				5	Mdplc16					
				6	Mdplc32					
				7	EU					
				8	Eu float					
				9	Par16					
				10	Par32					
23.3.51	4144	Fieldbus M->S13 mono		INT32	32 BIT	0	0	0	ER	FVS
23.3.52	4146	Fieldbus M->S13 div		float		1.0	1.0	1000.0	ERW	FVS
23.3.53	4150	Fieldbus M->S14 ipa		FBM2SIPA		0	0	20000	RW	FVS
23.3.54	4152	Fieldbus M->S14 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count16					
				2	Count32					
				3	Fill16					
				4	Fill32					
				5	Mdplc16					
				6	Mdplc32					
				7	EU					
				8	Eu float					
				9	Par16					
				10	Par32					
23.3.55	4154	Fieldbus M->S14 mon		INT32	32 BIT	0	0	0	ER	FVS
23.3.56	4156	Fieldbus M->S14 div		float		1.0	1.0	1000.0	ERW	FVS
23.3.57	4160	Fieldbus M->S15 ipa		FBM2SIPA		0	0	20000	RW	FVS
23.3.58	4162	Fieldbus M->S15 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count16					
				2	Count32					
				3	Fill16					
				4	Fill32					
				5	Mdplc16					
				6	Mdplc32					
				7	EU					
				8	Eu float					
				9	Par16					
				10	Par32					
23.3.59	4164	Fieldbus M->S15 mon		INT32	32 BIT	0	0	0	ER	FVS
23.3.60	4166	Fieldbus M->S15 div		float		1.0	1.0	1000.0	ERW	FVS
23.3.61	4170	Fieldbus M->S16 ipa		FBM2SIPA		0	0	20000	RW	FVS
23.3.62	4172	Fieldbus M->S16 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count16					
				2	Count32					
				3	Fill16					
				4	Fill32					
				5	Mdplc16					
				6	Mdplc32					
				7	EU					
				8	Eu float					
				9	Par16					
				10	Par32					
23.3.63	4174	Fieldbus M->S16 mon		INT32	32 BIT	0	0	0	ER	FVS
23.3.64	4176	Fieldbus M->S16 div		float		1.0	1.0	1000.0	ERW	FVS
23.4 - COMMUNICATION/FIELDBUS S2M										
23.4.1	4180	Fieldbus S->M1 ipa		FBS2MIPA		0	0	20000	RW	FVS
23.4.2	4182	Fieldbus S->M1 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count16					
				2	Count32					
				3	Fill16					
				4	Fill32					
				5	Mdplc16					
				6	Mdplc32					
				7	EU					

Menu	IPA	Description	EU	Type	Type FB	Def	Min	Max	Acc	Mod
				8	Eu float					
				9	Par16					
				10	Par32					
23.4.3	4184	Dig Fieldbus S->M1		INT3232 BIT		0	0	0	ERW	FVS
23.4.4	4186	Fieldbus S->M1 mul		float		1.0	1.0	1000.0	ERW	FVS
23.4.5	4190	Fieldbus S->M2 ipa		FBS2MIPA		0	0	20000	RW	FVS
23.4.6	4192	Fieldbus S->M2 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count16					
				2	Count32					
				3	Fill16					
				4	Fill32					
				5	Mdplc16					
				6	Mdplc32					
				7	EU					
				8	Eu float					
				9	Par16					
				10	Par32					
23.4.7	4194	Dig Fieldbus S->M2		INT32	32 BIT	0	0	0	ERW	FVS
23.4.8	4196	Fieldbus S->M2 mul		float		1.0	1.0	1000.0	ERW	FVS
23.4.9	4200	Fieldbus S->M3 ipa		FBS2MIPA		0	0	20000	RW	FVS
23.4.10	4202	Fieldbus S->M3 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count16					
				2	Count32					
				3	Fill16					
				4	Fill32					
				5	Mdplc16					
				6	Mdplc32					
				7	EU					
				8	Eu float					
				9	Par16					
				10	Par32					
23.4.11	4204	Dig Fieldbus S->M3		INT32	32 BIT	0	0	0	ERW	FVS
23.4.12	4206	Fieldbus S->M3 mul		float		1.0	1.0	1000.0	ERW	FVS
23.4.13	4210	Fieldbus S->M4 ipa		FBS2MIPA		0	0	20000	RW	FVS
23.4.14	4212	Fieldbus S->M4 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count16					
				2	Count32					
				3	Fill16					
				4	Fill32					
				5	Mdplc16					
				6	Mdplc32					
				7	EU					
				8	Eu float					
				9	Par16					
				10	Par32					
23.4.15	4214	Dig Fieldbus S->M4		INT32	32 BIT	0	0	0	ERW	FVS
23.4.16	4216	Fieldbus S->M4 mul		float		1.0	1.0	1000.0	ERW	FVS
23.4.17	4220	Fieldbus S->M5 ipa		FBS2MIPA		0	0	20000	RW	FVS
23.4.18	4222	Fieldbus S->M5 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count16					
				2	Count32					
				3	Fill16					
				4	Fill32					
				5	Mdplc16					
				6	Mdplc32					
				7	EU					
				8	Eu float					
				9	Par16					
				10	Par32					
23.4.19	4224	Dig Fieldbus S->M5		INT32	32 BIT	0	0	0	ERW	FVS
23.4.20	4226	Fieldbus S->M5 mul		float		1.0	1.0	1000.0	ERW	FVS
23.4.21	4230	Fieldbus S->M6 ipa		FBS2MIPA		0	0	20000	RW	FVS
23.4.22	4232	Fieldbus S->M6 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count16					
				2	Count32					
				3	Fill16					
				4	Fill32					
				5	Mdplc16					
				6	Mdplc32					
				7	EU					
				8	Eu float					

Menu	IPA	Description	EU	Type	Type FB	Def	Min	Max	Acc	Mod
				9	Par16					
				10	Par32					
23.4.23	4234	Dig Fieldbus S->M6		INT32	32 BIT	0	0	0	ERW	FVS
23.4.24	4236	Fieldbus S->M6 mul		float		1.0	1.0	1000.0	ERW	FVS
23.4.25	4240	Fieldbus S->M7 ipa		FBS2MIPA		0	0	20000	RW	FVS
23.4.26	4242	Fieldbus S->M7 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count16					
				2	Count32					
				3	Fill16					
				4	Fill32					
				5	Mdplc16					
				6	Mdplc32					
				7	EU					
				8	Eu float					
				9	Par16					
				10	Par32					
23.4.27	4244	Dig Fieldbus S->M7		INT32	32 BIT	0	0	0	ERW	FVS
23.4.28	4246	Fieldbus S->M7 mul		float		1.0	1.0	1000.0	ERW	FVS
23.4.29	4250	Fieldbus S->M8 ipa		FBS2MIPA		0	0	20000	RW	FVS
23.4.30	4252	Fieldbus S->M8 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count16					
				2	Count32					
				3	Fill16					
				4	Fill32					
				5	Mdplc16					
				6	Mdplc32					
				7	EU					
				8	Eu float					
				9	Par16					
				10	Par32					
23.4.31	4254	Dig Fieldbus S->M8		INT32	32 BIT	0	0	0	ERW	FVS
23.4.32	4256	Fieldbus S->M8 mul		float		1.0	1.0	1000.0	ERW	FVS
23.4.33	4260	Fieldbus S->M9 ipa		FBS2MIPA		0	0	20000	RW	FVS
23.4.34	4262	Fieldbus S->M9 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count16					
				2	Count32					
				3	Fill16					
				4	Fill32					
				5	Mdplc16					
				6	Mdplc32					
				7	EU					
				8	Eu float					
				9	Par16					
				10	Par32					
23.4.35	4264	Dig Fieldbus S->M9		INT32	32 BIT	0	0	0	ERW	FVS
23.4.36	4266	Fieldbus S->M9 mul		float		1.0	1.0	1000.0	ERW	FVS
23.4.37	4270	Fieldbus S->M10 ipa		FBS2MIPA		0	0	20000	RW	FVS
23.4.38	4272	Fieldbus S->M10 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count16					
				2	Count32					
				3	Fill16					
				4	Fill32					
				5	Mdplc16					
				6	Mdplc32					
				7	EU					
				8	Eu float					
				9	Par16					
				10	Par32					
23.4.39	4274	Dig Fieldbus S->M10		INT32	32 BIT	0	0	0	ERW	FVS
23.4.40	4276	Fieldbus S->M10 mul		float		1.0	1.0	1000.0	ERW	FVS
23.4.41	4280	Fieldbus S->M11 ipa		FBS2MIPA		0	0	20000	RW	FVS
23.4.42	4282	Fieldbus S->M11 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count16					
				2	Count32					
				3	Fill16					
				4	Fill32					
				5	Mdplc16					
				6	Mdplc32					
				7	EU					
				8	Eu float					
				9	Par16					

Menu	IPA	Description	EU	Type	Type FB	Def	Min	Max	Acc	Mod
				10	Par32					
23.4.43	4284	Dig Fieldbus S->M11		INT32	32 BIT	0	0	0	ERW	FVS
23.4.44	4286	Fieldbus S->M11 mul		float		1.0	1.0	1000.0	ERW	FVS
23.4.45	4290	Fieldbus S->M12 ipa		FBS2MIPA		0	0	20000	RW	FVS
23.4.46	4292	Fieldbus S->M12 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count16					
				2	Count32					
				3	Fill16					
				4	Fill32					
				5	Mdplc16					
				6	Mdplc32					
				7	EU					
				8	Eu float					
				9	Par16					
				10	Par32					
23.4.47	4294	Dig Fieldbus S->M12		INT32	32 BIT	0	0	0	ERW	FVS
23.4.48	4296	Fieldbus S->M12 mul		float		1.0	1.0	1000.0	ERW	FVS
23.4.49	4300	Fieldbus S->M13 ipa		FBS2MIPA		0	0	20000	RW	FVS
23.4.50	4302	Fieldbus S->M13 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count16					
				2	Count32					
				3	Fill16					
				4	Fill32					
				5	Mdplc16					
				6	Mdplc32					
				7	EU					
				8	Eu float					
				9	Par16					
				10	Par32					
23.4.51	4304	Dig Fieldbus S->M13		INT32	32 BIT	0	0	0	ERW	FVS
23.4.52	4306	Fieldbus S->M13 mulo		float		1.0	1.0	1000.0	ERW	FVS
23.4.53	4310	Fieldbus S->M14 ipa		FBS2MIPA		0	0	20000	RW	FVS
23.4.54	4312	Fieldbus S->M14 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count16					
				2	Count32					
				3	Fill16					
				4	Fill32					
				5	Mdplc16					
				6	Mdplc32					
				7	EU					
				8	Eu float					
				9	Par16					
				10	Par32					
23.4.55	4314	Dig Fieldbus S->M14		INT32	32 BIT	0	0	0	ERW	FVS
23.4.56	4316	Fieldbus S->M14 mul		float		1.0	1.0	1000.0	ERW	FVS
23.4.57	4320	Fieldbus S->M15 ipa		FBS2MIPA		0	0	20000	RW	FVS
23.4.58	4322	Fieldbus S->M15 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count16					
				2	Count32					
				3	Fill16					
				4	Fill32					
				5	Mdplc16					
				6	Mdplc32					
				7	EU					
				8	Eu float					
				9	Par16					
				10	Par32					
23.4.59	4324	Dig Fieldbus S->M15		INT32	32 BIT	0	0	0	ERW	FVS
23.4.60	4326	Fieldbus S->M15 mul		float		1.0	1.0	1000.0	ERW	FVS
23.4.61	4330	Fieldbus S->M16 ipa		FBS2MIPA		0	0	20000	RW	FVS
23.4.62	4332	Fieldbus S->M16 sys		ENUM		Not assigned	0	10	RW	FVS
				0	Not assigned					
				1	Count16					
				2	Count32					
				3	Fill16					
				4	Fill32					
				5	Mdplc16					
				6	Mdplc32					
				7	EU					
				8	Eu float					
				9	Par16					
				10	Par32					

