Modular Servodrive
System

SIEIDrive

AXV300

.... Installation and user manual

GEFRAN

Information about this manual

This manual contains detailed information on mechanical installation, electrical connections, fast commissioning, functions and a description of parameters.

The CD supplied with the drive contains all the manuals in electronic file format.

Software version

This manual applies to the hardware and software configurations of the following modules:

AXV300 CU

Hw: 1.0

Fw: tricore ver 0.0.0.16

AXV300

Hw: 0.9

Fw: ver 0.17

AXV300 SR

Hw: 0.X

Fw: ver 0.XX

AXV300 AFE-SR

Hw: 0.X

Fw: ver 0.XX

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 data plate of the **AXV300** and **AXV300 SM** modules or can be checked with the parameters:

- **AXV FW ver** (PAR 6) and **AXV FW rel** (PAR 7), MONITOR/VERSION menu (**AXV300 CU** modules)
- **DRV 0 FW ver** (PAR 1001) ... **DRV 7 FW ver** (PAR 8001) DRIVE 0....7 menu (**AXV300** axis modules)

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. Symbols used in the manual

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

Indicates 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.

Important

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.

1.2. 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.

1.3. 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.

Warning

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.

Les drives occasionnent des mouvements mécaniques. L'utilisateur est tenu de s'assurer que de tels mouvements mécaniques ne débouchent pas sur des conditions d'insécurité. Les butées de sécurité et les seuils d'exploitation prévus par le fabricant ne doivent être ni contournés ni modifiés.

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 supplyis switched on. Minimum time to wait before working on the terminals or inside the device is listed in section "4.6. Capacitor discharge time" on page 37.

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. Capacitor discharge time" on page 37.

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.

2 - General Description and Applicable Standards

2.1. General Description

The **AXV300** is a multi-drive rack system for controlling up to 8 axes, engineered to optimise costs, overall dimensions and performance.

The **AXV300** system consists of a supply module that generates the DC-link voltage to which one or more centrally-controlled **AXV300-xxxx** axis modules are connected, coordinated by an **AXV300 CU** control module that manages the axes via a high-speed optical fibre link.

The system comprises a series of modules in a range of sizes/power ratings that can be combined to create tailored solutions for specific multi-axis applications.

The rack-mountable mechanical components, electrical connections and the power section are all designed to create a system that is expandable in a single direction according to the axes and power ratings involved.

Combined with the mechanical and electrical components, the software system allows applications written in IEC61131 standard languages to be developed and tested according to machine specifications/functions.

The supply module may be of the conventional (**AXV300 SM**) or regenerative (**AXV300 AFE-SR + AXV300 SR**) type.

2.2. Identification of components

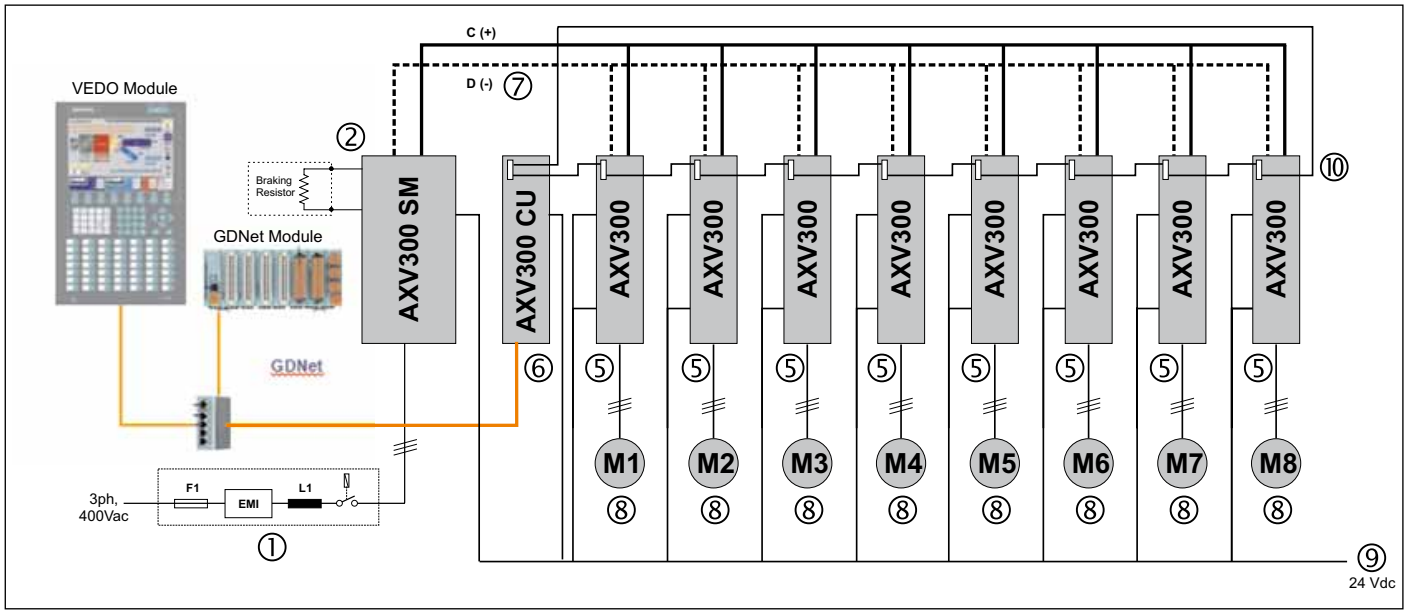


Figure 1: Key AXV300 system components

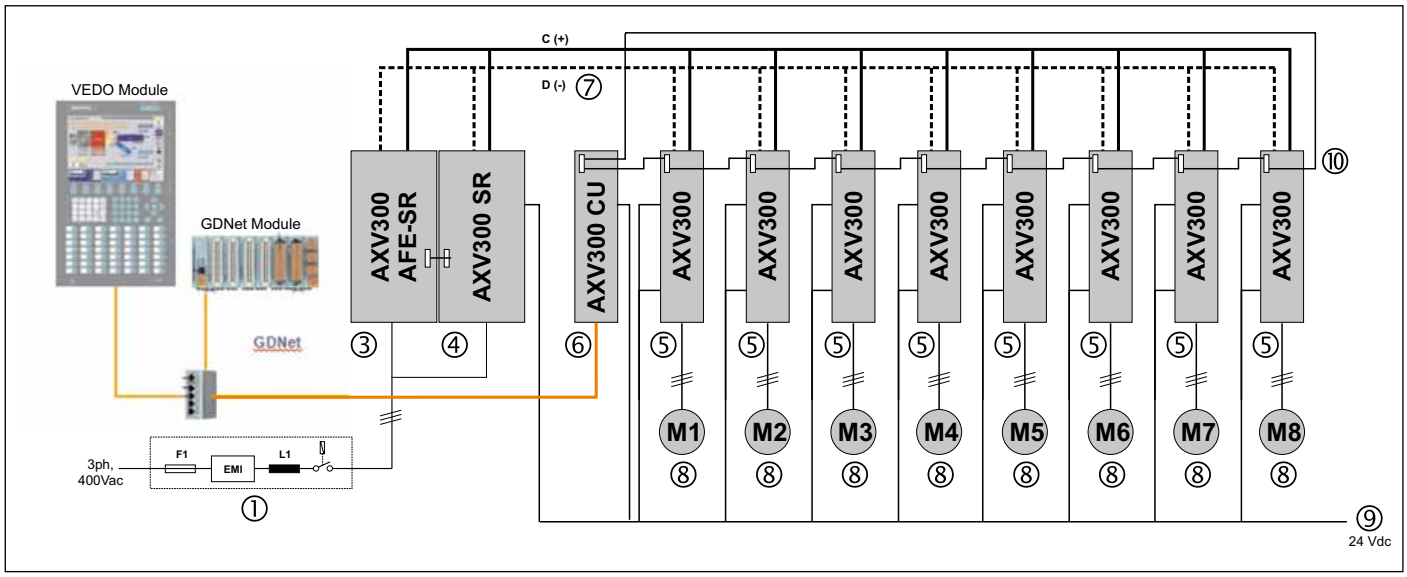


Figure 2: Key AXV300 regenerative system components

The **AXV300** system comprises the following components:

① **Power input section.** AC input voltage, EMI mains filter (optional), AC choke (optional), Mains fuses (optional), Power contactor controlled on supply module input (optional). See chapter **"13 - External components" on page 133**.

② **Supply module (AXV300 SM).** This generates the high DC voltage (VDC-link) for the **axis modules**. The size depends on the power requirements of the overall system. The module also includes the braking unit (BU) connected to the external braking resistor (BR);

③ **AFE regenerative control module (AXV300 AFE-SR)**. This is used with the **AXV300 SR** series of power modules to enable DC-link pre-loading and control of input and output values;

④ **Regenerative power module (AXV300 SR)**. Regenerative power modules are available with a wide range of power ratings and, with the **AXV300 AFE-SR** control module, implement the functions of a regenerative supply module;

⑤ **AXV300 axis modules**. The axes contain the power and control section for a given drive. Their size depends on the power rating of the motor that is used. There are different versions for brushless and asynchronous motors (currently being developed);

⑥ **Control Unit (AXV300 CU).** This is always present in the system. It coordinates the various axes as part of a customised application program;

⑦ Axis modules powered by a **common intermediate DC circuit**;

⑧ **Brushless and asynchronous motors** (currently being developed);

⑨ **24 VDC power supply circuit** for all axis modules and the **AXV300 CU** module;

⑩ **Optical fibre link**;

Accessories: the system also includes regeneration chokes, optical fibre cables.

2.2.1. Description of modules

② Supply modules

AXV300 SM non-regenerative supply modules can be used with the axis system according to the current required. Non-regenerative supply modules come in three sizes.

AXV300 modules have two three-phase inputs: one for the pre-load phase (**M3**) and a primary input (**M2**). An appropriately controlled external power contactor activates the power flow on the primary terminal when the pre-load phase is complete. The power contactor must be controlled via the specific Cont output (terminal P2) on the SM module.

The high voltage **VDC-link** bus must be wired to carry sufficient power/current from the supply module to the axis modules.

③ ④ Regenerative supply modules

The regenerative supply modules in the **AXV300** system are compound components obtained by using an **AXV300 SR** regenerative supply module and an **AXV300 AFE-SR** control module.

There are therefore the same number of regenerative supply modules and regenerative modules. They stabilise the VDC-link voltage at 625 VDC and feed or regenerate power to the grid according to the power/current flows.

Regeneration chokes must also be installed in series with the three-phase power supply, to ensure correct regenerative supply module operation.

⑤ Axis modules

The axis modules contain the power and control section for brushless or asynchronous motors (currently being developed).

The **axis modules** control the motors independently by closing/implementing the current and speed loop using encoder data and motor current readings.

The **AXV300 CU** module sends set-points to control the **axis modules**. The **axis modules** can be controlled separately via:

- Speed reference
- Torque reference
- Maximum Torque References
- Maximum Speed References.

The axis module control card implements the following software macro-functions:

- Brushless motor control loop
- Asynchronous motor control loop (as an alternative to the above, currently being developed)
- Current loop closure (62.5 µs)
- Speed loop closure (250 µs)
- Local encoder management
- Alarm/overload management
- Management of **GStar** communications from/to the **Control Unit**

⑥ **AXV300 CU Control Module**

The **AXV300 CU** interfaces with the **axis modules** via a physical optical fibre link implemented by a pair of closed optical links. Each link can support up to 4 axis modules for a maximum of 8 axes.

The **AXV300 CU** can send one or more references to each axis in real-time (250 µs) to control these as required. In the other direction (axis-control unit) each axis can be configured separately to send the various control data in real-time (250 µs):

- Position
- Actual speed
- Actual torque
- Current, etc

The **Control Unit** is the core of the axis motion coordination system. Its main functions are listed below:

initialisation of all axes:

- system alarm management;
- management of system alarms
- software updates;
- communication with PLC via fieldbus;
- communication with all axes;
- calculation/sending of set-points to all axes;
- reading of significant values of all axes;
- execution of application program;
- PLC functions with dedicated MDPLC software environment, standard programming languages according to IEC 61131;
- “GF-eXpress” Windows® configuration tool using ModBus protocol;
- management of standard analog and digital I/O;
- SD card;
- local keypad interface;
- options:
  - RTE (Real Time Ethernet) interface.
  - auxiliary encoder management.
  - analog and digital I/O expansion.

The **AXV300** system normally requires the use of a software application specifically designed and developed for a particular function (e.g. applications for all-electric plastic machinery, packaging, material handling, etc.). The user interface is also normally developed according to the specific application. However, the system can be controlled and configured via keypad unit or PC on which the GF-eXpress application is installed to give access to fundamental system parameters and monitor functions.

2.3. Specification

2.3.1. 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.
Mechanical conditions for installation	Vibrational stress: EN 60721-3-3 Class 3M1

Temperature:

Operating temperature	0…+40°C (32°…104°F)
Operating temperature (1)	+40 ... +50°C with derating, (+104 … +122°F with derating)
Storage	-25…+55°C (-13…+131°F), Class 1K4 as per EN50178.
	-20…+55°C (-4…+131°F), for keypad devices.
Transport	-25…+70°C (-13…+158°F), Class 2K3 as per EN50178
	-20…+60°C (-4…+140°F), for keypad devices.

Air humidity:

Operating	5 % to 85 % and 1 g/m3 to 25 g/m3 without moisture condensation or icing (class 3K3 as per EN50178)
Storage	5% to 95 %, 1 g/m^3 to 29 g/m^3 (Class 1K3 as per EN50178)
Transport	95 % (3), 60 g/m^3 (4)

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:

Operating [kPa]	86 to 106 (class 3K3 as per EN50178)
Storage	[kPa] 86 to 106 (class 1K4 as per EN50178)
Transport	[kPa] 70 to 106 (class 2K3 as per EN50178)

(1) See **"3.4.1. Ambient temperature reduction factor" on page 18.**
(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).

Important

The drive is suitable for use under the environmental service conditions (climate, mechanical, pollution, etc.) defined as usual service conditions according to EN61800-2.

2.3.2. Standards

Climatic conditions	3K3 EN 50178
Electrical safety	EN 50178, EN 61800-5-1, UL508C, UL840 degree of pollution 2
EMC compatibility	EN61800-3
Isolation	EN 50178, UL508C
Protection degree	IP21, IP54 with dedicated tool (currently being developed)
Approvals	CE UL c UL us (pending)

2.3.3. Performance

Current loop closure	16KHz (62,5μsec)
Speed loop closure	4KHz (250μsec)
GStar optical fibre link with axes	max 8 axes (2 lines x 4 axes), cycle 250μSec with relative indicator LEDs
I2t overload	slow : 150% In x 60 sec
	fast: 200% In x 0,5 sec
IxT overload	200% In x 10 sec

3.1. General information

This is a range of modules for controlling brushless or asynchronous motors (currently being developed).

3.2. Product identification

Axis modules for brushless motors:

AXV300 -1 04 13 -X

Software:
X = Standard

Max output current:
13 = 13 Arms
20 = 20 Arms
40 = 40 Arms
70 = 70 Arms
100 = 100 Arms
160 = 160 Arms
200 = 200 Arms
210 = 210 Arms
250 = 250 Arms
320 = 320 Arms

Rated current:
04 = 4 Arms
10 = 10 Arms
20 = 20 Arms
35 = 35 Arms
50 = 50 Arms
80 = 80 Arms
100 = 100 Arms
140 = 140 Arms
200 = 200 Arms

Mechanical dimensions:
1 = size 1
2 = size 2
3 = size 3
4 = size 4
5 = size 5
6 = size 6

Modular Servodrive System AXV300 series:
AXV300 = for brushless motors

Axis modules for asynchronous motors (currently being developed, preliminary datas):

AXV300A -1 0027 -X

Software:
X = Standard

Power x 10:
0027 = 2,7 kW
0060 = 6 kW
0120 = 12 kW
0210 = 21 kW
0300 = 30 kW
0480 = 48 kW
0600 = 60 kW
0840 = 84 kW
1200 = 120 kW

Mechanical dimensions:
1 = size 1
2 = size 2
3 = size 3
4 = size 4
5 = size 5
6 = size 6

Modular System AXV300 series:
AXV300A = for asynchronous motors

3.3. Data plates

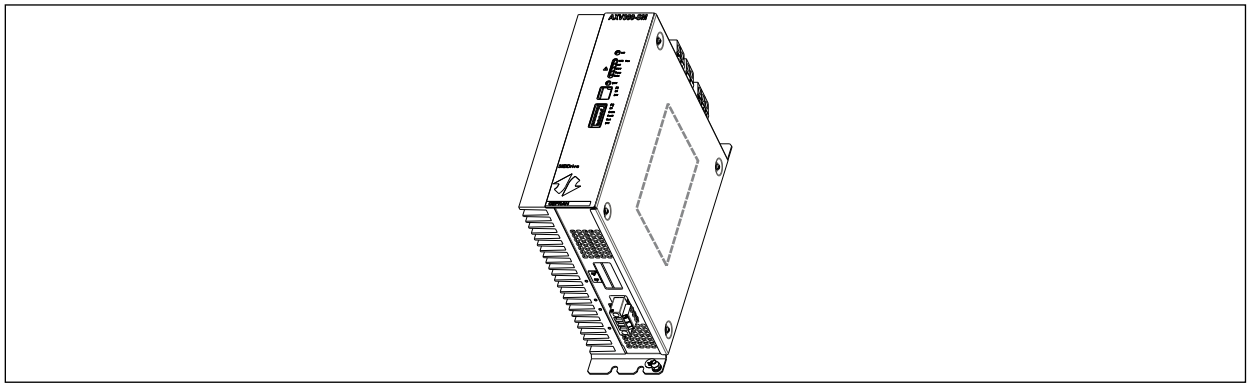


Figure 3: Position of data plates

Type :	AXV300-22040-XBX	S/N: 012345678
Inp:	600Vdc +/- 10%	20A@600Vdc
Out :	0-400Vac 400Hz 3Ph	12kW@400Vac
Ovrl I2t:	20A @400Vac Ovld . 150%-60s	200%-0.5s
Ovrl Ixt:	20A @400Vac Ovld . 200%-10s	
	Made in Italy CE	

Type : Servo Model **S/N** : Serial number

Inp: Input (Main supply, Input current)

Out: Output (voltage, frequency, power, current, I2t and Ixt overload)

Approvals

Figure 4: Identification Nameplate

Firmware Release	HW release				S/N: S/N: 012345678			Prod. CONF.
	D	F	P	R	S	BU	SW. CFG	
0.14			.-A	.-A			10.10.10	A1
			Power	Regolation			Software revision (configurator)	Product configuration

Firmware revision

Cards revision

Figure 5: Firmware & cards revision level nameplate

3.4. Input/Output datas

Module name AXV300 -		10413	21020	22040	33570	350100	480160	5100200	5140210	6200250	6200320
Operating temperature		-10°C ... +50°C (100% up to 40°C, Kt = 0.83 @50°C)									
Average dissipated power (*)	[W]	30	75	140	240	360	550	780	1120	1850	1850
INPUT											
VDC Input voltage	[VDC]	600 (±10%)									
IDC MAX Max. Input current	[A]	15.5	23	46	81	115	184	230	242	288	369
Overvoltage threshold	[V]	760									
Undervoltage threshold	[V]	440									
OUTPUT (**)											
Rated Power	[kW]	2.7	6	12	21	30	48	60	84	120	120
Peak Power	[kW]	8.1	12	24	42	60	96	120	126	150	192
Rated Current	[Arms]	4.5	10	20	35	50	80	100	140	200	200
Peak Current	[Arms]	13.5	20	40	70	100	160	200	210	250	320
Output voltage	[VAC]	0 ... 400									
Max. Output Frequency	[Hz]	400									
Switching Frequency (Defaut)	[kHz]	4									
Switching Frequency (Higher)	[kHz]	8 (KF = 0.7)									

(*) At nominal condition.
(**) Data @ VDC =600 V – Operating temperature 40°C, Switching frequency 4 KHz, Output frequency 400 Hz.

3.4.1. Ambient temperature reduction factor

Kt = 0,83 (1,7 % every °C above 40°C)

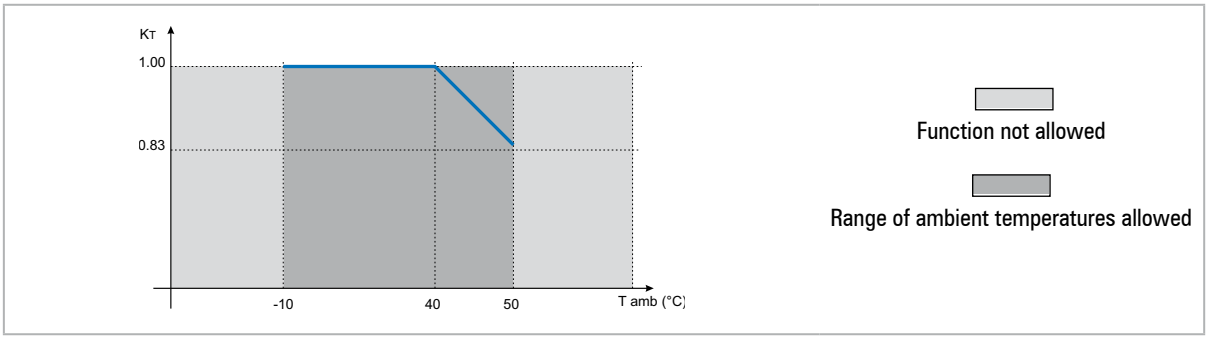


Figure 6: Tamb reduction coefficient

3.4.2. Module internal power supply

Module name AXV300 -		10413	21020	22040	33570	350100	480160	5100200	5140210	6200250	6200320
24 V POWER SUPPLY CONNECTORS P2 - P3											
Rated voltage	[VDC]	24									
Minimum value	[VDC]	21.5									
Maximum value	[VDC]	28.8									
Max. cable cross-section (24VDC)	[mm²]	0.05 ... 2.5 mm² (30 ...12 AWG)									
Average module absorption	[A]	0.65 A+0.3 x IENCODER A									

3.4.3. 24 V power supply fans

Module name AXV300 -		10413	21020	22040	33570	350100	480160	5100200	5140210	6200250	6200320
24 V POWER SUPPLY FANS WITH SEPARATE POWER SUPPLY											
Average absorption	[A]	-	-	-	-	-	1	2	3	4	4

3.4.4. Supply module dimensions

The supply module must be dimensioned to allow for the inductive load of the fans. High current levels are therefore requested for a relatively long time at start-up, especially in big axis modules with a separate fan power supply. This must either be taken into consideration in the system start-up sequence or there must be a separate supply module.

Given the power absorbed by the axis modules, the 24 VDC power supply alone causes considerable heating of the metal containers in the front of the module. This is normal

E.g. :

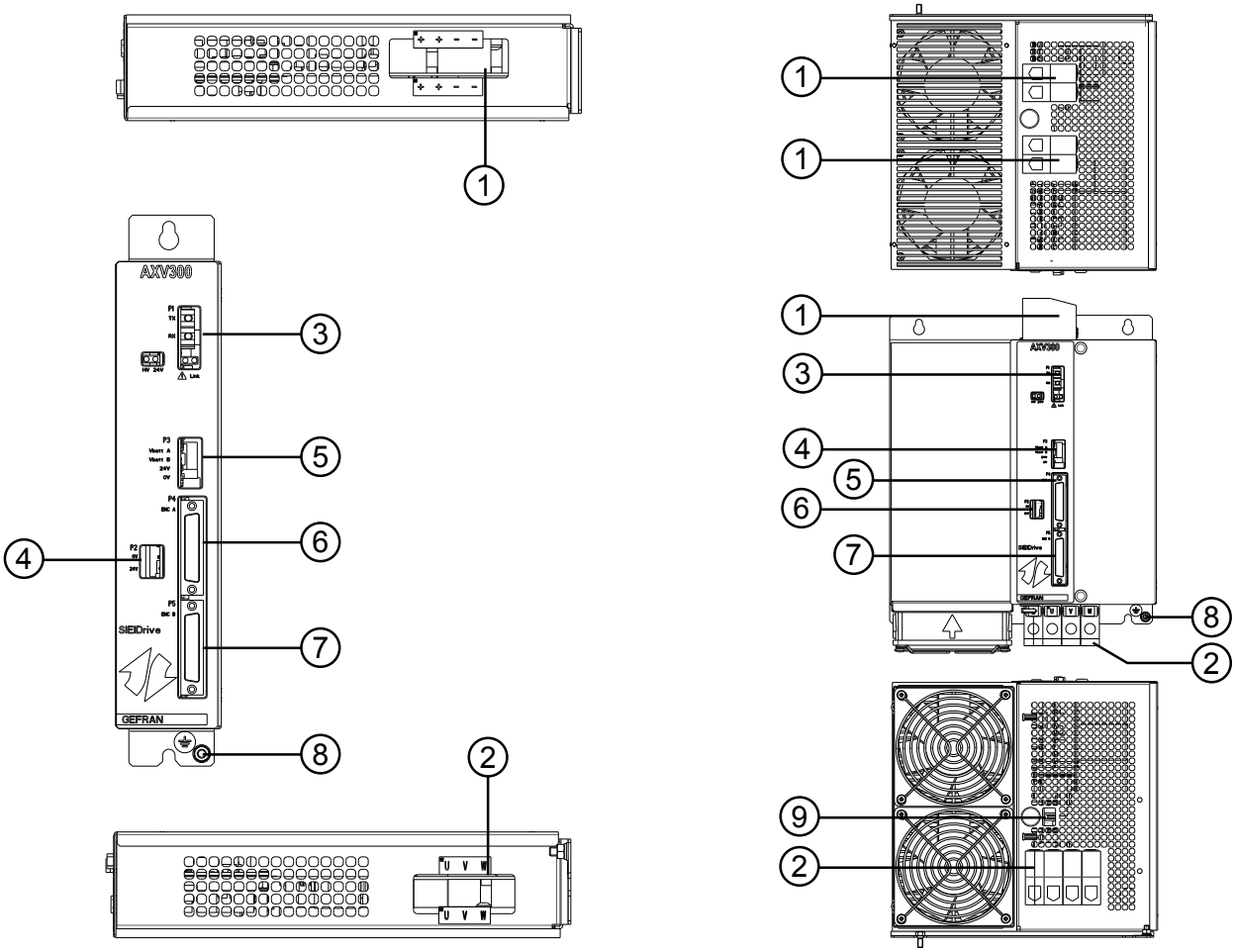
EnDat EQN1325 multi-turn encoder, consumption < 250mA

Average absorption 1 Axis = 0.650+0.3x0.25= 0.725 A (without separate fan unit)

Average absorption 1 Axis AXV300-5100200:

P2-P3 :	0.650+0.3x0.25= 0.725 A
Cooling fans:	2 A
Total:	2.75 A

3.5. Identification of terminals, tightening torques and cable sizes



Module name AXV300 -		10413	21020	22040	33570	350100	480160	5100200	5140210	6200250	6200320
(1) TERMINAL M1 - DC-LINK CONNECTION											
Terminal name		+, –, +, –			+, –, +, –		+, –, +, –			+, –, +, –	+, –, +, –
I Max to other modules (DC-LINK)	[A]	40			100		160			260	260
Maximum cable cross-section (flexible conductor)	mm^2	6			16		50			95	95
Maximum cable cross-section (rigid conductor)	mm^2	10			20		50			95	95
Maximum cable cross-section	AWG	8			4		1/0			3/0	3/0
Stripping length	mm	12			16		24			27	27
Min/max tightening torque	Nm	1.2 / 1.5			2 / 2.3		6 / 8			20	20
Recommended tool		1.0 x 4.0 x 100 mm slotted-head screwdriver			5 mm hex wrench					6 mm hex wrench	

Note ! Details of connection in paragraph **"10.4. DC-link System" on page 110.**

Module name AXV300 -		10413	21020	22040	33570	350100	480160	5100200	5140210	6200250	6200320
(2) TERMINAL M2 - MOTOR CONNECTION (U V W)											
Terminal name		**U, V, W**			**U, V, W** ⏚		**U, V, W** ⏚			**U, V, W** ⏚	**U, V, W** ⏚
Maximum cable cross-section (flexible conductor)	mm^2	6			16		50			95	95
Maximum cable cross-section (rigid conductor)	mm^2	10			25		50			95	95
Maximum cable cross-section	AWG	8			4		1/0			3/0	3/0
Stripping length	mm	12			16		24			27	27
Min/max tightening torque	Nm	1.2 / 1.5			2 / 2.3		6 / 8			20	20
Recommended tool		1.0 x 4.0 x 100 mm slotted-head screwdriver			5 mm hex wrench					6 mm hex wrench	

Note ! Details of connection in paragraph **"10.1. Electrical connection of AXV300 axis modules" on page 98**

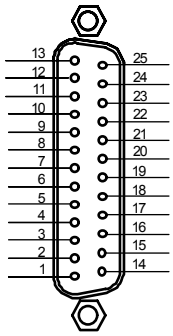
Module name AXV300 -		10413	21020	22040	33570	350100	480160	5100200	5140210	6200250	6200320
(3) TERMINAL P1 - OPTICAL FIBRE CONNECTION											
Terminal name		**TX - RX**									
Type		For "HFBR-4501"-type connectors (Supplied by Avago Technologies), Gefran code: 6S8V83.									
Cable		980/1000μm plastic optical fibre									

Note ! Details of connection in paragraph **"10.5. GStar Communication System" on page 112** and **"13.8.1. Optical fibre link connection (P1)" on page 142**

Module name AXV300 -		10413	21020	22040	33570	350100	480160	5100200	5140210	6200250	6200320
(4) TERMINAL P2 - INTERNAL MODULES POWER SUPPLY CONNECTION											
Terminal name		**0V, 24V**									
Maximum cable cross-section (flexible conductor)	mm^2	2.5									
Maximum cable cross-section	AWG	12									
Stripping length	mm	7									
Min/max tightening torque	Nm	0.6									
Recommended tool		0.6 x 3.5 x 100 mm slotted-head screwdriver									

Note ! Details of connection in paragraph **"3.4.2. Module internal power supply" on page 18**

Module name AXV300 -		10413	21020	22040	33570	350100	480160	5100200	5140210	6200250	6200320
(5) TERMINAL P3 - POWER SUPPLY CONNECTION											
Terminal name		**Vbatt A, Vbatt B, 24V, 0V**									
Maximum cable cross-section (flexible conductor)	mm^2	2.5									
Maximum cable cross-section	AWG	12									
Stripping length	mm	7									
Min/max tightening torque	Nm	0.6									
Recommended tool		0.6 x 3.5 x 100 mm slotted-head screwdriver									

Module name AXV300 -	10413	21020	22040	33570	350100	480160	5100200	5140210	6200250	6200320
(6) TERMINAL P4 - ENC A CONNECTION **(7) TERMINAL P5 - ENC B CONNECTION**										
Male 25-pin receptacle connector										

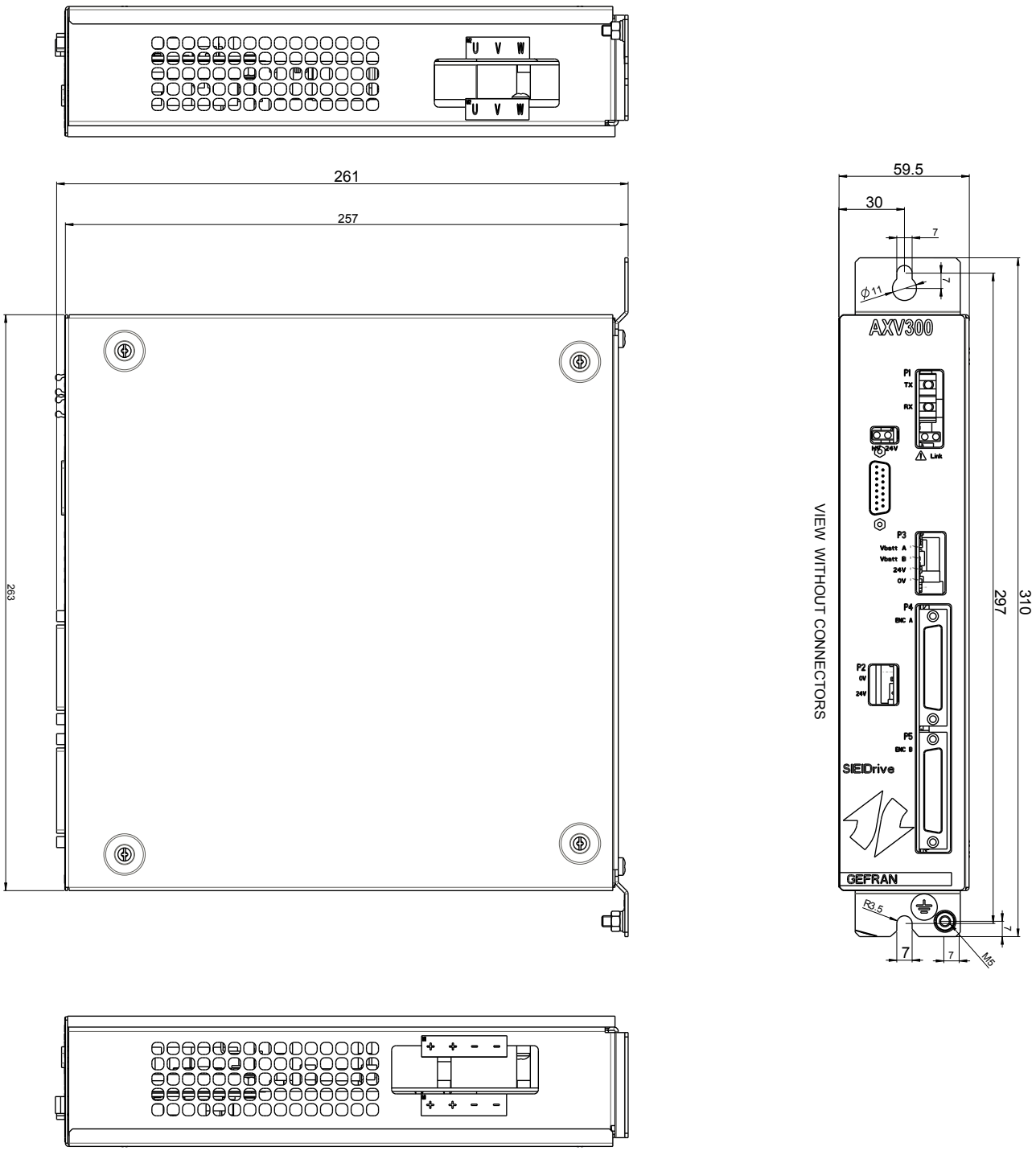
Note ! Details of connection in paragraph **"10.1.1. Encoder connection interface" on page 99.**

Module name AXV300 -		10413	21020	22040	33570	350100	480160	5100200	5140210	6200250	6200320
(8) TERMINAL ⏚ - GROUND CONNECTION											
Cable cross-section	mm^2	10	10	10	10	10	10	10	10	10	10
	AWG	8	8	8	8	8	8	8	8	8	8
Lock screw diameter	mm	M5	M5	M5	M5	M5	M5	M5	M5	M5	M5
Recommended terminal		Eyelet									
Tightening torque	Nm	6	6	6	6	6	6	6	6	6	6
Recommended tool		8-mm hex socket wrench									

Module name AXV300 -		10413	21020	22040	33570	350100	480160	5100200	5140210	6200250	6200320
(9) FAN UNIT TERMINAL CONNECTION											
Terminal name		-	-	-	-	-	**24V, 0V**				
Maximum cable cross-section (flexible conductor)	mm^2	-	-	-	-	-	2.5				
Maximum cable cross-section	AWG	-	-	-	-	-	12				
Stripping length	mm	-	-	-	-	-	7				
Min/max tightening torque	Nm	-	-	-	-	-	0.6				
Recommended tool							0.6 x 3.5 x 100 mm slotted-head screwdriver				

Note ! Details of connection in paragraph **"3.4.3. 24 V power supply fans" on page 18.**

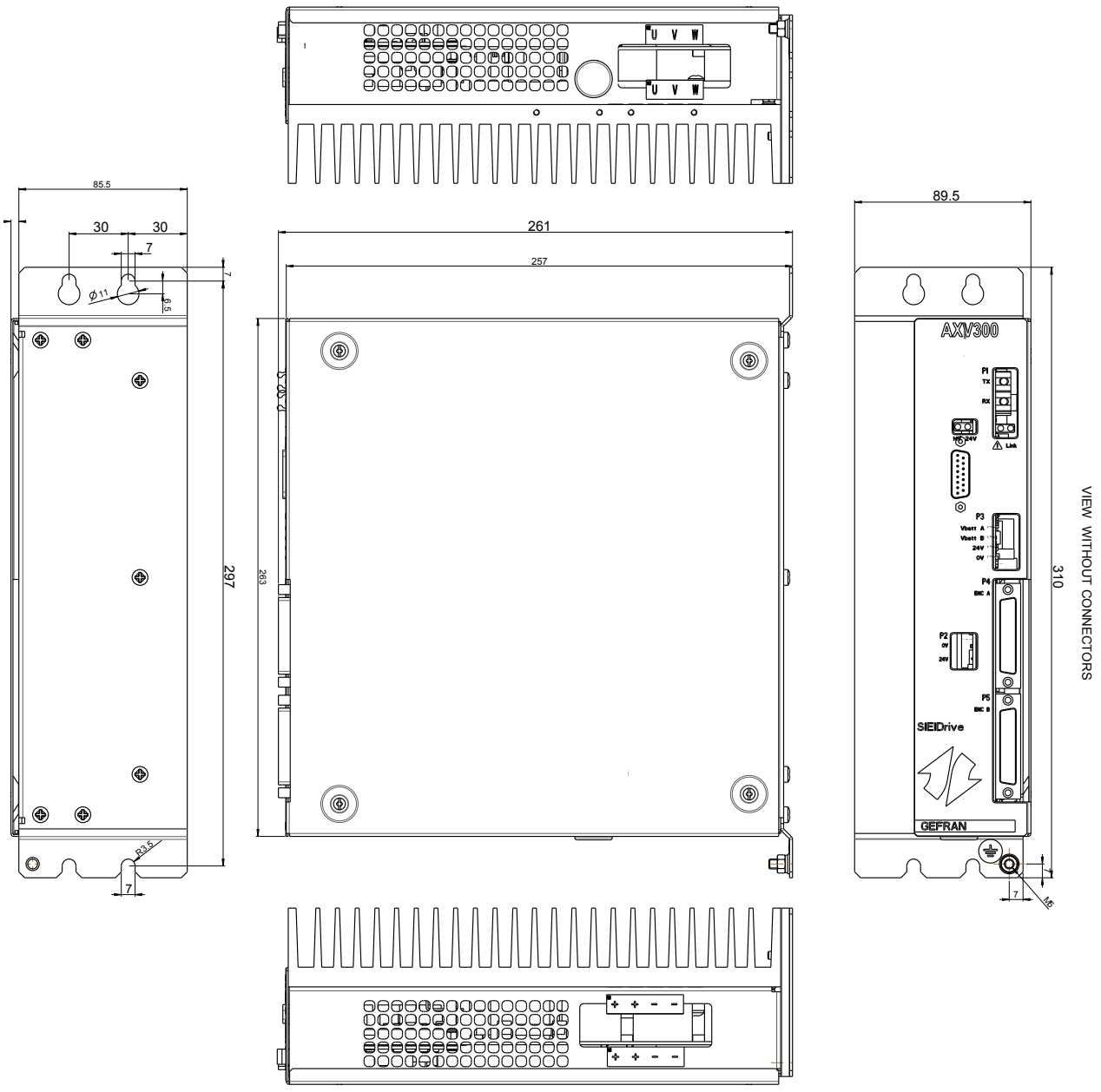
3.6. Size AXV300-10413 dimensions and weight