Menu	IPA	Description	EU	Type	Type FB	Def	Min	Max	Acc	Mod
23.4.63	4334	Dig Fieldbus S->M16		INT32	32 BIT	0	0	0	ERW	FVS
23.4.64	4336	Fieldbus S->M16 mul		float		1.0	1.0	1000.0	ERW	FVS
23.5 - COMMUNICATION/WORD COMP										
23.5.1	4400	Word bit0 src		LINK L_DIGSEL1	16 BIT	6000	0	16384	ERW	FVS
23.5.2	4402	Word bit1 src		LINK L_DIGSEL1	16 BIT	6000	0	16384	ERW	FVS
23.5.3	4404	Word bit2 src		LINK L_DIGSEL1	16 BIT	6000	0	16384	ERW	FVS
23.5.4	4406	Word bit3 src		LINK L_DIGSEL1	16 BIT	6000	0	16384	ERW	FVS
23.5.5	4408	Word bit4 src		LINK L_DIGSEL1	16 BIT	6000	0	16384	ERW	FVS
23.5.6	4410	Word bit5 src		LINK L_DIGSEL1	16 BIT	6000	0	16384	ERW	FVS
23.5.7	4412	Word bit6 src		LINK L_DIGSEL1	16 BIT	6000	0	16384	ERW	FVS
23.5.8	4414	Word bit7 src		LINK L_DIGSEL1	16 BIT	6000	0	16384	ERW	FVS
23.5.9	4416	Word bit8 src		LINK L_DIGSEL1	16 BIT	6000	0	16384	ERW	FVS
23.5.10	4418	Word bit9 src		LINK L_DIGSEL1	16 BIT	6000	0	16384	ERW	FVS
23.5.11	4420	Word bit10 src		LINK L_DIGSEL1	16 BIT	6000	0	16384	ERW	FVS
23.5.12	4422	Word bit11 src		LINK L_DIGSEL1	16 BIT	6000	0	16384	ERW	FVS
23.5.13	4424	Word bit12 src		LINK L_DIGSEL1	16 BIT	6000	0	16384	ERW	FVS
23.5.14	4426	Word bit13 src		LINK L_DIGSEL1	16 BIT	6000	0	16384	ERW	FVS
23.5.15	4428	Word bit14 src		LINK L_DIGSEL1	16 BIT	6000	0	16384	ERW	FVS
23.5.16	4430	Word bit15 src		LINK L_DIGSEL1	16 BIT	6000	0	16384	ERW	FVS
23.5.17	4432	Word comp mon		UINT3216 BIT		0	0	0	ER	FVS
23.6 - COMMUNICATION/WORD DECOMP										
23.6.1	4450	Dig word decomp		UINT32	16 BIT	0	0	0	ERW	FVS
23.6.2	4452	Word decomp src		LINK L_WDECOMP	16 BIT	4450	0	16384	ERW	FVS
23.6.3	4454	Bit0 decomp mon		BIT	16 BIT	0	0	1	ER	FVS
23.6.4	4456	Bit1 decomp mon		BIT	16 BIT	0	0	1	ER	FVS
23.6.5	4458	Bit2 decomp mon		BIT	16 BIT	0	0	1	ER	FVS
23.6.6	4460	Bit3 decomp mon		BIT	16 BIT	0	0	1	ER	FVS
23.6.7	4462	Bit4 decomp mon		BIT	16 BIT	0	0	1	ER	FVS
23.6.8	4464	Bit5 decomp mon		BIT	16 BIT	0	0	1	ER	FVS
23.6.9	4466	Bit6 decomp mon		BIT	16 BIT	0	0	1	ER	FVS
23.6.10	4468	Bit7 decomp mon		BIT	16 BIT	0	0	1	ER	FVS
23.6.11	4470	Bit8 decomp mon		BIT	16 BIT	0	0	1	ER	FVS
23.6.12	4472	Bit9 decomp mon		BIT	16 BIT	0	0	1	ER	FVS
23.6.13	4474	Bit10 decomp mon		BIT	16 BIT	0	0	1	ER	FVS
23.6.14	4476	Bit11 decomp mon		BIT	16 BIT	0	0	1	ER	FVS
23.6.15	4478	Bit12 decomp mon		BIT	16 BIT	0	0	1	ER	FVS
23.6.16	4480	Bit13 decomp mon		BIT	16 BIT	0	0	1	ER	FVS
23.6.17	4482	Bit14 decomp mon		BIT	16 BIT	0	0	1	ER	FVS
23.6.18	4484	Bit15 decomp mon		BIT	16 BIT	0	0	1	ER	FVS
24 - ALARM CONFIG										
24.1	4500	Fault reset src		LINK L_DIGSEL2	16 BIT	1218	0	16384	RW	FVS
24.2	4502	ExtFlt src		LINK L_DIGSEL2	16 BIT	6000	0	16384	RW	FVS
24.3	4504	ExtFlt activity		ENUM 0 1 2 3 4	 Ignore Warning Disable Stop Fast stop	Disable	0	4	RW	FVS
24.4	4506	ExtFlt restart		ENUM 0 1	 Disable Enable	Disable	0	1	RW	FVS
24.5	4508	ExtFlt restart time	ms	UINT16		1000	120	30000	RW	FVS
24.6	4510	ExtFlt holdoff	ms	UINT16		0	0	10000	RW	FVS

Menu	IPA	Description	EU	Type	Type FB	Def	Min	Max	Acc	Mod
24.7	4520	MotorOT src		LINK L_DIGSEL2	16 BIT	6000	0	16384	RW	FVS
24.8	4522	MotorOT activity		ENUM 0 1 2 3 4	 Ignore Warning Disable Stop Fast stop	Warning	0	4	RW	FVS
24.9	4524	MotorOT restart		ENUM 0 1	 Disable Enable	Disable	0	1	RW	FVS
24.10	4526	MotorOT restart time	ms	UINT16		1000	120	30000	RW	FVS
24.11	4528	MotorOT holdoff	ms	UINT16		1000	0	30000	RW	FVS
24.12	4540	Overspeed threshold	rpm	INT32		CALCI	0	CALCI	RW	FVS
24.13	4542	Overspeed activity		ENUM 0 1 2 3 4	 Ignore Warning Disable Stop Fast stop	Disable	0	4	RW	FVS
24.14	4544	Overspeed holdoff	ms	UINT16		0	0	5000	RW	FVS
24.15	4550	SpdRefLoss threshold	rpm	INT16		100	0	CALCI	RW	FV_
24.16	4552	SpdRefLoss activity		ENUM 0 1 2 3 4	 Ignore Warning Disable Stop Fast stop	Warning	0	4	RW	FV_
24.17	4554	SpdRefLoss holdoff	ms	UINT16		1000	0	10000	RW	FV_
24.18	4560	SpdFbkLoss activity		ENUM 0 1 2 3 4	 Ignore Warning Disable Stop Fast stop	Disable	0	4	RW	FVS
24.19	4562	SpdFbkLoss holdoff	ms	UINT16		200	0	10000	RW	FVS
24.20	4564	SpdFbkLoss threshold	rpm	INT16		100	5	CALCI	RW	FVS
24.21	4570	Drive ovld activity		ENUM 0 1 2 3 4	 Ignore Warning Disable Stop Fast stop	Ignore	0	4	ERW	FVS
24.22	4572	Motor ovld activity		ENUM 0 1 2 3 4	 Ignore Warning Disable Stop Fast stop	Warning	0	4	ERW	FVS
24.23	4574	Bres ovld activity		ENUM 0 1 2 3 4	 Ignore Warning Disable Stop Fast stop	Disable	0	4	ERW	FVS
24.24	4582	HTsens restart		ENUM 0 1	 Disable Enable	Disable	0	1	ERW	FVS
24.25	4584	HTsens restart time	ms	UINT16		20000	120	60000	ERW	FVS
24.26	4600	InAir activity		ENUM 0 1 2 3 4	 Ignore Warning Disable Stop Fast stop	Stop	0	4	ERW	FVS
24.27	4602	InAir restart		ENUM 0 1	 Disable Enable	Disable	0	1	ERW	FVS
24.28	4604	InAir restart time	ms	UINT16		1000	120	30000	ERW	FVS
24.29	4606	InAir holdoff	ms	UINT16		10000	0	30000	ERW	FVS
24.30	4610	Desat restart		ENUM 0 1	 Disable Enable	Disable	0	1	ERW	FVS
24.31	4612	Desat restart time	ms	UINT16		2000	1000	10000	ERW	FVS
24.32	4620	IOverC restart		ENUM 0	 Disable	Disable	0	1	ERW	FVS

Menu	IPA	Description	EU	Type	Type FB	Def	Min	Max	Acc	Mod
				1	Enable					
24.33	4622	IOverC restart time	ms	UINT16		2000	1000	10000	ERW	FVS
24.34	4630	OverV restart		ENUM		Disable	0	1	ERW	FVS
				0	Disable					
				1	Enable					
24.35	4632	OverV restart time	ms	UINT16		2000	1000	10000	ERW	FVS
24.36	4640	UnderV restart		ENUM		Enable	0	1	ERW	FVS
				0	Disable					
				1	Enable					
24.37	4642	UnderV restart time	ms	UINT16		1000	120	10000	ERW	FVS
24.38	4650	UVRep attempts		UINT16		5	0	1000	ERW	FVS
24.39	4652	UVRep delay	s	UINT16		240	0	300	ERW	FVS
24.40	4660	PhLoss activity		ENUM		Disable	0	4	ERW	FVS
				0	Ignore					
				1	Warning					
				2	Disable					
				3	Stop					
				4	Fast stop					
24.41	4662	PhLoss restart		ENUM		Disable	0	1	ERW	FVS
				0	Disable					
				1	Enable					
24.42	4664	PhLoss restart time	ms	UINT16		1000	120	10000	ERW	FVS
24.43	4670	Optionbus activity		ENUM		Disable	0	4	ERW	FVS
				0	Ignore					
				1	Warning					
				2	Disable					
				3	Stop					
				4	Fast stop					
24.44	4680	GroundFault thr	perc	float		10.0	0.0	150.0	ERWS	FVS
24.45	4700	Alarm dig sel 1		ENUM		No alarm	0	40	ERW	FVS
				0	No alarm					
				1	Overvoltage					
				2	Undervoltage					
				3	Ground fault					
				4	Overcurrent					
				5	Desaturation					
				6	MultiUndervolt					
				7	MultiOvercurr					
				8	MultiDesat					
				9	Heatsink OT					
				10	HeatsinkS OTUT					
				11	Intakeair OT					
				12	Motor OT					
				13	Drive overload					
				14	Motor overload					
				15	Bres overload					
				16	Phaseloss					
				17	Opt Bus fault					
				18	Opt 1 IO fault					
				19	Opt 2 IO fault					
				20	Opt Enc fault					
				21	External fault					
				22	Speed fbk loss					
				23	Overspeed					
				24	Speed ref loss					
				25	Emg stop alarm					
				26	Power down					
				27	Not Used1					
				28	Not Used2					
				29	Not Used3					
				30	Not Used4					
				31	Not Used5					
				32	Not Used6					
				33	Plc1 fault					
				34	Plc2 fault					
				35	Plc3 fault					
				36	Plc4 fault					
				37	Plc5 fault					
				38	Plc6 fault					
				39	Plc7 fault					
				40	Plc8 fault					
24.46	4702	Alarm dig sel 2		ENUM		No alarm	0	40	ERW	FVS
				0	No alarm					
				1	Overvoltage					
				2	Undervoltage					
				3	Ground fault					