Values in mm [inches]. Extractable terminals not included (front)

Module	Lenght mm [inches]	Height mm [inches]	Width mm [inches]	Weight kg [lbs]
AXV300-10413	59.5 [23.42]	310 [12.20]	261 [10.27]	3 [6.6]

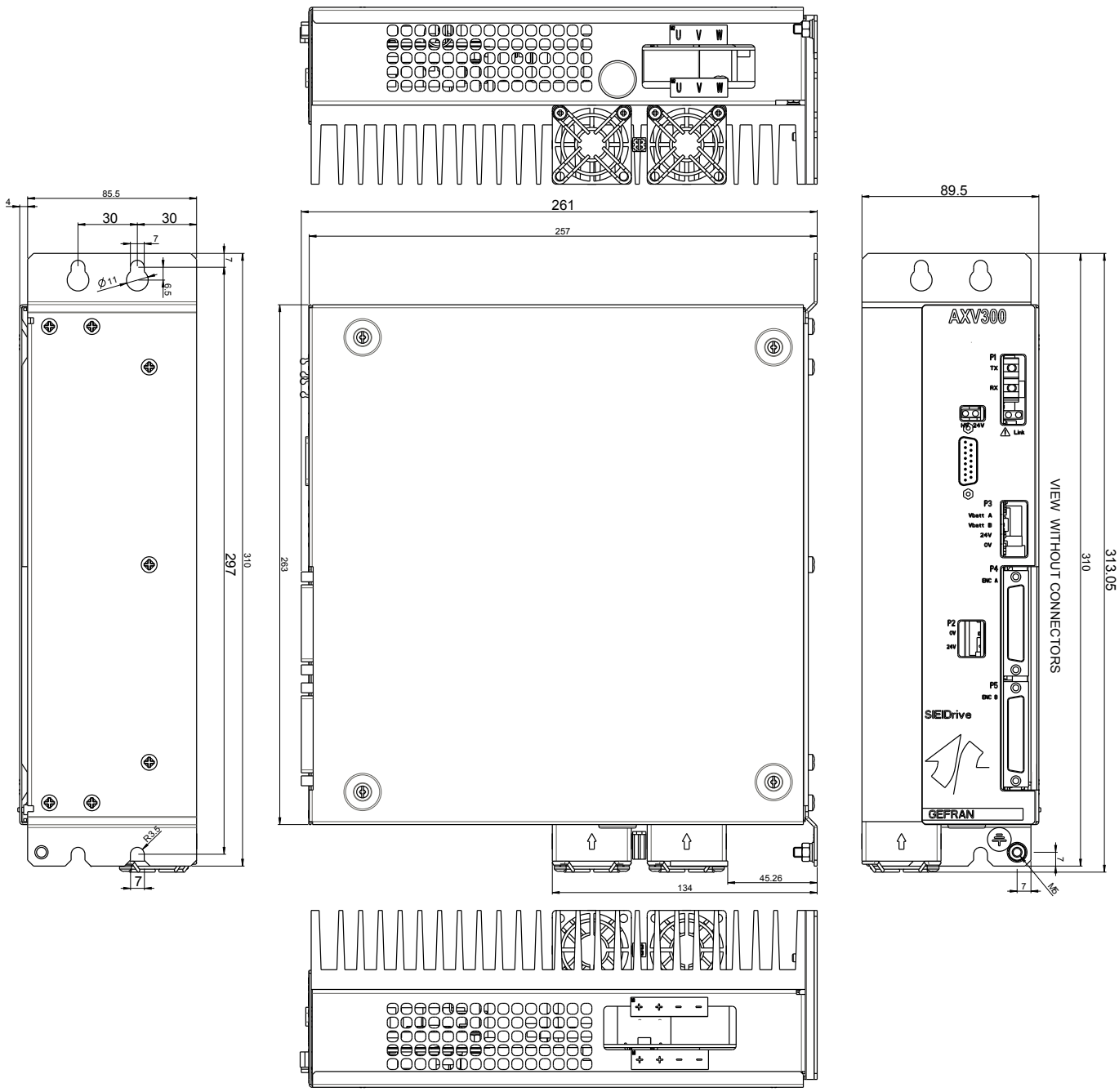
3.7. Size AXV300-21020 dimensions and weight



Values in mm [inches]. Extractable terminals not included (front)

Module	Lenght mm [inches]	Height mm [inches]	Width mm [inches]	Weight kg [lbs]
AXV300-21020	89.5 [3.52]	310 [12.20]	261 [10.27]	5 [11]

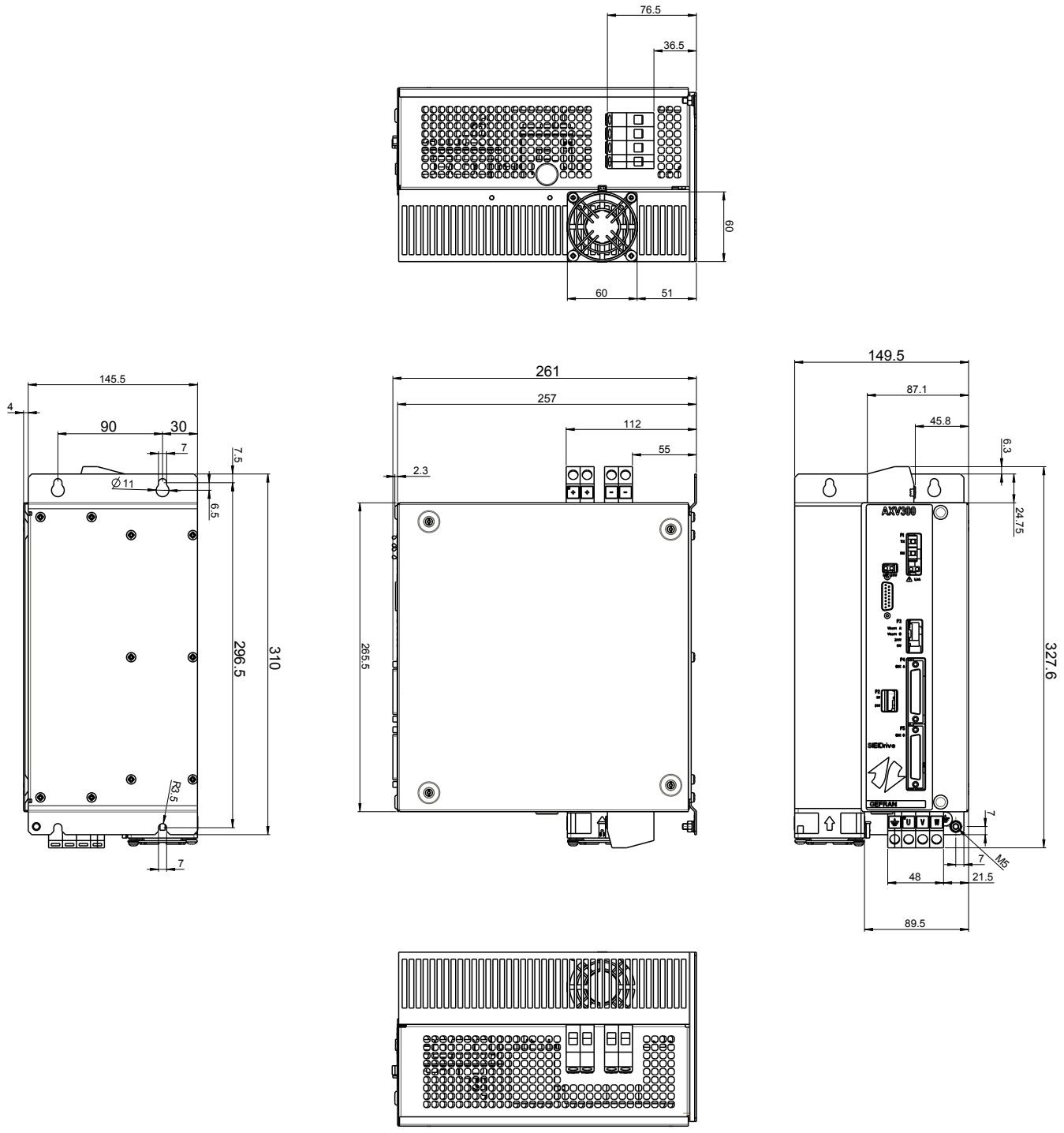
3.8. Size AXV300-22040 dimensions and weight



Values in mm [inches]. Extractable terminals not included (front)

Module	Lenght mm [inches]	Height mm [inches]	Width mm [inches]	Weight kg [lbs]
AXV300-22040	89.5 [3.52]	313 [12.32]	261 [10.27]	5 [11]

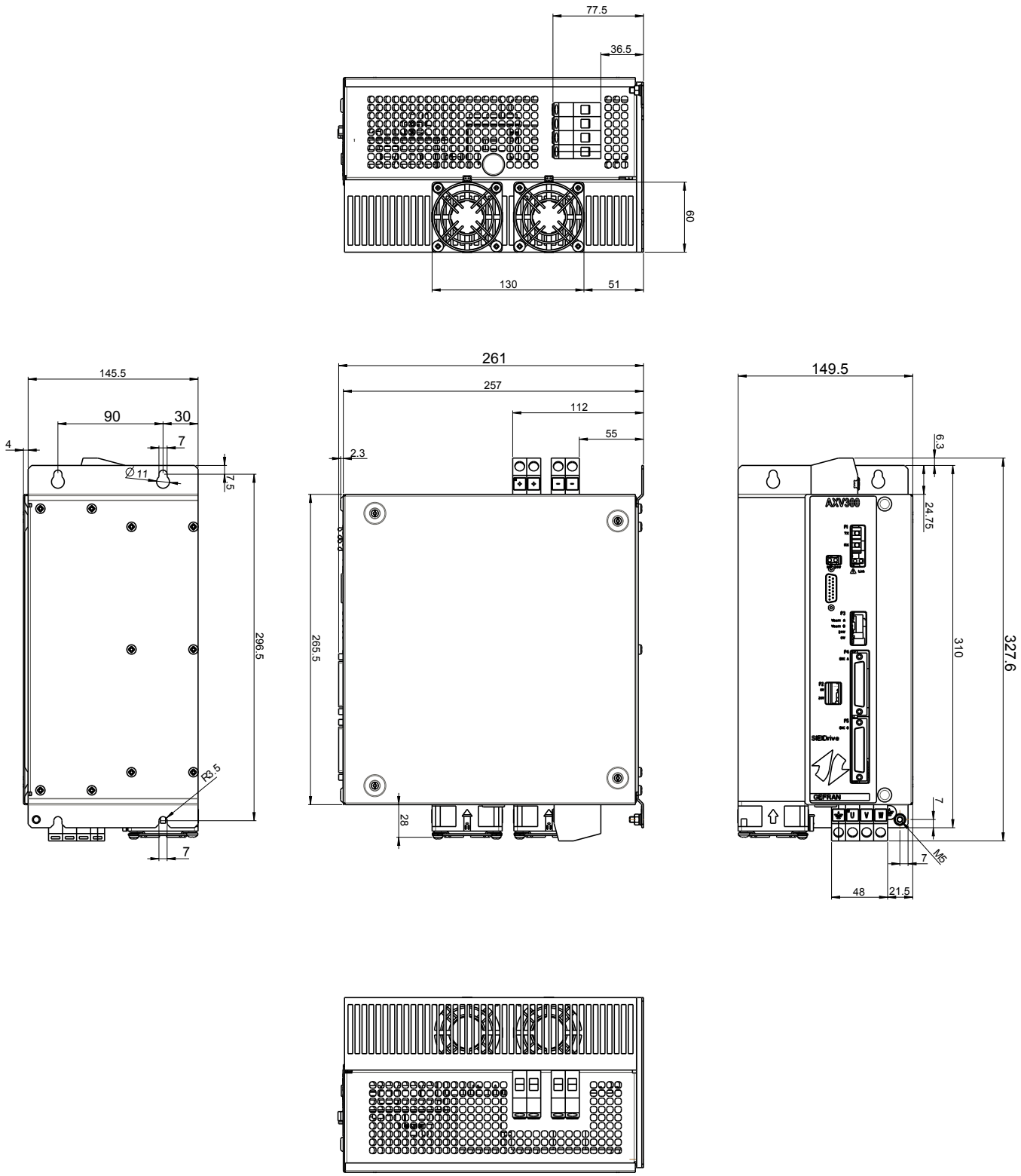
3.9. Size AXV300-33570 dimensions and weight



Values in mm [inches]. Extractable terminals not included (front)

Module	Lenght mm [inches]	Height mm [inches]	Width mm [inches]	Weight kg [lbs]
AXV300-33570	149.5 [5.88]	327.6 [12.9]	261 [10.27]	9 [19.8]

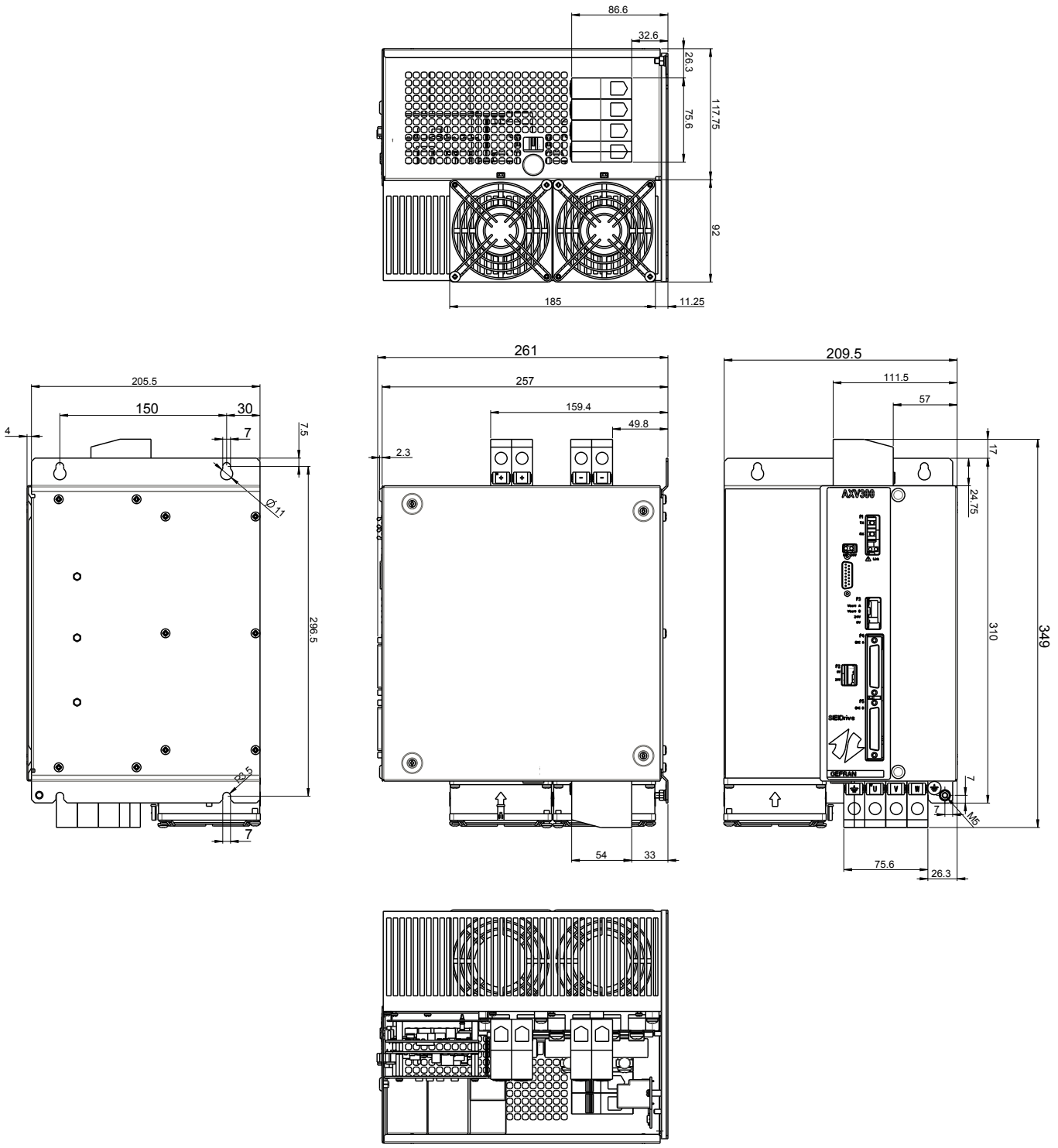
3.10. Size AXV300-350100 dimensions and weight



Values in mm [inches]. Extractable terminals not included (front)

Module	Lenght mm [inches]	Height mm [inches]	Width mm [inches]	Weight kg [lbs]
AXV300-350100	149.5 [5.88]	327.6 [12.9]	261 [10.27]	9 [19.8]

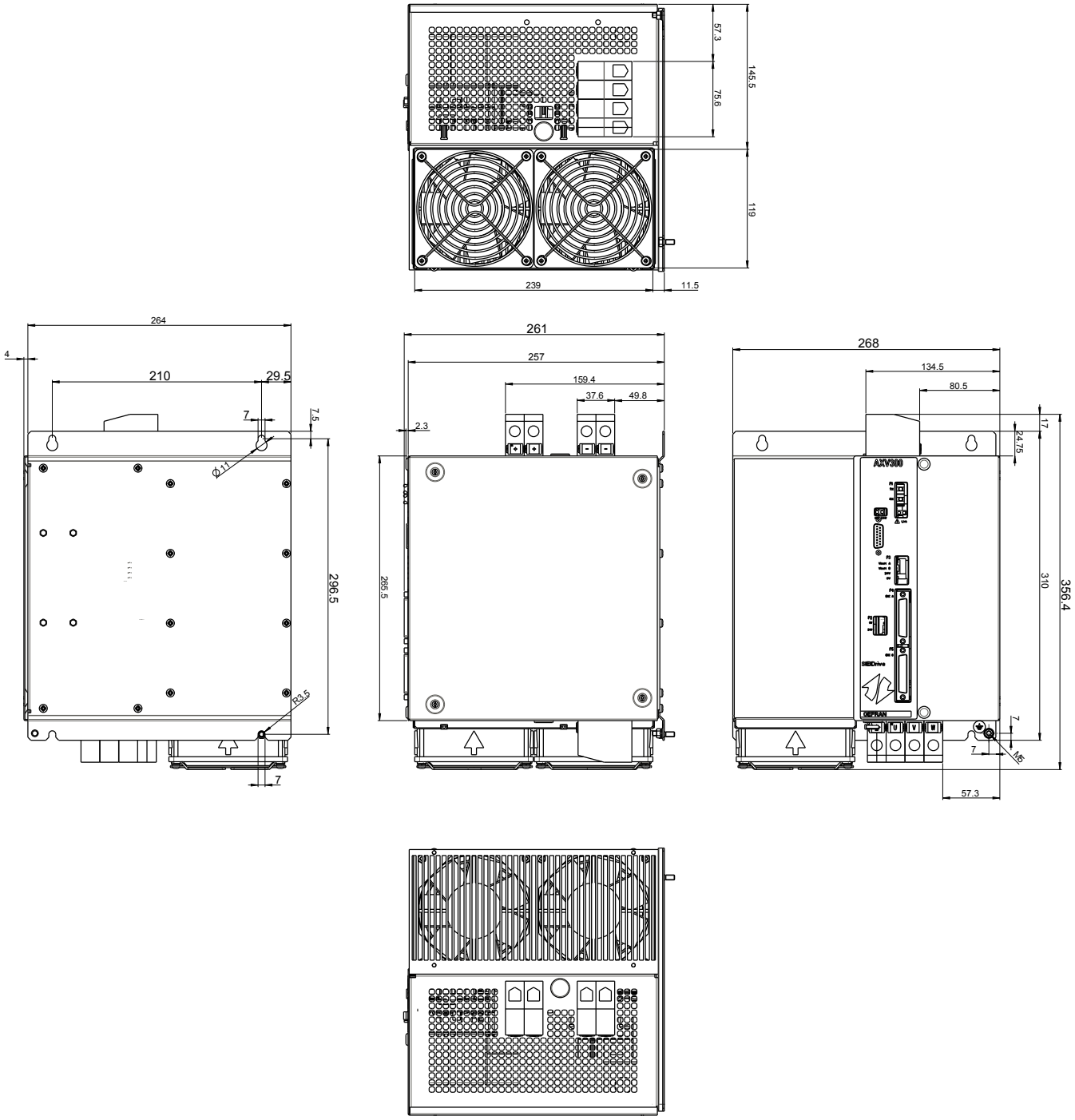
3.11. Size AXV300-480160 dimensions and weight



Values in mm [inches]. Extractable terminals not included (front)

Module	Lenght mm [inches]	Height mm [inches]	Width mm [inches]	Weight kg [lbs]
AXV300-480160	209,5 [8.25]	349 [13.74]	261 [10.27]	13 [28.6]

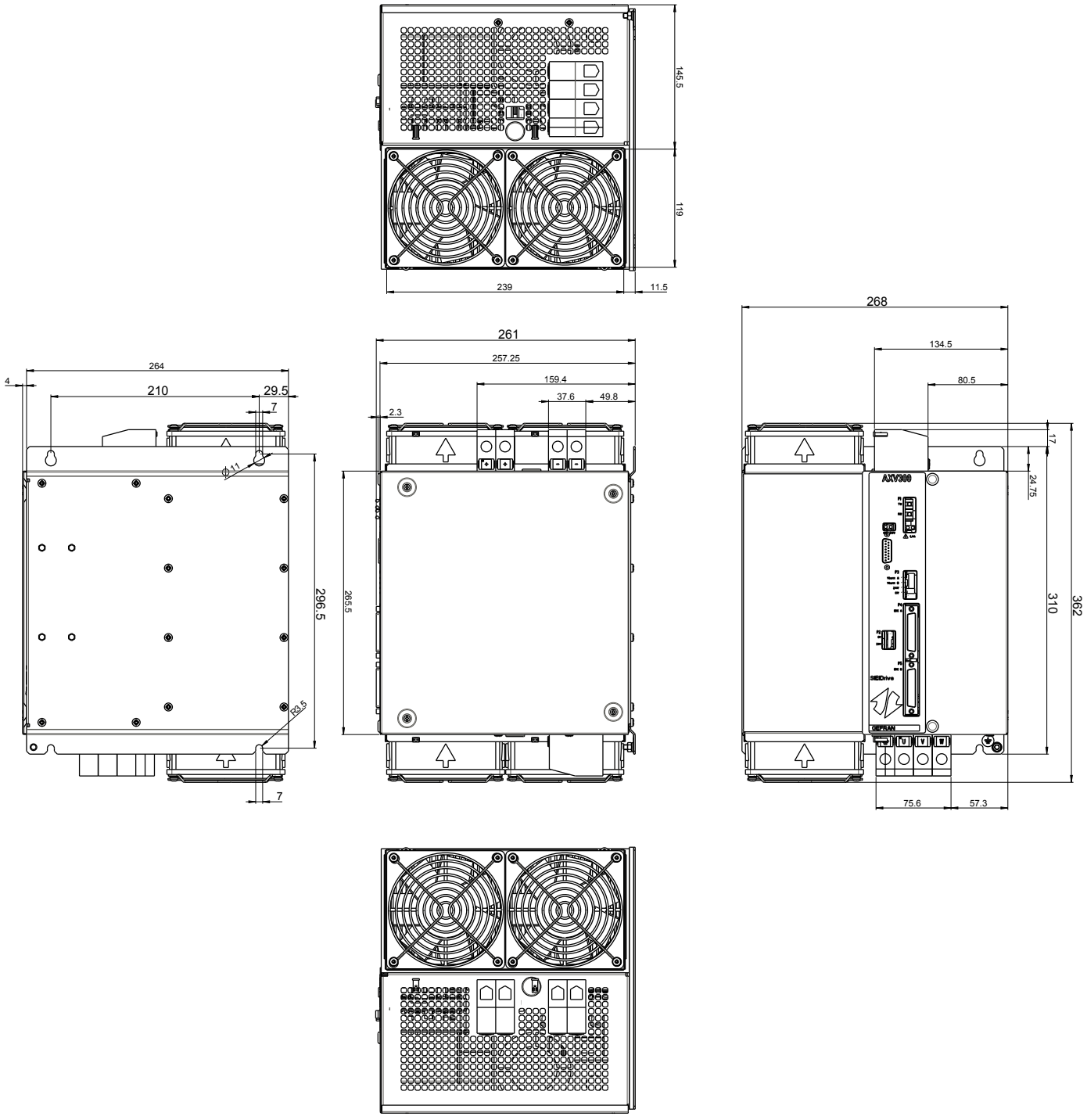
3.12. Size AXV300-5100200 dimensions and weight



Values in mm [inches]. Extractable terminals not included (front)

Module	Lenght mm [inches]	Height mm [inches]	Width mm [inches]	Weight kg [lbs]
AXV300-5100200	268 [10.55]	356.4 [10.03]	261 [10.27]	16 [35.3]

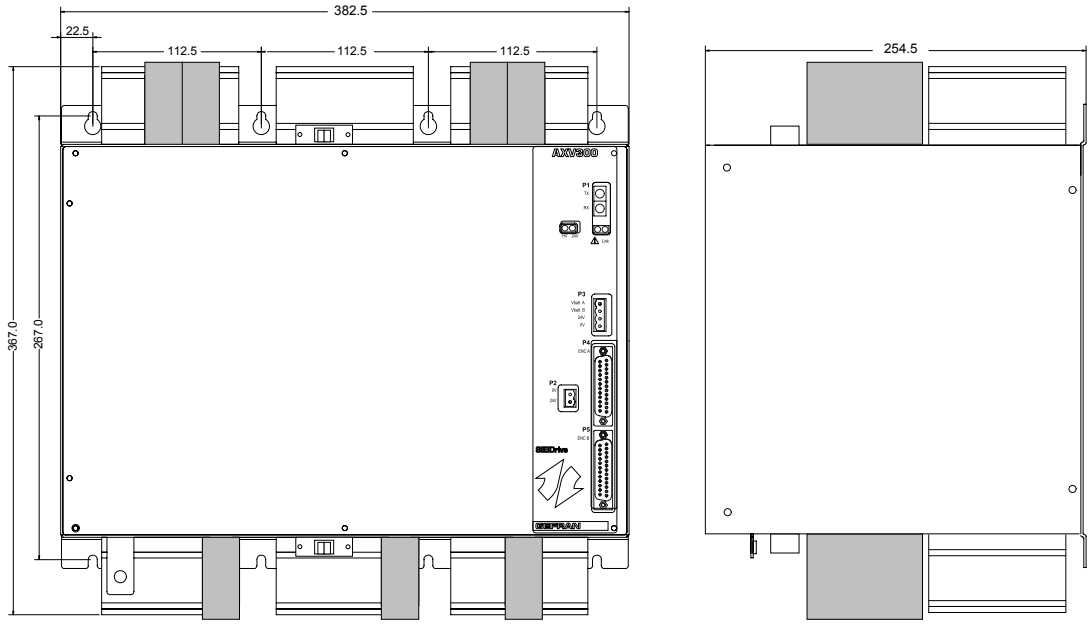
3.13. Size AXV300-5140210 dimensions and weight

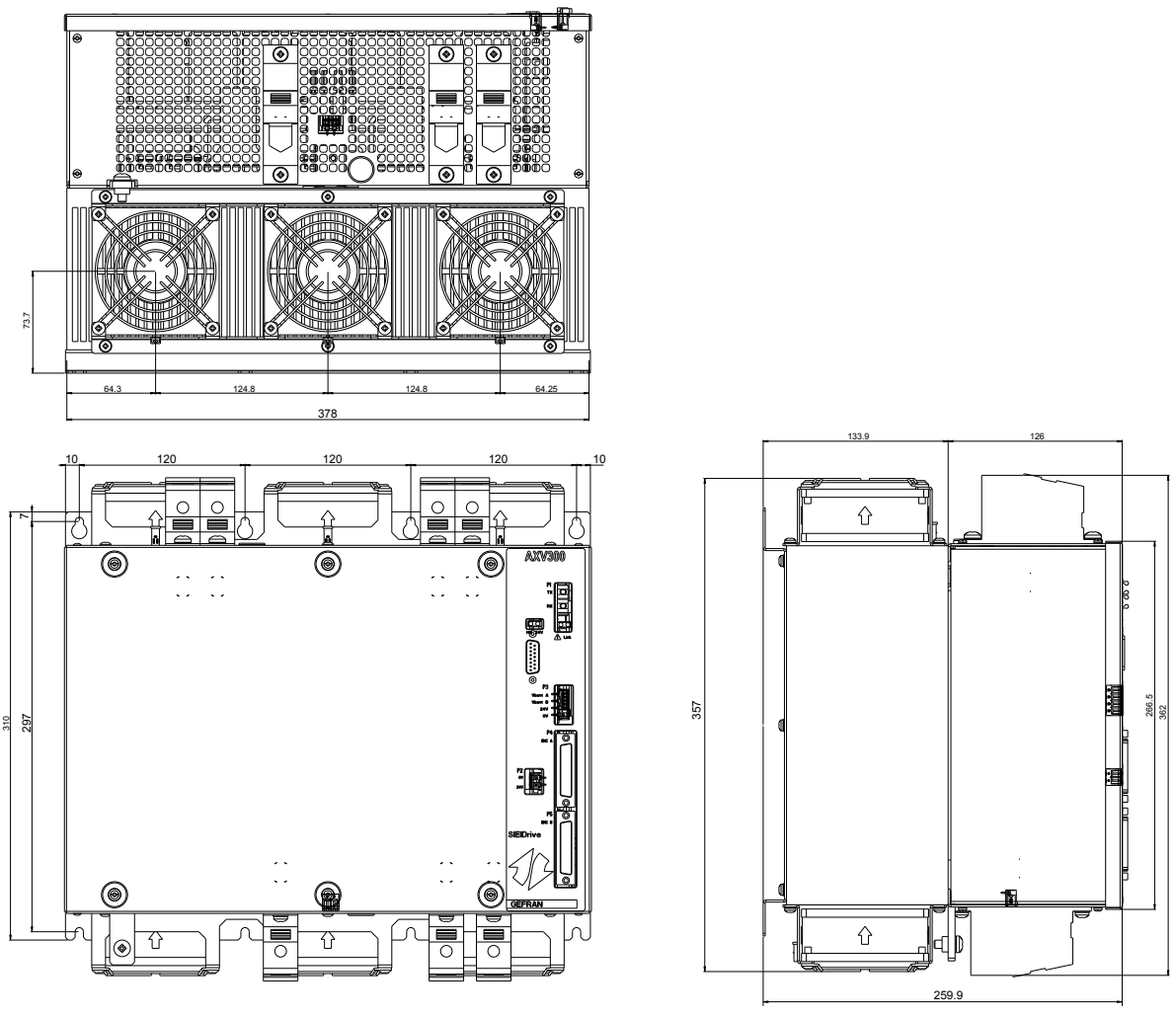


Values in mm [inches]. Extractable terminals not included (front)

Module	Lenght mm [inches]	Height mm [inches]	Width mm [inches]	Weight kg [lbs]
AXV300-5140210	268 [10.55]	362 [14.25]	261 [10.27]	20 [44.1]

3.14. Sizes AXV300-6200250 and AXV300-6200320 dimensions and weights





Values in mm [inches]. Extractable terminals not included (front)

Module	Lenght mm [inches]	Height mm [inches]	Width mm [inches]	Weight kg [lbs]
AXV300-6200250	382.5 [15.06]	367 [14.45]	254.5 [10.02]	27 [59.5]
AXV300-6200320	378 [14.88]	357 [14.05]	259.9 [10.23]	25 [55.1]

4 - AXV300 SM - Power supply module

4.1. General information

The module, which is part of the modular **AXV300** range, acts as the system's non-regenerative supply module: it delivers the voltage and current necessary to operate the **AXV300-xxxxx** axis modules of the system. When the axis modules generate current due to a motor braking action, that current is redirected to the braking resistor connected to the supply module.

Note ! The power supply module only generates the high DC voltage (565 VDC) necessary for the power section. The 24 VDC voltage required to operate all the AXV300 modules, including the AXV300 SM-xxxx power supply modules, must be supplied by an external source.

Thermal protection

The **AXV300 SM-xxxx** supply modules have a maximum internal temperature that is measured on the power module and defined as the **thermal protection** temperature. The thermal protection temperature is set at 110 °C. When the internal temperature approaches the thermal protection temperature and exceeds 95°C, a pre-alarm signal (24 V) moves to high (on connector P2). The pre-alarm signal should be monitored and used for controlled shutdown of the system in case of overtemperature.

4.2. Product identification

AXV300	SM	-1	20	40	-B	X

Configuration:
X = Standard

Braking unit:
B = Included

Peak current:
40 = 40 A
80 = 80 A
140 = 140 A

Rated current:
20 = 20 A
40 = 40 A
80 = 80 A

Mechanical dimensions:
1 = size 1
2 = size 2
3 = size 3

Module:
SM = Alimentatore

AXV300 series servo modular system

4.3. Data plates

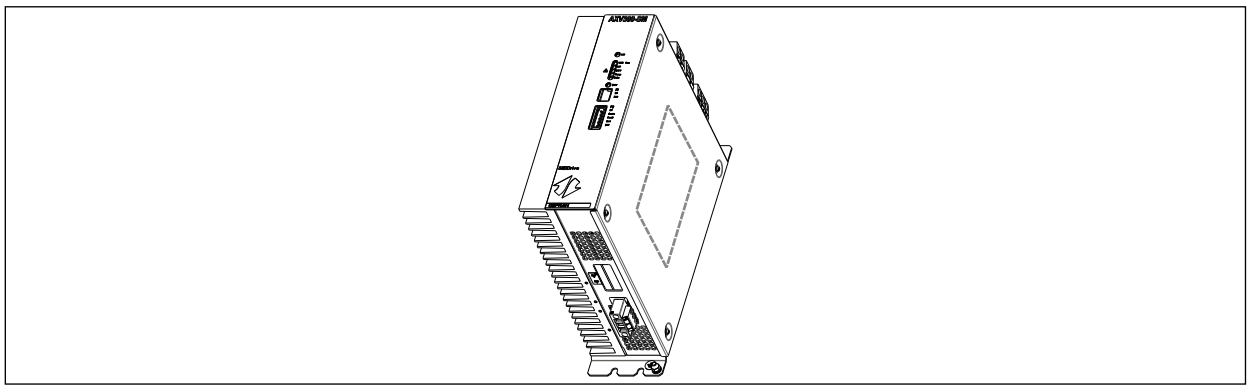
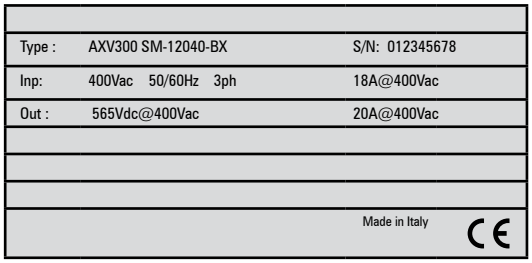


Figure 7: Position of data plates



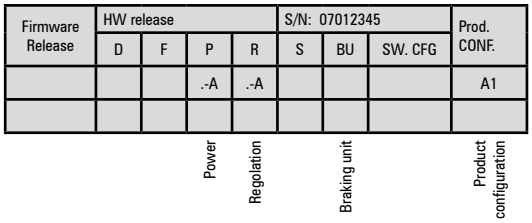
Type : Servo Model **S/N** : Serial number

Inp: Input (Main supply, Input current)

Out: Output (voltage, frequency, power, current, I2t and Ixt overload)

Approvals

Figure 8: Identification Nameplate

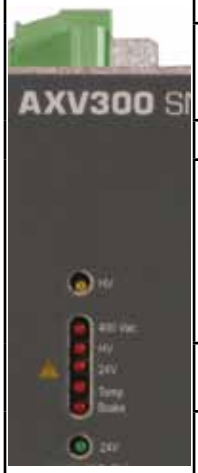


Cards revision

Figure 9: Firmware & cards revision level nameplate

4.4. Indicator LEDs

During normal operating conditions, the yellow and green LEDs (**HV OK**, **24V OK**) are lit and all the red LEDs are off. A series of indicator LEDs on the front of the supply modules light up to indicate the following errors:



LED	Colour	Meaning
HV OK	yellow	600 VDC present on the power module supply bus: this LED is normally lit during operation and stays on for some time when the 400 VAC power supply is turned off.
400Vac	red	400 VAC supply voltage out of spec. Voltage below 320 VAC alarm. This LED lights up if at least one of the three phases connected to terminal **M2** is absent or at a lower amplitude than allowed.
24V	red	External 24 VDC voltage out of spec
HV	red	600 VDC voltage on supply bus out of spec. This must be between 485 VDC and 700 VDC. There are several events that can cause this alarm. If the alarm occurs immediately after start-up, it probably indicates a power contactor or module fault. If the alarm occurs during a braking action, it could indicate a braking resistor fault or incorrect dimensions. If the alarm occurs during acceleration, the mains voltage may be too low or the cables delivering energy to the machine may be too small .
Temp	red	Supply module rectifier bridge temperature more than 105°C. This LED is also lit when the temperature is OK but there is no voltage on the DC bus
Brake	red	Incorrect connection of the braking resistor or resistor not connected. Check the connection of the external braking resistor (terminal M4)
24V OK	green	External 24 VDC supply voltage present

DC-link output terminal M1, comprising 4 contacts, must be wired to connect the supply module to the axis modules using cables that are long enough and have a suitable cross-section to carry the necessary current. See the relative paragraph for details of correct power cable dimensions.

4.5. Input/output specifications

The **AXV300 SM** supply module is designed for connection to the three-phase mains.

Caution

The input choke is mandatory on AXV300 SM modules if the output current exceeds the maximum limits given in paragraph "8.2. I2xT overload for AXV300 SM modules" on page 92.

Note ! Overload conditions (**peak current** and **peak power** in the table below) are described in paragraph **"8.2. I2xT overload for AXV300 SM modules" on page 92.**

Module name AXV300 SM-		12040	24080	380140
Operating temperature		-10°C ... +50°C (100% up to 40°C, Kt = 0.83 @50°C)		
Average dissipated power (*)	[W]	17		
INPUT				
VAC Input voltage	[VAC]	400 VAC ±10%		
Intput Frequency	[Hz]	50/60		
Rated input current (**)	[Arms]	18	37	80
Max input current (**)	[Arms]	37	72	127
OUTPUT				
Output voltage	[Vdc]	565		
Rated Current	[A]	20	40	80
Peak Current	[A]	40	80	140
Rated Power	[kW]	11	22	44
Peak Power	[kW]	22	44	80
EXTERNAL BRAKING RESISTOR				
Min. value braking resistor	[Ω]	33	9	6.8
Continuous braking power	[kW]	4	22	44
Peak braking power	[kW]	12 max	45 max	66 max

(*) At nominal condition.
(**) With input choke.

4.5.1. Low voltage power supply

All **AXV300** modules need a 24 VDC supply voltage to power: the regulation card, internal logic and fan units.

Module name AXV300 SM-		12040	24080	380140
24 V POWER SUPPLY CONNECTORS P1 - P2				
Rated voltage	[VDC]	24		
Minimum value	[VDC]	21,5		
Maximum value	[VDC]	28,8		
P1 and P2 max. cable cross-section (24VDC)	[mm²]	0,05 ... 2,5 mm² (30 ...12 AWG)		
Average module absorption	[A]	0,5 + power contactor absorption		

E.g. :
Power contactor consumption = 0.2 A
Average SM supply module absorption = 0.50 + 0.2 = 0.7 A

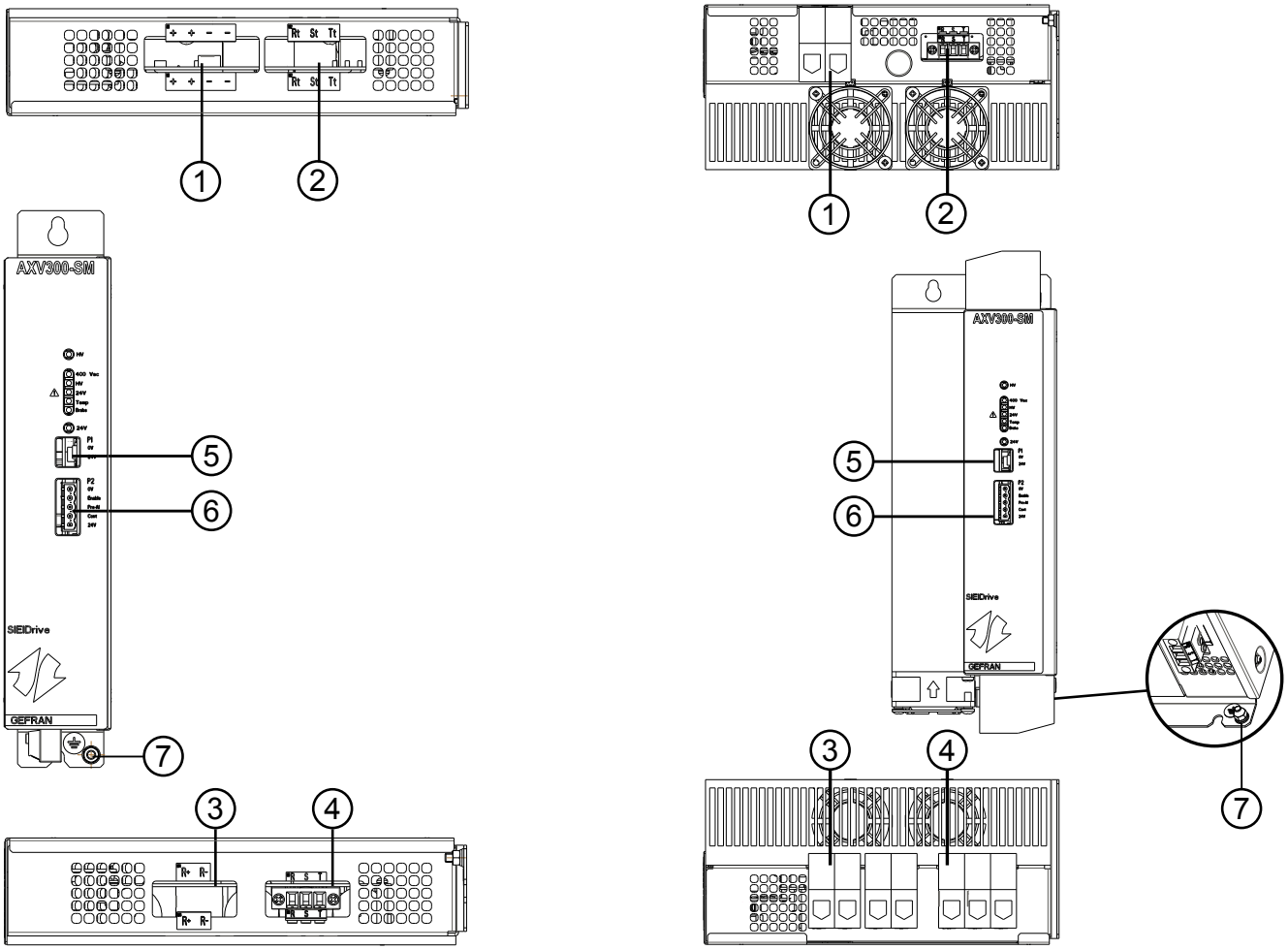
4.6. Capacitor discharge time

The DC-link high voltage discharge time depends on the configuration used, i.e. on the capacity of the DC-link (roughly from 2 to 6 minutes).

Warning

Important note: for safety reasons, after disconnecting the three-phase input power supply, wait until the high voltage indicator LED (HV OK) on the supply module (whether regenerative or not) goes out and then wait another minute before carrying out any work on the modules.

4.7. Identification of terminals, tightening torques and cable sizes



Module name AXV300 SM-		12040	24080	380140
(1) TERMINAL M1 - DC-LINK CONNECTION				
Terminal name		+, –, +, –	+, –, +, –	+, –, +, –
Maximum cable cross-section (flexible conductor)	mm^2	6	16	50
Maximum cable cross-section (rigid conductor)	mm^2	10	20	50
Maximum cable cross-section	AWG	8	4	1/0
Stripping length	mm	12	16	24
Min/max tightening torque	Nm	1.2 / 1.5	2 / 2.3	6 / 8
Recommended tool		Slotted-head screwdriver 1.0 x 4.0 x 100 mm	Slotted-head screwdriver 1.0 1.0 x .6.5 x 150 mm	5 mm hex wrench

Note ! Details of connection in paragraph **"10.4. DC-link System" on page 110**

Module name AXV300 SM-		12040	24080	380140
(2) TERMINAL M2 - MAINS CONNECTION				
Terminal name		**Rt, St, Tt**	**Rt, St, Tt**	**Rt, St, Tt**
Maximum cable cross-section (flexible conductor)	mm^2	6	16	50
Maximum cable cross-section (rigid conductor)	mm^2	10	20	50
Maximum cable cross-section	AWG	8	4	1/0
Stripping length	mm	12	16	24
Min/max tightening torque	Nm	1.2 / 1.5	2 / 2.3	6 / 8
Recommended tool		Slotted-head screwdriver 1.0 x 4.0 x 100 mm	Slotted-head screwdriver 1.0 1.0 x .6.5 x 150 mm	5 mm hex wrench

Module name AXV300 SM-		12040	24080	380140
(3) TERMINAL M3 - BRAKING RESISTOR CONNECTION				
Terminal name		**R+, R-**	**R+, R-**	**R+, R-**
Maximum cable cross-section (flexible conductor)	mm^2	6	6	50
Maximum cable cross-section (rigid conductor)	mm^2	10	10	50
Maximum cable cross-section	AWG	8	8	1/0
Stripping length	mm	12	12	24
Min/max tightening torque	Nm	1.2 / 1.5	1.2 / 1.5	6 / 8
Recommended tool		Slotted-head screwdriver 1.0 x 4.0 x 100 mm	Slotted-head screwdriver 1.0 1.0 x .6.5 x 150 mm	5 mm hex wrench

Module name AXV300 SM-		12040	24080	380140
(4) TERMINAL M4 - AUXILIARY GRID CONNECTION				
Terminal name		**R, S, T**		
Maximum cable cross-section:				
- flexible conductor	mm^2	4		
- rigid conductor	mm^2	4		
Maximum cable cross-section	AWG	10		
Stripping length	mm	10		
Min/max tightening torque	Nm	0.5 ... 0.6		
Recommended tool		0.6 x 3.5 x 100 mm slotted-head screwdriver		

Note ! Details of connection in paragraph **"10.2. Electrical connection of AXV300 SM supply modules" on page 101.**

Module name AXV300 SM-		12040	24080	380140
(5) TERMINAL P1 - MODULE INTERNAL POWER SUPPLY CONNECTION				
Terminal name (Terminal code)		**0V, 24V** (6STB019)		
Maximum cable cross-section (flexible conductor)	mm^2	2.5		
Maximum cable cross-section	AWG	12		
Stripping length	mm	7		
Min/max tightening torque	Nm	0.6		
Recommended tool		0.6 x 3.5 x 100 mm slotted-head screwdriver		

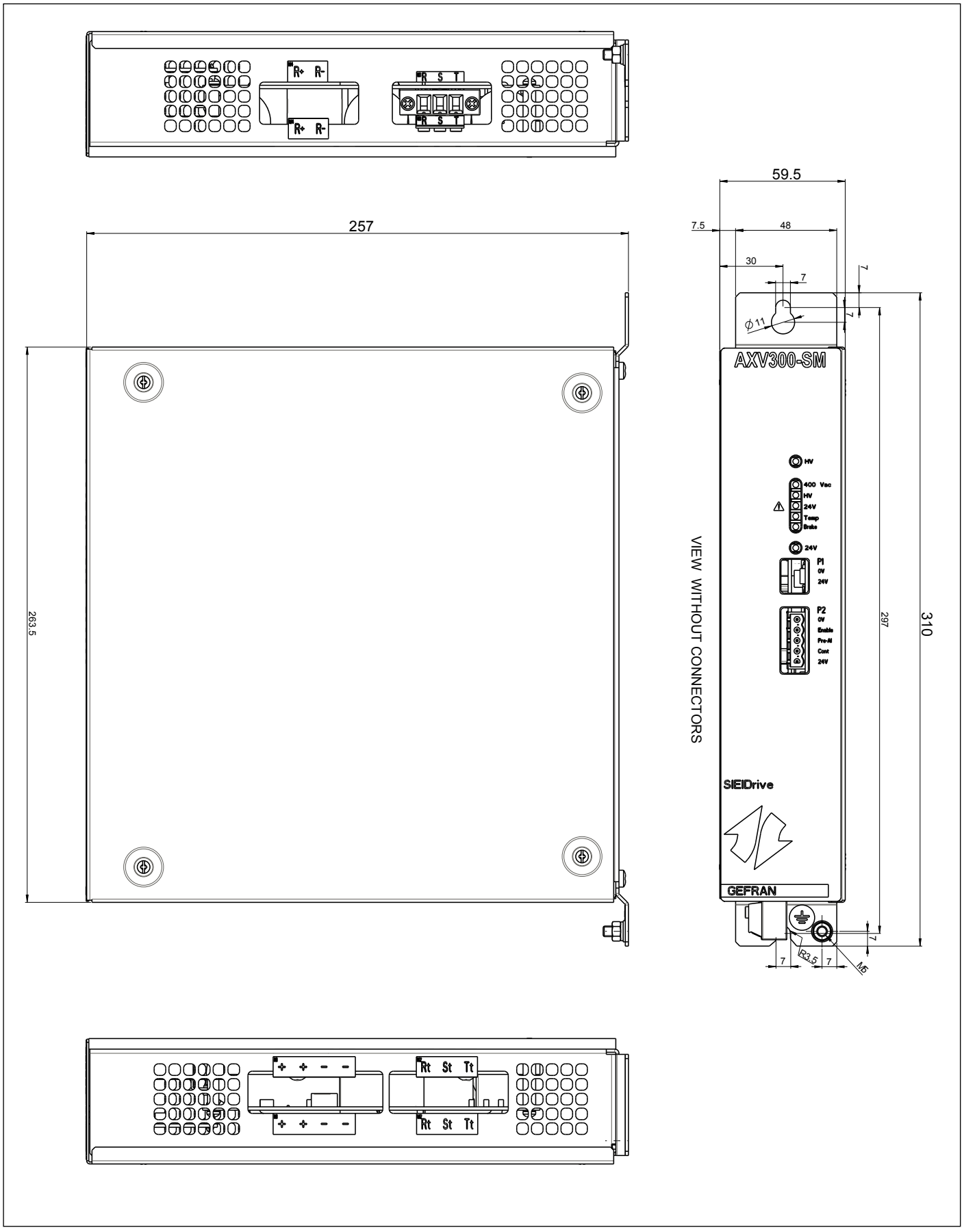
Note ! Details of connection in paragraph **"4.5.1. Low voltage power supply" on page 36.**

Module name AXV300 SM-		12040	24080	380140
(6) TERMINAL P2 - I/O CONNECTION				
Terminal name (Terminal code)		**0V, Enable, Pre-AI, Cont, 24V** (6STB020)		
Maximum cable cross-section (flexible conductor)	mm^2	2.5		
Maximum cable cross-section	AWG	12		
Stripping length	mm	7		
Min/max tightening torque	Nm	0.6		
Recommended tool		0.6 x 3.5 x 100 mm slotted-head screwdriver		

Note ! Details of connection in paragraph **"10.2. Electrical connection of AXV300 SM supply modules" on page 101.**

Module name AXV300 SM-		12040	24080	380140
(7) TERMINAL ⏚ - GROUND CONNECTION				
Cable cross-section	mm^2	10	10	10
	AWG	8	8	8
Lock screw diameter	mm	M5	M5	M5
Recommended terminal		Eyelet		
Tightening torque	Nm	6	6	6
Recommended tool		8-mm hex socket wrench		

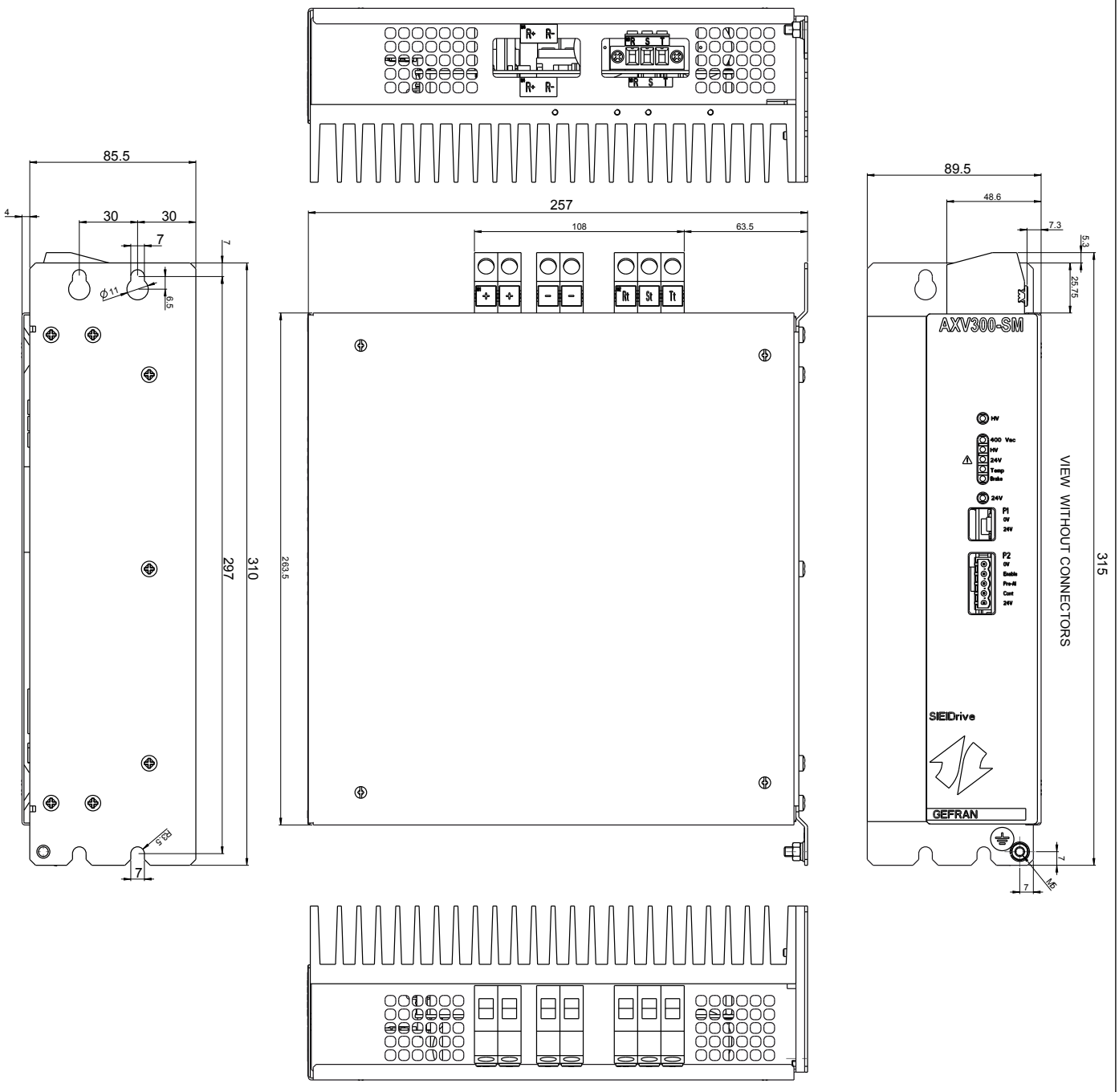
4.8. Size AXV300 SM-12040 dimensions and weight



Values in mm [inches]. Extractable terminals not included (front)

Module	Lenght mm [inches]	Height mm [inches]	Width mm [inches]	Weight kg [lbs]
AXV300 SM-12040	59.5 [23.42]	310 [12.20]	257 [10.11]	2 [4.4]

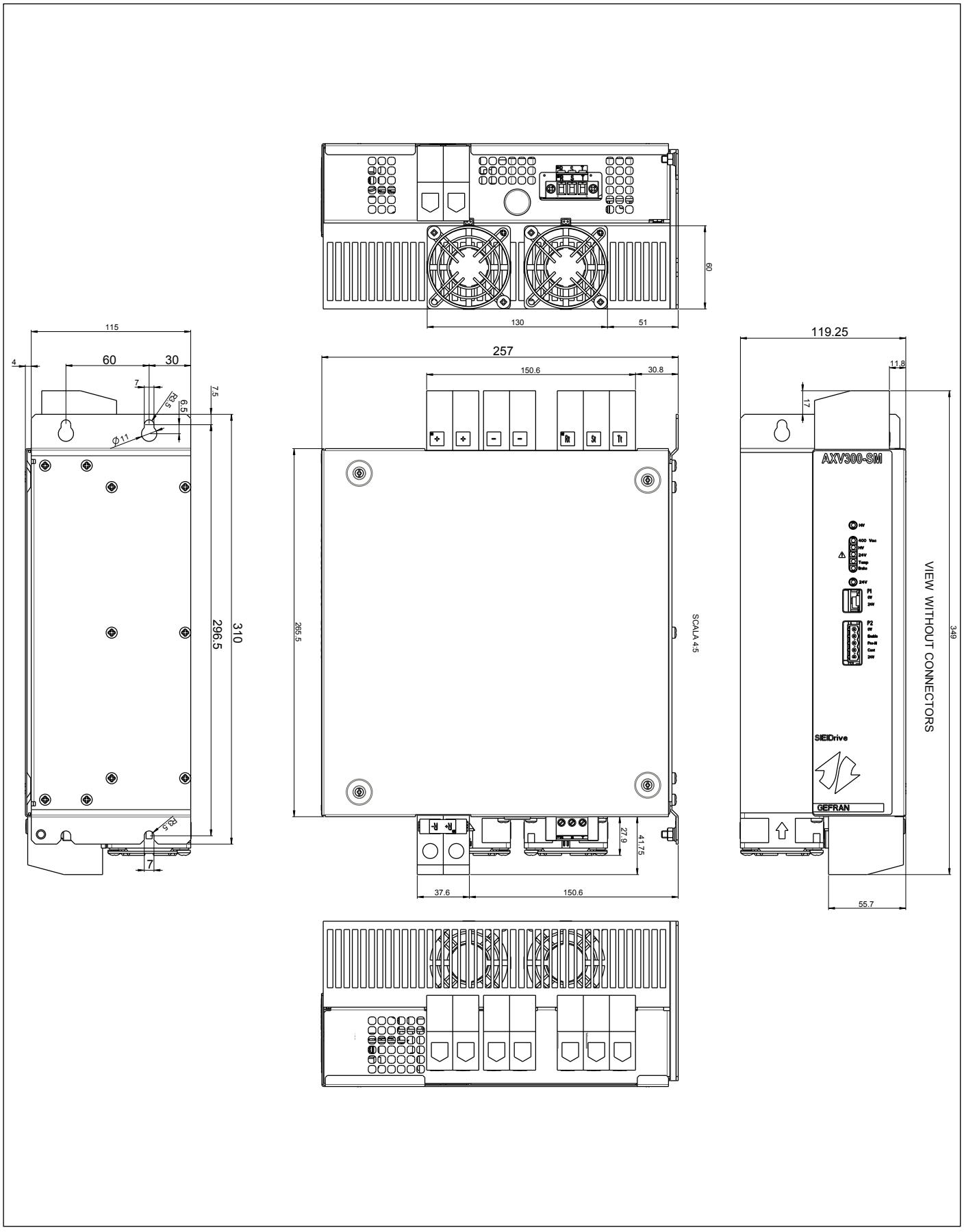
4.9. Size AXV300 SM-24080 dimensions and weight



Values in mm [inches]. Extractable terminals not included (front)

Module	Lenght mm [inches]	Height mm [inches]	Width mm [inches]	Weight kg [lbs]
AXV300 SM-24080	89.5 [3.52]	310 [12.20]	257 [10.11]	4 [8.8]

4.10. Size AXV300 SM-380140 dimensions and weight



Values in mm [inches]. Extractable terminals not included (front)

Module	Lenght mm [inches]	Height mm [inches]	Width mm [inches]	Weight kg [lbs]
AXV300 SM-380140	119.25 [4.7]	310 [12.20]	257 [10.11]	9 [19.8]

5 - AXV300 AFE-SR - Regenerative supply control module

5.1. General information

The **AXV300-AFE-SR** regenerative module controls the regenerative supply module that feeds energy back into the grid. **AXV300- SR xxx** power modules are available in a range of sizes. Used together these two modules form the regenerative supply module.

The regenerative supply module stabilises the DC bus voltage at 625 VDC.

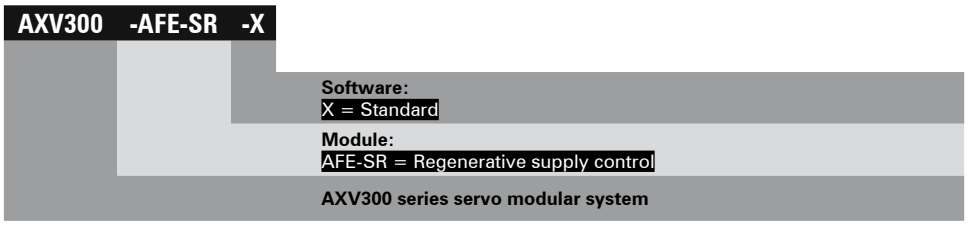
The power and current delivered correspond to those of the **AXV300-SR xxxxx** module that is used.

To determine the number and type of modules that can be connected to the regenerative supply module, check that the sum of the power absorbed by the modules less, where applicable, any coincidence factors, does not exceed the specified maximum peak power for the axis module used.

The three-phase input voltage must be 400 VAC ± 10%, with a frequency of 50 Hz or 60 Hz.

Regeneration chokes must also be installed in series with the three-phase power supply, to ensure correct regenerative supply module operation, as shown in the connection diagram **"10.3. AXV300 SR and AXV300 AFE-SR regenerative module electrical connection" on page 103**.

5.2. Product identification



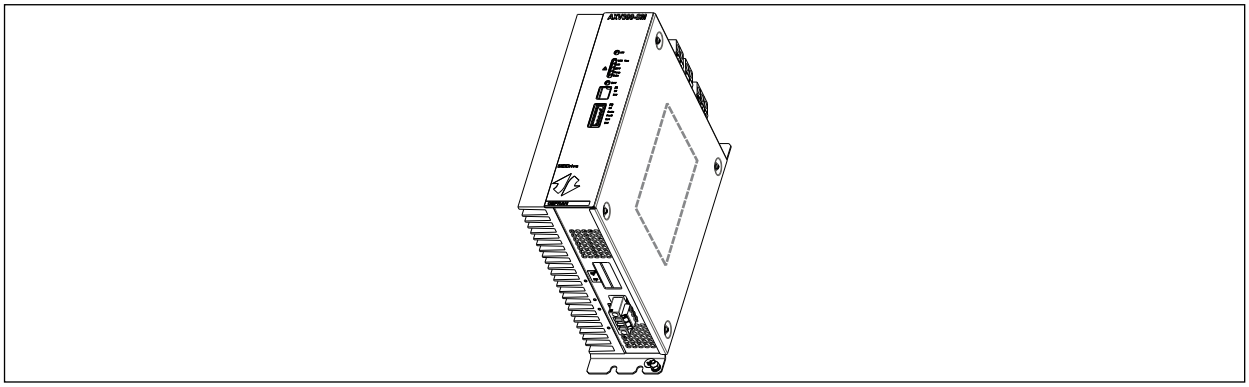


Figure 10: Position of data plates

Type :	AXV300-AFE-SR-X	S/N: 012345678
Inp:	400Vac 50/60Hz 3ph	0.8A@400Vac
Out :	625Vdc	
	Made in Italy	CE

Type : Servo Model

S/N : Serial number

Inp: Input (Main supply, Input current)

Out: Output (voltage)

Approvals

Figure 11: Identification Nameplate

Firmware Release	HW release				S/N: 012345678			Prod. CONF.
	D	F	P	R	S	BU		
			Power	Regolation	Security	Braking unit		Product configuration

Cards revision

Figure 12: Firmware & cards revision level nameplate

5.3. Input/output specifications

The **AXV300 AFE-SR** supply module is designed for connection to the three-phase mains.

Module name		AXV300 AFE-SR-1
Operating temperature		-10°C ... +50°C (100% fino a 40°C,
INPUT		
VAC Input voltage	[VAC]	400
Input frequency	[Hz]	50/60
Rated Current	[Arms]	0.8
Max. Current	[Arms]	6
OUTPUT		
Output voltage	[Vdc]	625
Rated Current	[A]	1
Peak Current	[A]	3

5.3.1. Low voltage power supply

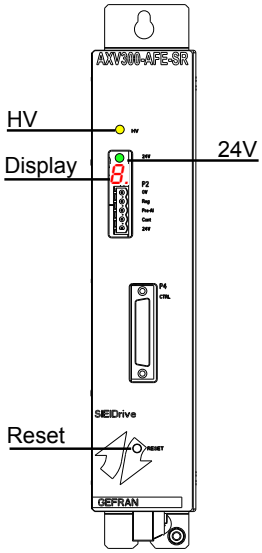
All **AXV300** modules need a 24 VDC supply voltage to power:

- the regulation card and internal logic,
- fan units.

Module name		AXV300 AFE-SR-1
24 V POWER SUPPLY CONNECTOR P2		
Rated voltage	[VDC]	24
Minimum value	[VDC]	21.5
Maximum value	[VDC]	28.8
Average module absorption	[A]	0.5

5.4. Indicator LEDs, Display and Reset Button

The yellow and green LEDs (**HV, 24 V**) are lit during normal operation.
Alarms are signalled by an error code shown on the display.



LED	Colour	Meaning
HV	yellow	Presence of high voltage on the power module supply bus
24V	green	Presence of external 24 VDC supply voltage
Display	red	See section **"10.3.3. Static operation" on page 109**

Reset button

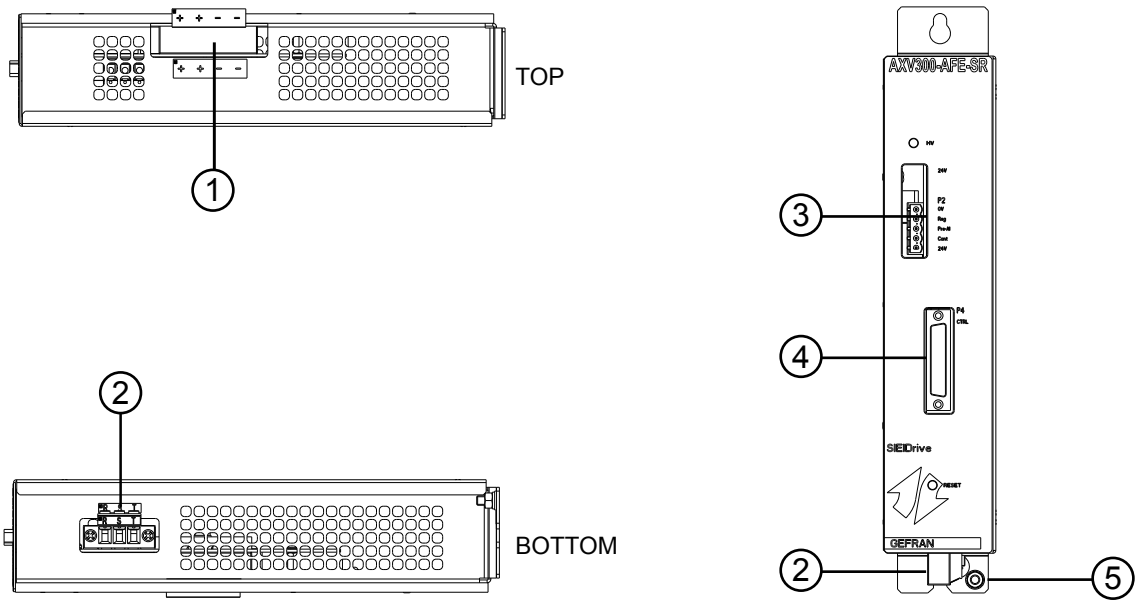
Use a screwdriver or small tool to access this button, which is used to remove the **AXV300 AFE-SR** from an alarm condition in the same way as switching the 24 V power supply off and then on again.

Note ! For further details on power off sequence, see paragraph **"10.6. Power-on, Power-off and Reset Supply Module Alarms Sequences" on page 113**.

Caution

Only press the RESET button to exit an alarm condition. Pressing this button during normal module operation would immediately trigger an alarm and block the supply module.

5.5. Identification of terminals, tightening torques and cable sizes



(1) TERMINAL M1 - DC-LINK CONNECTION		
Terminal name		+, –, +, –
I Max to other modules (DC-LINK)	[A]	40
Maximum cable cross-section (flexible conductor)	mm^2	6
Maximum cable cross-section (rigid conductor)	mm^2	10
Maximum cable cross-section	AWG	8
Stripping length	mm	12
Min/max tightening torque	Nm	1.2 / 1.5
Recommended tool - slotted-head screwdriver		1.0 x 4.0 x 100 mm

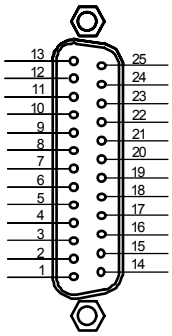
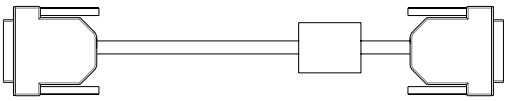
Note ! Details of connection in paragraph **"10.4. DC-link System" on page 110**

(2) TERMINAL M2 - AUXILIARY GRID CONNECTION		
Terminal name		**R, S, T**
Maximum cable cross-section:		
- flexible conductor	mm^2	4
- rigid conductor	mm^2	4
Maximum cable cross-section	AWG	10
Stripping length	mm	10
Min/max tightening torque	Nm	0.5 ... 0.6
Recommended tool		0.6 x 3.5 x 100 mm slotted-head screwdriver

Note ! Details of connection in paragraph **"5.3. Input/output specifications" on page 45**.

(3) TERMINAL P2 - I/O CONNECTION		
Terminal name		**0V, Enable, Pre-AI, Cont, 24V**
Maximum cable cross-section (flexible conductor)	mm^2	2.5
Maximum cable cross-section	AWG	12
Stripping length	mm	7
Min/max tightening torque	Nm	0.6
Utensile consigliato		0.6 x 3.5 x 100 mm slotted-head screwdriver

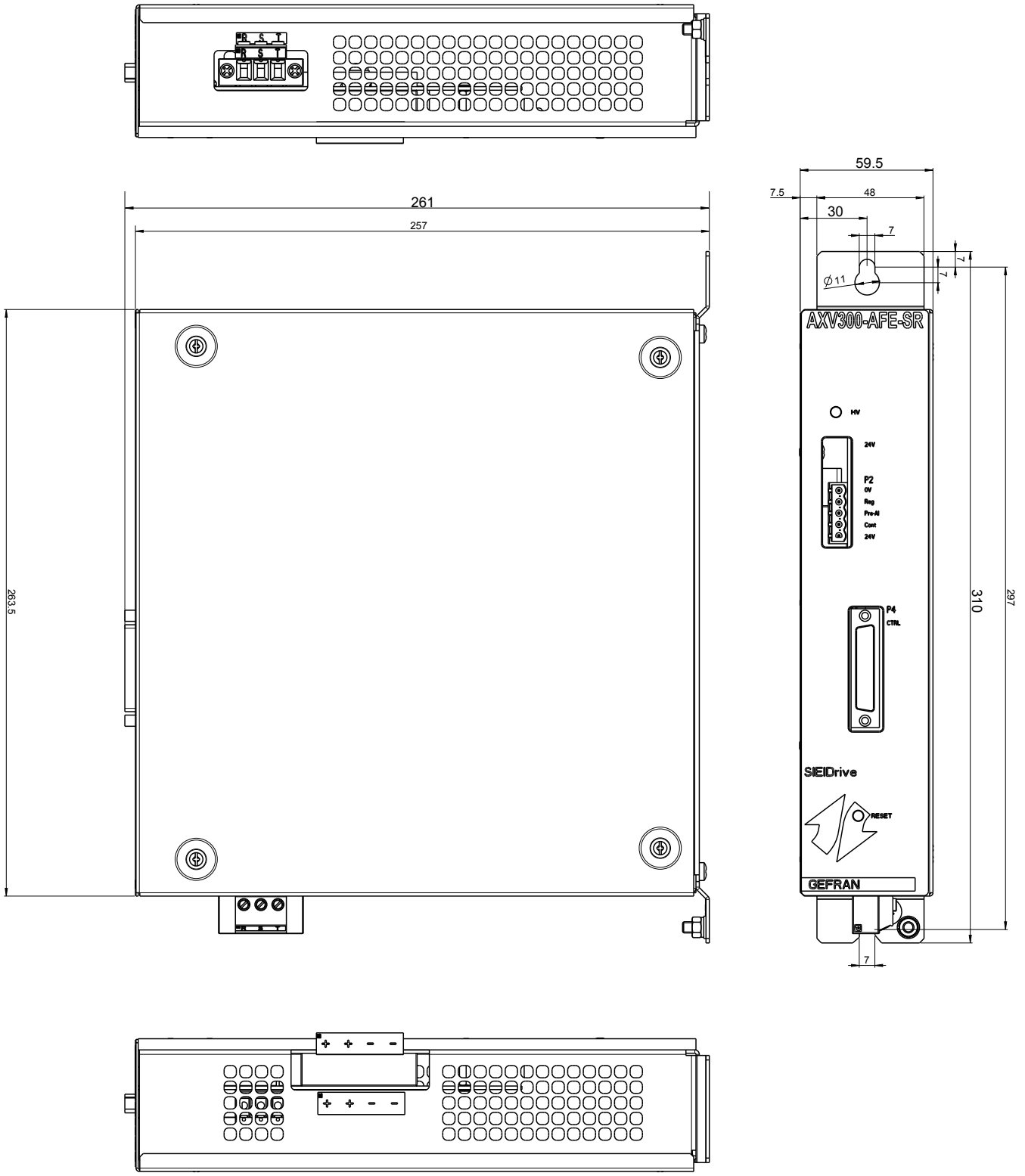
Note ! For details on connection. see paragraph **"10.3.1. Interconnections" on page 105**.

(4) TERMINAL P4 - CTRL CONNECTION		
Male 25-pin receptacle connector		 Cable cod. S72769.

Note ! See **"Figure 44: AXV300 SR and AXV300 AFE-SR module (regenerative supply module) connection diagram" on page 104**.
The cable (code S72769) is available as an accessory for this connection.

(8) TERMINAL ⏚ - GROUND CONNECTION		
Cable cross-section	mm^2	10
	AWG	8
Lock screw diameter	mm	M5
Recommended terminal		Eyelet
Tightening torque	Nm	6
Recommended tool		8-mm hex socket wrench

5.6. Size AXV300 AFE-SR-1 dimensions and weight



Values in mm [inches]. Extractable terminals not included (front)

Module	Lenght mm [inches]	Height mm [inches]	Width mm [inches]	Weight kg [lbs]
AXV300 AFE-SR-1	59.5 [23.42]	310 [12.20]	261 [10.27]	2 [4.4]

6 - AXV300 SR - Regenerative power supply module

6.1. General information

The AXV300 SR is the power module of the regenerative supply module. It is available in sizes ranging from 4/13 Arms to 200/320 Arms.

Used with the **AXV300 AFE-SR** power module it forms the system's regenerative supply module.

Thermal protection

The **AXV300 SR-XXXX** supply modules have a maximum internal temperature, measured on the power module and referred to as the thermal protection temperature. The thermal protection temperature is set to 110 °C. When the internal temperature approaches the thermal protection level and exceeds 95°C, a pre-alarm signal (24 V) moves to high (on connector P1 of the **AXV300 AFE-SR** module). The pre-alarm signal should be monitored and used for controlled shutdown of the system in case of overtemperature.

6.2. Product identification

AXV300 -SR -1 04 13 -X

Software:
X = Standard

Max Output Current:
13 = 13 Arms
20 = 20 Arms
40 = 40 Arms
70 = 70 Arms
100 = 100 Arms
160 = 160 Arms
200 = 200 Arms
210 = 210 Arms
250 = 250 Arms
320 = 320 Arms

Rated Current:
04 = 4 Arms
10 = 10 Arms
20 = 20 Arms
35 = 35 Arms
50 = 50 Arms
80 = 80 Arms
100 = 100 Arms
140 = 140 Arms
200 = 200 Arms

Mechanical Dimensions:
1 = size 1
2 = size 2
3 = size 3
4 = size 4
5 = size 5
6 = size 6

Module:
SR = Power supply module

AXV300 series servo modular system

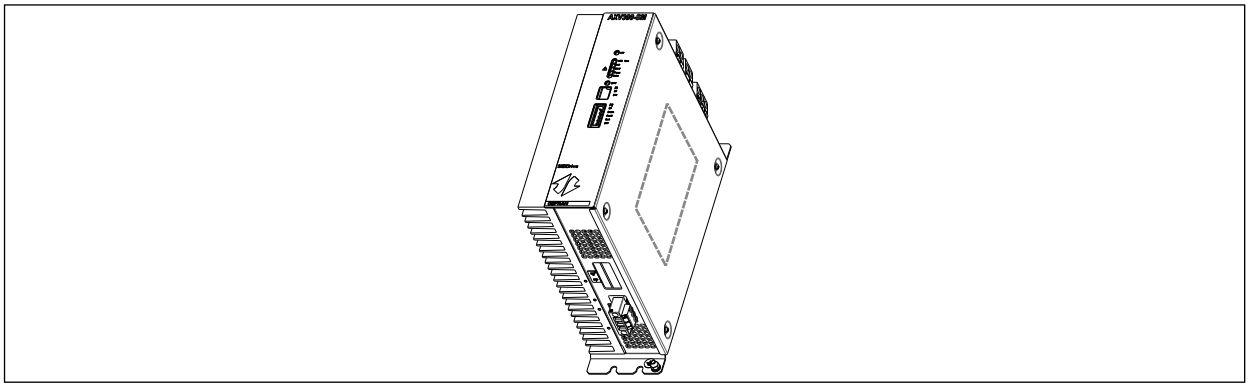
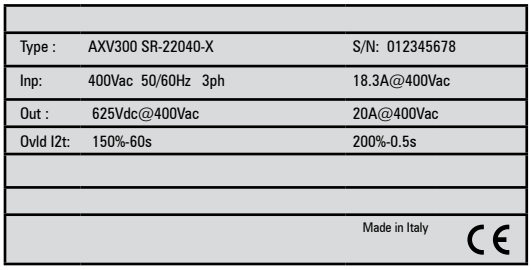


Figure 13: Position of data plates



Type : Servo Model **S/N** : Serial number

Inp: Input (Main supply, Input current)

Out: Output (voltage, frequency, power, current, I2t and Ixt overload)

Approvals

Figure 14: Identification Nameplate

Firmware Release	HW release				S/N: 012345678			Prod. CONF.
	D	F	P	R	S	BU	SW. CFG	
A 1.00	A		-A	-.-			1.000	A1
			Power	Regolation	Security	Braking unit	Software revision (configurator)	Product configuration

Firmware revision

Cards revision

Figure 15: Firmware & cards revision level nameplate

6.3. Input/output specifications

The **AXV300 SR** upply module is designed for connection to the three-phase mains.