Menu	IPA	Description	EU	Type	Type FB	Def	Min	Max	Acc	Mod
				4	Overcurrent					
				5	Desaturation					
				6	MultiUndervolt					
				7	MultiOvercurr					
				8	MultiDesat					
				9	Heatsink OT					
				10	HeatsinkS OTUT					
				11	Intakeair OT					
				12	Motor OT					
				13	Drive overload					
				14	Motor overload					
				15	Bres overload					
				16	Phaseloss					
				17	Opt Bus fault					
				18	Opt 1 IO fault					
				19	Opt 2 IO fault					
				20	Opt Enc fault					
				21	External fault					
				22	Speed fbk loss					
				23	Overspeed					
				24	Speed ref loss					
				25	Emg stop alarm					
				26	Power down					
				27	Not Used1					
				28	Not Used2					
				29	Not Used3					
				30	Not Used4					
				31	Not Used5					
				32	Not Used6					
				33	Plc1 fault					
				34	Plc2 fault					
				35	Plc3 fault					
				36	Plc4 fault					
				37	Plc5 fault					
				38	Plc6 fault					
				39	Plc7 fault					
				40	Plc8 fault					
24.47	4704	Alarm dig sel 3		ENUM		No alarm	0	40	ERW	FVS
				0	No alarm					
				1	Overvoltage					
				2	Undervoltage					
				3	Ground fault					
				4	Overcurrent					
				5	Desaturation					
				6	MultiUndervolt					
				7	MultiOvercurr					
				8	MultiDesat					
				9	Heatsink OT					
				10	HeatsinkS OTUT					
				11	Intakeair OT					
				12	Motor OT					
				13	Drive overload					
				14	Motor overload					
				15	Bres overload					
				16	Phaseloss					
				17	Opt Bus fault					
				18	Opt 1 IO fault					
				19	Opt 2 IO fault					
				20	Opt Enc fault					
				21	External fault					
				22	Speed fbk loss					
				23	Overspeed					
				24	Speed ref loss					
				25	Emg stop alarm					
				26	Power down					
				27	Not Used1					
				28	Not Used2					
				29	Not Used3					
				30	Not Used4					
				31	Not Used5					
				32	Not Used6					
				33	Plc1 fault					
				34	Plc2 fault					
				35	Plc3 fault					
				36	Plc4 fault					
				37	Plc5 fault					

Menu	IPA	Description	EU	Type	Type FB	Def	Min	Max	Acc	Mod
				38	Plc6 fault					
				39	Plc7 fault					
				40	Plc8 fault					
24.48	4706	Alarm dig sel 4		ENUM		No alarm	0	40	ERW	FVS
				0	No alarm					
				1	Overvoltage					
				2	Undervoltage					
				3	Ground fault					
				4	Overcurrent					
				5	Desaturation					
				6	MultiUndervolt					
				7	MultiOvercurr					
				8	MultiDesat					
				9	Heatsink OT					
				10	HeatsinkS OTUT					
				11	Intakeair OT					
				12	Motor OT					
				13	Drive overload					
				14	Motor overload					
				15	Bres overload					
				16	Phaseloss					
				17	Opt Bus fault					
				18	Opt 1 IO fault					
				19	Opt 2 IO fault					
				20	Opt Enc fault					
				21	External fault					
				22	Speed fbk loss					
				23	Overspeed					
				24	Speed ref loss					
				25	Emg stop alarm					
				26	Power down					
				27	Not Used1					
				28	Not Used2					
				29	Not Used3					
				30	Not Used4					
				31	Not Used5					
				32	Not Used6					
				33	Plc1 fault					
				34	Plc2 fault					
				35	Plc3 fault					
				36	Plc4 fault					
				37	Plc5 fault					
				38	Plc6 fault					
				39	Plc7 fault					
				40	Plc8 fault					
24.49	4720	Alm autoreset time	s	float		0.0	0.0	60.0	ERW	FVS
24.50	4722	Alm autoreset number		UINT16		20	0	100	ERW	FVS
25 - ALARM LOG										
26 - APPLICATION										
27 - SERVICE										
27.1 - SERVICE/TEST GENERATOR										
27.1.1	5000	Test gen dest		ENUM		Off	0	4	ERWZ	FVS
				0	Off					
				1	Ramp ref 1					
				2	Speed ref 1					
				3	Torque ref 1					
				4	Current ref					
27.1.2	5002	Test gen level high	perc	INT16		0	-200	200	ERW	FVS
27.1.3	5004	Test gen level low	perc	INT16		0	-200	200	ERW	FVS
27.1.4	5006	Test gen period	s	float		1.0	0.01	10.0	ERW	FVS
27.1.5	5008	Test gen out	perc	INT16	16 /32BIT	0	0	0	ER	FVS
27.2 - SERVICE/PARAM ADAPT										
27.2.1	180	Adapt Rr P gain	perc	float		1.0	0.01	10.0	ERWS	F
27.2.2	182	Adapt Rr I time	s	float		1.0	0.1	10.0	ERWS	F
27.2.3	184	Adapt Rrlq threshold	A	float		CALCF	0.0	0.0	ERWZS	F
27.2.4	170	Adapt Rs P gain	perc	float		2.0	0.01	10.0	ERWS	S
27.2.5	172	Adapt Rs I time	s	float		0.5	0.1	10.0	ERWS	S
27.2.6	174	Adapt Rslq threshold	A	float		CALCF	0.0	0.0	ERWZS	S
27.3 - SERVICE/POSITION										
27.3.1	2152	E1 Virtual pulses		UINT32		CALCI	0	0	ERW	FVS

Menu	IPA	Description	EU	Type	Type FB	Def	Min	Max	Acc	Mod
27.3.2	2154	E1 Virtual position	cnt	UINT32	32 BIT	0	0	0	ER	FVS
27.3.3	2156	E1 Revolutions		INT32	32 BIT	0	0	0	ER	FVS
27.3.4	2168	E1 Abs pulses		UINT32		CALCI	0	0	ER	FVS
27.3.5	2164	E1 Abs position	cnt	UINT32	32 BIT	0	0	0	ER	FVS
27.3.6	2166	E1 Abs revolutions		UINT32	32 BIT	0	0	0	ER	FVS
27.4 - SERVICE/FIELDBUS SERV										
27.4.1	4016	Fieldbus float order		BIT		0	0	1	ERW	FVS
PARAMETERS NOT PRESENT ON MENU										
-	262	Motor speed nofilter	rpm	INT16	16BIT	0	0	0	ER	
-	362	Drive overload trip		BIT	16BIT	0	0	1	ER	
-	366	Drive overload 80%		BIT	16BIT	0	0	1	ER	
-	626	Ramp ref out mon	rpm	INT16	16BIT	0	0	0	ER	
-	760	Ramp out mon	rpm	INT16	16BIT	0	0	0	ER	
-	764	Ramp acc state		BIT	16BIT	0	0	1	ER	
-	766	Ramp dec state		BIT	16BIT	0	0	1	ER	
-	934	Ref is 0		BIT	16BIT	0	0	1	ER	
-	936	Ref is 0 delay		BIT	16BIT	0	0	1	ER	
-	944	Speed is 0		BIT	16BIT	0	0	1	ER	
-	946	Speed is 0 delay		BIT	16BIT	0	0	1	ER	
-	956	Speed thr 1 2 mon		BIT	16BIT	0	0	1	ER	
-	966	Set speed		BIT	16BIT	0	0	1	ER	
-	976	Speed thr 3 mon		BIT	16BIT	0	0	1	ER	
-	986	Current thr mon		BIT	16BIT	0	0	1	ER	
-	1030	Local/remote mon		BIT	16BIT	0	0	1	ER	
-	1060	Sequencer status		UINT16	16BIT	0	0	0	ER	
-	1062	Drive OK		BIT	16BIT	0	0	1	ER	
-	1064	Drive ready		BIT	16BIT	0	0	1	ER	
-	1110	Digital input E mon		BIT	16BIT	0	0	1	ER	
-	1210	Digital input 1X mon		BIT	16BIT	0	0	1	ER	
-	1212	Digital input 2X mon		BIT	16BIT	0	0	1	ER	
-	1214	Digital input 3X mon		BIT	16BIT	0	0	1	ER	
-	1216	Digital input 4X mon		BIT	16BIT	0	0	1	ER	
-	1218	Digital input 5X mon		BIT	16BIT	0	0	1	ER	
-	1220	Digital input 6X mon		BIT	16BIT	0	0	1	ER	
-	1222	Digital input 7X mon		BIT	16BIT	0	0	1	ER	
-	1224	Digital input 8X mon		BIT	16BIT	0	0	1	ER	
-	1630	Analog inp1X		BIT	16BIT	0	0	1	ER	
-	1680	Analog inp2X		BIT	16BIT	0	0	1	ER	
-	2388	Torque ref nofilter	perc	FLOAT	16BIT	0.0	0.0	0.0	ER	
-	3180	Brake control mon		BIT	16BIT	0	0	1	ER	
-	3214	Motor overload trip		BIT	16BIT	0	0	1	ER	
-	3262	Bres overload trip		BIT	16BIT	0	0	1	ER	
-	3342	Energysave out run		BIT	16BIT	0	0	1	ER	
-	3374	Vf catch out		INT32	16BIT	0	0	0	ER	
-	3442	Powerloss rampdown		BIT	16BIT	0	0	1	ER	
-	3446	Powerloss nextratio		INT32	32BIT	0	0	0	ER	
-	3448	Powerloss nextactive		BIT	16BIT	0	0	1	ER	
-	3480	Vdc ctrl ramp freeze		BIT	16BIT	0	0	1	ER	
-	4372	DS402 status word		UINT16	16BIT	0	0	65535	ER	
-	4708	Alm dig out mon 1		BIT	16BIT	0	0	1	ER	
-	4710	Alm dig out mon 2		BIT	16BIT	0	0	1	ER	
-	4712	Alm dig out mon 3		BIT	16BIT	0	0	1	ER	
-	4714	Alm dig out mon 4		BIT	16BIT	0	0	1	ER	
-	4770	First alarm		UINT32	16BIT	0	0	0	ERW	
-	4780	Alarm PLC		UINT16		0	0	0	ER	
-	4840	Alarm lo state		UINT32	32BIT	0	0	0	ER	
-	4842	Alarm hi state		UINT32	32BIT	0	0	0	ER	
-	6000	Null		UINT32	32BIT	0	0	0	ER	
-	6002	One		UINT32	32BIT	1	1	1	ER	
-	6004	Speed limit state		BIT	16BIT	0	0	1	ER	
-	6006	Current limit state		BIT	16BIT	0	0	1	ER	

11.3 Selection lists

L_ANOUT

PAR	Description	Menu
6000	Null	0.0 (*)
626	Ramp ref out mon	0.0 (*)
628	Ramp setpoint	1.4
760	Ramp out mon	0.0 (*)
664	Speed setpoint	1.5
260	Motor speed	1.6
262	Motor speed nofilter	0.0 (*)
2150	Encoder 1 speed	17.11
250	Output current	1.1
252	Output voltage	1.2
254	Output frequency	1.3
280	Torque current ref	1.9
282	Magnet current ref	1.10
284	Torque current	1.11
286	Magnet current	1.12
2360	Torque lim Pos Inuse	20.6
2362	Torque lim Neg Inuse	20.7
2386	Torque ref	20.11
2388	Torque ref nofilter	0.0 (*)
270	DC link voltage	1.7
852	Multi ref out mon	7.24
870	Mpot setpoint	8.1
894	Mpot output mon	8.13
920	Jog output mon	9.6
3104	Inertia comp mon	22.1.3
1600	Analog input 1X mon	14.1
1650	Analog input 2X mon	14.16
368	Drive overload accum	1.14
3212	Motor overload accum	1.13
3260	Bres overload accum	1.15
2232	Spd reg P gain Inuse	18.11
2234	Spd reg I gain Inuse	18.12
3446	Powerloss nextratio	0.0 (*)
3340	Energysave out	22.10.6
4024	Fieldbus M->S1 mon	23.3.3
4034	Fieldbus M->S2 mon	23.3.7
4044	Fieldbus M->S3 mon	23.3.11
4054	Fieldbus M->S4 mon	23.3.15
4064	Fieldbus M->S5 mon	23.3.19
4074	Fieldbus M->S6 mon	23.3.23
4084	Fieldbus M->S7 mon	23.3.27
4094	Fieldbus M->S8 mon	23.3.31
4104	Fieldbus M->S9 mon	23.3.35
4114	Fieldbus M->S10 mon	23.3.39
4124	Fieldbus M->S11 mon	23.3.43
4134	Fieldbus M->S12 mon	23.3.47
4144	Fieldbus M->S13 mon	23.3.51
4154	Fieldbus M->S14 mon	23.3.55
4164	Fieldbus M->S15 mon	23.3.59
4174	Fieldbus M->S16 mon	23.3.63
3700	Pad 1	22.7.1
3702	Pad 2	22.7.2
3704	Pad 3	22.7.3
3706	Pad 4	22.7.4
3708	Pad 5	22.7.5
3710	Pad 6	22.7.6
3712	Pad 7	22.7.7
3714	Pad 8	22.7.8
3716	Pad 9	22.7.9
3718	Pad 10	22.7.10
3720	Pad 11	22.7.11
3722	Pad 12	22.7.12
3724	Pad 13	22.7.13
3726	Pad 14	22.7.14
3728	Pad 15	22.7.15
3730	Pad 16	22.7.16
5008	Test gen out	27.1.5