Module name AXV300 SR-		10413	21020	22040	33570	350100	480160	5100200	5140210	6200250	6200320
Operating temperature		-10°C ... +50°C (100% fino a 40°C)									
Average dissipated power (*)	[W]	30	75	140	240	360	550	780	1120	1850	1850
INPUT (AC side)											
Vac Input voltage	[VAC]	400 VAC ±10%									
Intput Frequency	[Hz]	50/60									
Rated Current	[Arms]	4.1	9.1	18.3	32	46	73	91,5	128	183,5	183,5
Max. Current	[Arms]	12.2	18.3	36.3	64	91.5	147	183	185	288	367
OUTPUT (DC side)											
Output voltage	[Vdc]	625									
Rated Current	[A]	4,5	10	20	35	50	80	100	140	200	200
Peak Current	[A]	13.5	20	40	70	100	160	200	210	250	320
Rated Power	[kW]	2.8	6.3	12.5	21.9	31.3	50	62.5	87.5	125	125
Peak Power	[kW]	8.4	12.5	25	43.8	62.5	100	125	131.3	156.3	200

(*) At nominal condition.

6.3.1. Low voltage power supply

All **AXV300** modules need a 24 VDC supply voltage to powe:

- the regulation card and internal logic,
- fan units.

Module name AXV300 SR-		10413	21020	22040	33570	350100	480160	5100200	5140210	6200250	6200320
24 V POWER SUPPLY CONNECTORS P2 - P3											
Rated voltage	[VDC]	24									
Minimum value	[VDC]	21.5									
Maximum value	[VDC]	28.8									
P1 and P2 max. cable cross-section (24Vdc)	[mm²]	0.05 ... 2,5 mm² (30 ...12 AWG)									
Average module absorption	[A]	0.5 + power contactor absorption									

6.3.2. 24 V power supply fans

Module name AXV300 SR-		10413	21020	22040	33570	350100	480160	5100200	5140210	6200250	6200320
24 V POWER SUPPLY FANS WITH SEPARATE POWER SUPPLY											
Average absorption	[A]	-	-	-	-	-	1	2	3	4	4

6.3.3. Supply module dimensions

The supply module must be dimensioned to allow for the inductive load of the fans. High current levels are therefore requested for a relatively long time at start-up, especially in big axis modules with a separate fan power supply. This must either be taken into consideration in the system start-up sequence or there must be a separate supply module.

Given the power absorbed by the axis modules, the 24 VDC power supply alone causes considerable heating of the metal containers in the front of the module. This is normal.

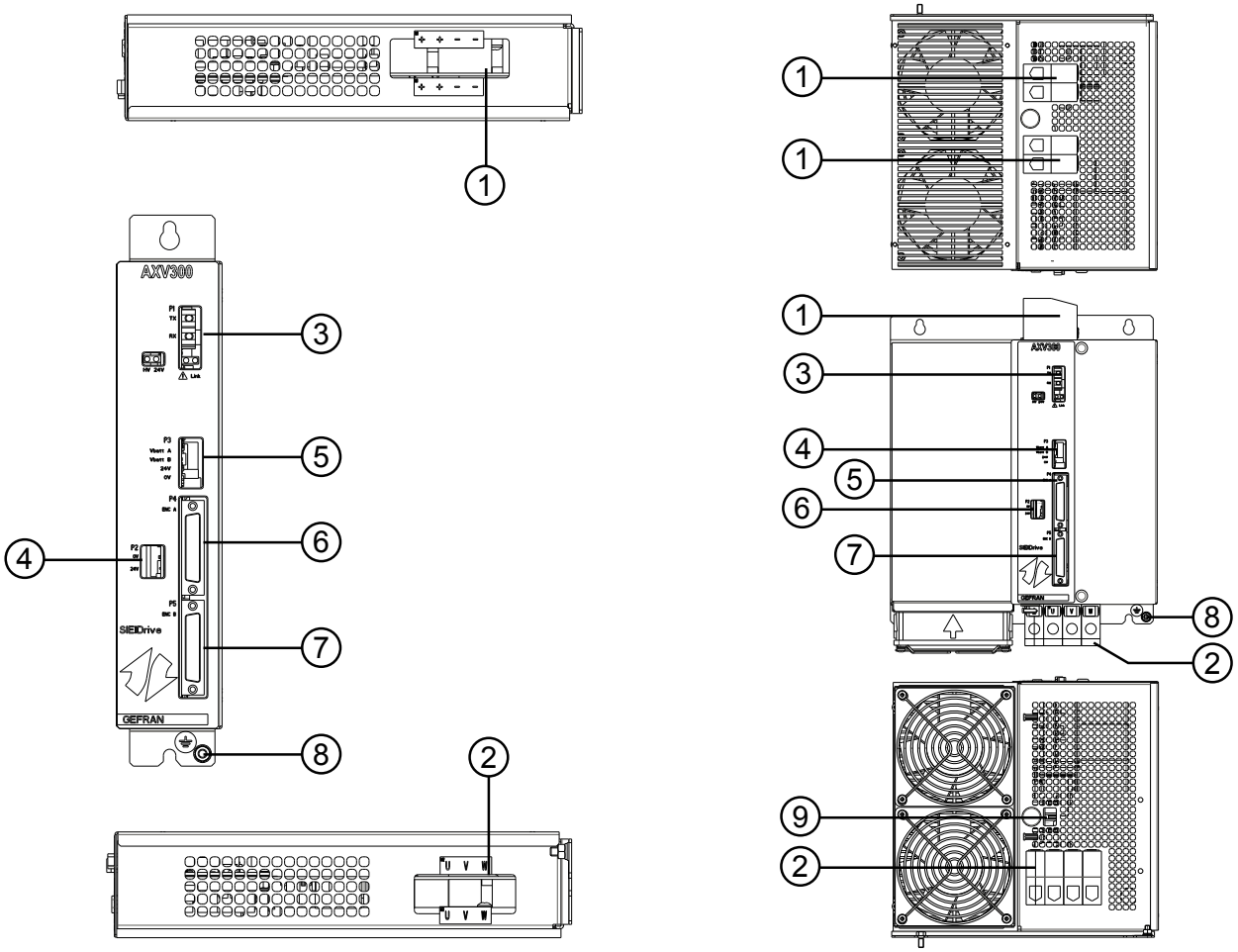
E.g.:

Power contactor consumption = 0.2 A

Average AXV300 SR supply module absorption = 0.50 + 0.2 = 0.7 A

AXV300 SR-5100200 supply module = 0.7 + 2 = 2.7 A

6.4. Identification of terminals, tightening torques and cable sizes



Module name AXV300 SR-		10413	21020	22040	33570	350100	480160	5100200	5140210	6200250	6200320
(1) TERMINAL M1 - DC-LINK CONNECTION											
Terminal name		+, –, +, –			+, –, +, –		+, –, +, –			+, –, +, –	+, –, +, –
I Max to other modules (DC-LINK)	[A]	40			100		160			260	260
Maximum cable cross-section (flexible conductor)	mm^2	6			16		50			95	95
Maximum cable cross-section (rigid conductor)	mm^2	10			20		50			95	95
Maximum cable cross-section	AWG	8			4		1/0			3/0	3/0
Stripping length	mm	12			16		24			27	27
Min/max tightening torque	Nm	1.2 / 1.5			2 / 2.3		6 / 8			20	20
Recommended tool		1.0 x 4.0 x 100 mm slotted-head screwdriver			5 mm hex wrench					6 mm hex wrench	

Note! Details of connection in paragraph **"10.4. DC-link System" on page 110**

Module name AXV300 SR-		10413	21020	22040	33570	350100	480160	5100200	5140210	6200250	6200320
(2) TERMINAL M2 - MAIN GRID CONNECTION											
Terminal name		**U, V, W**			**U, V, W** ⏚		**U, V, W** ⏚			**U, V, W** ⏚	**U, V, W** ⏚
Maximum cable cross-section (flexible conductor)	mm^2	6			16		50			95	95
Maximum cable cross-section (rigid conductor)	mm^2	10			25		50			95	95
Maximum cable cross-section	AWG	8			4		1/0			3/0	3/0
Stripping length	mm	12			16		24			27	27
Min/max tightening torque	Nm	1.2 / 1.5			2 / 2.3		6 / 8			20	20
Recommended tool		1.0 x 4.0 x 100 mm slotted-head screwdriver			5 mm hex wrench					6 mm hex wrench	

Note ! Details of connection in paragraph **"10.1. Electrical connection of AXV300 axis modules" on page 98**

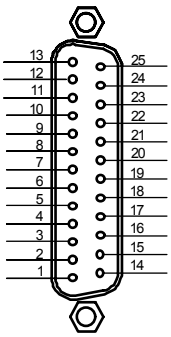
Module name AXV300 SR-		10413	21020	22040	33570	350100	480160	5100200	5140210	6200250	6200320
(3) TERMINAL P1 - OPTICAL FIBRE CONNECTION											
Terminals name		**TX - RX**									
Type		For "HFBR-4501"-type connectors (Supplied by Avago Technologies), Gefran code: 6S8V83.									
Cable		980/1000μm plastic optical fibre									

Note ! Details of connection in paragraph **"10.5. GStar Communication System" on page 112** and **"13.8.1. Optical fibre link connection (P1)" on page 142**

Module name AXV300 SR-		10413	21020	22040	33570	350100	480160	5100200	5140210	6200250	6200320
(4) TERMINAL P2 - INTERNAL MODULES POWER SUPPLY CONNECTION											
Terminal name (Terminal code)		**0V, 24V** (6STB019)									
Maximum cable cross-section (flexible conductor)	mm^2	2.5									
Maximum cable cross-section	AWG	12									
Stripping length	mm	7									
Min/max tightening torque	Nm	0.6									
Recommended tool		0.6 x 3.5 x 100 mm slotted-head screwdriver									

Note ! Details of connection in paragraph **"6.3.1. Low voltage power supply" on page 52**

Module name AXV300 SR -		10413	21020	22040	33570	350100	480160	5100200	5140210	6200250	6200320
(5) TERMINAL P3 - I/O CONNECTION											
Terminal name		**Vbatt A, Vbatt B, 24V, 0V**									
Maximum cable cross-section (flexible conductor)	mm^2	2.5									
Maximum cable cross-section	AWG	12									
Stripping length	mm	7									
Min/max tightening torque	Nm	0.6									
Recommended tool		0.6 x 3.5 x 100 mm slotted-head screwdriver									

Module name AXV300 SR -	10413	21020	22040	33570	350100	480160	5100200	5140210	6200250	6200320
(6) TERMINAL P4 - ENC A CONNECTION **(7) TERMINAL P5 - ENC B CONNECTION**										
Male 25-pin receptacle connector										

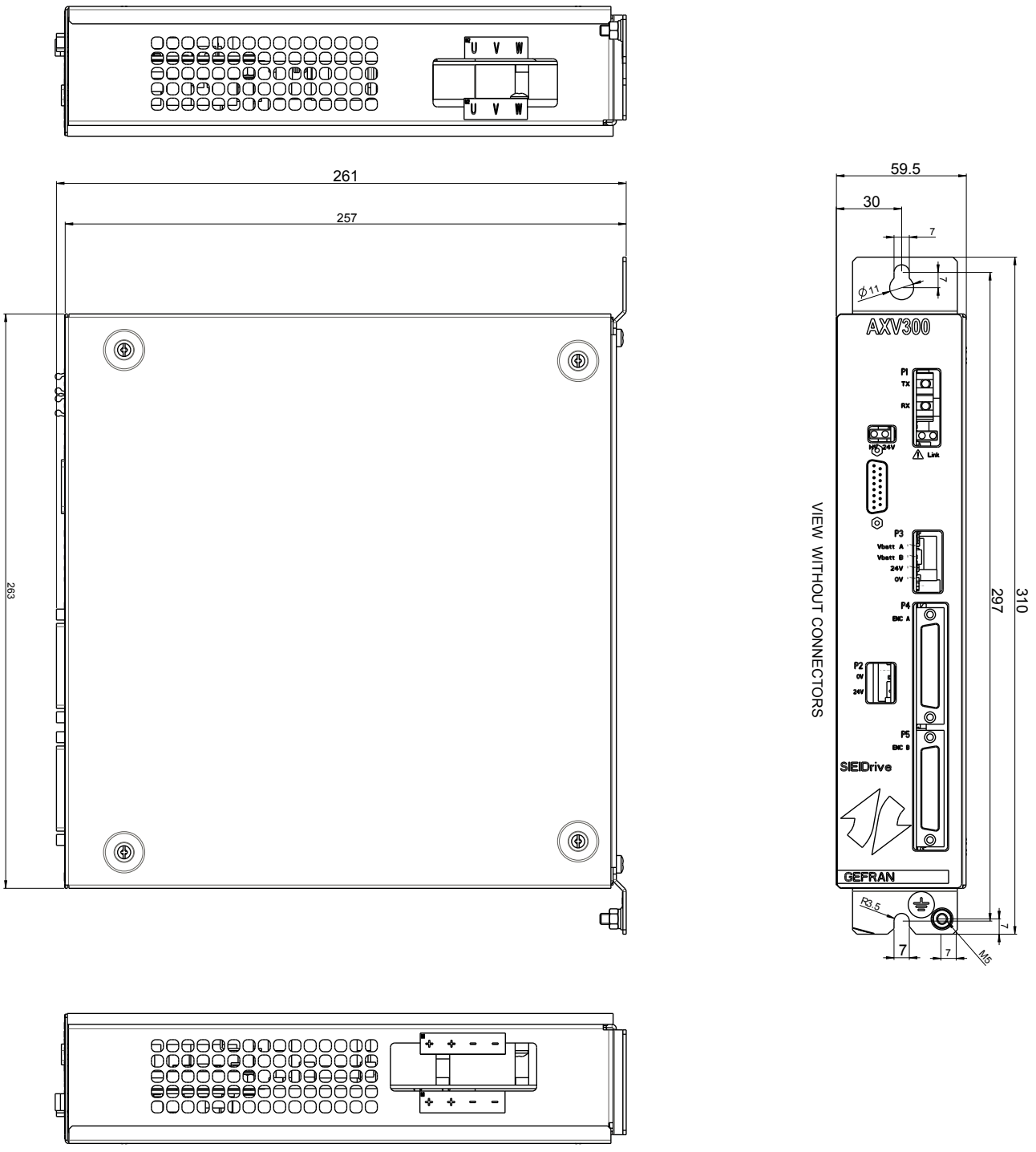
Note ! Details of connection in paragraph **"10.1.1. Encoder connection interface" on page 99.**

Module name AXV300 SR -		10413	21020	22040	33570	350100	480160	5100200	5140210	6200250	6200320
(8) TERMINAL ⏚ - GROUND CONNECTION											
Cable cross-section	mm^2	10	10	10	10	10	10	10	10	10	10
	AWG	8	8	8	8	8	8	8	8	8	8
Lock screw diameter	mm	M5	M5	M5	M5	M5	M5	M5	M5	M5	M5
Recommended terminal		Eyelet									
Tightening torque	Nm	6	6	6	6	6	6	6	6	6	6
Recommended tool		8-mm hex socket wrench									

Module name AXV300 SR -		10413	21020	22040	33570	350100	480160	5100200	5140210	6200250	6200320
(9) FAN UNIT TERMINAL CONNECTION											
Terminal name (Terminal code)		-	-	-	-	-	**24V, 0V** (6STB017)				
Maximum cable cross-section (flexible conductor)	mm^2	-	-	-	-	-	2.5				
Maximum cable cross-section	AWG	-	-	-	-	-	12				
Stripping length	mm	-	-	-	-	-	7				
Min/max tightening torque	Nm	-	-	-	-	-	0.6				
Recommended tool							0.6 x 3.5 x 100 mm slotted-head screwdriver				

Note ! Details of connection in paragraph **"3.4.3. 24 V power supply fans" on page 18.**

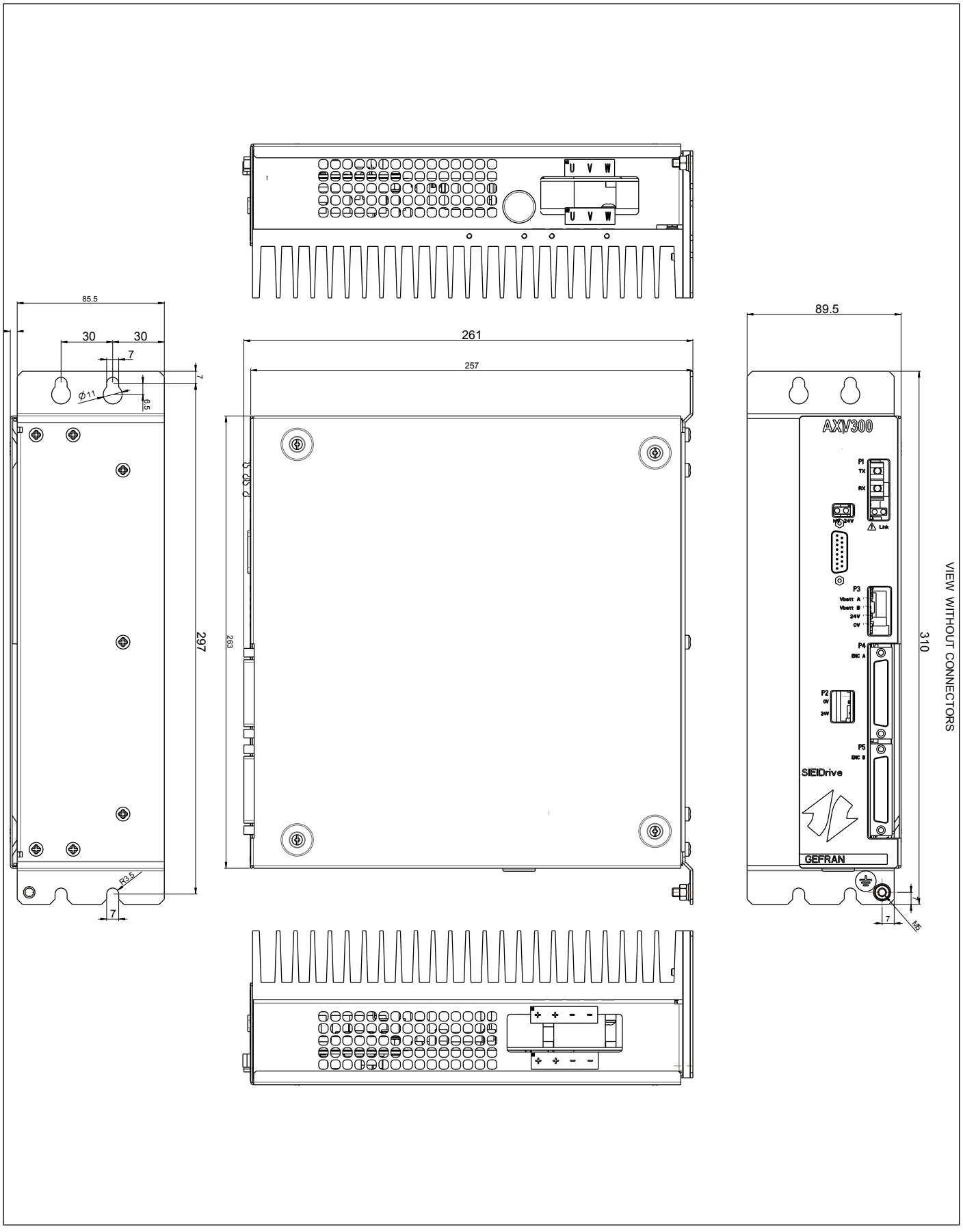
6.5. Size AXV300 SR -10413 dimensions and weight



Values in mm [inches]. Extractable terminals not included (front)

Module	Lenght mm [inches]	Height mm [inches]	Width mm [inches]	Weight kg [lbs]
AXV300 SR-10413	59.5 [23.42]	310 [12.20]	261 [10.27]	3 [6.6]

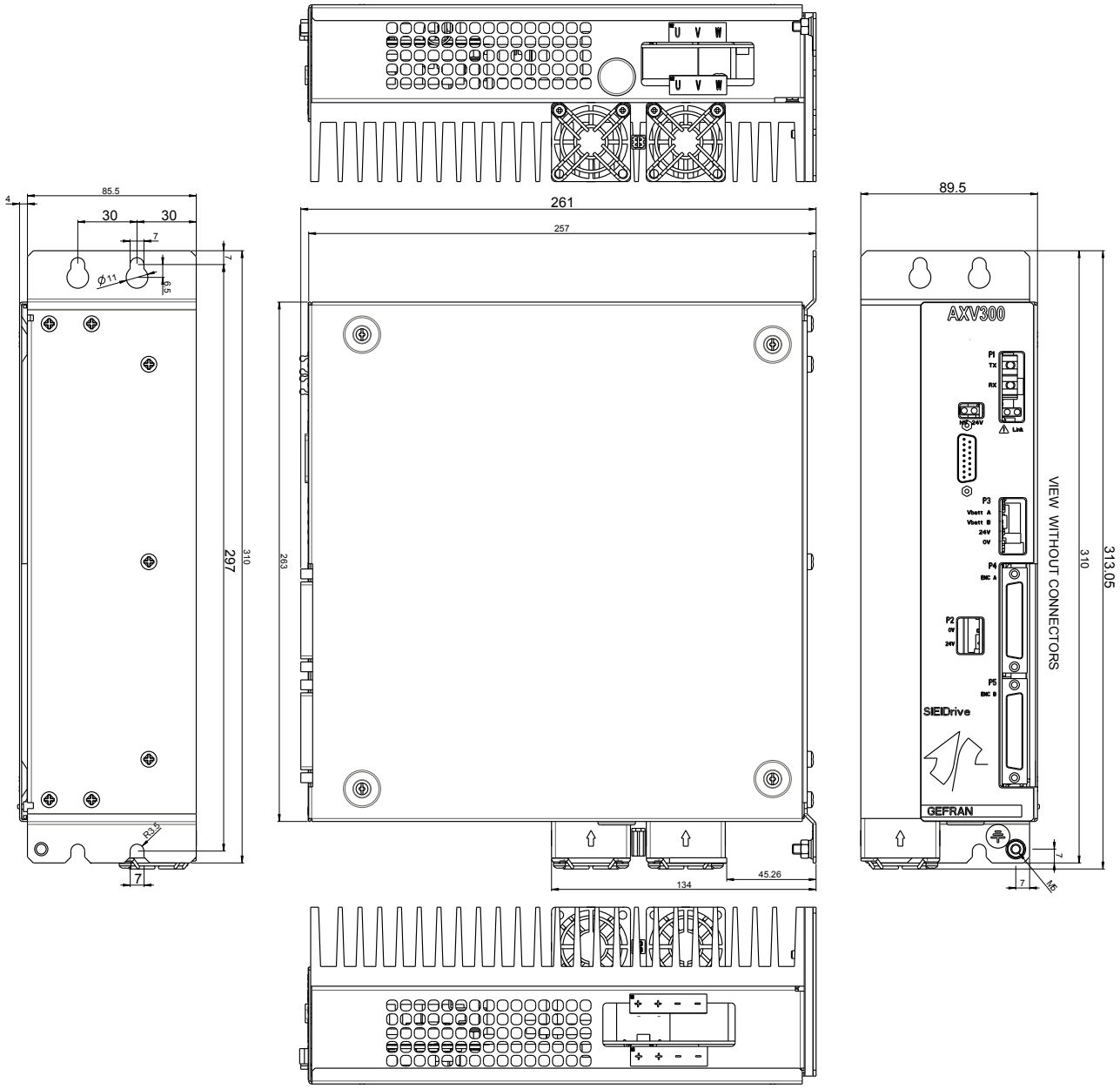
6.6. Size AXV300 SR-21020 dimensions and weight



Values in mm [inches]. Extractable terminals not included (front)

Module	Lenght mm [inches]	Height mm [inches]	Width mm [inches]	Weight kg [lbs]
AXV300 SR-21020	89.5 [3.52]	310 [12.20]	261 [10.27]	5 [11]

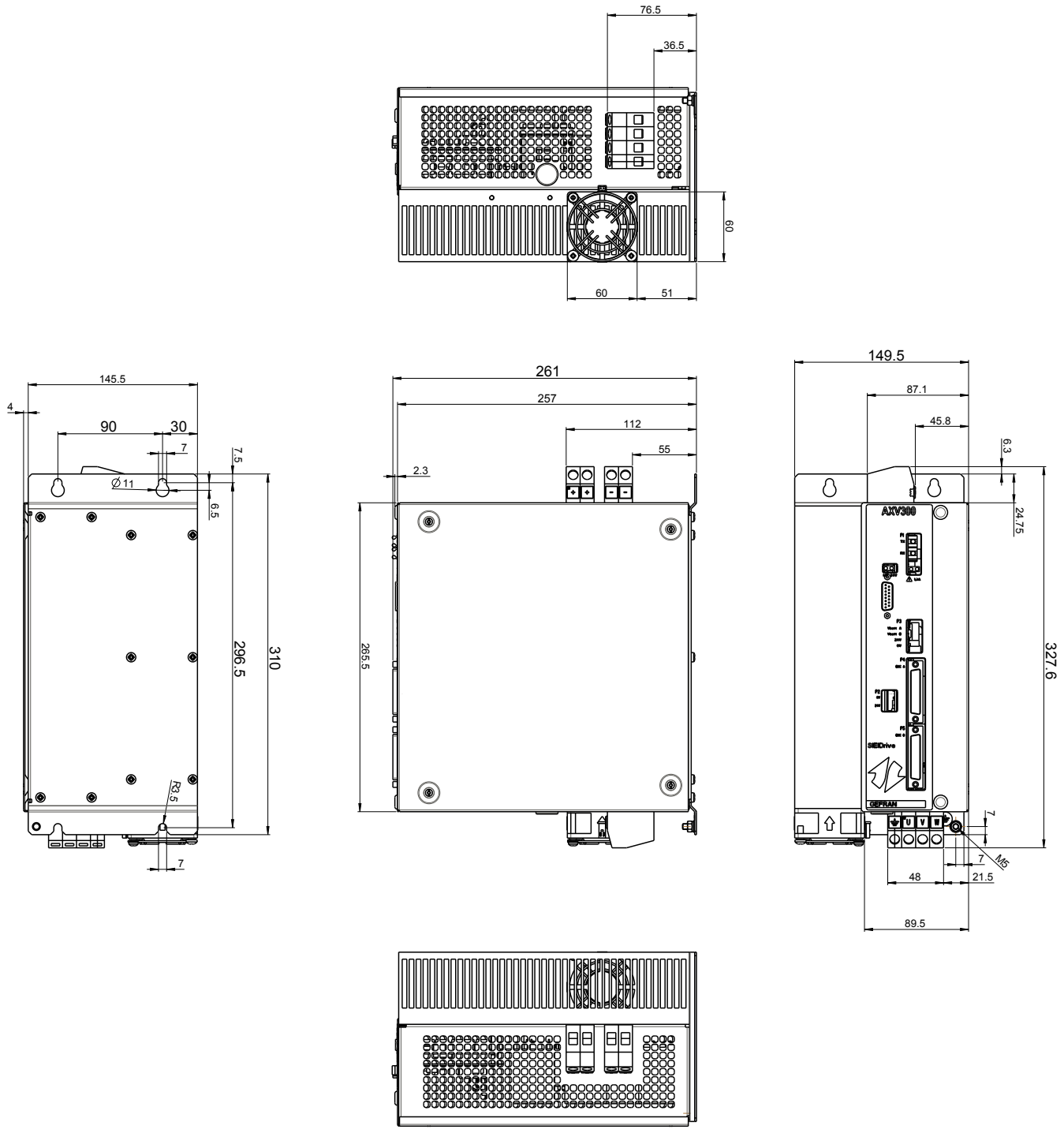
6.7. Size AXV300 SR-22040 dimensions and weight



Values in mm [inches]. Extractable terminals not included (front)

Module	Lenght mm [inches]	Height mm [inches]	Width mm [inches]	Weight kg [lbs]
AXV300 SR-22040	89.5 [3.52]	313 [12.32]	261 [10.27]	5 [11]

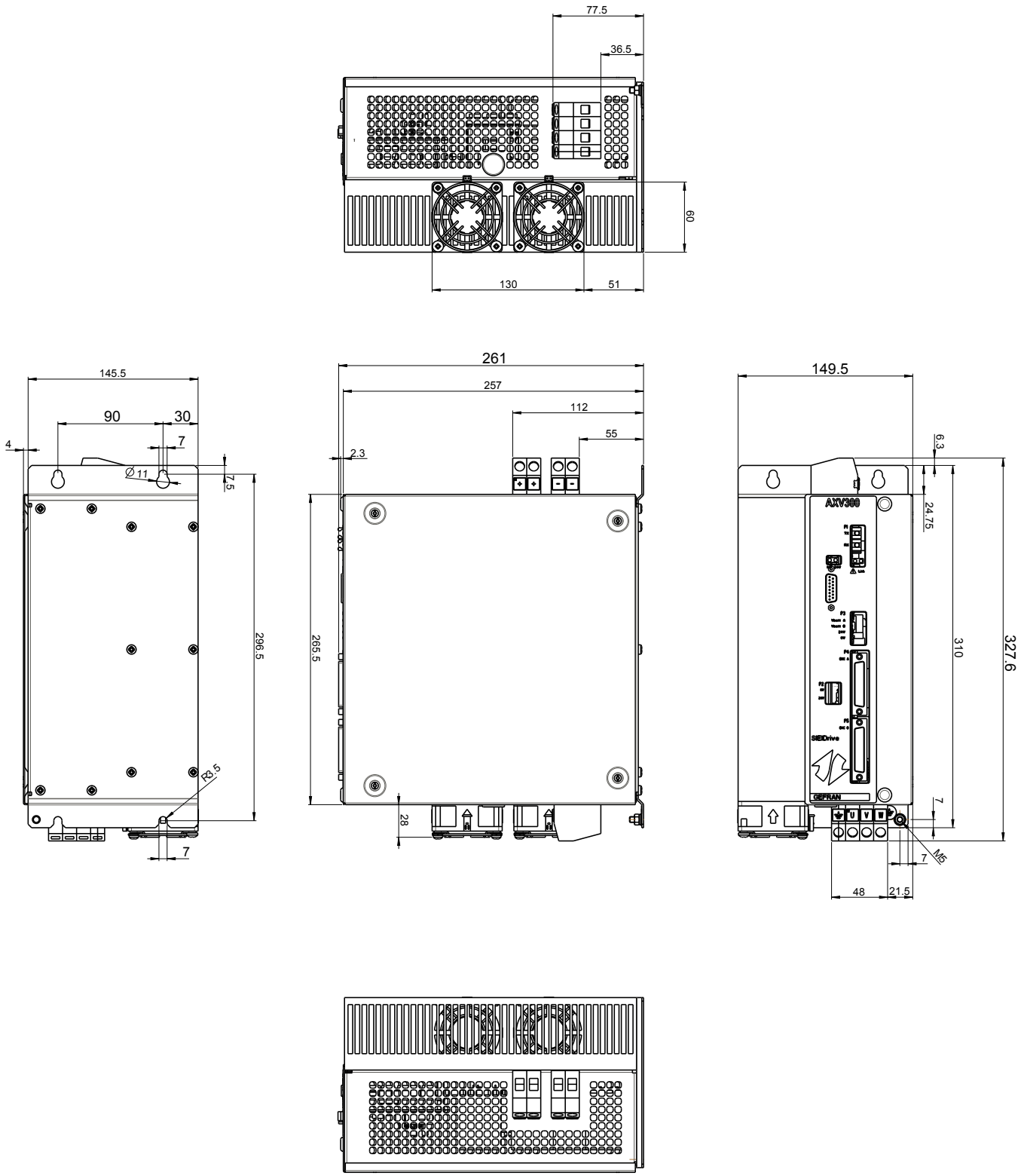
6.8. Size AXV300 SR-33570 dimensions and weight



Values in mm [inches]. Extractable terminals not included (front)

Module	Lenght mm [inches]	Height mm [inches]	Width mm [inches]	Weight kg [lbs]
AXV300 SR-33570	149.5 [5.88]	327.6 [12.9]	261 [10.27]	9 [19.8]

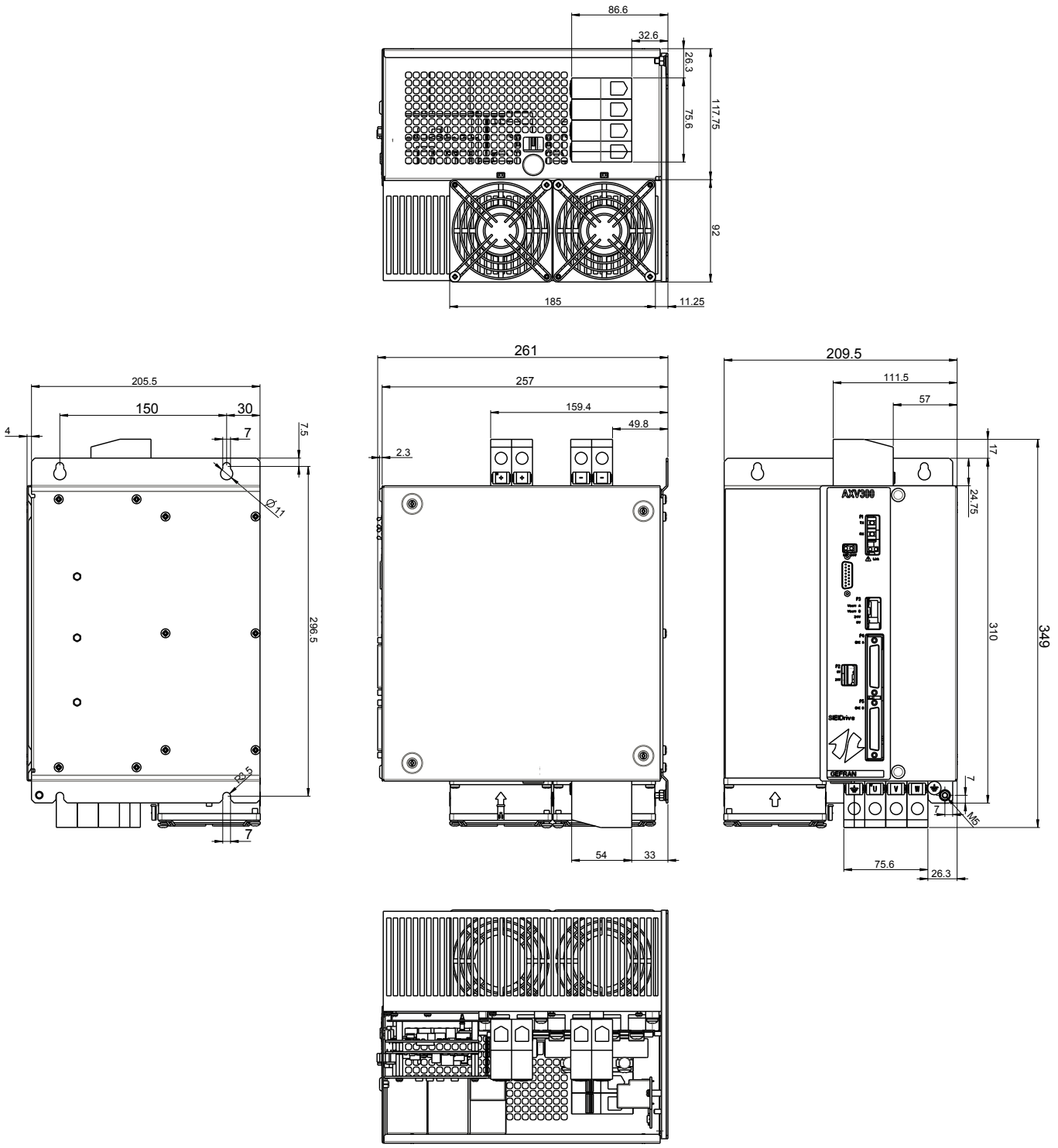
6.9. Size AXV300 SR-350100 dimensions and weights



Values in mm [inches]. Extractable terminals not included (front)

Module	Lenght mm [inches]	Height mm [inches]	Width mm [inches]	Weight kg [lbs]
AXV300 SR-350100	149.5 [5.88]	327.6 [12.9]	261 [10.27]	9 [19.8]

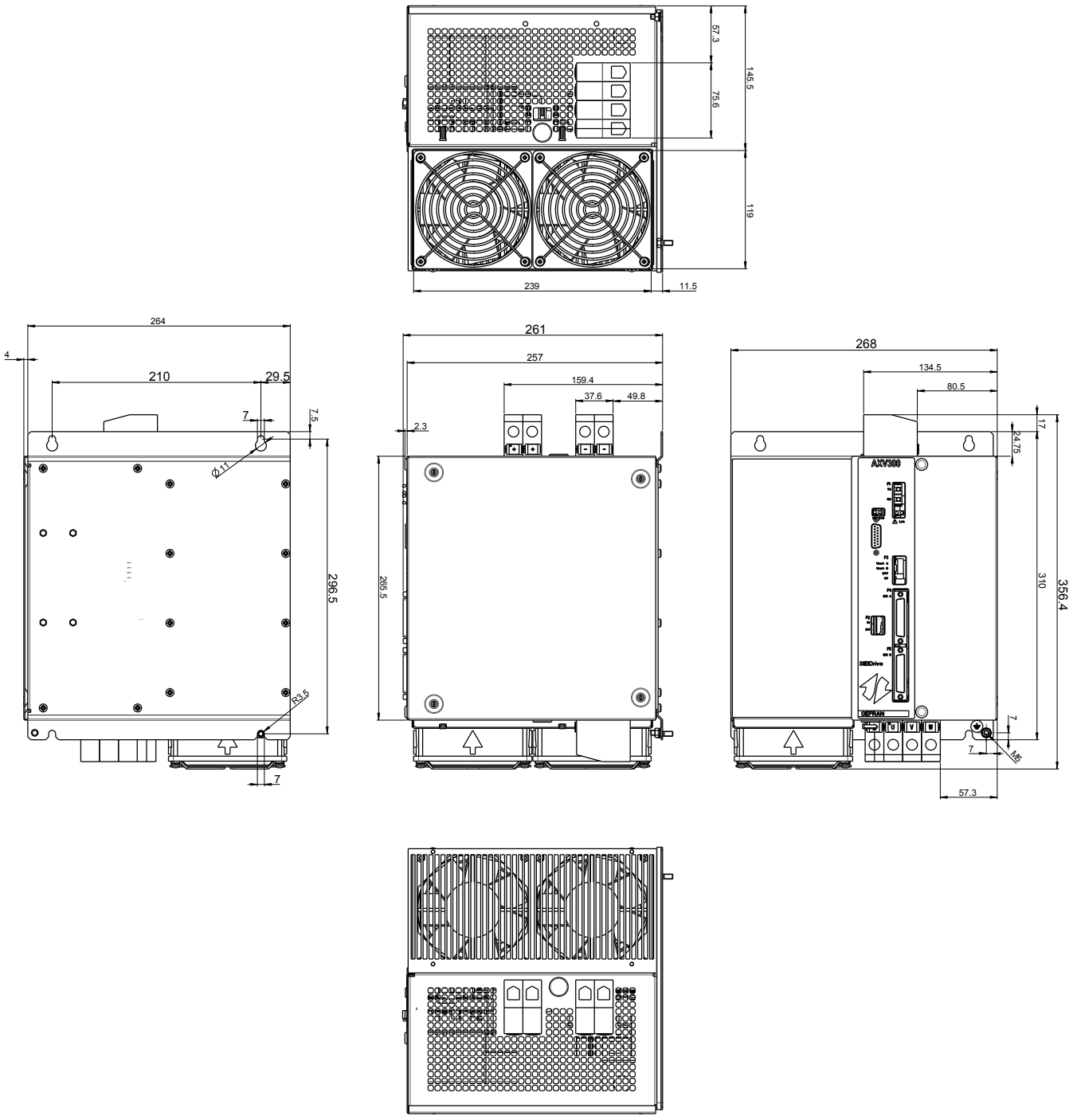
6.10. Size AXV300 SR-480160 dimensions and weight