L_CMP

PAR	Description	Menu
XXXX	*(1)*	
626	Ramp ref out mon	0.0 (*)
628	Ramp setpoint	1.4
760	Ramp out mon	0.0 (*)
664	Speed setpoint	1.5
260	Motor speed	1.6
262	Motor speed nofilter	0.0 (*)
2150	Encoder 1 speed	17.11
250	Output current	1.1
252	Output voltage	1.2
254	Output frequency	1.3
280	Torque current ref	1.9
282	Magnet current ref	1.10
284	Torque current	1.11
286	Magnet current	1.12
2386	Torque ref	20.11
2388	Torque ref nofilter	0.0 (*)
270	DC link voltage	1.7
852	Multi ref out mon	7.24
870	Mpot setpoint	8.1
894	Mpot output mon	8.13
920	Jog output mon	9.6
1600	Analog input 1X mon	14.1
1650	Analog input 2X mon	14.16
368	Drive overload accum	1.14
3212	Motor overload accum	1.13
3260	Bres overload accum	1.15
4024	Fieldbus M->S1 mon	23.3.3
4034	Fieldbus M->S2 mon	23.3.7
4044	Fieldbus M->S3 mon	23.3.11
4054	Fieldbus M->S4 mon	23.3.15
4064	Fieldbus M->S5 mon	23.3.19
4074	Fieldbus M->S6 mon	23.3.23
4084	Fieldbus M->S7 mon	23.3.27
4094	Fieldbus M->S8 mon	23.3.31
4104	Fieldbus M->S9 mon	23.3.35
4114	Fieldbus M->S10 mon	23.3.39
4124	Fieldbus M->S11 mon	23.3.43
4134	Fieldbus M->S12 mon	23.3.47
4144	Fieldbus M->S13 mon	23.3.51
4154	Fieldbus M->S14 mon	23.3.55
4164	Fieldbus M->S15 mon	23.3.59
4174	Fieldbus M->S16 mon	23.3.63
3700	Pad 1	22.7.1
3702	Pad 2	22.7.2
3704	Pad 3	22.7.3
3706	Pad 4	22.7.4
3708	Pad 5	22.7.5
3710	Pad 6	22.7.6
3712	Pad 7	22.7.7
3714	Pad 8	22.7.8
3716	Pad 9	22.7.9
3718	Pad 10	22.7.10
3720	Pad 11	22.7.11
3722	Pad 12	22.7.12
3724	Pad 13	22.7.13
3726	Pad 14	22.7.14
3728	Pad 15	22.7.15
3730	Pad 16	22.7.16

(1) the XXXX parameter changes according to the src parameter used:

960	*Set speed ref src*	
(1) = 968	*Dig set speed ref*	*10.11*
3660	*Compare input 1 src*	
(1) = 3650	*Dig compare input 1*	*0.0 (*)*
3662	*Compare input 2 src*	
(1) = 3652	*Dig compare input 2*	*0.0 (*)*

L_DIGSEL1

6000	Null	0.0
6002	One	0.0 (*)
1110	Digital input E mon	0.0 (*)
1210	Digital input 1X mon	0.0 (*)
1212	Digital input 2X mon	0.0 (*)
1214	Digital input 3X mon	0.0 (*)
1216	Digital input 4X mon	0.0 (*)
1218	Digital input 5X mon	0.0 (*)
1220	Digital input 6X mon	0.0 (*)
1222	Digital input 7X mon	0.0 (*)
1224	Digital input 8X mon	0.0 (*)
1062	Drive OK	0.0 (*)
1064	Drive ready	0.0 (*)
934	Ref is 0	0.0 (*)
936	Ref is 0 delay	0.0 (*)
944	Speed is 0	0.0 (*)
946	Speed is 0 delay	0.0 (*)
956	Speed thr 1_2 mon	0.0 (*)
966	Set speed	0.0 (*)
976	Speed thr 3 mon	0.0 (*)
986	Current thr mon	0.0 (*)
1066	Enable state mon	1.16
1068	Start state mon	1.17
1070	FastStop state mon	1.18
1024	Enable cmd mon	11.13
1026	Start cmd mon	11.14
1028	FastStop cmd mon	11.15
4708	Alm dig out mon 1	0.0 (*)
4710	Alm dig out mon 2	0.0 (*)
4712	Alm dig out mon 3	0.0 (*)
4714	Alm dig out mon 4	0.0 (*)
1630	Analog inp1X<thr	0.0 (*)
1680	Analog inp2X<thr	0.0 (*)
362	Drive overload trip	0.0 (*)
3214	Motor overload trip	0.0 (*)
3262	Bres overload trip	0.0 (*)
366	Drive overload 80%	0.0 (*)
1048	FR start mon	11.20
1050	FR reverse mon	11.21
4454	Bit0 decomp mon	23.6.3
4456	Bit1 decomp mon	23.6.4
4458	Bit2 decomp mon	23.6.5
4460	Bit3 decomp mon	23.6.6
4462	Bit4 decomp mon	23.6.7
4464	Bit5 decomp mon	23.6.8
4466	Bit6 decomp mon	23.6.9
4468	Bit7 decomp mon	23.6.10
4470	Bit8 decomp mon	23.6.11
4472	Bit9 decomp mon	23.6.12
4474	Bit10 decomp mon	23.6.13
4476	Bit11 decomp mon	23.6.14
4478	Bit12 decomp mon	23.6.15
4480	Bit13 decomp mon	23.6.16
4482	Bit14 decomp mon	23.6.17
4484	Bit15 decomp mon	23.6.18
3700	Pad 1	22.7.1
3702	Pad 2	22.7.2
3704	Pad 3	22.7.3
3706	Pad 4	22.7.4
3708	Pad 5	22.7.5
3710	Pad 6	22.7.6
3712	Pad 7	22.7.7
3714	Pad 8	22.7.8
3716	Pad 9	22.7.9
3718	Pad 10	22.7.10
3720	Pad 11	22.7.11
3722	Pad 12	22.7.12
3724	Pad 13	22.7.13
3726	Pad 14	22.7.14
3728	Pad 15	22.7.15
3730	Pad 16	22.7.16
6004	Speed limit state	0.0 (*)
6006	Current limit state	0.0 (*)
764	Ramp acc state	0.0 (*)
766	Ramp dec state	0.0 (*)
1030	Local/remote mon	0.0 (*)
4780	Alarm PLC	0.0 (*)
3442	Powerloss rampdown	0.0 (*)
3448	Powerloss nextactive	0.0 (*)
3180	Brake control mon	0.0 (*)

L_DIGSEL2

6000	Null	0.0 (*)
6002	One	0.0 (*)
1110	Digital input E mon	0.0 (*)
1210	Digital input 1X mon	0.0 (*)
1212	Digital input 2X mon	0.0 (*)
1214	Digital input 3X mon	0.0 (*)
1216	Digital input 4X mon	0.0 (*)
1218	Digital input 5X mon	0.0 (*)
1220	Digital input 6X mon	0.0 (*)
1222	Digital input 7X mon	0.0 (*)
1224	Digital input 8X mon	0.0 (*)
4454	Bit0 decomp mon	23.6.3
4456	Bit1 decomp mon	23.6.4
4458	Bit2 decomp mon	23.6.5
4460	Bit3 decomp mon	23.6.6
4462	Bit4 decomp mon	23.6.7

PAR	Description	Menu
4464	Bit5 decomp mon	23.6.8
4466	Bit6 decomp mon	23.6.9
4468	Bit7 decomp mon	23.6.10
4470	Bit8 decomp mon	23.6.11
4472	Bit9 decomp mon	23.6.12
4474	Bit10 decomp mon	23.6.13
4476	Bit11 decomp mon	23.6.14
4478	Bit12 decomp mon	23.6.15
4480	Bit13 decomp mon	23.6.16
4482	Bit14 decomp mon	23.6.17
4484	Bit15 decomp mon	23.6.18
3700	Pad 1	22.7.1
3702	Pad 2	22.7.2
3704	Pad 3	22.7.3
3706	Pad 4	22.7.4
3708	Pad 5	22.7.5
3710	Pad 6	22.7.6
3712	Pad 7	22.7.7
3714	Pad 8	22.7.8
3716	Pad 9	22.7.9
3718	Pad 10	22.7.10
3720	Pad 11	22.7.11
3722	Pad 12	22.7.12
3724	Pad 13	22.7.13
3726	Pad 14	22.7.14
3728	Pad 15	22.7.15
3730	Pad 16	22.7.16
1630	Analog inp1X<thr	0.0 (*)
1680	Analog inp2X<thr	0.0 (*)
1048	FR start mon	11.20
1050	FR reverse mon	11.21
3480	Vdc ctrl ramp freeze	0.0 (*)
3342	Energysave out run	0.0 (*)

L_DIGSEL3

XXXX	*(2)*	
6000	Null	0.0 (*)
6002	One	0.0 (*)
1110	Digital input E mon	0.0 (*)
1210	Digital input 1X mon	0.0 (*)
1212	Digital input 2X mon	0.0 (*)
1214	Digital input 3X mon	0.0 (*)
1216	Digital input 4X mon	0.0 (*)
1218	Digital input 5X mon	0.0 (*)
1220	Digital input 6X mon	0.0 (*)
1222	Digital input 7X mon	0.0 (*)
1224	Digital input 8X mon	0.0 (*)
1062	Drive OK	0.0 (*)
1064	Drive ready	0.0 (*)
934	Ref is 0	0.0 (*)
936	Ref is 0 delay	0.0 (*)
944	Speed is 0	0.0 (*)
946	Speed is 0 delay	0.0 (*)
956	Speed thr 1_2 mon	0.0 (*)
966	Set speed	0.0 (*)
976	Speed thr 3 mon	0.0 (*)
986	Current thr mon	0.0 (*)
1066	Enable state mon	1.16
1068	Start state mon	1.17
1070	FastStop state mon	1.18
1024	Enable cmd mon	11.13
1026	Start cmd mon	11.14
1028	FastStop cmd mon	11.15
4708	Alm dig out mon 1	0.0 (*)
4710	Alm dig out mon 2	0.0 (*)
4712	Alm dig out mon 3	0.0 (*)
4714	Alm dig out mon 4	0.0 (*)
1630	Analog inp1X<thr	0.0 (*)
1680	Analog inp2X<thr	0.0 (*)
362	Drive overload trip	0.0 (*)
3214	Motor overload trip	0.0 (*)
3262	Bres overload trip	0.0 (*)
366	Drive overload 80%	0.0 (*)
1048	FR start mon	11.20
1050	FR reverse mon	11.21
4454	Bit0 decomp mon	23.6.3
4456	Bit1 decomp mon	23.6.4
4458	Bit2 decomp mon	23.6.5
4460	Bit3 decomp mon	23.6.6
4462	Bit4 decomp mon	23.6.7
4464	Bit5 decomp mon	23.6.8
4466	Bit6 decomp mon	23.6.9
4468	Bit7 decomp mon	23.6.10
4470	Bit8 decomp mon	23.6.11
4472	Bit9 decomp mon	23.6.12
4474	Bit10 decomp mon	23.6.13
4476	Bit11 decomp mon	23.6.14
4478	Bit12 decomp mon	23.6.15
4480	Bit13 decomp mon	23.6.16
4482	Bit14 decomp mon	23.6.17
4484	Bit15 decomp mon	23.6.18
3700	Pad 1	22.7.1
3702	Pad 2	22.7.2
3704	Pad 3	22.7.3
3706	Pad 4	22.7.4
3708	Pad 5	22.7.5
3710	Pad 6	22.7.6
3712	Pad 7	22.7.7
3714	Pad 8	22.7.8
3716	Pad 9	22.7.9
3718	Pad 10	22.7.10
3720	Pad 11	22.7.11
3722	Pad 12	22.7.12
3724	Pad 13	22.7.13
3726	Pad 14	22.7.14
3728	Pad 15	22.7.15
3730	Pad 16	22.7.16
6004	Speed limit state	0.0 (*)
6006	Current limit state	0.0 (*)
764	Ramp acc state	0.0 (*)
766	Ramp dec state	0.0 (*)
4780	Alarm PLC	0.0 (*)

(2) the XXXX parameter changes according to the src parameter used:

1014 Local/remote src
(2) = Dig local/remote 11.7

L_FBS2M

XXXX	*(3)*	
6000	Null	0.0 (*)
6002	One	0.0 (*)
626	Ramp ref out mon	0.0 (*)
628	Ramp setpoint	1.4
760	Ramp out mon	0.0 (*)
664	Speed setpoint	1.5
260	Motor speed	1.6
262	Motor speed nofilter	0.0 (*)
2150	Encoder 1 speed	17.11
250	Output current	1.1
252	Output voltage	1.2
254	Output frequency	1.3
280	Torque current ref	1.9
282	Magnet current ref	1.10
284	Torque current	1.11
286	Magnet current	1.12
2360	Torque lim Pos Inuse	20.6
2362	Torque lim Neg Inuse	20.7
2386	Torque ref	20.11
2388	Torque ref nofilter	0.0 (*)
270	DC link voltage	1.7
2162	Encoder 1 position	17.12
2154	E1 Virtual position	27.3.2
2156	E1 Revolutions	27.3.3
852	Multi ref out mon	7.24
870	Mpot setpoint	8.1
894	Mpot output mon	8.13
920	Jog output mon	9.6
3104	Inertia comp mon	22.1.3
1600	Analog input 1X mon	14.1
1650	Analog input 2X mon	14.16
368	Drive overload accum	1.14
3212	Motor overload accum	1.13
3260	Bres overload accum	1.15
272	Heatsink temperature	1.8
1060	Sequencer status	0.0 (*)
4432	Word comp mon	23.5.17
3446	Powerloss nextratio	0.0 (*)
4372	DS402 status word	0.0 (*)
4024	Fieldbus M->S1 mon	23.3.3
4034	Fieldbus M->S2 mon	23.3.7
4044	Fieldbus M->S3 mon	23.3.11
4054	Fieldbus M->S4 mon	23.3.15
4064	Fieldbus M->S5 mon	23.3.19
4074	Fieldbus M->S6 mon	23.3.23
4084	Fieldbus M->S7 mon	23.3.27
4094	Fieldbus M->S8 mon	23.3.31
4104	Fieldbus M->S9 mon	23.3.35
4114	Fieldbus M->S10 mon	23.3.39
4124	Fieldbus M->S11 mon	23.3.43
4134	Fieldbus M->S12 mon	23.3.47
4144	Fieldbus M->S13 mon	23.3.51
4154	Fieldbus M->S14 mon	23.3.55
4164	Fieldbus M->S15 mon	23.3.59
4174	Fieldbus M->S16 mon	23.3.63
3700	Pad 1	22.7.1
3702	Pad 2	22.7.2
3704	Pad 3	22.7.3
3706	Pad 4	22.7.4
3708	Pad 5	22.7.5
3710	Pad 6	22.7.6
3712	Pad 7	22.7.7
3714	Pad 8	22.7.8
3716	Pad 9	22.7.9
3718	Pad 10	22.7.10
3720	Pad 11	22.7.11
3722	Pad 12	22.7.12
3724	Pad 13	22.7.13
3726	Pad 14	22.7.14
3728	Pad 15	22.7.15
3730	Pad 16	22.7.16
4770	First alarm	0.0 (*)
4840	Alarm lo state	0.0 (*)
4842	Alarm hi state	0.0 (*)
1200	Digital input X mon	1.19
5008	Test gen out	27.1.5

(3) the XXXX parameter changes according to the src parameter used:

4340 DS402 cw src
(3) = 4024 Fieldbus M->S1 mon 23.3.3

L_LIM

6000	Null	0.0 (*)
2380	Dig torque ref 1	20.8
1600	Analog input 1X mon	14.1
1650	Analog input 2X mon	14.16
4024	Fieldbus M->S1 mon	23.3.3
4034	Fieldbus M->S2 mon	23.3.7
4044	Fieldbus M->S3 mon	23.3.11
4054	Fieldbus M->S4 mon	23.3.15
4064	Fieldbus M->S5 mon	23.3.19
4074	Fieldbus M->S6 mon	23.3.23
4084	Fieldbus M->S7 mon	23.3.27
4094	Fieldbus M->S8 mon	23.3.31
4104	Fieldbus M->S9 mon	23.3.35
4114	Fieldbus M->S10 mon	23.3.39
4124	Fieldbus M->S11 mon	23.3.43
4134	Fieldbus M->S12 mon	23.3.47
4144	Fieldbus M->S13 mon	23.3.51
4154	Fieldbus M->S14 mon	23.3.55
4164	Fieldbus M->S15 mon	23.3.59
4174	Fieldbus M->S16 mon	23.3.63
3700	Pad 1	22.7.1
3702	Pad 2	22.7.2
3704	Pad 3	22.7.3
3706	Pad 4	22.7.4
3708	Pad 5	22.7.5
3710	Pad 6	22.7.6
3712	Pad 7	22.7.7
3714	Pad 8	22.7.8
3716	Pad 9	22.7.9
3718	Pad 10	22.7.10
3720	Pad 11	22.7.11
3722	Pad 12	22.7.12
3724	Pad 13	22.7.13
3726	Pad 14	22.7.14
3728	Pad 15	22.7.15
3730	Pad 16	22.7.16
5008	Test gen out	27.1.5

L_MLTREF

XXXX	*(4)*	
852	Multi ref out mon	7.24
894	Mpot output mon	8.13
2150	Encoder 1 speed	17.11

PAR	Description	Menu
1600	Analog input 1X mon	14.1
1650	Analog input 2X mon	14.16
4024	Fieldbus M->S1 mon	23.3.3
4034	Fieldbus M->S2 mon	23.3.7
4044	Fieldbus M->S3 mon	23.3.11
4054	Fieldbus M->S4 mon	23.3.15
4064	Fieldbus M->S5 mon	23.3.19
4074	Fieldbus M->S6 mon	23.3.23
4084	Fieldbus M->S7 mon	23.3.27
4094	Fieldbus M->S8 mon	23.3.31
4104	Fieldbus M->S9 mon	23.3.35
4114	Fieldbus M->S10 mon	23.3.39
4124	Fieldbus M->S11 mon	23.3.43
4134	Fieldbus M->S12 mon	23.3.47
4144	Fieldbus M->S13 mon	23.3.51
4154	Fieldbus M->S14 mon	23.3.55
4164	Fieldbus M->S15 mon	23.3.59
4174	Fieldbus M->S16 mon	23.3.63
3700	Pad 1	22.7.1
3702	Pad 2	22.7.2
3704	Pad 3	22.7.3
3706	Pad 4	22.7.4
3708	Pad 5	22.7.5
3710	Pad 6	22.7.6
3712	Pad 7	22.7.7
3714	Pad 8	22.7.8
3716	Pad 9	22.7.9
3718	Pad 10	22.7.10
3720	Pad 11	22.7.11
3722	Pad 12	22.7.12
3724	Pad 13	22.7.13
3726	Pad 14	22.7.14
3728	Pad 15	22.7.15
3730	Pad 16	22.7.16
5008	Test gen out	27.1.5

(4) the XXXX parameter changes according to the src parameter used:

610	*Ramp ref 1 src*	
(4) = 600	*Dig ramp ref 1*	*5.1*
612	*Ramp ref 2 src*	
(4) = 602	*Dig ramp ref 2*	*5.2*
614	*Ramp ref 3 src*	
(4) = 604	*Dig ramp ref 3*	*5.3*
650	*Speed ref 1 src*	
(4) = 640	*Dig speed ref 1*	*5.15*
652	*Speed ref 2 src*	
(4) = 642	*Dig speed ref 2*	*5.16*
832	*Multi ref 0 src*	
(4) = 800	*Multi reference 0*	*7.1*
834	*Multi ref 1 src*	
(4) = 802	*Multi reference 1*	7.2

L_REF

XXXX	*(5)*	
3104	Inertia comp mon	22.1.3
3374	Vf catch out	0.0 (*)
1600	Analog input 1X mon	14.1
1650	Analog input 2X mon	14.16
4024	Fieldbus M->S1 mon	23.3.3
4034	Fieldbus M->S2 mon	23.3.7
4044	Fieldbus M->S3 mon	23.3.11
4054	Fieldbus M->S4 mon	23.3.15
4064	Fieldbus M->S5 mon	23.3.19
4074	Fieldbus M->S6 mon	23.3.23
4084	Fieldbus M->S7 mon	23.3.27
4094	Fieldbus M->S8 mon	23.3.31
4104	Fieldbus M->S9 mon	23.3.35
4114	Fieldbus M->S10 mon	23.3.39
4124	Fieldbus M->S11 mon	23.3.43
4134	Fieldbus M->S12 mon	23.3.47
4144	Fieldbus M->S13 mon	23.3.51
4154	Fieldbus M->S14 mon	23.3.55
4164	Fieldbus M->S15 mon	23.3.59
4174	Fieldbus M->S16 mon	23.3.63
3700	Pad 1	22.7.1
3702	Pad 2	22.7.2
3704	Pad 3	22.7.3
3706	Pad 4	22.7.4
3708	Pad 5	22.7.5
3710	Pad 6	22.7.6
3712	Pad 7	22.7.7
3714	Pad 8	22.7.8
3716	Pad 9	22.7.9
3718	Pad 10	22.7.10
3720	Pad 11	22.7.11
3722	Pad 12	22.7.12
3724	Pad 13	22.7.13
3726	Pad 14	22.7.14
3728	Pad 15	22.7.15
3730	Pad 16	22.7.16
6000	Null	0.0 (*)
5008	Test gen out	27.1.5

(5) the XXXX parameter changes according to the src parameter used:

2382	*Torque ref 1 src*	
(5) = 2380	*Dig torque ref 1*	*20.8*
2492	*Vf scale src*	
(5) = 2490	*Dig Vf scale*	*21.22*
3002	*Speed ratio src*	
(5) = 3000	*Dig speed ratio*	*0.0 (*)*

L_WDECOMP

XXXX	*(6)*	
6000	Null	0.0 (*)
6002	One	0.0 (*)
4432	Word comp mon	23.5.17
4024	Fieldbus M->S1 mon	23.3.3
4034	Fieldbus M->S2 mon	23.3.7
4044	Fieldbus M->S3 mon	23.3.11
4054	Fieldbus M->S4 mon	23.3.15
4064	Fieldbus M->S5 mon	23.3.19
4074	Fieldbus M->S6 mon	23.3.23
4084	Fieldbus M->S7 mon	23.3.27
4094	Fieldbus M->S8 mon	23.3.31
4104	Fieldbus M->S9 mon	23.3.35
4114	Fieldbus M->S10 mon	23.3.39
4124	Fieldbus M->S11 mon	23.3.43
4134	Fieldbus M->S12 mon	23.3.47
4144	Fieldbus M->S13 mon	23.3.51
4154	Fieldbus M->S14 mon	23.3.55
4164	Fieldbus M->S15 mon	23.3.59
4174	Fieldbus M->S16 mon	23.3.63
3700	Pad 1	22.7.1
3702	Pad 2	22.7.2
3704	Pad 3	22.7.3
3706	Pad 4	22.7.4
3708	Pad 5	22.7.5
3710	Pad 6	22.7.6
3712	Pad 7	22.7.7
3714	Pad 8	22.7.8
3716	Pad 9	22.7.9
3718	Pad 10	22.7.10
3720	Pad 11	22.7.11
3722	Pad 12	22.7.12
3724	Pad 13	22.7.13
3726	Pad 14	22.7.14
3728	Pad 15	22.7.15
3730	Pad 16	22.7.16