Values in mm [inches]. Extractable terminals not included (front)

Module	Lenght mm [inches]	Height mm [inches]	Width mm [inches]	Weight kg [lbs]
AXV300 SR-480160	209,5 [8.25]	349 [13.74]	261 [10.27]	13 [28.6]

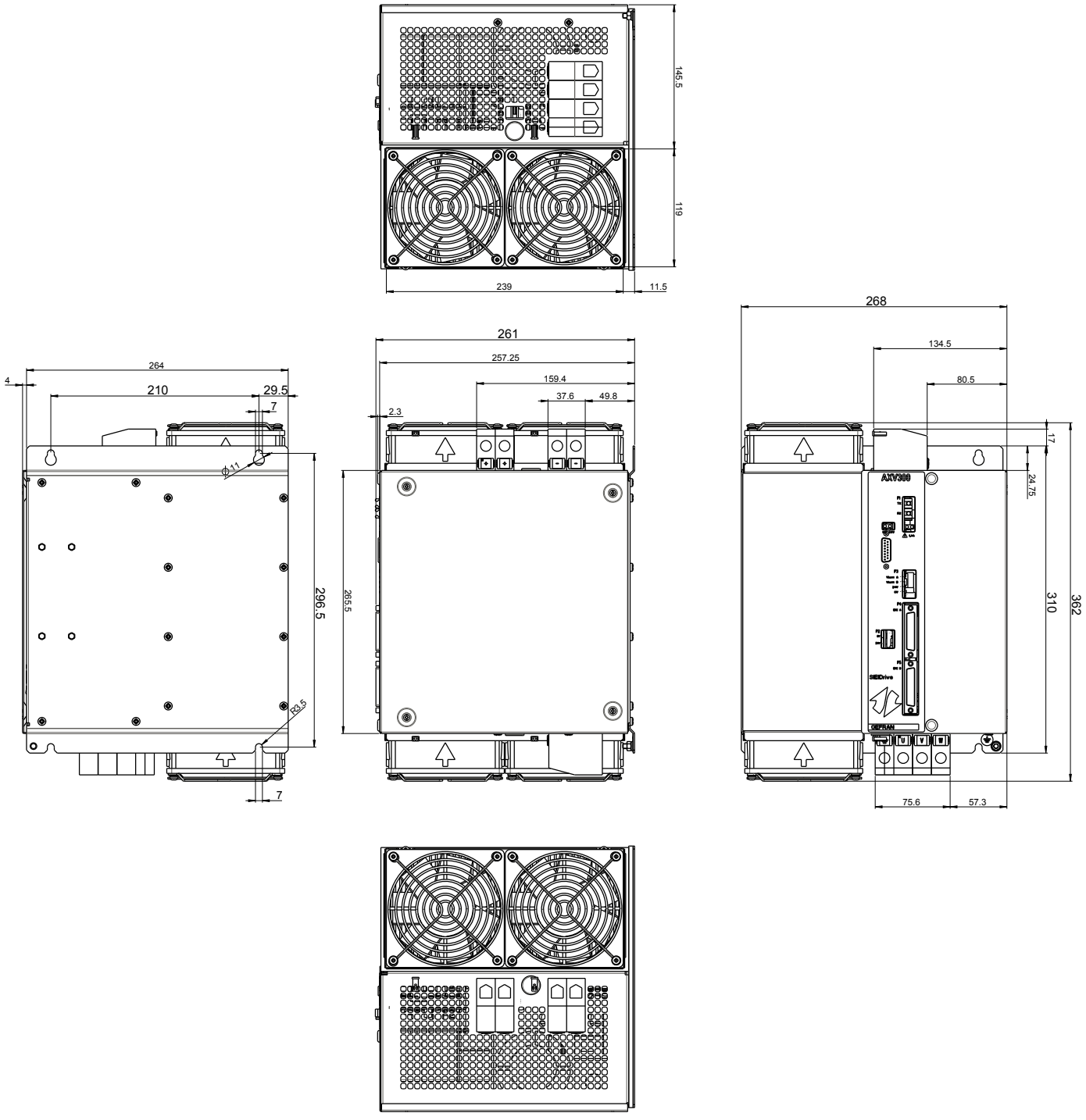
6.11. Size AXV300 SR-5100200 dimensions and weight



Values in mm [inches]. Extractable terminals not included (front)

Module	Lenght mm [inches]	Height mm [inches]	Width mm [inches]	Weight kg [lbs]
AXV300 SR-5100200	268 [10.55]	356.4 [10.03]	261 [10.27]	16 [35.3]

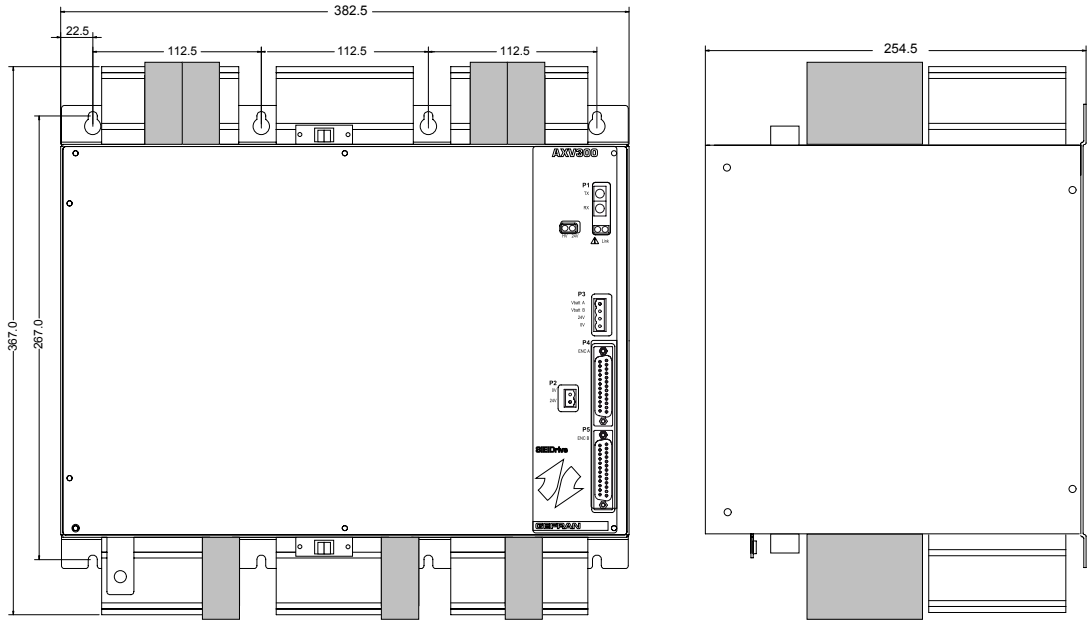
6.12. Size AXV300 SR-5140210 dimensions and weight

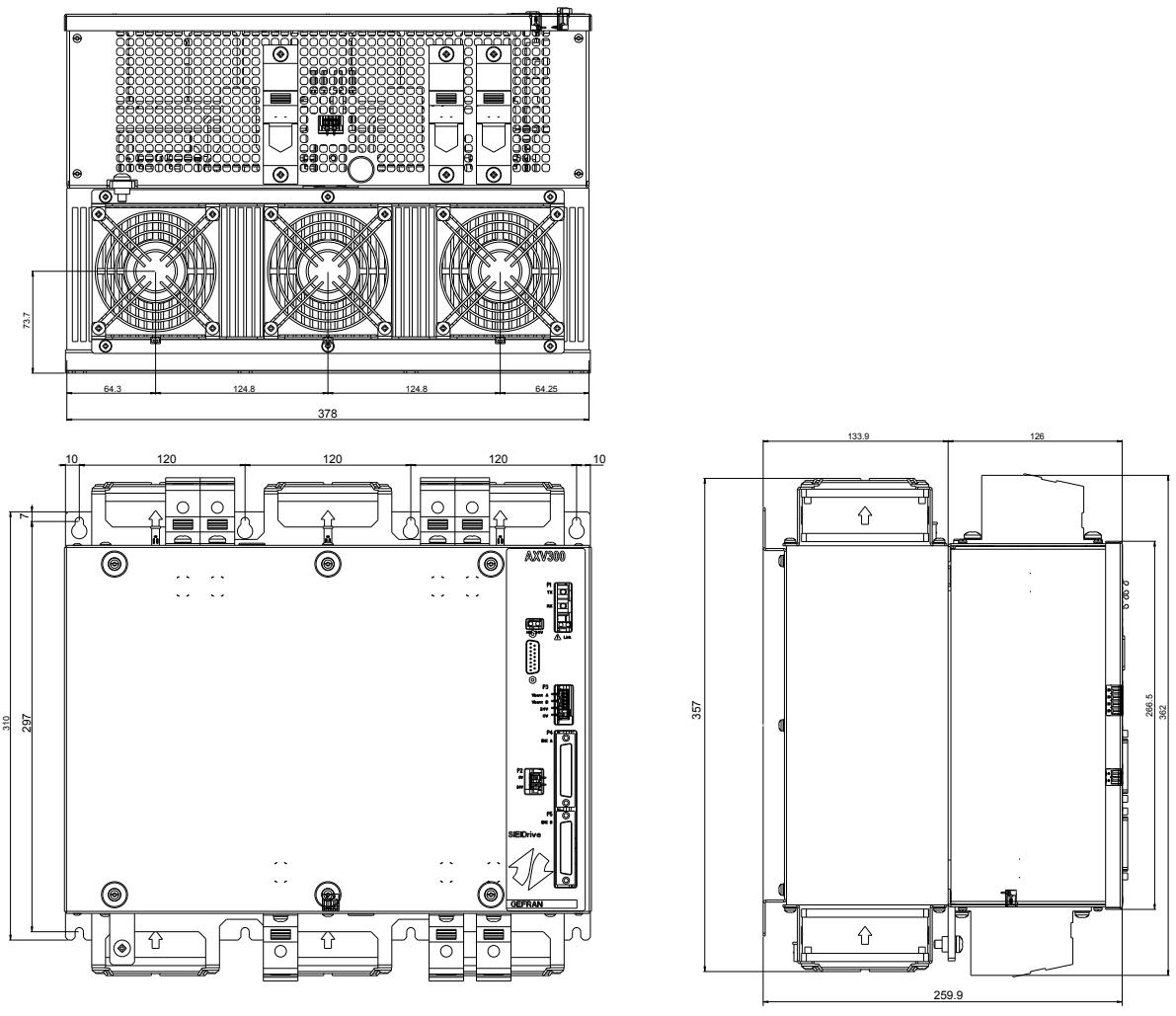


Values in mm [inches]. Extractable terminals not included (front)

Module	Lenght mm [inches]	Height mm [inches]	Width mm [inches]	Weight kg [lbs]
AXV300 SR-5140210	268 [10.55]	362 [14.25]	261 [10.27]	20 [44.1]

6.13. Sizes AXV300 SR-6200250 and AXV300 SR-6200320 dimensions and weights





Values in mm [inches]. Extractable terminals not included (front)

Module	Lenght mm [inches]	Height mm [inches]	Width mm [inches]	Weight kg [lbs]
AXV300 SR-6200250	382.5 [15.06]	367 [14.45]	254.5 [10.02]	27 [59.5]
AXV300 SR-6200320	378 [14.88]	357 [14.05]	259.9 [10.23]	25 [55.1]

7.1. General information

The **AXV300 CU** module is always included in the system. It usually receives machine data from an external PLC via fieldbus or I/O, controls and coordinates the movements of the various axes on the basis of a programmed application or inputs from the outside.

Dedicated cards can be added to the basic configuration to implement different functions:

- Encoder card to allow the control module to interface directly with an encoder (normally the line encoder);
- Real-Time Ethernet card. Provides the control module with a series of protocols to interface the fieldbus (e.g.: GD-Net, Ethercat, ...) .

Note ! Cards are installed directly in factory.

The **AXV300** CU control module card exchanges data with the axis modules using the **GStar** communication protocol.

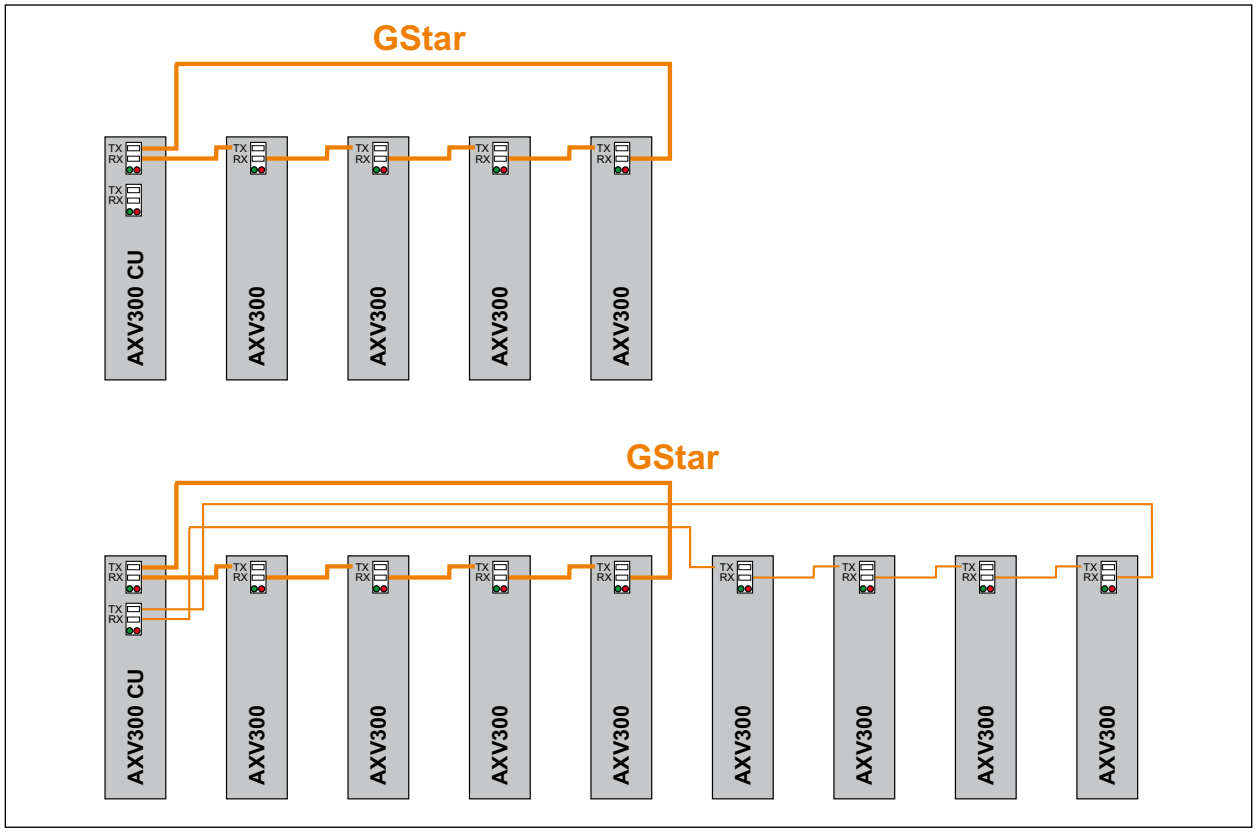


Figure 16: Diagram of GStar communications between the control module and axes (Top: one link up to 4 axes. Bottom: two links up to 8 axes)

The **GStar** protocol runs on an optical fibre link as shown in the figure above. Each link can manage up to 4 axes.

The **AXV300** CU is the communication master device. The card has two TX/RX pairs to create two independent axis links for up to 8 axes. There are 2 indicator LEDs for each TX/RX pair to signal the status of the corresponding link (1 green LED, 1 red LED).

7.2. Product identification

AXV300 -CU -XX -X -X -XX

Special version:
16 = 16bit analogical Input

Software:
X = Standard

Input encoder module option:
X = not included
A = SSI protocol absolute Encoder
D = Digital Encoder
B = BiSS protocol absolute Encoder
R = 2 poles Resolver
S = SinCos and 5-channelsEncoder
U = EN-DAT 2.1 / EN-DAT 2.2 protocol Encoder

Real Time Ethernet module option:
XX = not included
ET = EtherCAT Module
GD = GD-Net Module
EP = EtherNet IP module

Module:
CU = Control Unit Module

Modular Servodrive System AXV300 series

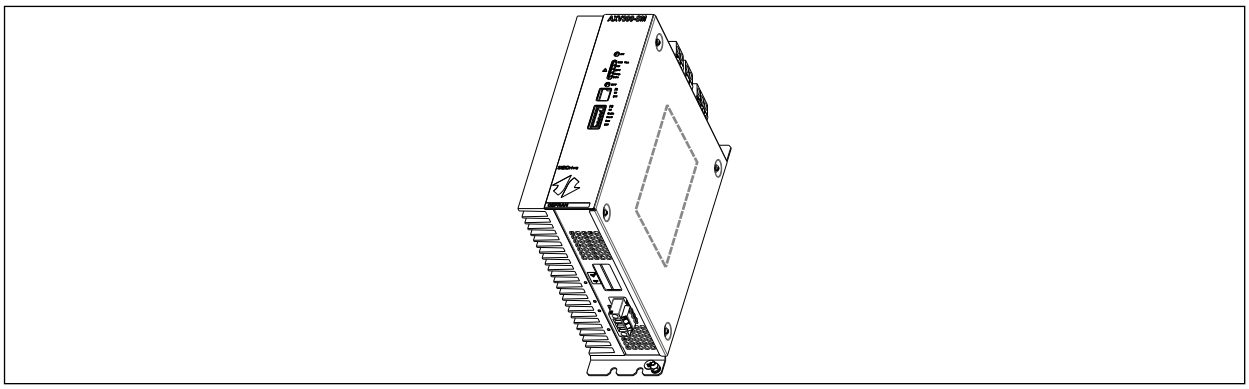


Figure 17: Position of data plates

Type :	AXV300 CU-XX-X-X-X	Modulo Servo	S/N: 012345678
Inp:	24Vdc	0.8A@24Vdc	(NO I/O LOADS)
			Made in Italy CE

Type : Servo Model

S/N : Serial number

Inp: Input (Main supply, Input current)

Approvals

Figure 18: Identification Nameplate

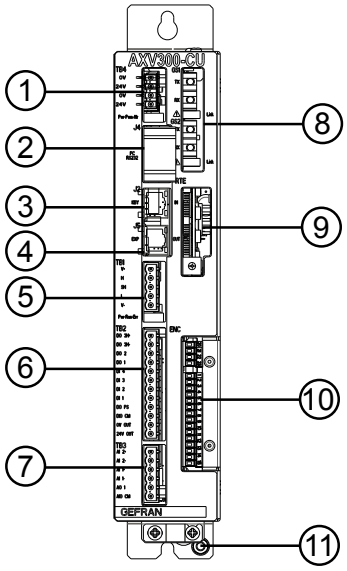
Firmware Release	HW release				S/N: 012345678			Prod. CONF.
			BP	CORE	GS	RTE	SW. CFG	
0.0.0.13			-.A	-.A	-.A			A1
			Power	Regolation	Security			Product configuration

Firmware revision

Cards revision

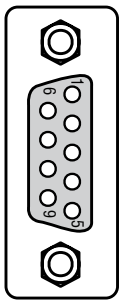
Figure 19: Firmware & cards revision level nameplate

7.3. Identification of terminals, tightening torques and cable sizes

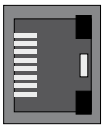


(1) TERMINAL TB4 - 24V POWER SUPPLY CONNECTION		
Terminal name		**0V, 24V, 0V, 24V**
Maximum cable cross-section (flexible conductor)	mm^2	2.5
Maximum cable cross-section	AWG	12
Stripping length	mm	7
Min/max tightening torque	Nm	0.6
Recommended tool		0.6 x 3.5 x 100 mm slotted-head screwdriver

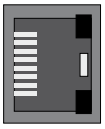
Note ! For details on connection. see paragraph **"10 - Electrical/Optical connections" on page 96.**

(2) TERMINAL J4 - PC RS232 CONNECTION	
Female 9-pin receptacle connector	

Note ! For details on connection. see paragraph **"7.5.3. RS232 port" on page 75** and **"11.2. Serial interface RS232 - Modbus communication" on page 117**.

(3) TERMINAL J2 - KBY KEYPAD CONNECTION	
RJ45 Connector	

Note ! For details on connection. see paragraph **"7.5.8. Keypad interface" on page 77**.

(4) TERMINAL J5 - EXP EXPANSION CONNECTION	
RJ45 Connector	

Note ! For details on connection. see paragraph **"7.5.10. External I/O expansion card" on page 85.**

(5) TERMINAL TB1 - CANBUS CONNECTION		
Terminals name		**V+, H, SH, L, V-**
Maximum cable cross-section (flexible conductor)	mm^2	2.5
Maximum cable cross-section	AWG	12
Stripping length	mm	7
Min/max tightening torque	Nm	0.6
Recommended tool		0.6 x 3.5 x 100 mm slotted-head screwdriver

Note ! For details on connection. see paragraph **"7.5.2. CANbus port" on page 75** and **"11.1. CAN interface - CANopen/DeviceNet communication" on page 115**

(6) TERMINAL TB2 - I/O CONNECTION		
Terminals name		**1 ... 12**
Maximum cable cross-section (flexible conductor)	mm^2	2.5
Maximum cable cross-section	AWG	12
Stripping length	mm	7
Min/max tightening torque	Nm	0.6
Recommended tool		0.6 x 3.5 x 100 mm slotted-head screwdriver

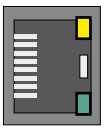
Note ! For details on connection. see paragraph **"7.5.5. System I/O" on page 76**

(7) TERMINAL TB3 - I/O CONNECTION		
Terminals name		**1 ... 6**
Maximum cable cross-section (flexible conductor)	mm^2	2.5
Maximum cable cross-section	AWG	12
Stripping length	mm	7
Min/max tightening torque	Nm	0.6
Recommended tool		0.6 x 3.5 x 100 mm slotted-head screwdriver

Note ! For details on connection. see paragraph **"7.5.5. System I/O" on page 76**

(8) TERMINALS GS1, GS2 - OPTICAL FIBRE CONNECTION		
Terminal name		**TX - RX**
Type		For "HFBR-4501"-type connectors (Supplied by Avago Technologies), Gefran code: 6S8V83.
Cable		980/1000μm plastic optical fibre

Note ! For details on connection. see paragraph **"10.5. GStar Communication System" on page 112** and **"13.8.1. Optical fibre link connection (P1)" on page 142**

(9) TERMINAL RTE - I/O CONNECTION		
RJ45 Connector (x2)		

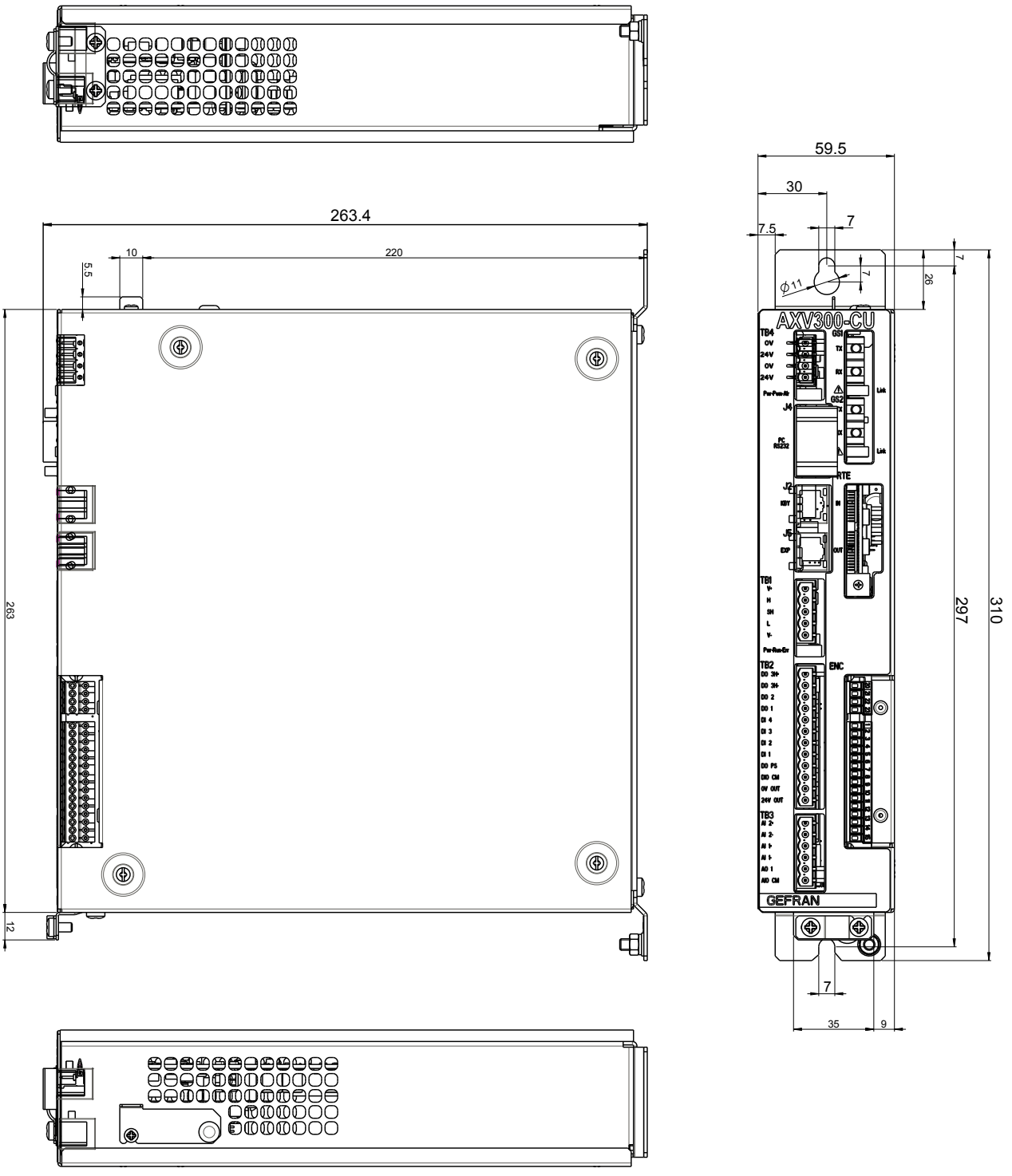
Note ! For details on connection. see Appendix e.

(10) TERMINAL ENC - ENCODER CONNECTION		
Terminals name		1 ...15, 20 ... 23
Maximum cable cross-section (flexible conductor)	mm^2	1.5
Maximum cable cross-section	AWG	16
Stripping length	mm	5 mm
Min/max tightening torque	Nm	0.25
Recommended tool		0.4 x 2.5 x 80 mm slotted-head screwdriver

Note ! For details on connection. see paragraph **"7.5.9. Encoder expansion card" on page 78**.

(11) TERMINAL ⏚ - GROUND CONNECTION		
Cable cross-section	mm^2	10
	AWG	8
Lock screw diameter	mm	M5
Recommended terminal		Eyelet
Tightening torque	Nm	6
Recommended tool		8-mm hex socket wrench

7.4. Size AXV300 CU dimensions and weight



Values in mm [inches]. Extractable terminals not included (front)

Module	Lenght mm [inches]	Height mm [inches]	Width mm [inches]	Weight kg [lbs]
AXV300 CU	59.5 [23.42]	310 [12.20]	263.4 [10.37]	3 [6.6]

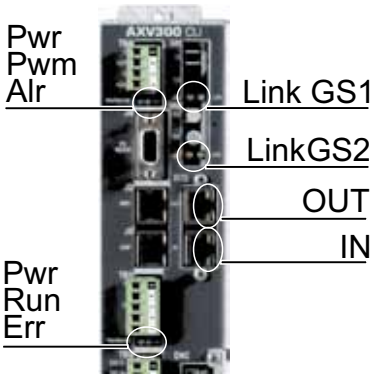
7.5. AXV300 CU basic system

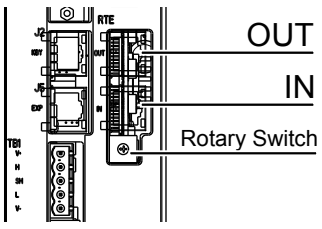
The basic **AXV300 CU** module configuration comprises:

- Indicator LEDs
- CAN port for fieldbus communication,
- RS232 port for programming and configuration via PC,
- SD card,
- system I/O,
- 2 RX/TX pairs on optical fibre for **GStar** link management
- external 24 V power supply
- RJ45 connector for connection to keypad,
- two expansion cards: Encoder and RTE FieldBus.
- RJ45 connector for connection of external I/O expansion card.

7.5.1. Indicator LEDs

The following indicator LEDs on the front indicate the system's operating status:





Status indicator		
Pwr	green	Lit=power/power supplies OK
Pwm	yellow	PWM enabled on at least one axis
Alr	red	flashing/lit when an alarm occurs

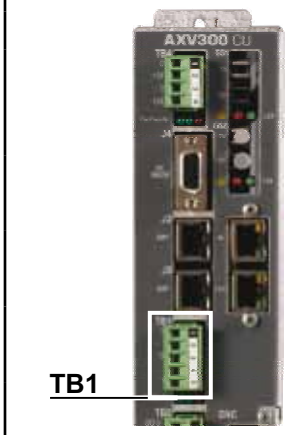
GStar communication		
Link (GS1)	green	There are 2 indicator LEDs for each TX/RX pair to signal the status of the corresponding link.
	red	
Link (GS2)	green	
	red	

CANopen communication		
Pwr	green	Lit= interface power supplies OK
Run	green	Lit= CANopen interface operational
Err	red	Lit= CANopen interface alarm

Run	**Err**	Meaning
OFF	OFF	Stop
ON	OFF	Op
OFF	ON	Pre-op

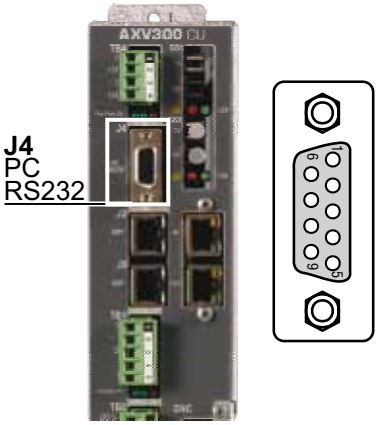
RTE communication			
		GD-NET	
IN	green	**DATA**: flashing: the system transfers datas	
	yellow	**LINK**: lit: the system is connected to the grid	
OUT	green	Not used	
	yellow		
Rotary Switch		16 positions Rotary switch for node configuration	
		For further details see paragraph **"Appendix A - The GD-Net system" on page 223**	

7.5.2. CANbus port



TB1 connector			
Terminal	**Designation**	**Function**	**Max**
1	V+	CAN external positive supply (dedicated for supply of transceiver and optocouplers)	11...30V
2	CAN_H	Linea bus Can_H (dominante alta)	-
3	CAN_SHLD	CAN shield	-
4	CAN_L	Can_L busline (dominant low)	-
5	V-	Ground / 0V / V-	0V

7.5.3. RS232 port



J4 connector			
PIN	**Function**	**Elect. Interface**	**I / O**
1	-	-	-
2	TxD	RS232	Input
3	RxD	RS232	Output
4	-	-	-
5	0V (Ground)	Supply	-
6	-	-	-
7	-	-	-
8	-	-	-
9	+5V	Supply	-

7.5.4. SD Card interface

With the **AXV300 CU** module, data can be saved on a normal Secure Digital-type memory card.

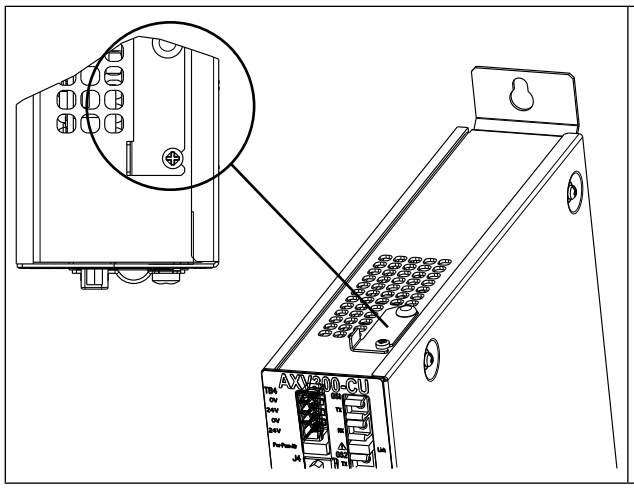


Figure 20: SD-CARD slot on the AXV300 CU module

Figure 21: SD-CARD key kit

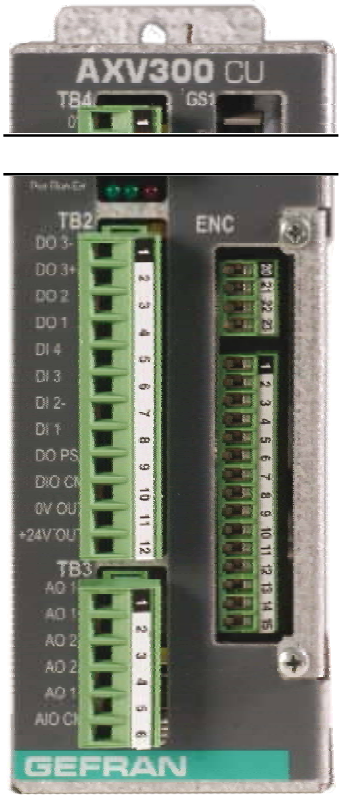
To use the memory card, the specific adapter (code S72644, SD-CARD key kit) must be connected by inserting it in the dedicated slot on the top of the drive.

7.5.5. System I/O

The I/O system interfaces with the outside via extractable terminal connectors.
The number of contacts needed is 12+6.

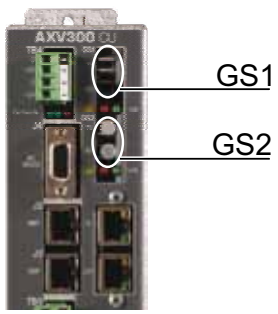
The basic configuration includes the following inputs/outputs:

- 2 non-opto-isolated analog inputs (AI1 and AI2)
- 1 non-opto-isolated analog output (AO1)
- Power supply for digital outputs (DO PS - DIO CM)
- 4 opto-isolated digital inputs (DI1... DI4)
- 3 opto-isolated digital outputs (DO3... DO1)



Terminal TB2			
N.	**Ref.**	**Description**	
1	DO 3H-	Opto-isolated digital outputs. Active pull-up output configuration	30V@40mA Iout max = 40mA
2	DO 3H+		
3	DO2		
4	DO1		
5	DI 4	Opto-isolated digital inputs	HTL 0…30V Range min/max +15V…30V
6	DI 3		
7	DI 2		
8	DI 1		
9	DO PS	Power supply for digital outputs	Range min/max +15V…30V
10	DIO CM		
11	0V OUT		
12	24V OUT		
Terminal TB3			
N.	**Ref.**	**Description**	
1	AI 2+	Non-opto-isolated analog inputs	-10V…+10V 11-bit resolution value + 1 signed bit
2	AI 2-		
3	AI 1+		
4	AI 1-		
5	AO 1	Non-opto-isolated analog output	-10V…+10V @ 5mA 9-bit resolution value + 1 signed bit
6	AIO CM		

7.5.6. RX/TX for GStar communication system



Terminal GS1	
Ref.	**Description**
TX / RX	Optical fibre connector see paragraph "13.8.1. Optical fibre link connection (P1)" on page 142
Terminal GS2	
Ref.	**Description**
TX / RX	Optical fibre connector see paragraph "13.8.1. Optical fibre link connection (P1)" on page 142

7.5.7. External 24 V power supply

The **AXV300 CU** module is powered with a 24 VDC voltage (external) that also powers all the other modules that require an auxiliary 24 V.

It supplies all the voltages required to operate the module.

The module has a 4-pin terminal connector to receive the 24 VDC and, if necessary, direct this to the other modules.

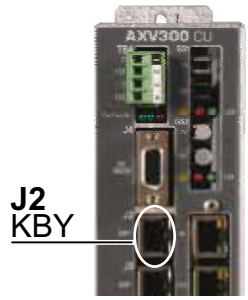
External power supply data

Supply voltage range	18…28VDC
Maximum current absorbed	1.6A
Average current absorbed	0.8A (refers to the standard version), 1A (refers to the version with RTE)
Average power absorbed (*)	20W (refers to the standard version), 24W (refers to the version with RTE)

(*) At nominal condition.

7.5.8. Keypad interface

Currently being developed.



Terminal J2 - KBY			
Interface	**Function**	**Characteristics**	**Software management**
Keypad on RJ45	Keypad management	Non-opto-isolated RS485 serial connection speed up to 115 KBaud	

7.5.9. Encoder expansion card

The encoder card (factory assembled) supports incremental encoders with the following output formats:

Type	Name of card integrated in the module
HTL-TTL incremental	AXV300 CU-XXD
SinCos	AXV300 CU-XXS
Resolver	AXV300 CU-XXR, (currently being developed)
EnDat 2.1 / 2.2 + SSi	AXV300 CU-XXU)
BiSS	AXV300 CU-XXB, (currently being developed)

The encoder expansion card also has the following characteristics:

- use of 2 freeze channels
- encoder repetition on HTL-TTL digital outputs.