(6) the XXXX parameter changes according to the src parameter used:

4452	*Word decomp src*	
(6) = 4450	*Dig word decomp*	*23.6.1*

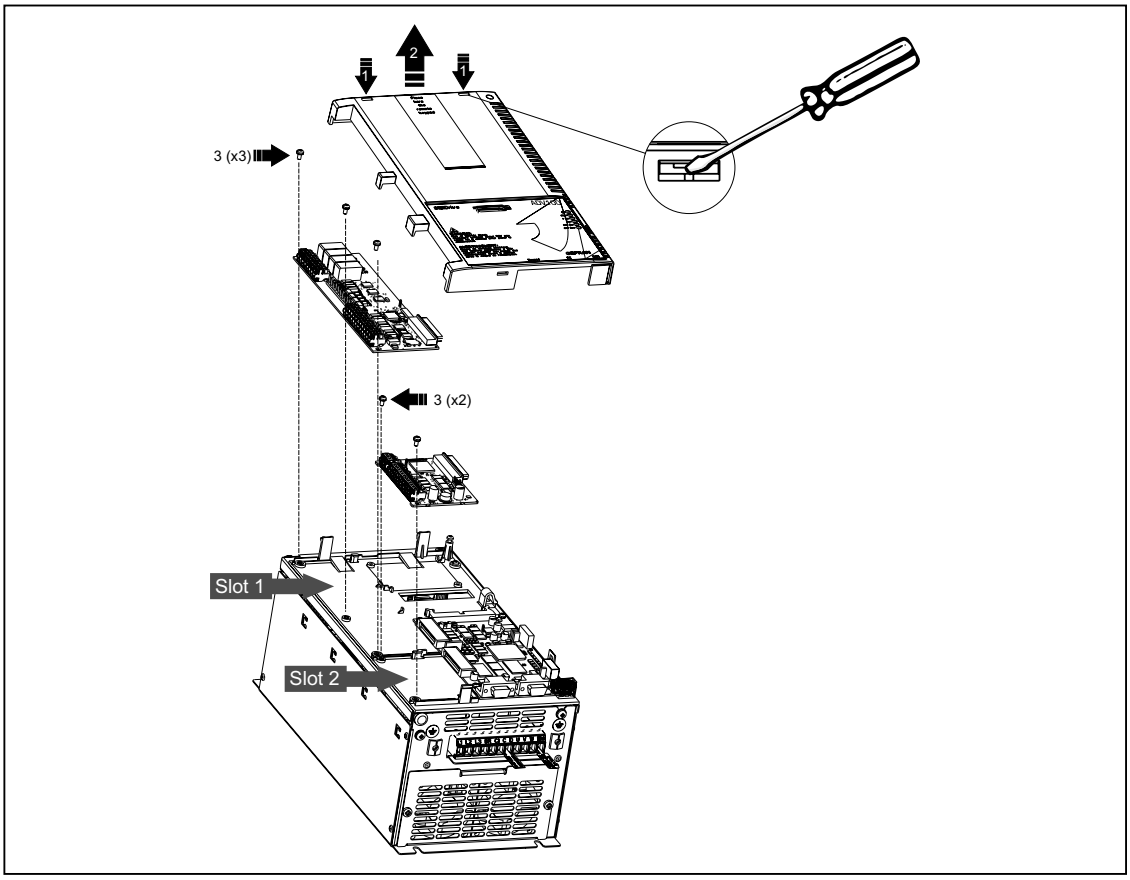
PAR	Description	Menu

A.1 - ADV100 Basic Configuration

ADV100 is coded as the BASIC version (see chepter 2.3 Standard configurations) and does not implement any I/O or encoder expansion cards.
The user may integrate any of the available options, to meet specific system requirements. These integrations can be performed quickly and simply, by inserting the cards in the relative connectors on the regulation card (provided as standard with the drive and not interchangeable).

A.1.1 - Inserting expansion cards

- **Slot 1:** dedicated to I/O cards (EXP-IO-...-ADL)
- **Slot 2:** dedicated to encoder expansion cards (EXP-DE-...-ADL)

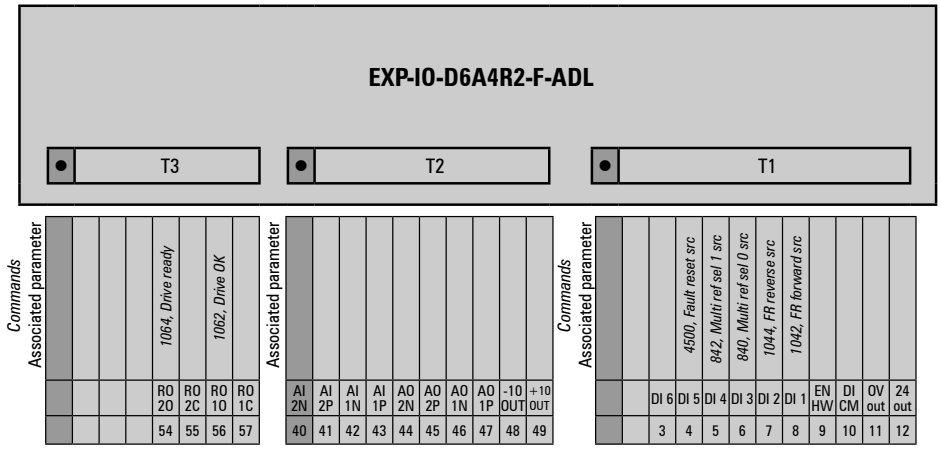


1. Remove the top cover: insert a screwdriver into the holes at the top of the plastic card cover and push gently
2. Raise the cover as shown in the figure.
3. *To replace an expansion card, loosen the screws (A) and remove the card to be replaced.*
4. Insert the new card in the dedicated slot and tighten the screws (A) supplied with the card in the seats (C).

A.2 - I/O Cards

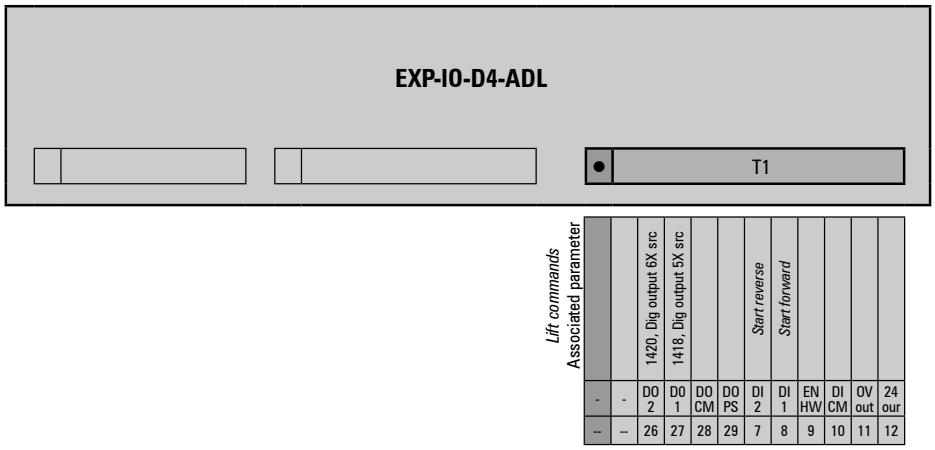
- **EXP-IO-D6A4R2-F-ADL (standard)**

1 enable input (Enable) + 6 digital inputs (DI) + 2 analog inputs (AI) + 2 analog outputs (AO) + 2 relay outputs (RO).
The terminals of this card are not extractable.



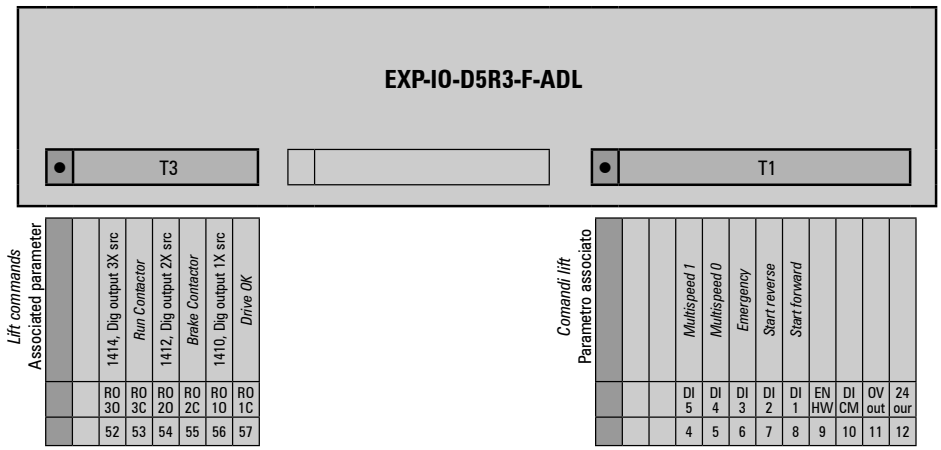
- **EXP-IO-D4-ADL (optional)**

1 enable input (Enable) + 2 digital inputs (DI) + 2 digital outputs (DO)



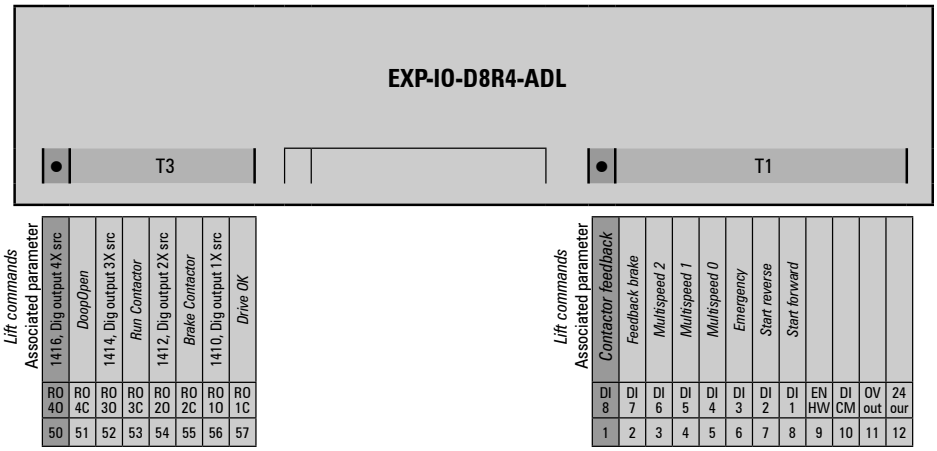
- **EXP-IO-D5R3-F-ADL (optional)**

1 enable input (Enable) + 5 digital inputs (DI) + 3 relay outputs (RO).
The terminals of this card are not extractable.