The encoder interface consists of 2 connectors, respectively with 4 and 15 pins:

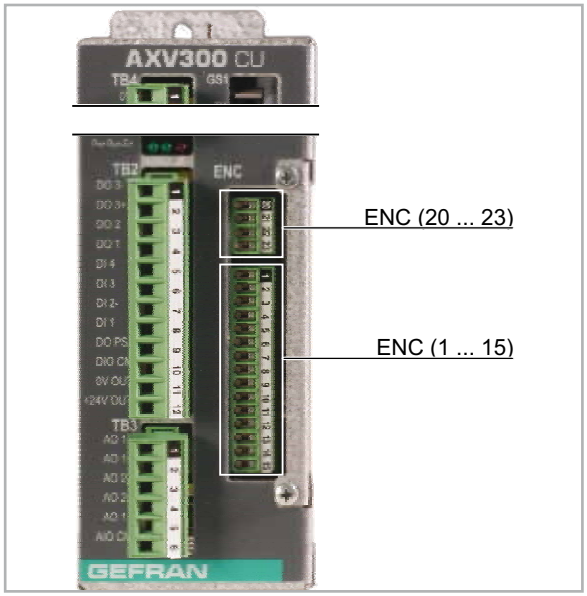


Figure 22: Expansion Encoder Connectors

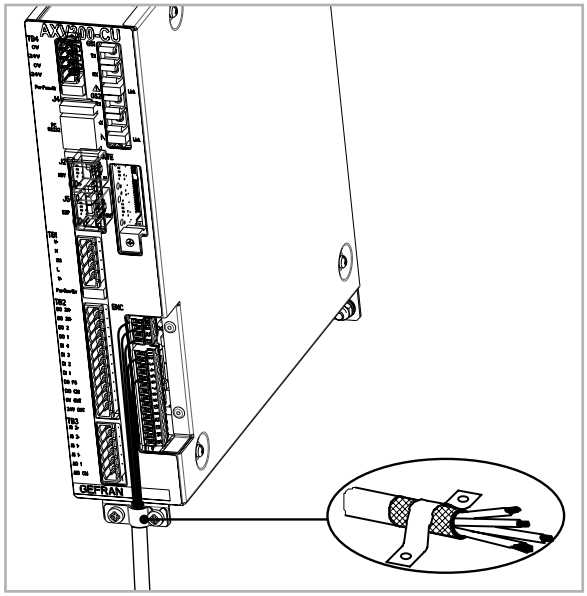
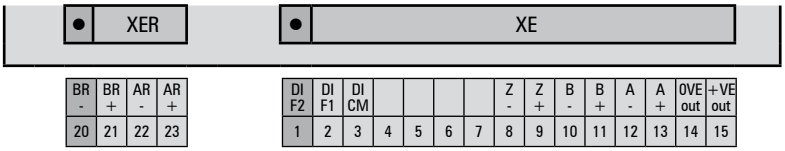


Figure 23: Shield connection

Digital Incremental Encoder



(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: Internal power supply of the encoder" on page 84.**
Cable length	max 50m

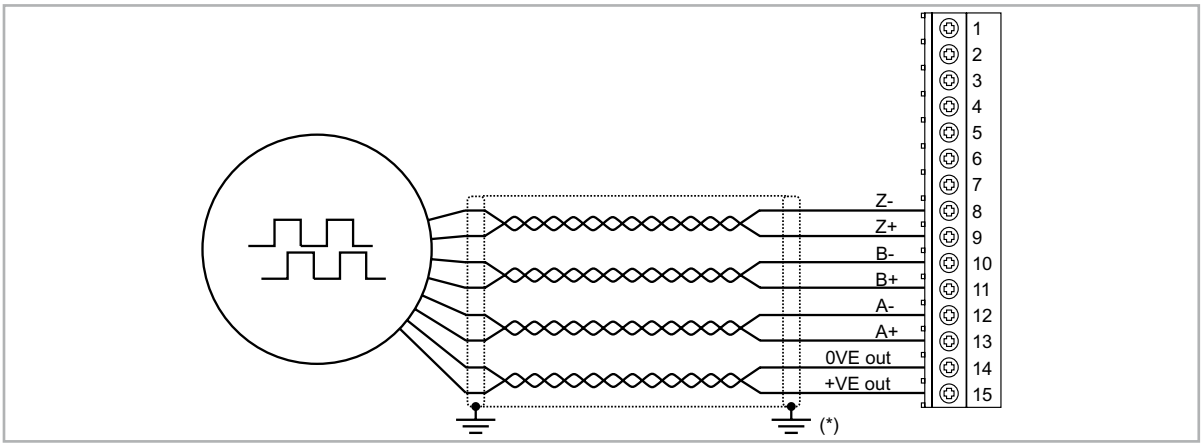


Figure 24: Digital Incremental Encoder (DE) PUSH-PULL / LINE DRIVER

(*) Connection of shielding, see **"Figure 23: Shield connection" on page 78.**

(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: Internal power supply of the encoder" on page 84.**
Cable length	max 50m

(*) with external supply.

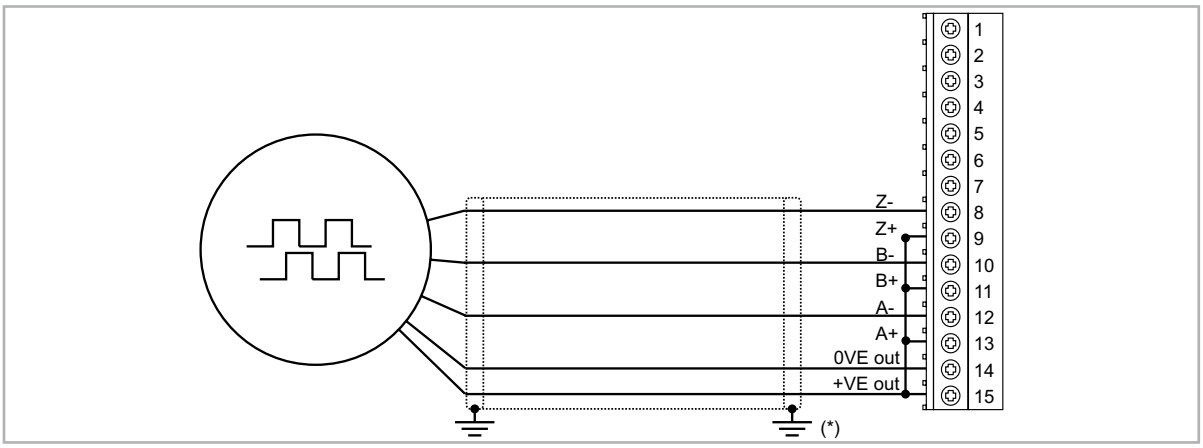


Figure 25: Digital Incremental Encoder (DE) SINGLE ENDED NPN O.C.

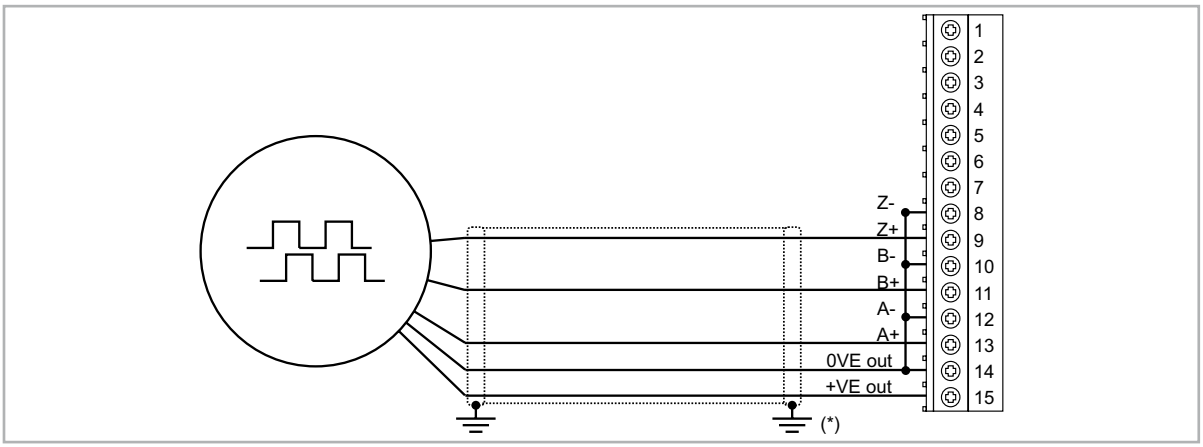
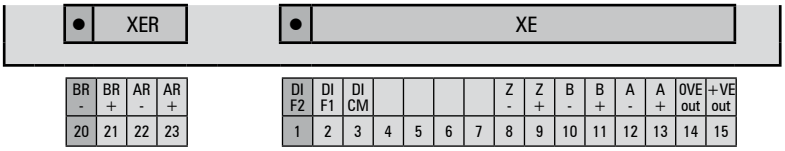


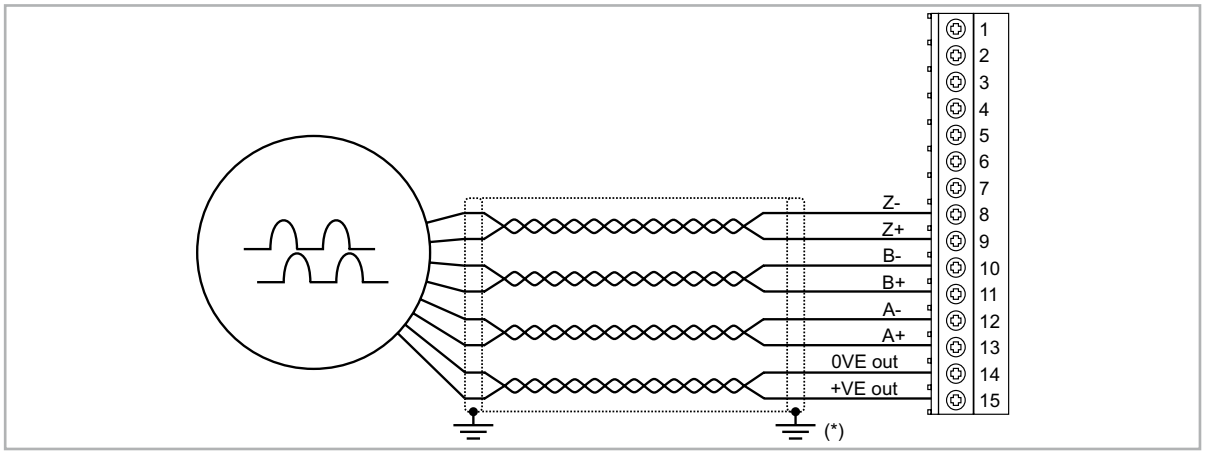
Figure 26: Digital Incremental Encoder (DE) SINGLE ENDED PNP O.C.

(*) Connection of shielding, see **"Figure 23: Shield connection" on page 78.**

SinCos - Incremental Sinusoidal Encoder



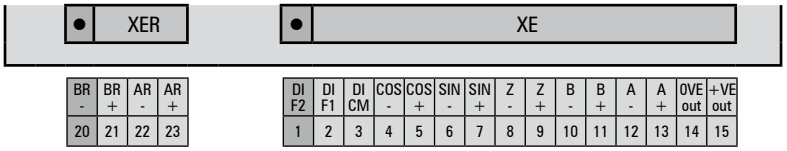
Channels	A+ A-, B+ B-, Z+ Z-, differential. Management of loss of encoder signals
Max frequency	200 kHz (check the number of encoder impulses according to the maximum speed)
Number of impulses	min 128, max 16384 (default 1024)
Electrical interface	Channels A/B 0,8V ≤ Vpp ≥ 1,2V (typ. 1,0V) — Channel Z 0,2V ≤ Vpp ≥ 0,8V
Load capacity	8mA @ 1.0Vpp (Zin 120Ω)
Programmable internal power supply	min +5.2 V, max +6.0 V (default + 5.2 V) — Imax 150 mA. See **"Table 1: Internal power supply of the encoder" on page 84.**
Cable length	max 50m



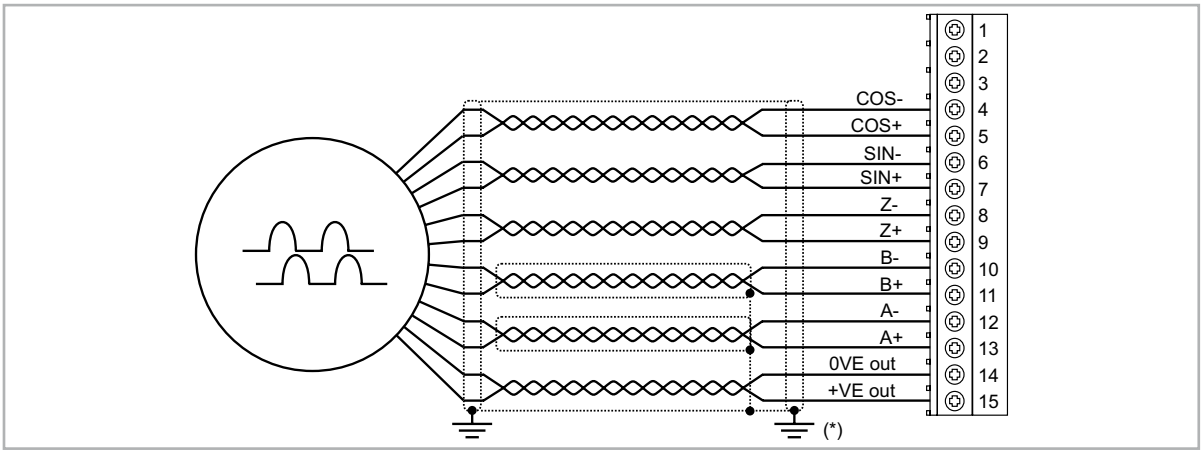
(*) Connection of shielding, see **"Figure 23: Shield connection" on page 78.**

Figure 27: Incremental Sinusoidal Encoder (SE)

Incremental Sinusoidal Encoder + absolute SinCos



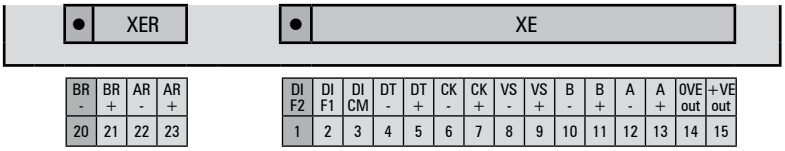
Channels	A+ A-, B+ B-, Z+ Z-, Cos+ Cos-, Sin+ Sin-, differential Management of loss of encoder signals.
Max frequency	200 kHz (check the number of encoder impulses according to the maximum speed)
Number of impulses	min 128, max 16384 (default 1024)
Electrical interface	Channels A/B/Sin/Cos 0.6 V ≤ Vpp ≥ 1.2 V (typ. 1.0 V) — Channel I 0.2 V ≤ Vpp ≥ 0.8 V
Load capacity	Channels A/B/I 8 mA @ 1.0 Vpp (Zin 120Ω) Channels Sin/Cos 1 mA @ 1.0 Vpp (Zin 1kΩ)
Programmable internal power supply	min +5.2 V, max +6.0 V (default + 5.2 V) — Imax 150 mA. See **"Table 1: Internal power supply of the encoder" on page 84.**
Cable length	max 50m



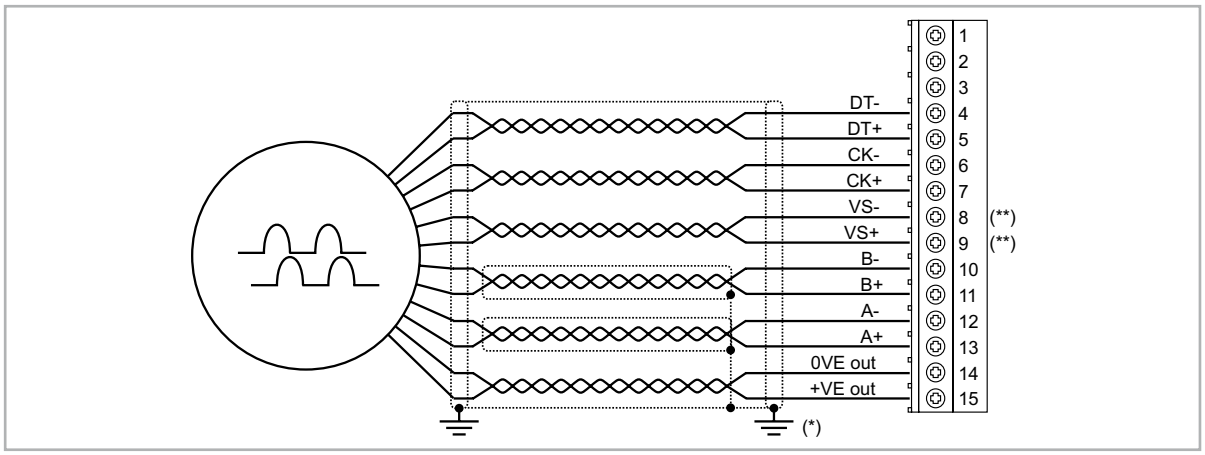
(*) Connection of shielding, see **"Figure 23: Shield connection" on page 78.**

Figure 28: Incremental Sinusoidal Encoder + absolute SinCos /SESC)

Incremental sinusoidal + Absolute EnDat/SSI



Channels	A+ A-, B+ B-, differential 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 (automatic recognition at initialisation)
Electrical interface	0.6 V ≤ Vpp ≥ 1.2 V (typ. 1.0 V)
Load capacity	8 mA @ 1.0 Vpp (Zin 120Ω)
Programmable internal power supply	min +5.2 V, max +6.0 V (default + 5.2 V) — Imax 150 mA. See **"Table 1: Internal power supply of the encoder" on page 84.**
Cable length	max 50m (see encoder cable length section)
Absolute channels	CK+ CK-, DT+ DT- differential, RS-485 Management of loss of encoder signals.
Interface	EnDat: 2.1/2.2 single/multi-turn (command set managed only compatible with 2.1) SSI: Standard Sick/Stegman single/multi-turn
Max frequency	EnDat: 1 MHz with delay compensation (not programmable) SSI: 400 KHz (not programmable)
Number of bits	EnDat: max 32 bit/turn* max 32bit/turn (automatic recognition at initialisation) SSI:13-25 bits (default 25)



(*) Connection of shielding, see **"Figure 23: Shield connection" on page 78.**

(**) VS+ / VS- : optional (encoder supply feedback)

Figure 29: Incremental sinusoidal + Absolute EnDat/SSI (EN/SSI)

Resolver

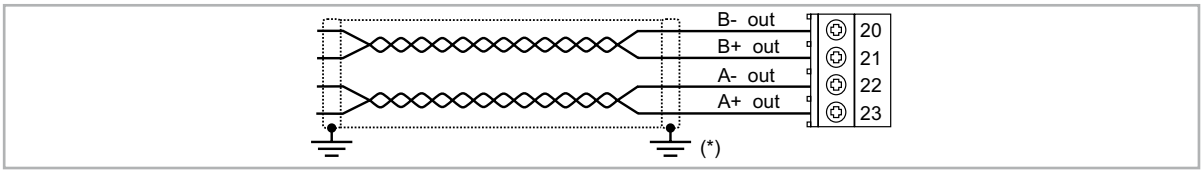
Currently being developed.

Incremental sinusoidal + Absolute BiSS

Currently being developed.

Repeat Encoder RE (TTL/HTL line-driver)

Encoder expansion cards have an incremental encoder output with TTL/HTL Line Driver levels (according to the main encoder supply) to be used to repeat the servomotor feedback device. This function is performed via HW and an encoder output can be repeated with a programmable divider. The encoder output signals are available on the XER connector (20...23):



(*) Connection of shielding, see **"Figure 23: Shield connection" on page 78.**

Channels	A+ A-, B+ B-, differential line drivers, optoisolated.
Max frequency	200 kHz
Number of impulses	1/1-1/2-1/4-1/8 repeat (default 1/1)
Electrical interface	TTL (ref. GND) Ulow ≤ 0.5 V Uhigh ≥ 2.5 V HTL Ulow ≤ 3.0 V Uhigh ≥ Venc - 3.0 V (only with DE encoder)
Load capacity	TTL 20mA @ 5,5V (Zin 120Ω) for each channel HTL 50mA max. for each channel .
Power supply	Venc (encoder signals are repeated on the same value of the primary encoder), the supply value for the repeat is always that set for the primary encoder.
Cable length	max 50m

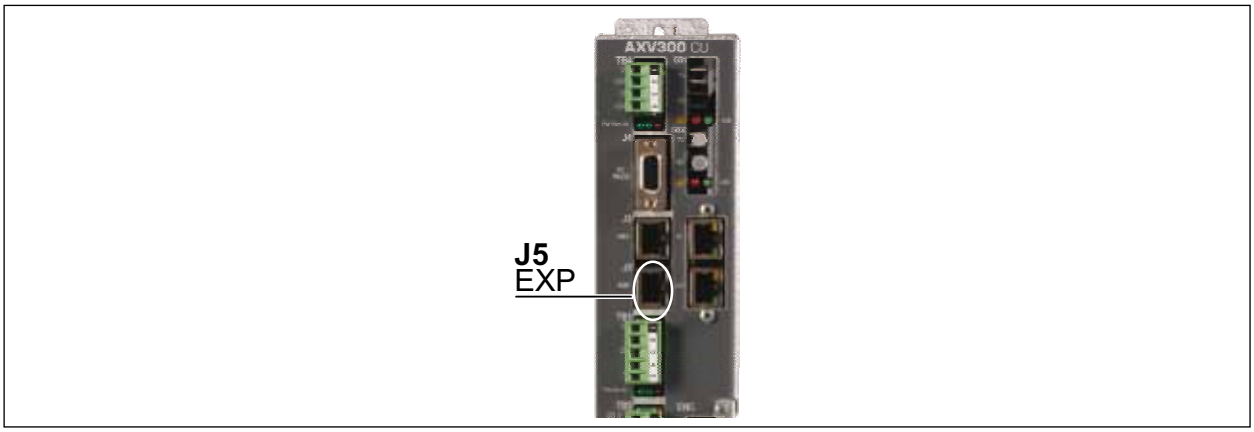
(1) The internal power supply of the encoder can be selected from the keypad (ENCODER CONFIG menu, parameter Encoder supply (PAR 2102) to balance the loss of voltage due to the length of the encoder cable and load current, minimum step 0.1 V

Internal power supply of the encoder			
Encoder option type	**Def**	**Min**	**Max**
Enc 1	5.2 V	5.2 V	20.0 V
Enc 2	5.2 V	5.2 V	6.0 V
Enc 3	5.2 V	5.2 V	6.0 V
Enc 4	5.2 V	5.2 V	10.0 V
Enc 5	8.0 V	7.0 V	12.0 V

Table 1: Internal power supply of the encoder

7.5.10. External I/O expansion card

The optional **EXP-AXV300-IO** external expansion card can be used to expand the **AXV300 CU** module I/Os.



The card is connected to the AXV300 CU module via connector RJ45 (J5).

(Currently being developed).

7.5.11. RTE (Real Time Ethernet) fieldbus module

The RTE (Real-Time Ethernet) expansion card enables connection to deterministic Ethernet networks, used as fieldbuses dedicated to process and configuration data communication. This interface allows the device to act as slave in a dedicated network using one of the card-specific protocols that are supported. The network hardware is, however, always compatible with the industrial Ethernet standard.

At present, the following protocols can be used:

- GD-Net: Gefran deterministic Network. Version -GD
- EtherCAT: Ethernet for Control Automation Technology. Version -ET
- EthernetIP: Ethernet Industrial Protocol. Option. Version -EP

Given the high baud rate guaranteed by Ethernet, 44 input words and 44 output words can be exchanged with a minimum cycle time of 250μs .

8 - Rated and overload currents

8.1. Overload for AXV300 axis modules

AXV300 axes manage two separate overload algorithms that can be selected by the user with parameter IPA x304, according to the application:

- Algorithm **I²xT** for applications that require a limited overload but for longer (150% In for 60 sec for sizes up to **AXV300 5100200** see table **I²xT**);
- Algorithm **I xT** for highly dynamic applications (200% In for 10 sec up to size **AXV300 5100200** see table **I xT**).

The axes envisage an additional thermal protection that triggers a drive alarm when the temperature exceeds those shown in the table (see “Overtemperature”)..

8.1.1. I²xT overload for AXV300 axis modules

This overload function envisages two modes of operation, one fast and one slow, defined as follows:

- Slow overload (typically 150% In for 60 sec);
- Fast overload (typically 200% In for 0.5 sec);

The recovery time is the period after which the overload function becomes available again.

In the table, the recovery time is shown for a current delivered equal to 90% In.

AXV300		**10413**	**21020**	**22040**	**33570**	**350100**	**480160**	**5100200**	**5140210**	**6200250**	**6200320**
In @ 0 Hz	[Arms]	3.2	7.0	12.0	24.5	30.0	56.0	70.0	98.0	140.0	140.0
In @ F1 Hz	[Arms]	4.5	10	20	35	50	80	100	140	200	200
Iovld Slow @ 0 Hz	[Arms]	4.7	10.5	18.0	36.8	45.0	84.0	105.0	122.5	154.0	182.0
Iovld Slow @ F1 Hz	[Arms]	6.75	15	30	52.5	75	120	150	175	220	260
• **Overload time**	[s]	60	60	60	60	60	60	60	60	60	60
• **Recovery Time @90%In**	[s]	395	395	395	395	395	395	395	178	66	218
F1	[Hz]	3	3	5	3	5	3	3	3	3	3
Iovld Fast @ 0 Hz	Arms	9.45	14	24	49	60	112	140	147	182	224
Iovld Fast @ F1 Hz	[Arms]	13.5	20	40	70	100	160	200	210	260	320
• **Overload time**	[s]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
• **Recovery Time @90%In**	[s]	7.9	2.0	2.0	2.0	2.0	2.0	2.0	1.2	1.0	1.4
Overtemperature	[°C]	100	100	105	95	95	80	80	80	80	80

Table 2: I2T overload data for AXV300 axis sizes

Algorithm **I²xT** depends on the output current frequency.

For output frequencies of between **0 Hz** and **F1**, the rated current is reduced by a factor that also depends on the size.

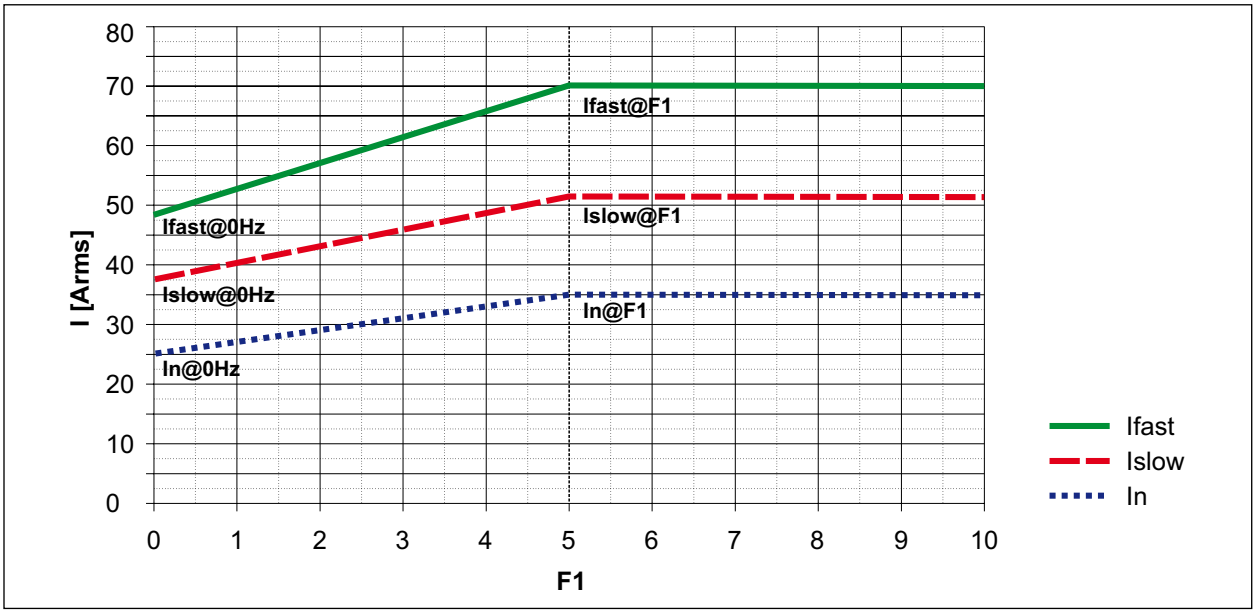


Figure 30: Algorithm I^2xT: current and frequency values are those shown in the table (depending on the size)

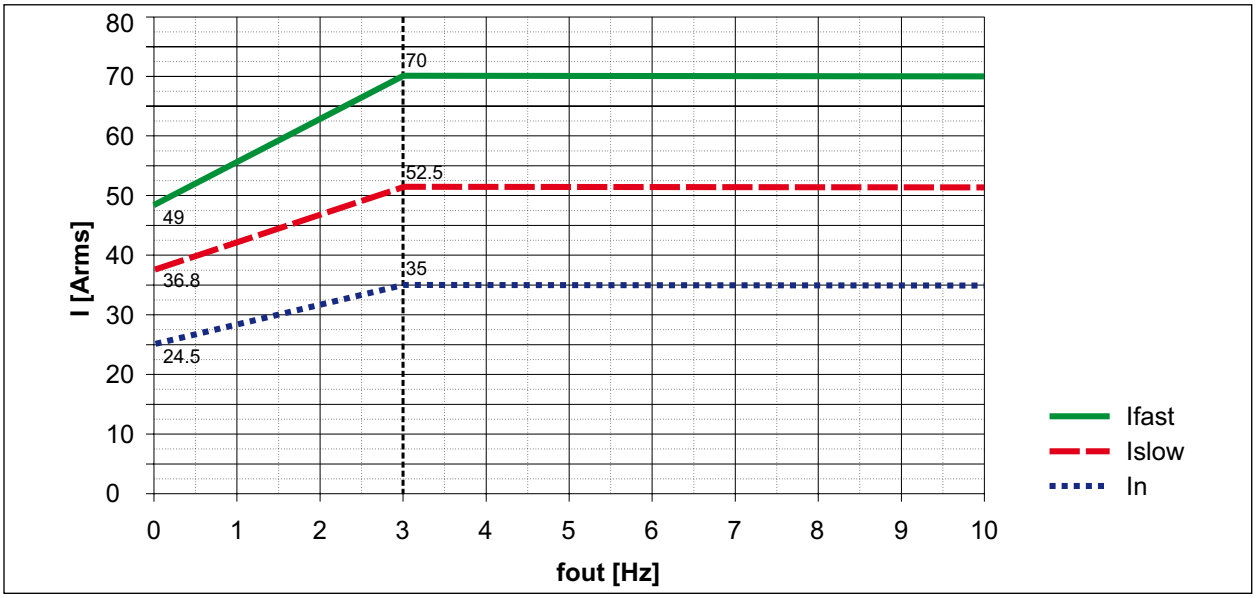


Figure 31: I^2xT algorithm example for AXV300 33570 module

Slow overload is calculated according to the following formula:

$$\textbf{fslow \%} = \frac{\int (Imot^2 - In^2) \cdot dt}{(Islow^2 - In^2) \cdot Tslow} \cdot 100$$

and displayed in the **DrvX Overload** parameter, IPA x758 (Drives \ Drive_X \ Monitor menu.

Note: X = 1…8, x = 0...7.

Fast overload is calculated according to the formula:

$$\textbf{ffast \%} = \frac{\int (Imot^2 - Islow^2)^2 \cdot dt}{(Ifast^2 - Islow^2) \cdot Tfast} \cdot 100$$

Current limit management

When the current supplied by the drive exceeds the In value, **fslow%** increases to 100%.

The drive then limits the maximum current that can be supplied to the **In** value.

fslow% reaches 100% in 60 sec if the current supplied by the drive is equal to **Islow**.

The drive can also supply a maximum current equal to **Ifast**. In this case, when the output current exceeds the

Islow threshold, the **ffast%** value is increased to 100% in 0.5 sec, after which the maximum current is limited to the **Islow** value.

Example of calculation of overload times with slow overload:

Let us consider drive **AXV300 21020.**

The data are obtained from the table:

F1 = 3 Hz	In = 10 Arms
Islow = 15 Arms (150%In)	Tslow = 60 s
Ifast = 20 Arms (200%In)	Tfast = 0.5 s.

Let us assume the drive supplies a current of **Imot** = 13 Arms at 100 Hz (**In < Imot < 150%In**)

Only the **fslow%** value is increased.

The maximum overload time **Ts** is equal to:

$$\mathbf{Ts} = \frac{(Islow^2 - In^2) \cdot Tslow}{(Imot^2 - In^2)} = \frac{(15^2 - 10^2) \cdot 60}{(13^2 - 10^2)} = 108 \text{ s}$$

When **Ts** has elapsed, the **Drivex Overload** (**fslow%**) parameter has reached 100% and the maximum current is decreased to the rated current = 10 Arms.

The drive will only be able to supply the maximum current of 150%In again when **Drivex Overload** (**fslow%**) has returned to 0%.

The time needed to discharge **fslow%** depends on the current supplied by the drive (which must be less than **In**).

If **Imot** = 9 Arms, the recovery time will be equal to:

$$\mathbf{Trec} = \frac{(Islow^2 - In^2) \cdot Tslow}{(Imot^2 - In^2)} = \frac{(15^2 - 10^2) \cdot 60}{(9^2 - 10^2)} = 395 \text{ s}$$

Example of calculation of overload times in case of fast overload

Let us assume that the drive supplies a current of **Imot** = 18 Arms at 100 Hz (**150% In < Imot < 200% In**)

Only the **ffast%** value is increased.

The maximum overload time **Tf** is equal to:

$$\mathbf{Tf} = \frac{(Ifast^2 - Islow^2) \cdot Tfast}{(Imot^2 - Islow^2)} = \frac{(20^2 - 15^2) \cdot 0{,}5}{(18^2 - 15^2)} = 0{,}88 \text{ s}$$

At the same time the **fslow%** value is also increased for 0.88 sec:

$$\mathbf{fslow\ \%} = \frac{\int (Imot^2 - In^2) \cdot dt}{(Islow^2 - In^2) \cdot Tslow} \cdot 100 = \frac{\int (18^2 - 10^2) \cdot 0{,}88}{(15^2 - 10^2) \cdot 60} \cdot 100 = 2{,}6\ \%$$

At this point the current limit is reduced to **150%In** and this value can be maintained for a time equal to **Tslow** decreased by the percentage already accumulated:

60s – 2.6%(60s) = 60 – 0.026*60 = 58.44 s

8.1.2. IxT overload for AXV300 axis modules

The **I xT** overload function allows a typical overload of 200% In for 10 sec (sizes up to **AXV300 5100200**).
The recovery time is the period after which the overload function becomes available again.
In the table, the recovery time is shown for a current delivered equal to 90% In.

AXV300		10413	21020	22040	33570	350100	480160	5100200	5140210	6200250	6200320
In @ 0 Hz	[Arms]	4.5	7.0	14.0	24.5	25.0	80.0	100.0	98.0	140.0	140.0
In @ F1 Hz	[Arms]	4.5	10.0	20.0	35.0	50.0	80.0	100.0	140.0	200.0	200.0
Iovld @ 0 Hz	[Arms]	13.5	14.0	28.0	49.0	50.0	160.0	200.0	147.0	182.0	224.0
Iovld @ F1 Hz	[Arms]	13.5	20.0	40.0	70.0	100.0	160.0	200.0	210.0	260.0	320.0
Overload time	[s]	10	10	10	10	10	10	10	10	10	10
F1	[Hz]	--	3	3	3	3	--	--	3	3	3
Recovery Time @90%In	[s]	200	100	100	100	100	100	100	50	30	60
Overtemperature	[°C]	90	90	95	90	90	75	75	75	75	75

For output frequencies of between 0 Hz and F 1, the rated current is reduced by a factor that also depends on the size (see table).

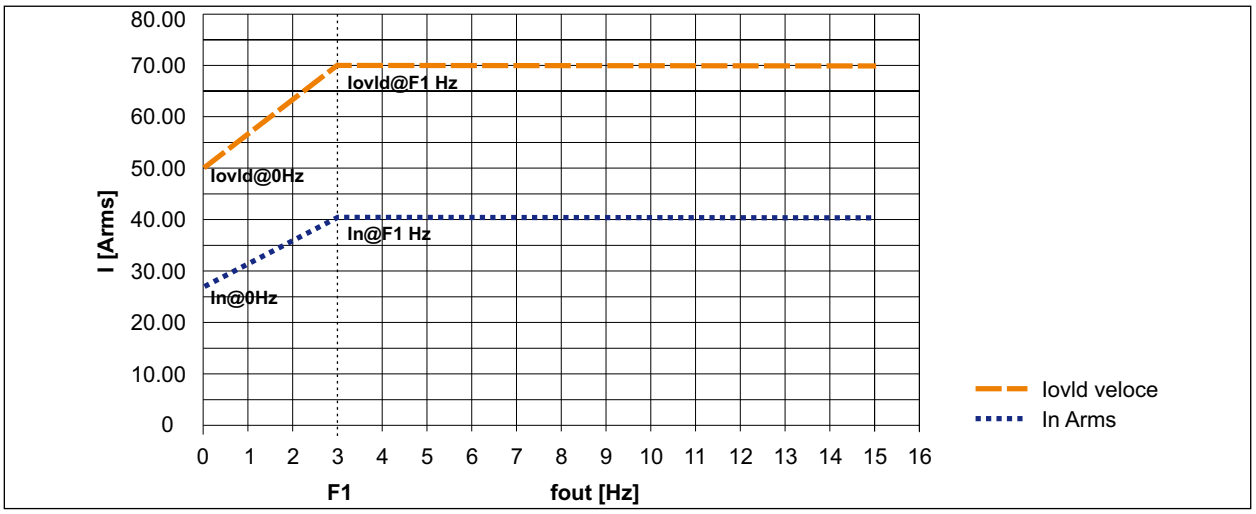


Figure 32: IxT algorithm, current and frequency values are those shown in the table

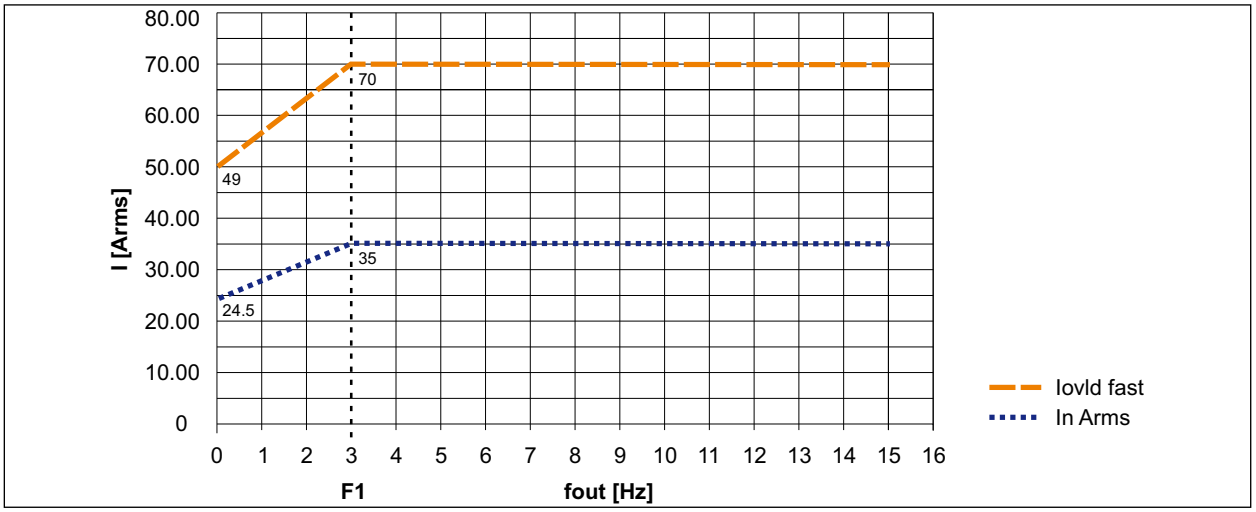


Figure 33: Algorithm IxT: example for module AXV300 33570

The IxT overload is calculated according to the following formula:

$$\textbf{fovl \%} = \frac{\int (Imot - In) \cdot dt}{(Iovl - In) \cdot Tovl} \cdot 100$$

and displayed in the **DrvX Overload** parameter, IPA x**758** (Drives \ Drive_X \ Monitor menu.
Note: X = 1…8, x = 0...7.

Current limit management

When the drive supplies a current that exceeds the In value, **fovl%** increases to 100%.
The drive then limits the maximum current that can be supplied to the **In** value.
fovl% reaches 100% in 10 sec if the current supplied by the drive is equal to **Iovl**.

Example of calculation of overload times:

Let us consider drive AXV300 21020.

The data are obtained from the table:

F1 = 3 Hz	In = 10 Arms
Iovl = 20 Arms (200%In)	Tovl = 10 s

Let us assume that the drive supplies a current of **Imot** = 16 Arms at 100 Hz (**In < Imot < 150%In**)
The maximum overload time **Ts** is equal to:

$$\textbf{Ts} = \frac{(Iovl - In) \cdot Tovl}{(Imot - In)} = \frac{(20 - 10) \cdot 10}{(16 - 10)} = 16{,}7 \text{ s}$$

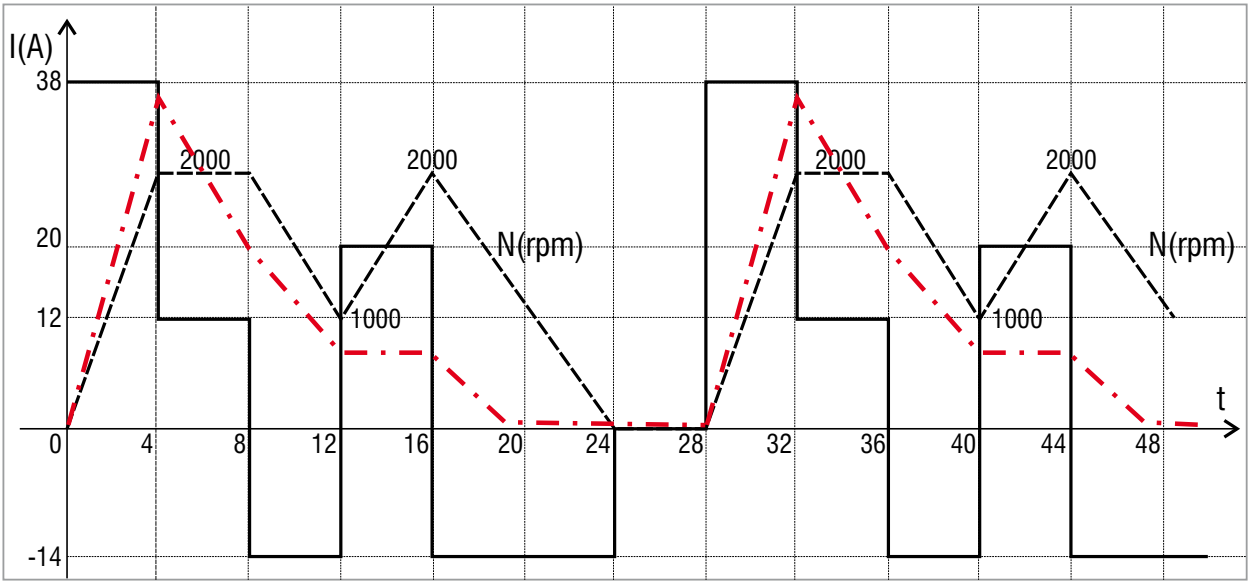
When **Ts** has elapsed, the **Drivex Overload** (**fovl%**) parameter has reached 100% and the maximum current is decreased to the rated current = 10 Arms.
The drive will only be able to deliver the maximum current of 200%**In** again when **Drivex Overload** (**fovl%**) returns to 0%.

The time needed to discharge fovl% depends on the current supplied by the drive (which must be less than **In**).
If **Imot** = 9 Arms, the recovery time will be equal to:

$$\textbf{Trec} = \frac{(Iovl - In) \cdot Tovl}{(Imot - In)} = \frac{(20 - 10) \cdot 10}{(9 - 10)} = 100 \text{ s}$$

Consider the following discharge cycle to select the most suitable drive:

Time (sec)	0	4	8	12	16	20	24
Speed (rpm)	0	2000	2000	1000	2000	1000	0
Motor curr (A)	38	12	-14	20	-14	14	0
Drive Overload (%)	36	20	8	8	0	0	0



The cycle is repeated continuously.

The average motor current value is 16 Arms.

Peak current is 38 Arms and peak duration is 4 seconds.

If using an **AXV300 22040** with In= 20 Arms and Iolvd=40 Arms, we can calculate that during acceleration ovld% will increase to 36%.

For the next few seconds the current stays below In. We can therefore consider that average current = 12.33 Arms and ovld% = 0%.

Based on this result, the **AXV300 22040** drive is suitable for this application.

8.2. I²xT overload for AXV300 SM modules

Like the axis modules, **AXV300 SM** non-regenerative supply modules have predefined current/power overloads that must never be exceeded.

The supply module overload curve means these are able to supply an output current that is higher than the rated current for a certain period of time, but always less than the maximum value.

The supply module curve is of the I^2T type, i.e. it satisfies a quadratic equation in terms of current supplied, as follows:

$$\textbf{fslow \%} = \frac{\int (Idc^2 - In^2) \cdot dt}{(Idcmax^2 - In^2) \cdot Tovld} \cdot 100$$

The above ratio reflects the fact that when operating in the maximum current condition (Idcmax), the supply module can remain in this condition for a limited time of not more than Tovld seconds.

The ratio varies quadratically with the current.

In case of overload, the **AXV300 SM** supply module first signals an alarm via the *Pre-al* output, then if the overload exceeds 100% disables the Cont signal (which opens the input power contactor).

Module name AXV300 SM-		12040	24080	380140
Idc nom	[A]	20	40	80
Idc max	[A]	40	80	140
Tovld	[sec]	30	30	30
Inmax	[A]	36	72	129
Ilimit	[A]	14 (70% Inom)	40 (Inom)	80 (Inom)

For correct supply module operation the maximum supply module input current must be kept within certain limits.

The table above shows the maximum input current values that always apply.

We recommend the use of chokes upstream of the non-regenerative supply module to limit the maximum current. The table shows the output current limits, above which an input choke is necessary.

Recommended characteristics of chokes for the various **AXV300 SM** modules are shown in section **"13.5. Input chokes for AXV300 SM modules" on page 139**.

8.3. I²xT overload for AXV300 SR modules

Like the axis modules, **AXV300 SR** regenerative supply modules have predefined current/power overloads that must never be exceeded.

This overload function envisages two modes of operation, one fast and one slow, defined as follows:

- Slow overload (typically 150% In for 60 sec);
- Fast overload (typically 200% In for 0.5 sec);

The recovery time is the period after which the overload function becomes available again.

In the table, the recovery time is shown for a current delivered equal to 90% In.

AXV300 SR		10413	21020	22040	33570	350100	480160	5100200	5140210	6200250	6200320
Idc nom	[A]	4.5	10	20	35	50	80	100	140	200	200
Idc ovld Slow	[A]	6.75	15	30	52.5	75	120	150	175	220	260
• **Overload time**	[s]	60	60	60	60	60	60	60	60	60	60
• **Recovery Time @90%In**	[s]	395	395	395	395	395	395	395	178	66	218
Idc ovld Fast	[A]	13.5	20	40	70	100	160	200	210	250	320
• **Overload time**	[s]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
• **Recovery Time @90%In**	[s]	7.9	2.0	2.0	2.0	2.0	2.0	2.0	1.2	1.0	1.4
Overtemperature	[°C]	100	100	105	95	95	80	80	80	80	80

Slow overload is calculated according to the following formula:

$$\textbf{fslow \%} = \frac{\int (Idc^2 - In^2) \cdot dt}{(Islow^2 - In^2) \cdot Tslow} \cdot 100$$

Fast overload is calculated according to the formula:

$$\textbf{ffast \%} = \frac{\int (Idc^2 - Islow^2)^2 \cdot dt}{(Ifast^2 - Islow^2) \cdot Tfast} \cdot 100$$

Current limit management

When the current supplied by the supplier exceeds the In value, **fslow%** increases to 100%.

The supplier then limits the maximum current that can be supplied to the **In** value.

fslow% reaches 100% in 60 sec if the current supplied by the drive is equal to **Islow**.

The regen supplier can also supply a maximum current equal to Ifast. In this case, when the output current exceeds the Islow threshold, the **ffast%** value is increased to 100% in 0.5 sec, after which the maximum current is limited to the **Islow** value.

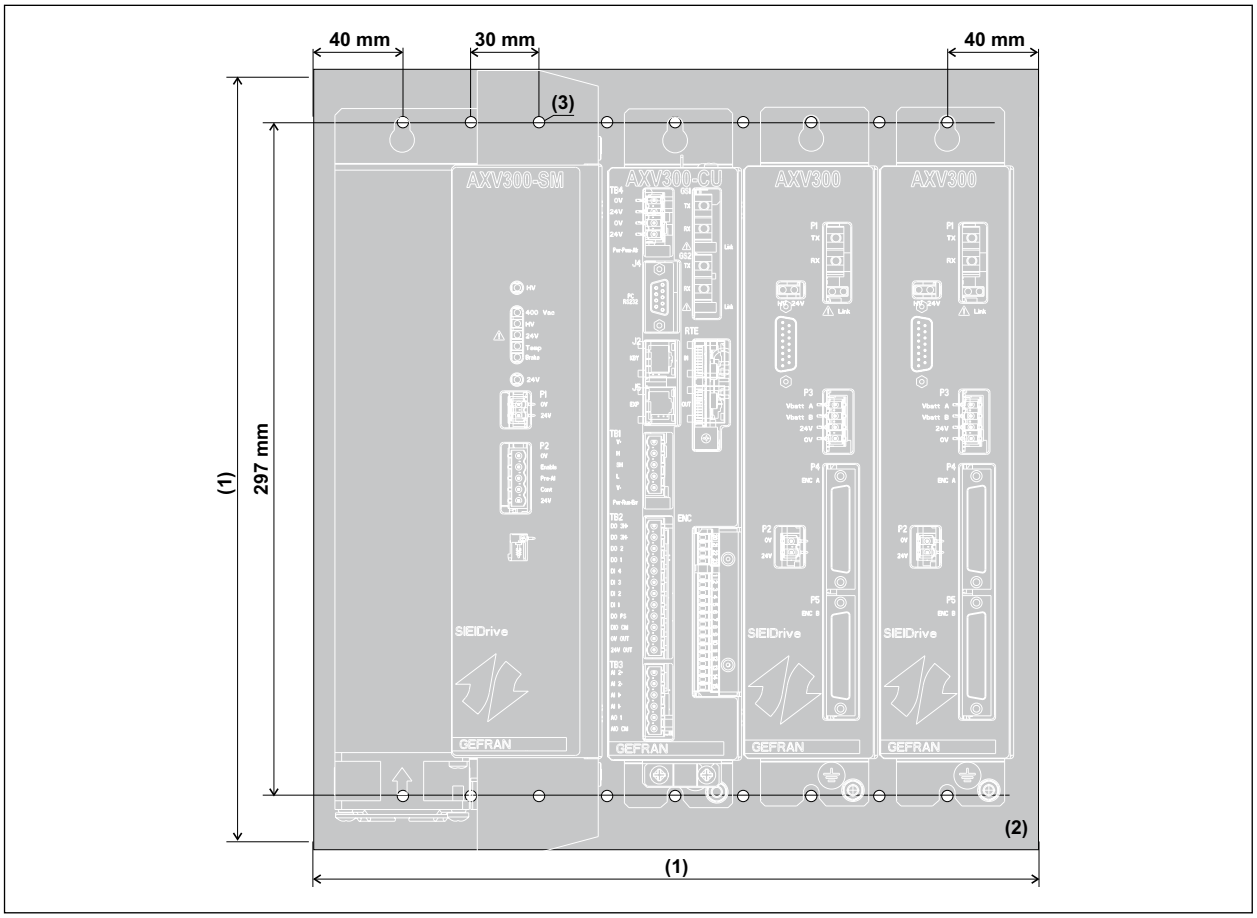
All supply modules, axes and CUs are mechanically compatible (same height and depth), so that they can be installed side by side without wasting any space.

9.1. Wall-mounted modules

The modules can be wall-mounted using the specific eyelets and slots on the rear of each one.

The mounting points are arranged with a multiple pitch of 30 mm (*). Holes can therefore be drilled 30 mm apart in the cabinet wall to mount any combination of modules.

There must be two rows of holes drilled 297 mm apart.



(1) This depends on the size of the modules used. Refer to the dimensions of the modules used.

(2) Wall area used.

(3) Recommended fastening screws: **M5**, minimum length **12 mm**.

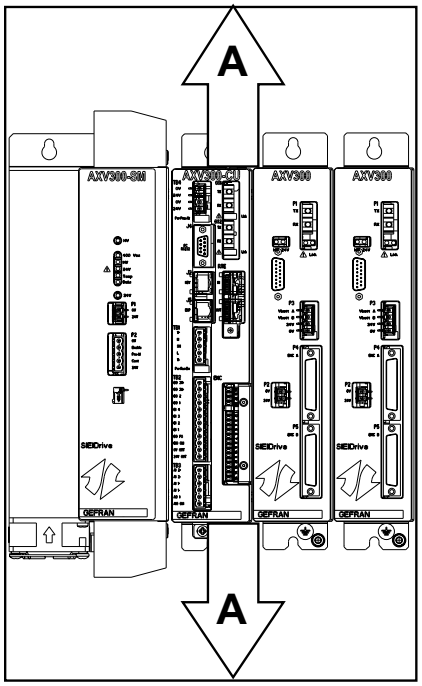
Important

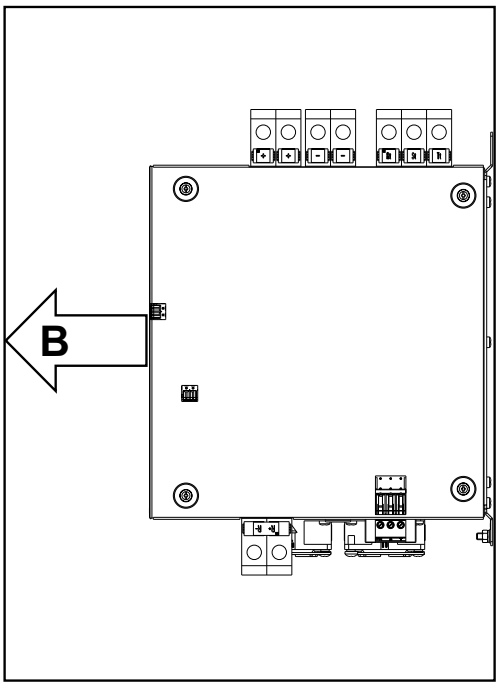
(*) Important note: due to project requirements, on the AXV300 6200250 and AXV300 6200320 axis modules and the AXV300 SR-6200250 and AXV300 SR-6200320 supply module power modules the fastening eyelets are not 30 mm apart.

For these modules, see section "3.14. Sizes AXV300-6200250 and AXV300-6200320 dimensions and weights" on page 32 and "6.13. Sizes AXV300 SR-6200250 and AXV300 SR-6200320 dimensions and weights" on page 66.

9.2. Minimum clearance for air flow

The modules must be mounted so as to guarantee an adequate air flow for correct cooling.





	AXV300 10413 ... 350100 modules AXV300 SR-10413 ... 350100 modules AXV300 SM e AXV300 AFE-SR modules	AXV300 480160 ... 6200320 modules AXV300 SR-480160 ... 6200320 modules
A	100 mm [3.93 inches]	200 mm [7.87 inches]
B	45 mm [1.77 inches]	45 mm [1.77 inches]

Maximum slope allowed _____ The modules must always be mounted vertically
Minimum distance between drives_____ none
Minimum distance at the side _____ none

9.3. Fan capacity

Modules		Fans with internal supply [n.]	Fans with external supply 24V [n.]	Average fan absorption with separate 24 V power supply [A]	Fan capacity [m³/h]
AXV300 AXV300 SR	10413	-	-	-	-
	21020	-	-	-	-
	22040	1	-	-	20
	33570	1	-	-	60
	350100	2	-	-	120
	480160	-	2	1	400
	5100200	-	2	1.6	600
	5140210	-	4	3.2	1200
	6200250	-	7	3.2	1300
	6200320	-	7	3.2	1300
AXV300 SM	12040	-	-	-	-
	24080	-	-	-	-
	380140	-	2	0.5	150
AXV300 CU		-	-	-	-
AXV300 AFE-SR-1		-	-	-	-

Each **AXV300** system comprises several modules and must be appropriately wired using electrical and optical cables. The wiring of each **AXV300** system is shown below and described in the following paragraphs:

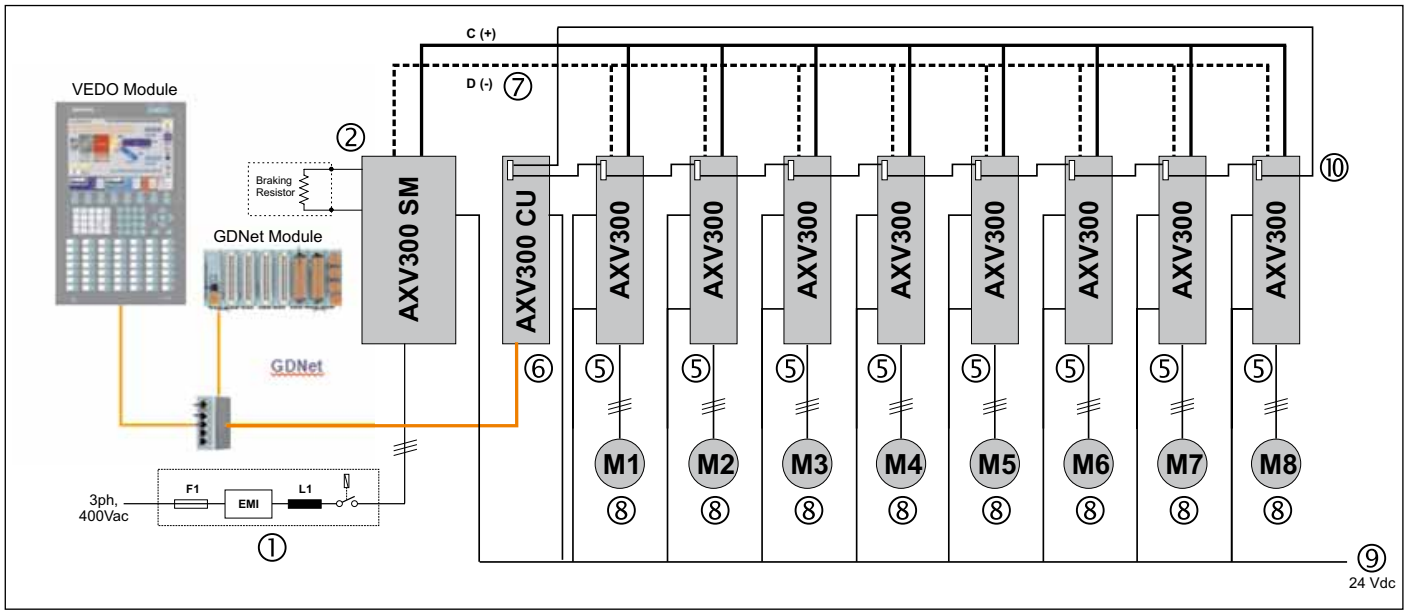


Figure 34: Key AXV300 system components

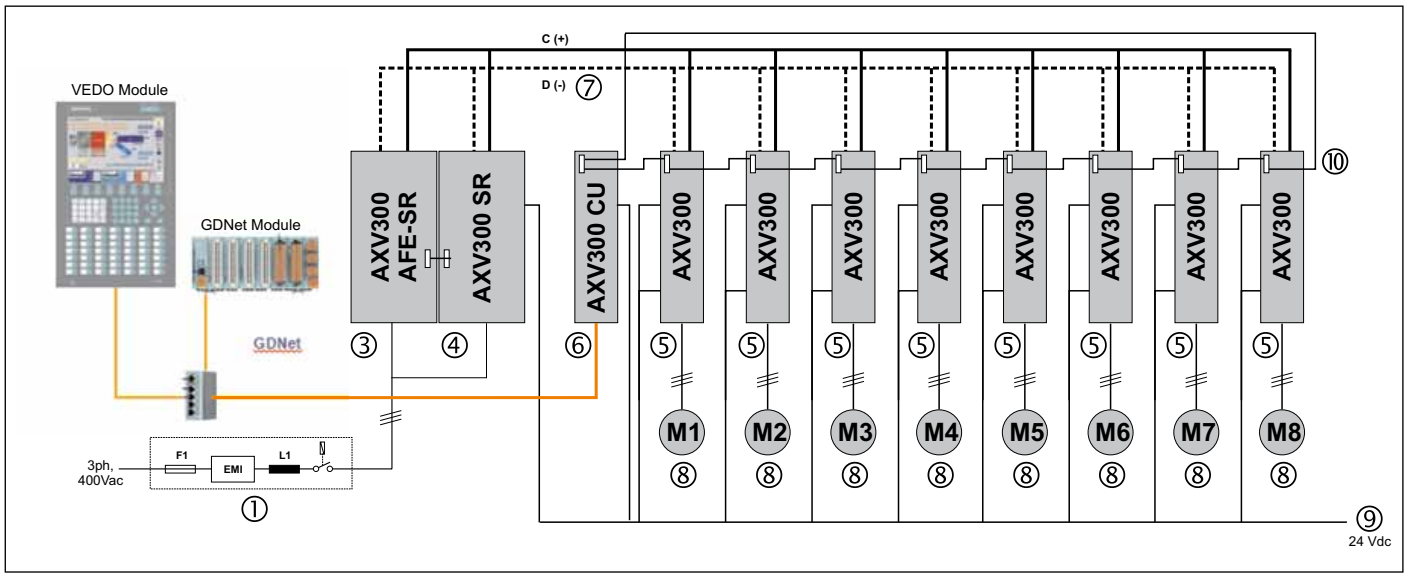


Figure 35: Key AXV300 regenerative system components

- **(1) 400 V input power supply** (delivers current and power voltage to the system input). This part includes any EMI filters, input power contactors and other accessories (e.g. fuses). See chapters **"3.5. Identification of terminals, tightening torques and cable sizes" on page 20** and **"10.1. Electrical connection of AXV300 axis modules" on page 98**

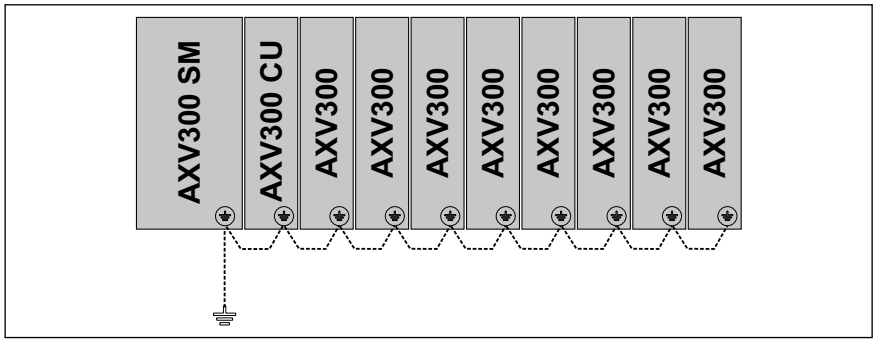
- **(8) Motor wiring**. This refers to the connections from each axis module to the relative motor that is controlled. It always comprises the motor power cable and encoder cables described in section **"10.1. Electrical connection of AXV300 axis modules" on page 98**

- (7) **DC-link wiring**. This wiring enables the system supply module to deliver power to all axis modules via a system of high-voltage (600 V) cables. Given the high power levels involved, this wiring also imposes constraints on the relative position of the axis modules. See chapter **"10.4. DC-link System" on page 110**

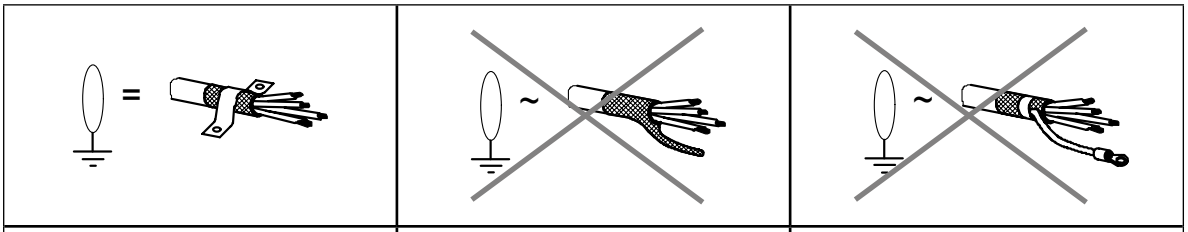
- (9) **Low-voltage wiring**. This wiring distributes low voltage (24 VDC) to supply the logic section of each **AXV300** module. It also includes the 24 V supply module (external) and any accessories (circuit breaker, fuses, etc.).

- **(10) Optical links**. Plastic optical fibre links connect the data and control part of the **AXV300 CU** module and of all the axes. Up to 4 axes can be connected on each link and one **AXV300** system can manage up to a maximum of 8 axes. See chapter **"10.5. GStar Communication System" on page 112**

- **Grounding**. The ground connection point on each single module must be connected to the plant ground circuit via the shortest possible route.



- **Cable shielding** should preferably be connected to the external ground bar or to the power module ground screw via a 360° contact, pigtail connection or "wired" connection (If using a pigtail or wired connection, these must be as short as possible, so as not to undermine connection efficiency).



360° connection	Pigtail connection	Wired connection

10.1. Electrical connection of AXV300 axis modules

On the **AXV300** axis module, the DC input voltage is connected to terminal **M1** and the three-phase motor output to terminal **M2**.

Other connections are needed to exchange data with the **AXV300 CU** module and power all the cards in the power module. The connection diagram is shown in the figure below.

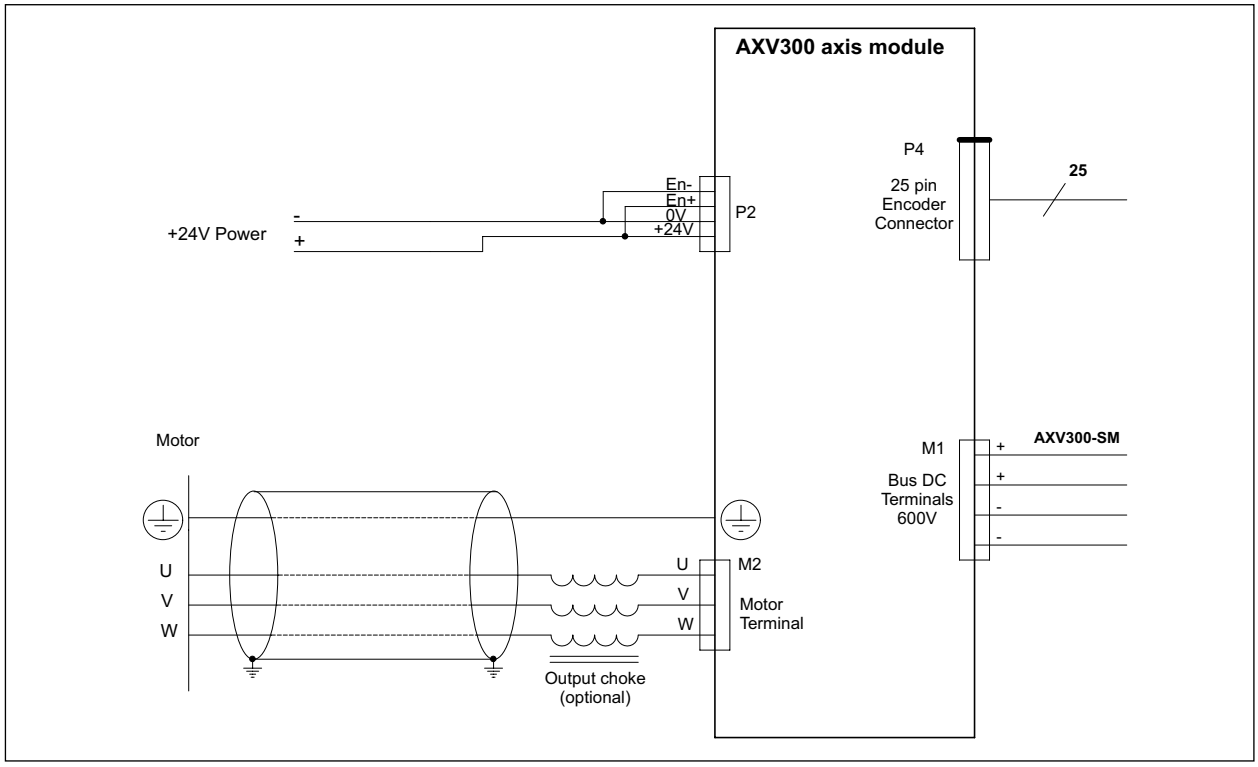


Figure 36: Connection diagram of an AXV300 axis module

For the **GStar** control link connection, reference should be made to the paragraph on the **AXV300 CU** module.

All axis modules are connected to the VDC-link on one side (connector **M1** at the top of the module) and to the motor on the other (connector **M2** at the bottom of the module).

Terminals **M1** and **M2** differ according to the size (see **""3.5. Identification of terminals, tightening torques and cable sizes" on page 20**)) but always have 4 input connections (**M1**) and 4 connections (**M2**) to drive the motor: phases U,V,W and ground connection.

Figure 37: Top part of an AXV300 system: VDC-link connection terminals

Figure 38: Bottom part of an AXV300 system: motor terminals of the single axes and 400 V input

10.1.1. Encoder connection interface

In addition to the above connections, all **AXV300** axis modules feature an encoder port via the 25-pin receptacle connector at the front. The encoder interface supports the following encoders:

- SinCos 1 Vpp
- EnDat 2.1/2.2
- SSI/BiSS
- TTL incremental

The electrical connections that must be provided to connect each type of encoder are defined below.

SinCos encoder

The **AXV300** allows management of sincos encoders with incremental and/or absolute tracks and/or zero reference. The cables for these encoders are structured as follows:

- shielded wire pairs cross-section 0.14 mm² (Can A, Can B = 2 incremental sincos channels)
- 1 shielded wire pair cross-section 0.14 mm² (Can R = Zero)
- wires cross-section 0.14 mm² (Can C, Can D = 2 absolute sincos channels)
- 2 wires cross-section 0.25 mm² (Temp = Heat sensor)
- 2 wires cross-section 0.5 mm² (+5 V, GND = Power supply)
- 2 wires cross-section 0.25 mm² (+5 V Sense, GND Sense = Power supply sense)

The connection diagram of the axis module side is shown in the figure below.

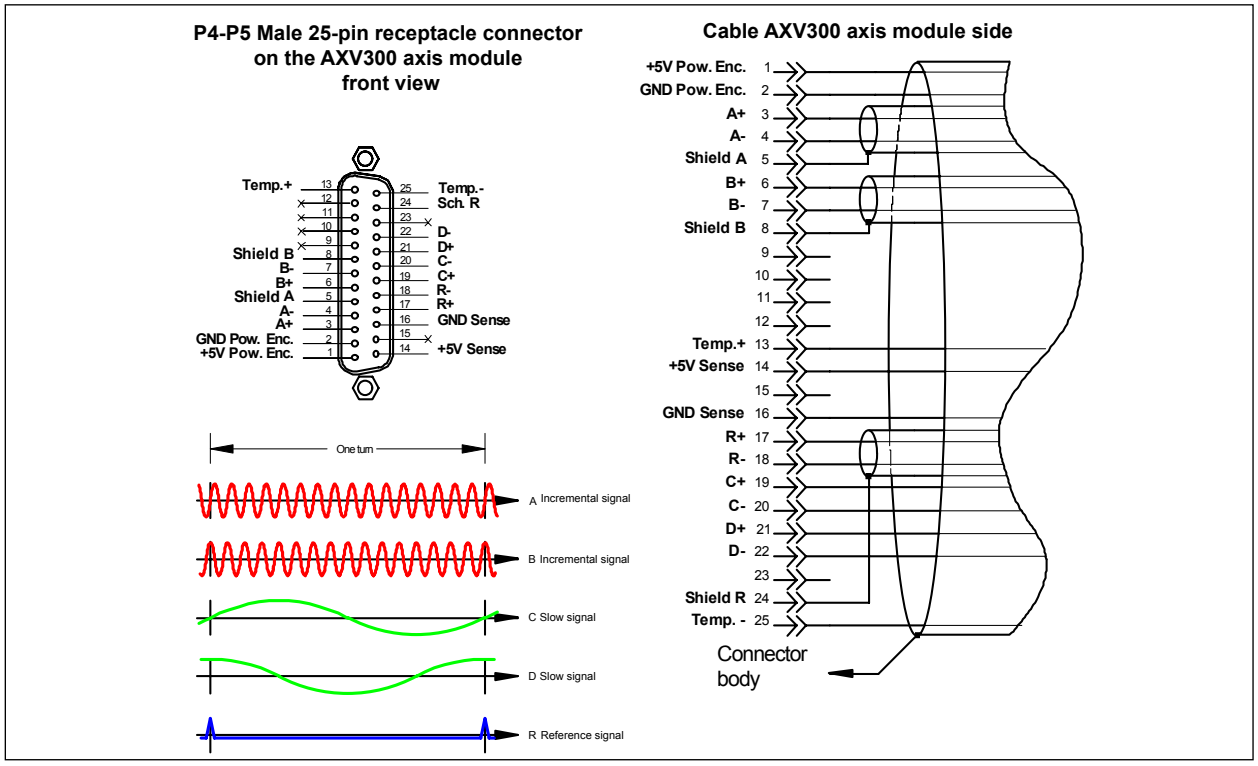


Figure 39: Connections for SinCos-type encoder

Endat 2.1/2.2 and SSI encoders

The **AXV300** allows management of Endat and SSI encoders with or without incremental tracks. The cables for these encoders are structured as follows:

- shielded wire pairs cross-section 0.14 mm² (Can A, Can B = 2 incremental sincos channels)
- 2 wire pairs cross-section 0.14 mm² (DATA = Data Endat, CLOCK = CLOCK Endat)
- 2 wires cross-section 0.25 mm² (Temp = Heat sensor)
- 2 wires cross-section 0.5 mm² (+5 V, GND = Power supply)
- 2 wires cross-section 0.25 mm² (+5 V Sense, GND Sense = Power supply sense)

The connection diagram of the axis module side is shown in the figure below.

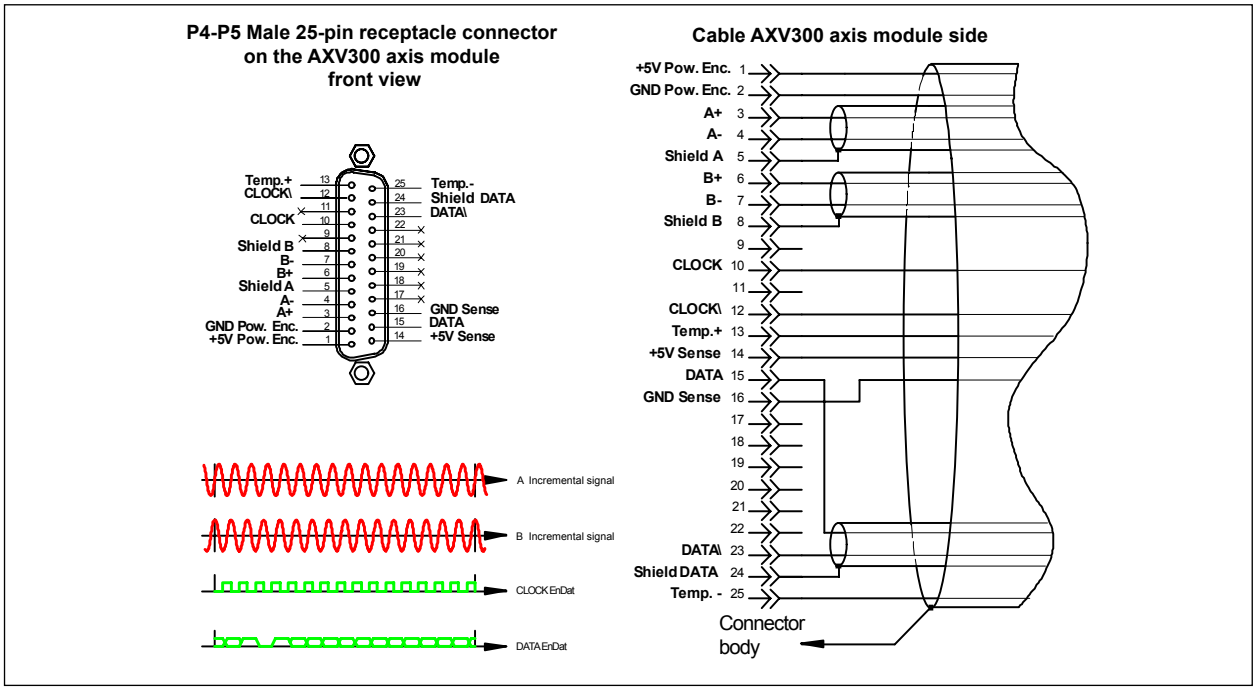


Figure 40: Connections for Endat-type encoders

TTL incremental encoder

AXV300 allows management of TTL incremental signal encoders with or without sinusoidal tracks and/or zero reference. The cables for these encoders are structured as follows:

- shielded wire pairs cross-section 0.14 mm^2 (Can A, Can B = 2 incremental TTL channels)
- 1 shielded wire pair cross-section 0.14 mm^2 (Can R = Zero)
- wires cross-section 0.14 mm^2 (Can C, Can D = 2 absolute sincos channels, if used)
- 2 wires cross-section 0.25 mm^2 (Temp = Heat sensor)
- 2 wires cross-section 0.5 mm^2 (+5 V, GND = Power supply)
- 2 wires cross-section 0.25 mm^2 (+5 V Sense, GND Sense = Power supply sense)

The connection diagram of the axis module side is shown in the figure below.