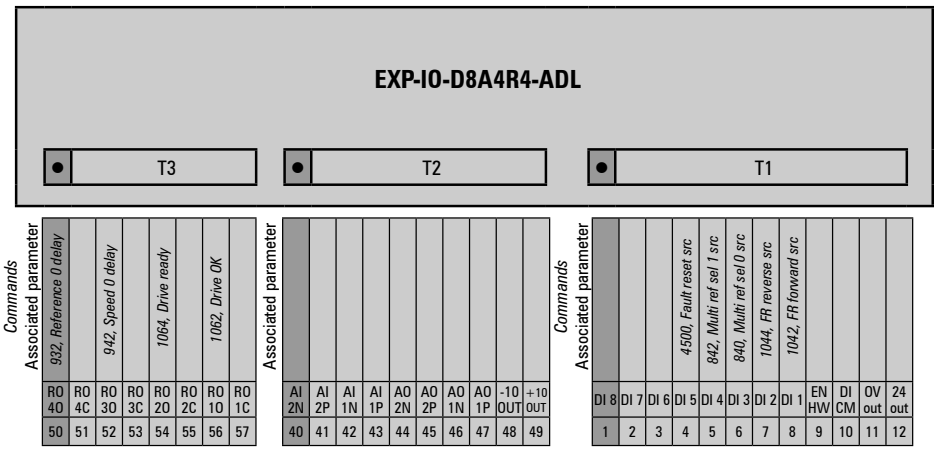
- **EXP-IO-D8R4-ADL (optional)**

1 enable input (Enable) + 8 digital inputs (DI) + 4 relay outputs (RO)



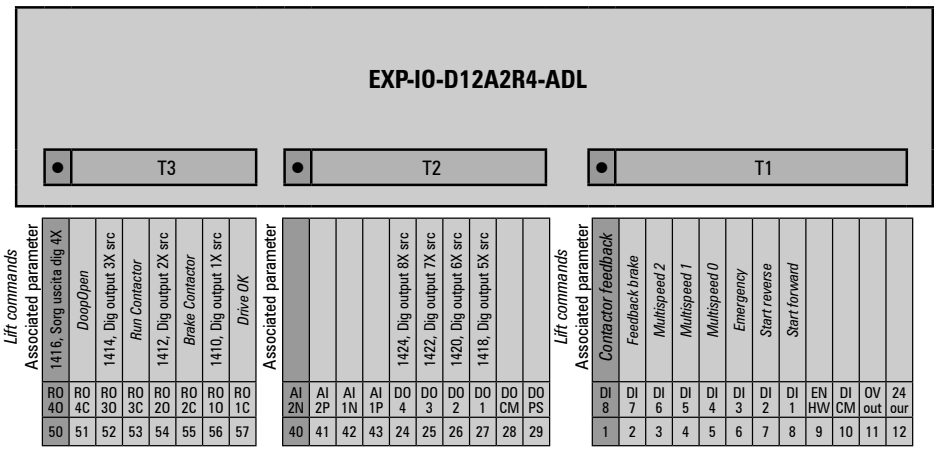
- **EXP-IO-D8A4R4-ADL (optional)**

1 enable input (Enable) + 8 digital inputs (DI) + 2 analog inputs (AI) + 2 analog outputs (AO) + 4 relay outputs (RO)



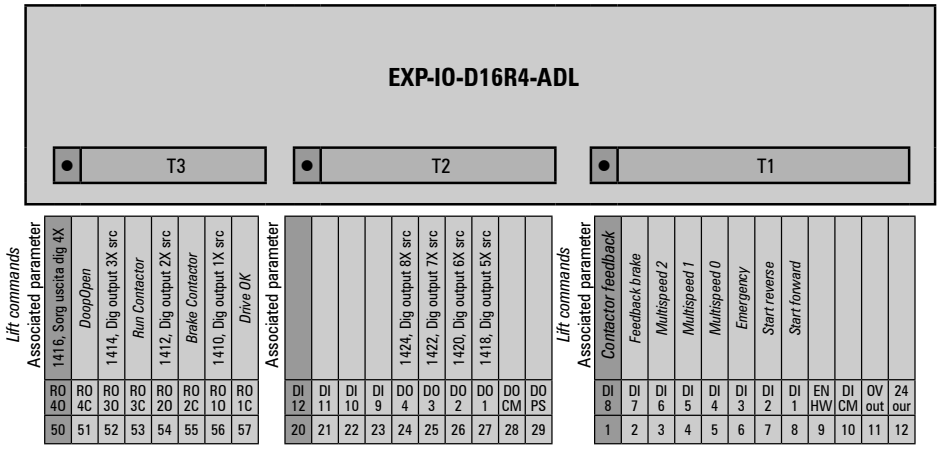
- **EXP-IO-D12A2R4-ADL (optional)**

1 enable input (Enable) + 8 digital inputs (DI) + 4 digital outputs (DO) + 2 analog inputs (AI) + 4 relay outputs (RO)



- **EXP-IO-D16R4-ADL (optional)**

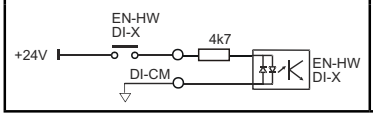
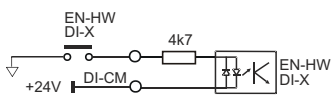
1 enable input (Enable) + 12 digital inputs (DI) + 4 digital outputs (DO) + 4 relay outputs (RO)



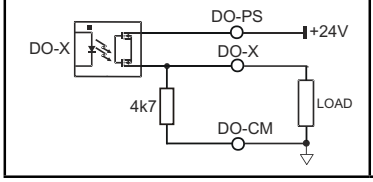
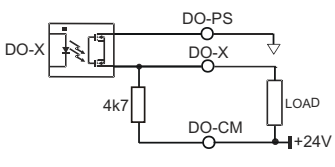
A.2.1 Input/Output features

24V DC power supply	
Tolerance	± 10%
Maximum current	150 mA
Isolation	1 KV

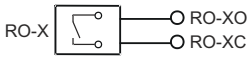
- **Digital inputs (DI) and enable hardware inputs (EN-HW)**

Description	Features
Type	24 V PNP / NPN
Operating voltage	0 V to + 24 V (+ 30 V max)
Load	5 mA @ +24 V - R_L = 4.7 kΩ
Thresholds	V_{IC} < 5 V – V_{IH} > 15 V
Isolation	Yes – Functional (> 1 kV)
PNP 	NPN 

- **Digital outputs (DO)**

Description	Features
Type	24V PNP / NPN
Operating voltage	0V to + 24V (+ 30V max)
Load	20mA @ +24V - R_L = 1,2 kΩ (40mA max)
Thresholds	V_{OL} < 1V – V_{OH} > V_{ALI}-1
Isolation	Si – Funzionale (> 1 kV)
PNP 	NPN 

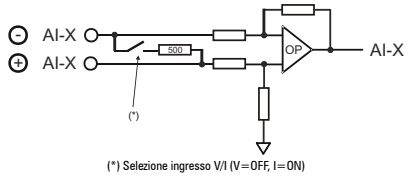
- **Relay outputs (RO)**

Description	Features
Type	NO Relay (single contact)
Operating voltage	250 VAC / - 30 VDC / 2 A
Load	50 mA @ +10 V
Isolation	Yes – 4 kV
	

- **Analog inputs (AI)**

Description	Features
Type	Voltage differential
Input voltage	± 10 V (± 12.5 V full scale)
Input R	10 kΩ
Resolution	12 Bits (11 + sign)
Precision	1% of full scale
Isolation	NO
Description	**Features**
Type	Current differential (AI2 only)
Input current	0 (4) mA to 20 mA
Input R	500 Ω
Resolution	12 Bits (11 + sign)
Precision	1% of full scale

Isolation	NO

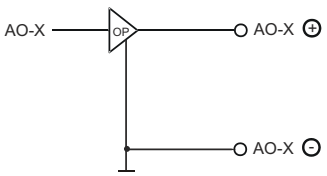


(*) Selezione ingresso V/I (V=OFF, I=ON)

- **Analog outputs (AO)**

Description	Features
Type	Single-ended in voltage
Input voltage	± 10 V (± 12.5 V full scale)
Load	5 mA @ ± 10 V - R_L = 2.2 kΩ
Resolution	12 Bits (11 + sign)
Precision	2% of full scale
Isolation	NO

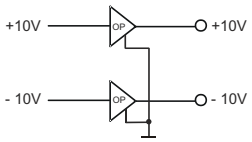
OUTPUT #1



(*) Selezione uscita V/I (solo per uscita 2, V=1-2, I=1-3)

- **Analog reference outputs (±10)**

Description	Features
Type	Single-ended in voltage
Operating voltage	± 10 V
Load	5 mA @ ± 10 V - R_L = 5 kΩ (max 10 mA)
Precision	1% of full scale
Isolation	NO
Short-circuit protection	YES



A.3 Encoders and encoder expansion cards

A.3.1 Encoders

Encoders provide motor speed and position feedback

The regulation algorithms in the ADV100 drive are capable of controlling asynchronous motors, it may or may not use the speed measurement obtained from the encoder reading. The regulation algorithm needs an encoder that also allows the absolute motor position to be verified.

Encoders must be fitted to the motor shaft using anti-backlash couplings.
For electrical connections always use good quality cables with shielded twisted pairs, according to the procedures and specifications described in the following paragraphs.

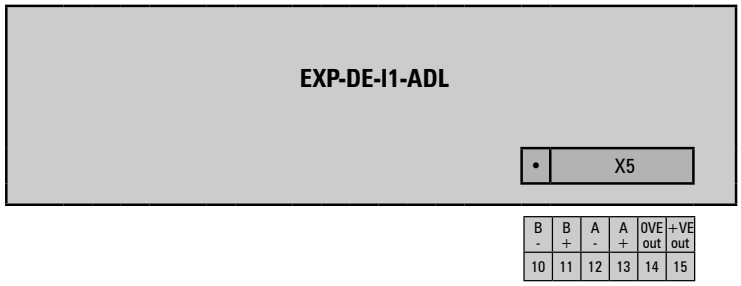
The configuration parameters for each encoder can be found in the ENCODER CONFIG.
In the event of an encoder malfunction the drive generates the **Speed fbk back loss** alarm and the cause of the malfunction is shown in parameter 2172 **SpdFbkLoss code**.
If the encoder is not used by the regulation algorithm the drive still manages the encoder position reading but does not generate an alarm in case of malfunctioning.

A.3.2 Encoder cards

Note ! The encoder power supply must be adequate considering the cable length and the absorption rates as shown in table (1) at the end of this chapter.

EXP-DE-I1-ADL (Standard)

Digital Incremental Encoder. This is the default card supplied with drives ADV120-...- to control asynchronous motors in field-oriented flux vector mode (FOC).

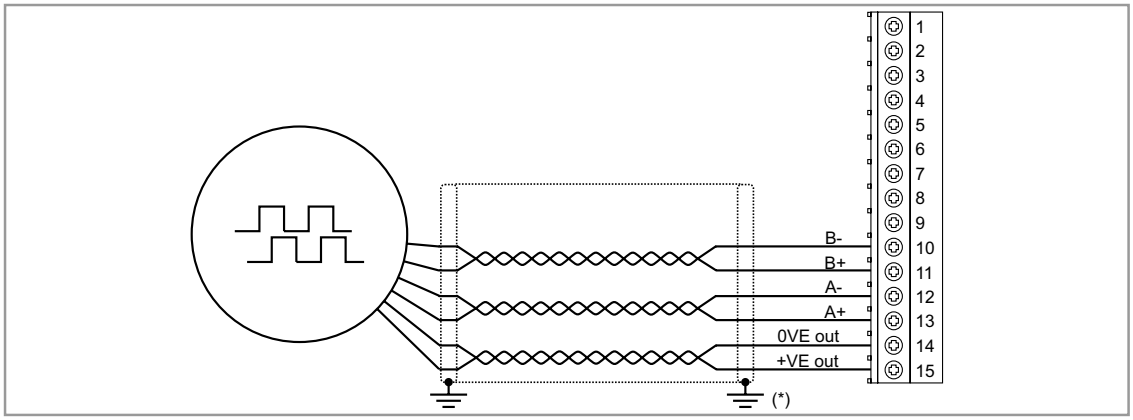


B -	B +	A -	A +	0VE out	+VE out
10	11	12	13	14	15

(TTL Line-driver)

Channels	A+ A-, B+ B-, differential line drivers, optoisolated. Management of loss of encoder signals
Max frequency	200 kHz (check the number of encoder impulses according to the maximum speed)
Number of impulses	min 128, max 16384 (default 1024)
Electrical interface	TTL (ref. GND) Ulow ≤ 0.5 V Uhigh ≥ 2.5 V
Load capacity	10 mA @ 5.5 V (Zin 365Ω)
Power supply	min +5.2 V, max +6.0 V (default + 5.2 V) – Imax 150 mA. Programmable internal power supply (1)
Cable length	max 50m

INCREMENTAL DIGITAL ENCODER (DE) PUSH-PULL/LINE DRIVER

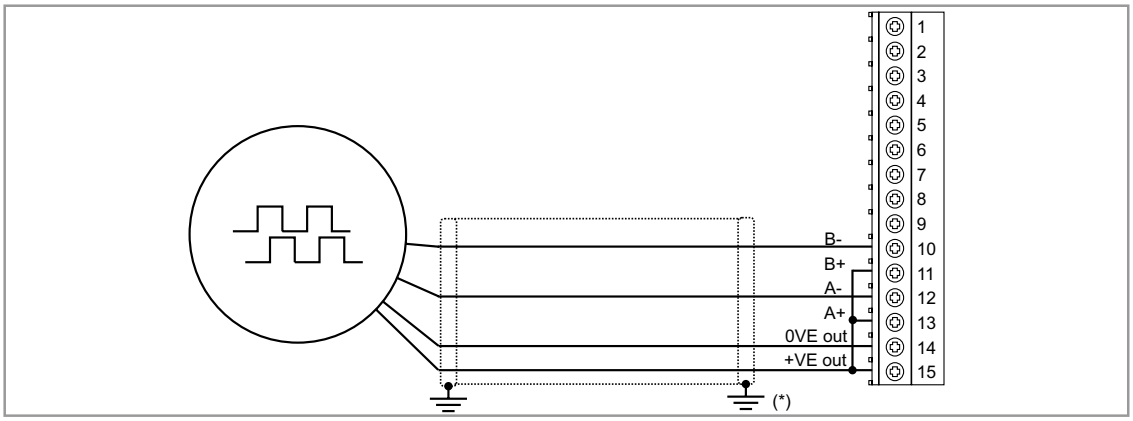


(*) Connection of shielding, see figure 7.2.4

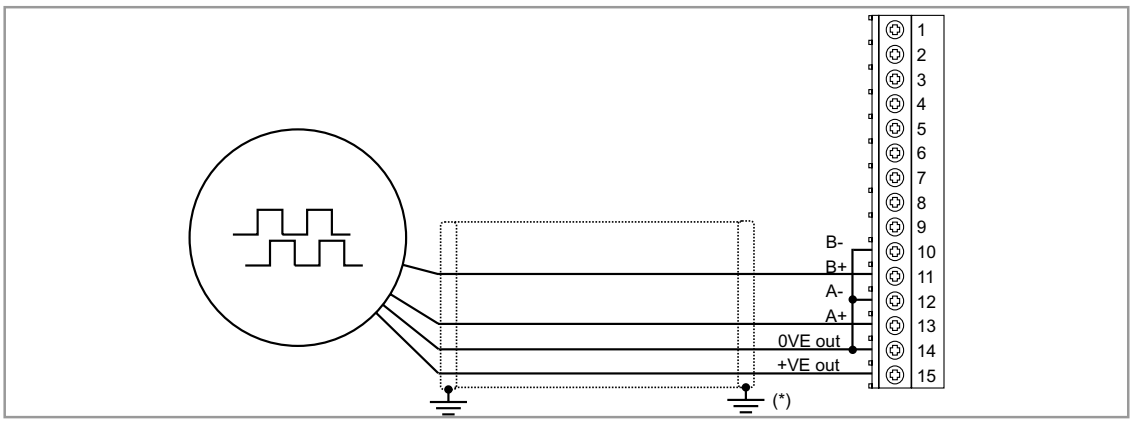
(TTL/HTL push-pull)

Channels	A/B, complementary push-pull, optoisolated. Loss of encoder cannot be managed with single-ended versions. In this case disable the **Speed Fbk Loss**.
Max frequency	100 kHz (check the number of encoder impulses according to the maximum speed)
Number of impulses	min 128, max 16384 (default 1024)
Electrical interface	HTL Ulow ≤ 3.0 V Uhigh ≥ Venc - 3.0 V
Load capacity	7 mA @ 22.0 V (Zin 2635Ω)
Power supply	min +6.0 V, max +20.0 V (default + 6.0 V) – Imax 150 mA. Programmable internal power supply (1)
Cable length	max 50m

INCREMENTAL DIGITAL ENCODER (DE) SINGLE ENDED NPN O.C.



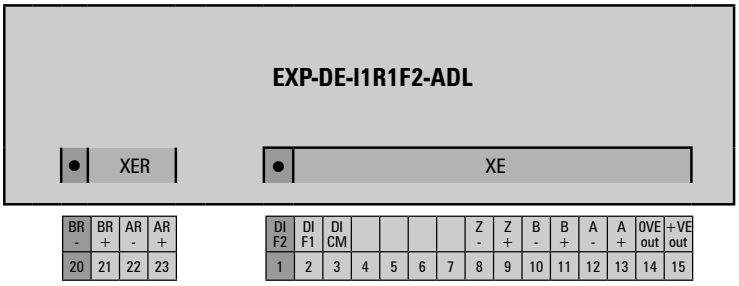
INCREMENTAL DIGITAL ENCODER (DE) SINGLE ENDED PNP O.C.



(*) Connection of shielding, see figure 7.2.4

EXP-DE-I1R1F2-ADL

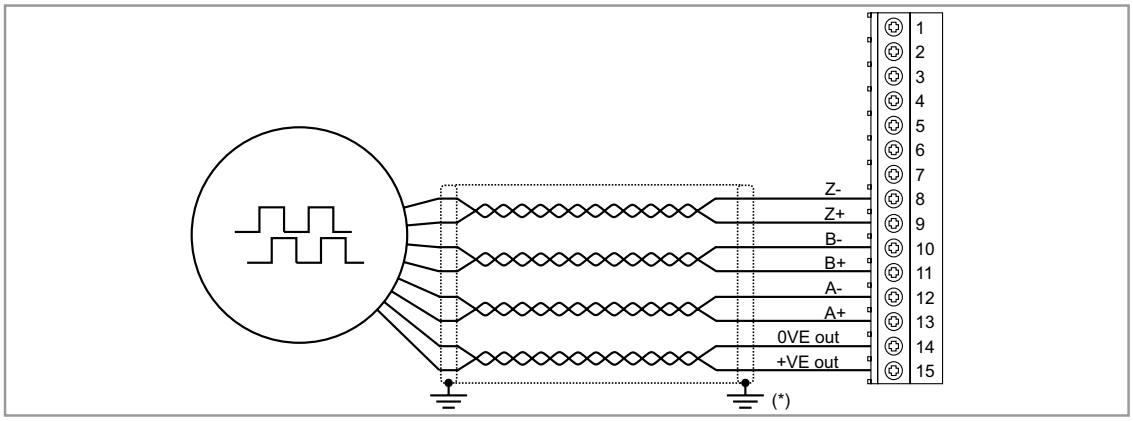
Digital Incremental Encoder, to control asynchronous motors in field-oriented flux vector mode (FOC).



(TTL Line-driver)

Channels	A+ A-, B+ B-, Z+ Z-, differential line drivers, optoisolated. Management of loss of encoder signals
Max frequency	200 kHz (check the number of encoder impulses according to the maximum speed)
Number of impulses	min 128, max 16384 (default 1024)
Electrical interface	TTL (ref. GND) Ulow ≤ 0.5 V Uhigh ≥ 2.5 V
Load capacity	10 mA @ 5.5 V (Zin 365Ω)
Programmable internal power supply	min +5.2 V, max +6.0 V (default + 5.2 V) – Imax 150 mA. See table (1)
Cable length	max 50m

INCREMENTAL DIGITAL ENCODER (DE) PUSH-PULL/LINE DRIVER



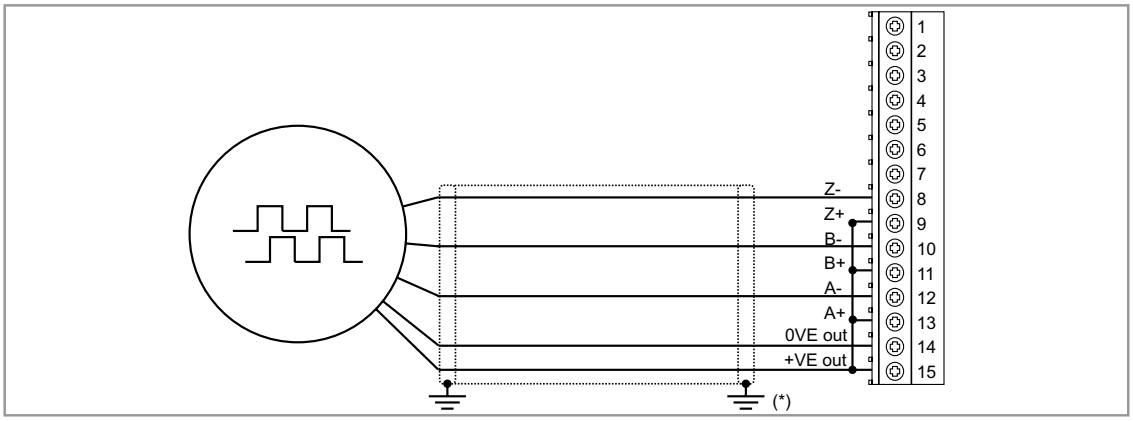
(*) Connection of shielding, see figure 7.2.4

(TTL/HTL push-pull)

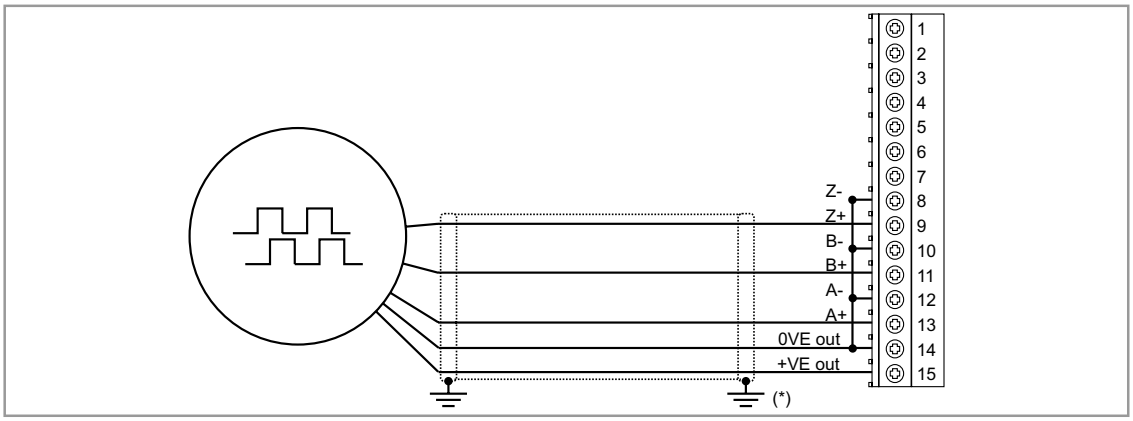
Channels	A/B/Z, complementary push-pull, optoisolated. Loss of encoder cannot be managed with single-ended versions. In this case disable the **Speed Fbk Loss**.
Max frequency	100 kHz (check the number of encoder impulses according to the maximum speed)
Number of impulses	min 128, max 16384 (default 1024)
Electrical interface	HTL Ulow ≤ 3.0 V Uhigh ≥ Venc - 3.0 V
Load capacity	7 mA @ 20.0 V (Zin 2635Ω)
V max Digital Inputsi (*)	HTL = 27V max. TTL = 7V max
Programmable internal power supply	min +6.0 V, max +20.0 V (default + 6.0 V) – Imax 150 mA. See table(1)
Cable length	max 50m

(*) with external supply.

INCREMENTAL DIGITAL ENCODER (DE) SINGLE ENDED NPN O.C.



INCREMENTAL DIGITAL ENCODER (DE) SINGLE ENDED PNP O.C.



(*) Connection of shielding, see figure 7.2.4

Internal power supply

(1) The internal power supply of the encoder can be selected from the keypad (ENCODER CONFIG menu, parameter **Encoder supply** (PAR 2102) to balance the loss of voltage due to the length of the encoder cable and load current, minimum step 0.1 V

Encoder option type	Def	Min	Max
Enc 1	5,2 V	5,2 V	20,0 V

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