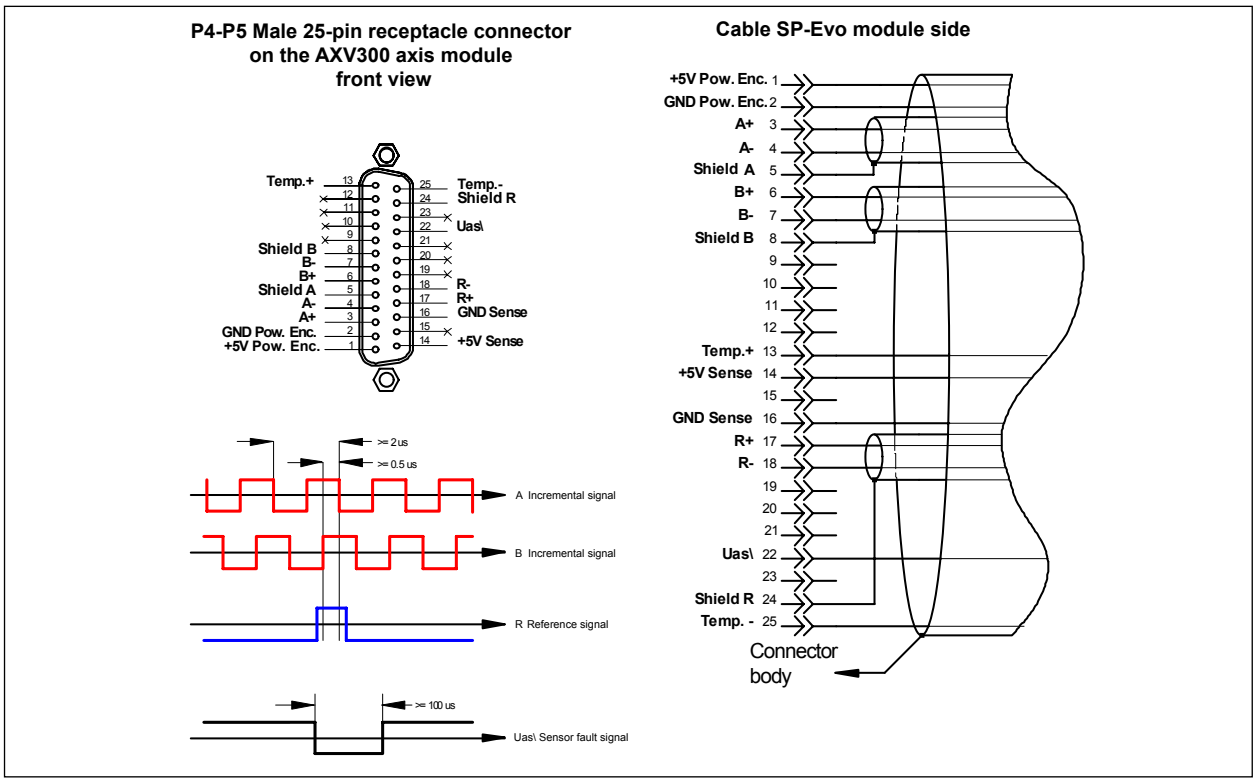


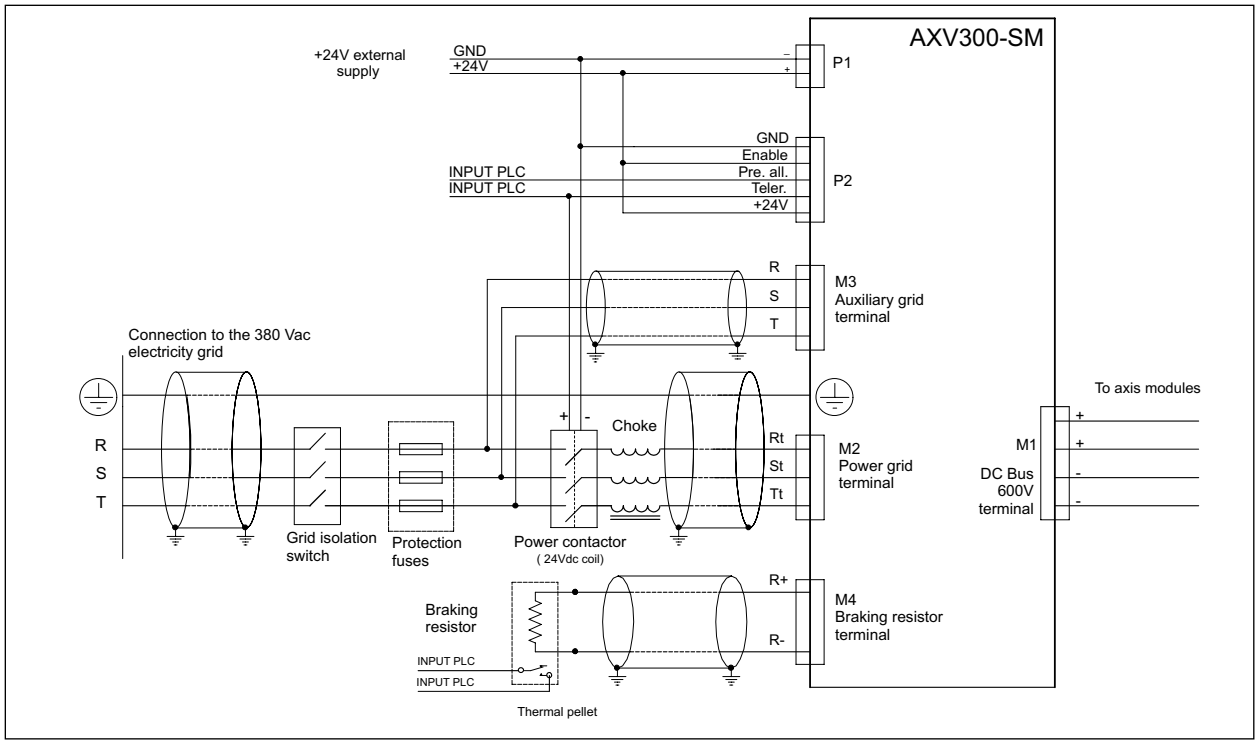
Figure 41: Connections for TTL incremental-type encoders

10.2. Electrical connection of AXV300 SM supply modules

Typical connections for a non-regenerative supply module are shown in the figure below. Note that the **AXV300 SM-xxxx** supply modules have two inputs for the three-phase mains voltage:

- **M2: primary input**
- **M3: auxiliary input**

To enable the supply module, a voltage of 24 V must be applied on the Enable input. The auxiliary M3 input is used during start-up for pre-loading the module (internal capacitors). During the pre-loading phase the primary input must not be connected to the mains. When pre-loading is complete, indicated by the Cont signal which moves to +24 V, the power contactor that disconnects the mains from the primary terminal M1 must be closed. At this point if there are no alarms on the supply module, the system can supply power.



For information about the sequences for resetting the supply module, see paragraph 10.6.

Figure 42: Connection diagram for AXV200 SM-xxxx modules

Caution

The input choke is mandatory on AXV300 SM modules if the output current exceeds the maximum limits given in paragraph "8.2. I2xT overload for AXV300 SM modules" on page 92.

Note !

Overload conditions (**peak current** and **peak power** in the table below) are described in paragraph **"8.2. I2xT overload for AXV300 SM modules" on page 92.**

I/O connector P2: the table below provides a summary of the specifications of each contact. All three logic signals (pins 2, 3 and 4) are active high signals. The connection is identical on each **AXV300 SM** module.

Term. P2	Type	Voltage	Max. current	Function
0V	Ground	0V	2A	Output ground
Enable	Input	0-24V	5mA (In)	Enables complete operation
Pre-al	Output	0-24V	100 mA (Out)	Indicates temperature pre-alarm (95° on the active component)
Cont	Output	0-24V	2A (Out)	Power contactor coil power supply and supply module signal OK
24V	Power supply	24V (-10%+20%)	2A	Output power supply

We recommend using the machine PLC to control the supply module outputs that signal correct operation (*Cont*) and the temperature pre-alarm (*Pre-Al*). The supply module is only ready when *Cont* is high (+24 V). When this signal is low the supply module is not ready or is in an alarm condition and cannot guarantee correct drive operation.

The delay before the supply module is ready after being switched on depends on the number and type of power modules connected to the DC-link and may last several seconds.

The overtemperature alarm blocks the supply module, bringing the machine to an immediate standstill. It is therefore important to use the pre-alarm, which is triggered about 10 seconds before the alarm, in order to move the machine to a position where it can stop without harming the processes being performed.

10.3. AXV300 SR and AXV300 AFE-SR regenerative module electrical connection

The **AXV300** series of regenerative supply modules comprise two single modules arranged side by side and appropriately connected:

- 1 **AXV300 SR-XXXX** series power module
- 1 **AXV300 AFE-SR** regenerative power supply control module

The supply modules, which are part of the modular **AXV300** range, act as regenerative system supply modules: they supply the voltage and current necessary to operate the **AXV300-xxxxx** axis modules of the system. When the axis modules generate current as the result of a motor braking action, that current is redirected to the three-phase network thus avoiding the need for any expensive and space-consuming resistors.

Regenerative supply modules are configured as shown in the figure below.

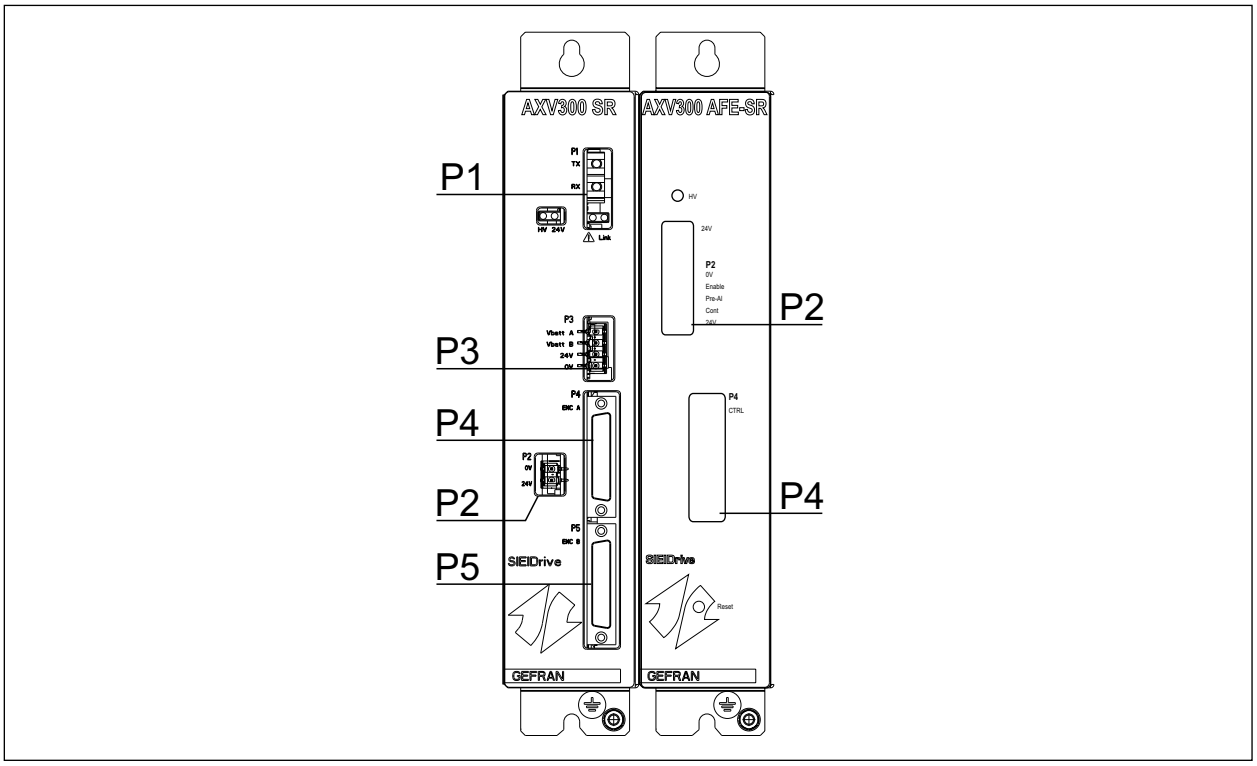


Figure 43: Composition of regenerative AXV300 SR

The **AXV300 Sr-xxxx** modules shown are actual regenerative power modules that, given the three-phase 400 VAC input voltage, generate a 600 VDC output voltage.

The **AXV300 AFE-SR** module is used with these modules, to which it is connected via a 25-pin cable as shown in the figure below, and measures the three-phase network and DC output voltage. **The AXV300 AFE-SR** module also performs the pre-loading phase via internal resistors and the *Cont* output, suitable for controlling a power contactor.

After the pre-loading phase, the power contactor K1 closes and the **AXV300 SR** module controls the DC-link voltage. The green **HV** and 24 V LEDs on the **AXV300 AFE-SR** module must light up to indicate the presence of high voltage and 24 VDC.

During all operating phases the **AXV300 AFE-SR** module shows information about operating status and any errors or problems on a 1-character 7-segment display.

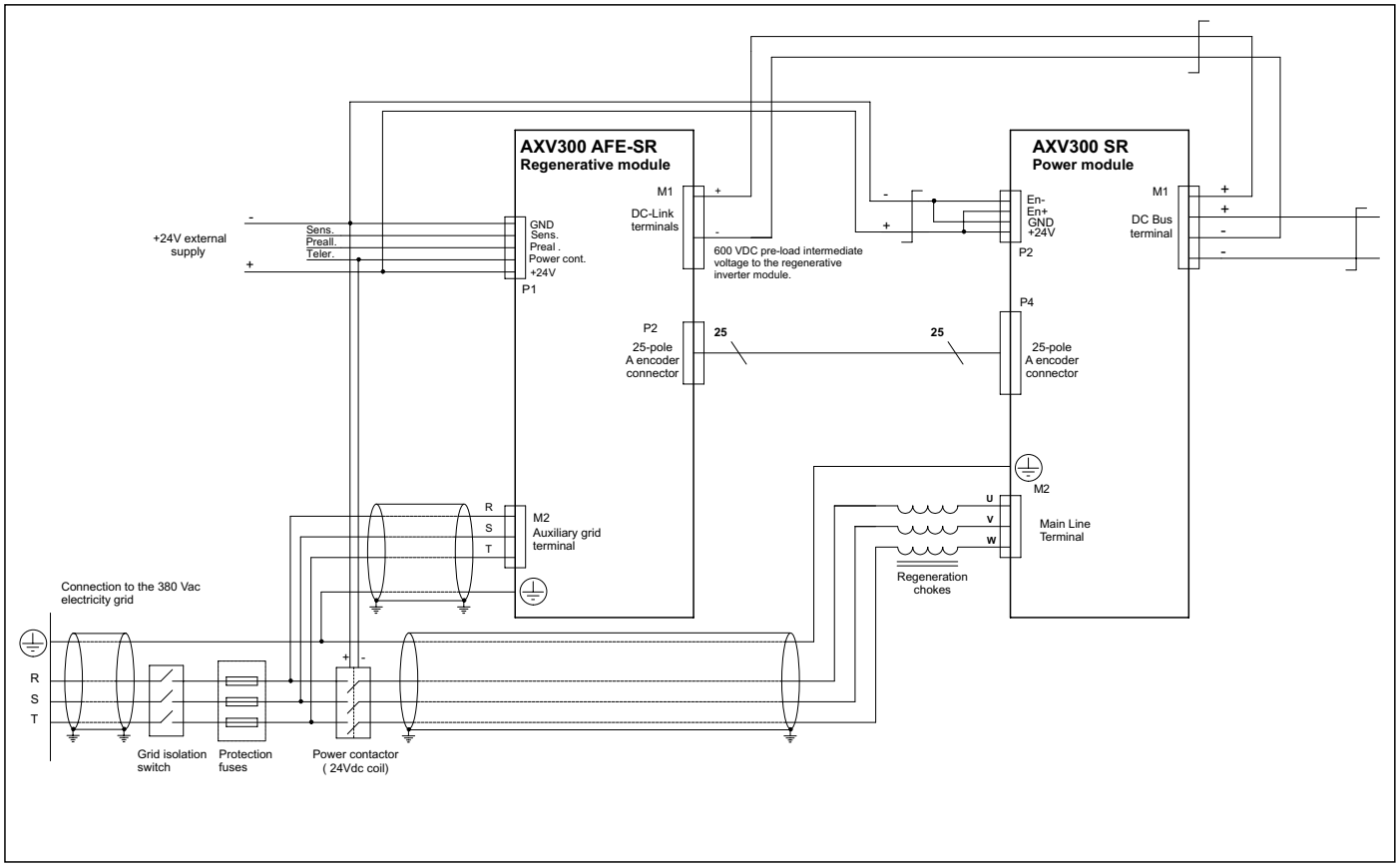


Figure 44: AXV300 SR and AXV300 AFE-SR module (regenerative supply module) connection diagram

Important

All the supply modules only generate the high DC voltage (600 V) necessary for the power section. The 24 VDC required to operate all the AXV300 SR-XXXX and AXV300 AFE-SR modules must be supplied by an external source.

Typical connections for a non-regenerative supply module are shown in the figure above. Note that regenerative supply systems have two inputs for the three-phase network voltage:

- **AXV300 SR-XXXX: primary input M2**
- **AXV300 AFE-SR: auxiliary input M2**

The auxiliary input on the **AXV300 AFE-SR** module is used at start-up for pre-loading the DC-link and the capacitors that are connected. During the pre-loading phase the primary input must not be connected to the mains. When pre-loading is complete, indicated by the Cont signal that moves to +24V, the power contactor that disconnects the mains from the primary terminal **M2** of the **AXV300 AFE-SR** must be closed. At this point if there are no alarms on the supply module, the system can supply power.

Output terminal M1, comprising 4 contacts, must be wired to connect the supply module to the axis modules using cables that are long enough and have a suitable cross-section to carry the necessary current. See the relative paragraph in the handbook for correct power cable dimensions.

10.3.1. Interconnections

Table summarising the connectors on the **AXV300 AFE-SR** regenerative module:

Poles		Max. connectable cross-section
I/O connector P1	5	2.5 mm²
Connector P2 to AXV300 SR module	25	Dedicated cable (cod. S72769)
DC bus connector M1	4 (2+2)	10 mm²
Auxiliary power supply connector M2	3	4 mm²

Table summarising connections of the **ASV300 SR** module associated with the **AXV300 AFE-SR** module

AXV300 SR xxxx	Poles	**AXV300 AFE-SR** connection
24 VDC torque enable connector P2	2	24Vdc
Encoder A connector P4	25	**AXV300 AFE-SR** module connector P2 (cod. S72769)
Encoder B connector P5	25	Not connected
DC bus connector M1	4 (2+2)	M1 **AXV300 AFE-SR** module DC bus connector DC bus connector first module powered
Primary mains connector M2	3	Regeneration chokes

Note ! AXV300 AFE-SR module: details of terminal positions are provided in paragraph **"5.5. Identification of terminals, tightening torques and cable sizes" on page 47.**

- **AXV300 AFE-SR module: DC bus connector M1**

This is a 4-pin terminal connector with a maximum cable cross-section of 10 mm².

The cables from this connector must be connected to connector M1 on the relative **AXV300 SR** module, ensuring correct polarity.

The connections to the DC bus carry dangerous voltage levels (625 VDC rated voltage) and conductors must be appropriately terminated and isolated.

High current levels can be attained. Use cables with a cross-section of 10 mm². Use twisted cables with a pitch of 10 cm or less.

- **AXV300 AFE-SR module: Auxiliary power supply connector M2**

This is a 3-pin terminal connector with a maximum cable cross-section of 10 mm².

The **AXV300 AFE-SR** module must be connected to a three-phase voltage of 400 VAC ± 10% 50/60 Hz, not conditioned by the power contactor, to generate the pre-load voltage for the capacitors on the power modules connected via M1. The cables may have a cross-section of 1.5 to 2 mm², given the low current supplied, but must also meet the isolation criterion as the rated operating voltage is 400 VAC.

Twisted cables with a pitch of 10 cm or less must be connected to this connector.

- **AXV300 AFE-SR module: I/O connector P2**

This is a 5-pin terminal connector with a maximum connectable cross-section of 2.5 mm². The acceptable input voltage is 24 VDC -10% / +20%. Maximum absorption by the 24 V contact is 2.5 A. The current absorbed is only used for the "Reg" "Pre-Al" and "Cont" outputs on this connector. A "safety extra low voltage" is applied to the contacts on this connector. There is no need to provide protection against electric shock for conductors connected to these contacts.

The specifications of each contact are summed up in the table below. All three logic signals (pins 2, 3 and 4) are active high signals.

	Type	Voltage	Max. current	Function
0V	Ground	0V	2.5 A	Ground
Reg	Output	0-24V	100 mA (Out)	Supply module ready, voltage regulation on DC bus is working. " “|-“ is displayed
Pre-Al	Output	0-24V	100 mA (Out)	Temperature pre-alarm at 95°C on the active component of the associated AXV300 SR module. NB: at 110°C a supply module alarm is generated.
Cont	Output	0-24V	2 A (Out)	Power contactor coil power supply.
24V	Power supply	24 V-10% / +20%	2.5 A	Output power supply

We recommend using the machine PLC to control the outputs of the AXV300 AFE-SR module that signal correct operation (Reg and Cont) and the temperature pre-alarm (Pre-Al).

The supply module is only ready when Cont is high (+24 V). When this signal is low the supply module is not ready or is in an alarm condition and cannot guarantee correct drive operation.

The delay before the supply module is ready after being switched on depends on the number and type of power modules connected to the DC bus. This may take several seconds.

The overtemperature alarm blocks the supply module and brings the machine to a standstill.

The pre-alarm signal, which precedes the alarm, can be used to reduce the operating load or move the machine to a safe condition before the actual alarm is generated.

To reset alarms, see **"10.6. Power-on, Power-off and Reset Supply Module Alarms Sequences" on page 113.**

- **AXV300 AFE-SR module: Connector P4 to the AXV300 SR module**

This is a male 25-pin receptacle connector that must be connected to the EN C A connector of the associated **AXV300 SR** module. The cable is supplied with the **AXV300 AFE-SR** regenerative module.

Note ! AXV300 AFE-SR module: details of terminal positions are provided in paragraph **"6.4. Identification of terminals, tightening torques and cable sizes" on page 54.**

- **AXV300 SR module: DC bus connector (M1 associated power module).**

This is a 4-pin (2+2) terminal connector on the **AXV300 SR** module associated with the **AXV300 AFE-SR** module. Its size depends on the type of module. Specifications are provided in the relative paragraph in this handbook.

One pair of terminals on the **AXV300 SR** module must be connected to one pair of terminals on the **AXV300 AFE-SR** module. The other pair of terminals on the AXV300 SR module must be connected to the first of the subsequent power modules that are powered, using cables with the biggest possible cross-section for that module.

These connections carry a dangerous voltage (625 V_{DC} rated voltage) and the appropriate protective measures must be taken.

Use twisted cables with a pitch of 10 cm or less.

- **AXV300 SR module: 24 VDC connector (P2 associated power module).**

This is a male 4-pin terminal connector that carries the enable signal to the **AXV300 AFE-SR** module associated with the **AXV300 AFE-SR** module.

The supply module cannot operate without this power supply and neither DC bus pre-loading nor voltage regulation are performed.

Any VBattA or VBatt (24 V_{DC}) supply voltages can be used as back-up sources and keep the regenerative supply unit active even when the main 24 V_{DC} supply is disconnected.

- **AXV300 SR module: Encoder A connector (P4 associated power module).**

This is a male 25-pin receptacle connector on the **AXV300 SR** module associated with the **AXV300 AFE-SR** module.

When used as a regenerative supply module it must be connected to connector P2 on the **AXV300 AFE-SR** module.

- **AXV300 SR module: Encoder B connector (P5 associated power module).**

This is a male 25-pin receptacle connector on the **AXV300 SR** module associated with the **AXV300 AFE-SR** module.

When used as a regenerative supply module it must remain disconnected.

- **AXV300 SR module: Power supply connector (M2 associated power module) .**

This is a 3-pin plus ground terminal connector on the **AXV300 SR** module associated with the **AXV300 AFE-SR** module. Its size depends on the type of module. Specifications are provided in the relative power module paragraph in this handbook.

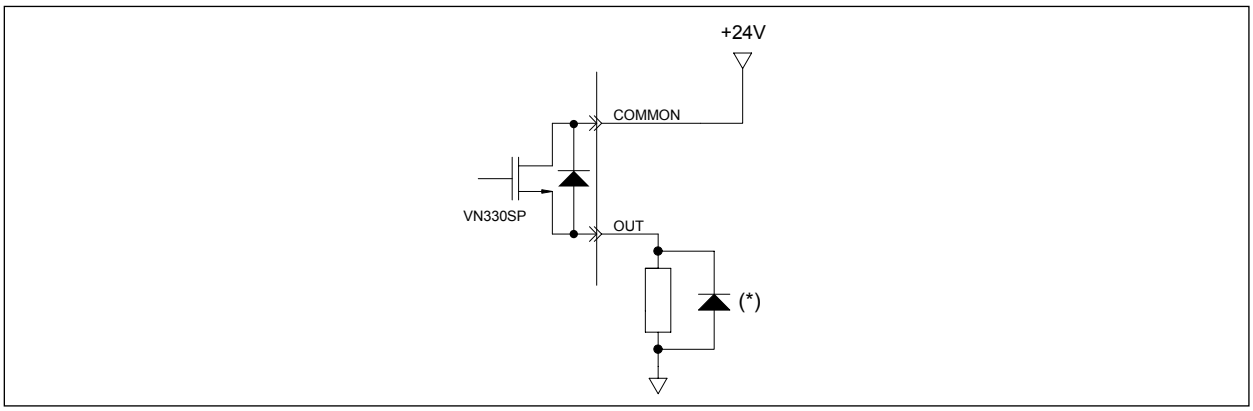
Caution

The three-phase power supply from the power contactor and regeneration chokes must be carried to this connector. We recommend the phase combinations of R-U, S-V and T-W, between connector M2 on the AXV300 AFE-SR module and the motor phases connector M2 on the associated module.

A power contactor and the regeneration chokes must be installed between the mains and the associated power module. The power contactor is controlled directly by the **AXV300 AFE-SR** module, which only sends the enable signal (24 V 2 A Max output) when all conditions for correct operation are met.

Caution

We recommend the use of a power contactor with a built-in recirculation diode or inserting one on the power contactor contacts to damp opening surges.



(*) diode mandatory for inductive loads.

Figure 45: Power contactor Output

Power contactor sizes and conductor cross-sections must be proportional to the power absorbed by the AXV300 SR module (see **"6.3. Input/output specifications" on page 52**).

The use of regeneration chokes is mandatory to ensure correct system operation. These must be installed as near to the associated power module as possible (see **"6.3. Input/output specifications" on page 52**).

Twisted cables with a pitch of 10 cm or less must be used for connections between the three-phase power supply, power contactor, chokes and **AXV300 SR** module. These must be appropriately terminated and isolated as they carry dangerous voltage levels (400 VAC rated voltage).

Fuses and a mains circuit breaker must be installed upstream of the power contactor (see **"Figure 44: AXV300 SR and AXV300 AFE-SR module (regenerative supply module) connection diagram" on page 104**).

10.3.2. Start-up and pre-load sequence

This section describes the pre-load procedure and correct management of this from system start-up (connection to the 24 VDC).

1- **Start-up**. Power contactor K1 is open so that connector **M2** on the **AXV300 SR-XXXX** is not powered. The **AXV300 AFE-SR** module recognises the 400 V three-phase input voltage on connector **M2**. The **AXV300 AFE-SR** module does not pre-load the DC-link yet. The **HV** (high voltage) and 24 V LEDs must be lit to continue the start-up sequence.

2- **Boot**. First the characters rXX are scrolled across the **AXV300 AFE-SR** module display, where XX is a numerical code indicating the firmware version. Next the characters SPYYY are scrolled, where YYY indicates the size of the associated **AXV300 SR** module using the code system described in paragraph **"10.3.3. Static operation" on page 109**

3- **Checks**. The **AXV300 AFE-SR** module displays the following sequence of characters 0=checking three-phase power supply, 1=synchronisation with three-phase power supply

4- **Pre-load**. The **AXV300 AFE-SR** module displays the character 2 (DC-link pre-load via internal pre-load resistors).

5- **End of pre-load.** Pre-loading is complete, the **AXV300 AFE-SR** module closes power contactor K1 and raises the Cont output potential. The **AXV300 AFE-SR** module displays character 3.

6- **AXV300 SR module check**. The **AXV300 SR** module, now receiving the three-phase input power supply, generates a continuous voltage on the output terminals. The system checks that voltage absorption and regulation are correct. Character 4 is displayed.

7- **Running in regulation mode**. The **AXV300 SR-XXXX** module generates and regulates the continuous bus voltage. If the voltage is regulated correctly to 625 V the **AXV300 AFE-SR** displays character -|.

10.3.3. Static operation

During static operation the regenerative supply module stabilises the voltage at 625 V.

The **AXV300 AFE-SR** module displays a different message according to the output status:

-  synchronisation with mains
-  DC-link voltage more than 625 V
-  DC-link voltage = 625 V
-  DC-link voltage less than 625 V

The point on the display flashes continuously to indicate correct operation of the supply module firmware.

If the regenerative supply module stops, the **AXV300 AFE-SR** module signals the type of error. Possible alarm codes are listed below:

Alarm codes	Error
C 0, C 1	AXV300 SR module U phase current measurement error
C 2, C 3	AXV300 SR module V phase current measurement error
C 4	AXV300 SR module current too high
C 5	AXV300 SR module current thermal protection
E 0	AXV300 SR module “Enable” connection missing or current too high
F 1	AXV300 SR module U phase connection error
F 2	AXV300 SR module V phase connection error
F 3, F 4, F 5, F 6	AXV300 SR module W phase connection error
F A, F b, F c, F d, F E, F F, F	Error in connections to the AXV300 SR module
F H	Excessive capacity of modules connected to the DC-link
H 4	AXV300 AFE-SR module reset unexpectedly
L 0, L 2	Incorrect R phase to AXV300 AFE-SR module
L 1, L 3	Incorrect T phase to the AXV300 AFE-SR module
L 4, L 5	Incorrect three-phase power supply frequency to the AXV300 AFE-SR module
L 6, L 7, L 8	Incorrect three-phase power supply to the AXV300 AFE-SR module
L 9	Regeneration chokes too small
L A	Regeneration chokes too big
P 0 – P 9, P A – P U	Internal error. Contact the technical service centre
t 0	Temperature inside the AXV300 SR module too low
t 1, t 2	Temperature inside the AXV300 SR module too high
t 3	AXV300 SR module internal temperature measurement error
U 0, U 1	Mains voltage too high
U 2, U 3, U 4, U 9	DC-link voltage too high
U 5, U 6, U 7, U A	DC-link voltage too low
U 8, U b, U C, U F	Too many axis modules connected to the system or mains voltage unstable or insufficient

10.4. DC-link System

The DC-link is a two-wire system that carries high voltage (600 VDC) to all the axis modules and the supply or regenerative current (in one direction or the other) for all the modules.

The DC-link cables that connect the power supply and power modules need not be shielded provided they are kept outside the cable tray, twisted, close to the module containers and some distance from the other cables (see figure below).

The DC-link must guarantee minimum losses and present very low impedance to all system components. This is achieved by adopting certain criteria for the dimensioning and assembly of all components connected to a common DC-link.

The approach adopted here first considers a series of qualitative principles and then provides a series of quantitative rules for dimensioning.

General rules for dimensioning:

- Each axis module is provided with two pairs of connectors to receive the DC-link and redirect it to other modules;
- Axes that redirect the DC-link must be able to withstand the current for themselves and for the modules downstream;
- Bigger axis modules have a bigger current carrying capacity and must therefore be arranged as close as possible to the supply module;
- The above rule also applies for the **AXV300 AFE SR** module installed close to the **AXV300 SR** power module but which has a smaller transport capacity since it is a size 1 module;
- The DC-link must have a linear wiring structure (a single power supply line leading from the biggest axes to the smallest ones) or a two-wire structure (two power supply lines leading from the supply module).

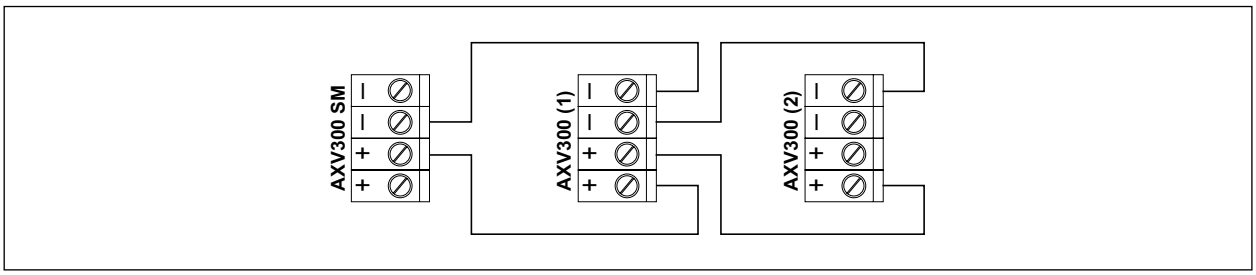


Figure 46: Example of linear wiring

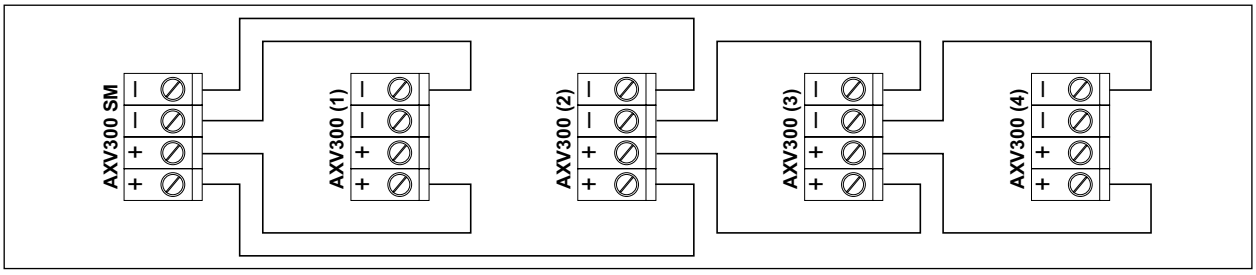


Figure 47: Example of two-wire structure

Quantitative rules for DC-link dimensioning:

1. The sum of the axis module power ratings, if necessary multiplied by the coincidence factor, must not exceed the rated capacity of the supply module (power).
2. Each axis module has a specific current transfer capacity. The sum of the currents required by the drives downstream of the axis module must not exceed the axis module's transfer capacity.

The current transfer capacities of each axis are shown in the table below:

Module name AXV300 -		10413	21020	22040	33570	350100	480160	5100200	5140210	6200320
Rated current In	[A]	4.5	10	20	35	50	80	100	140	200
Transfer capacity	[A]	40	40	40	100	100	160	160	160	260

10.5. GStar Communication System

The **GStar** communication protocol is based on a 10 Mbit optical link. The optical link allows two-way synchronous communication at 250 µs. With the **GStar** protocol, the values sent as references (from control unit to axes) and the values to be read (from axes to control unit) can be defined for each axis at each system cycle.

Figure 48: AXV300 system with 4 axes interlinked to the control unit via optical fibre link

Each parameter must be duly mapped on a communication channel. Before communication starts, the parameters of each axis must be defined on each optical link as they are revised.

Each parameter can be mapped on 3 different communication channels and the boot parameters.

1. **Fast update**

   Data exchanged on the real-time channel (fixed period of 250 µs).

   The fast channel is synchronised with the main task at 250 µs. The slow channel cycle time can be set to between 500 µs and 4 ms.

2. **Slow update**

   Data exchanged on a slow channel (the slow update period can be defined).

   The slow channel can be synchronised with a task that has the same cycle time (or a multiple thereof) so that when executed it has just received the updated data from the slow channel.

3. **Async**

   Data exchanged asynchronously, when possible after the needs of the other channels.

   The *Async* channel is highly flexible but the cycle time cannot be set: all parameters defined as *Async* can be requested by/sent to an axis. One or more *Async* parameters can be requested simultaneously, but the time it takes to send them cannot be determined in advance.

4. **Boot parameters**

   Boot data cannot be updated for the entire duration of the communication session. They are therefore constants. Boot parameters are sent by the control unit to each axis as soon as the communication link is established or when data are updated.

   The boot parameters are the configuration settings of an axis and depend on the actual module and on the user-defined motor and encoder settings, etc. chosen by the user.

Note ! For details on connection. see paragraph **"13.8.1. Optical fibre link connection (P1)" on page 142**.

10.6. Power-on, Power-off and Reset Supply Module Alarms Sequences

Power-on and Power-off Sequences

This section describes the correct sequences for switching on and off and for stopping the axes for the AXV300 digital drive system, to be used for ordinary machine operations.

Wiring in the supply and power module cabinets and connection of optical fibres to the **AXV300 CU** module are described in the relative paragraphs.

The procedures for starting a machine that has been completely shut down to make it fully operational are described below.

AXV300 system: with reference to **"Figure 42: Connection diagram for AXV200 SM-xxxx modules" on page 101**, and **"Figure 44: AXV300 SR and AXV300 AFE-SR module (regenerative supply module) connection diagram" on page 104**, note that the **AXV300** digital drive system (**AXV300 SM** supply module or **AXV300 SR** regenerative module + **AXV300-XXXX** series of power inverter modules) has two power supply sources:

- 400 VAC terminals M2 and M3 of the **AXV300 SM** module (terminals M2 of the associated **AXV300 AFE-SR**, **AXV300 SM** and **AXV300 SR** modules for the regenerative supply module)
- +24 VDC terminals P1 and P2 of the **AXV300 SM** module (terminal P2 of the **AXV300 AFE-SR** module and terminals P2 and P3 of the associated **AXV300 SR** module) + terminals P2 and P3 of the **AXV300**-XXXX modules.

These two power supply sources are activated when the supply module is switched on.

The sequence of activation is not important.

Either one can be activated first, or both together.

For **AXV300 SM** supply modules, the "**Cont.**" signal (connector P2 output) indicates supply module OK if active high (+24 V) when the 400 VAC and +24 VDC power supplies reach the steady state.

This occurs when the DC bus has completed the pre-load phase via the 380 VAC on connector M3 at a voltage of approx. 450 V.

The time this takes depends on the number and type of **AXV300** modules that are connected. It ranges from a minimum of about 1 second to a maximum of 6-8 seconds.

The "**Cont.**" signal is deactivated whenever any alarms occur on the **AXV300 SM** supply module.

Caution

To reset a possible alarm condition on the AXV300 SM and AXV300 AFE-SR supply modules, disconnect and then re-connect the +24 V on connectors P1 and P2 (sequence to be entered in the external PLC/machine logic).

The 24 VDC power to the **AXV300 XXXX** axis modules must be supplied to connector P3 to prevent any interruptions in the **AXV300** system start-up procedure, which would undermine communication with the control unit and trigger an alarm that is only resettable by rebooting the machine

Caution

The +24 VDC power supply must always be applied to connector P3 on the AXV300 xxxx modules during machine operation.

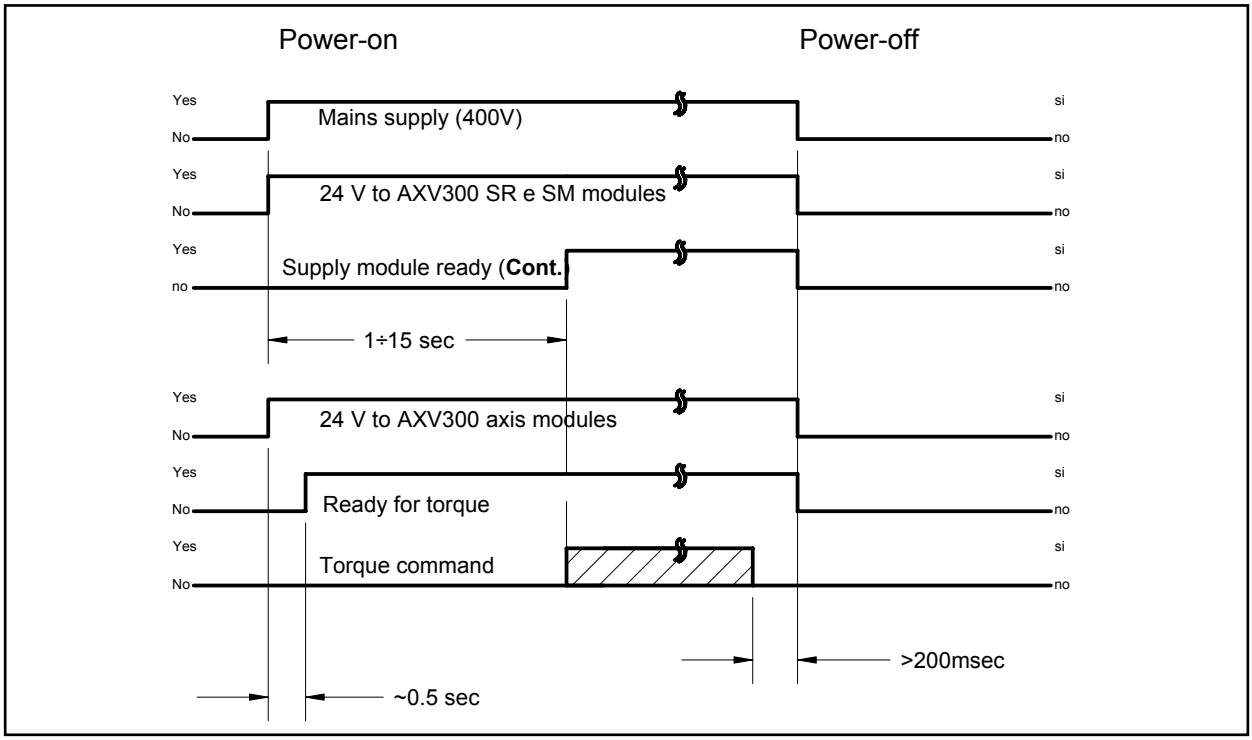


Figure 49: Power-on and power-off sequences

Caution

In the start-up phase, wait for the "Cont." supply module ready signal and the ready for torque signal before enabling the axis (Enable).

In the power-off phase, we always recommend (if possible) removing the enable axes command before switching the system off.

Note the power-off phase in the figure above. The order in which the two power supplies are disconnected is not important. We recommend (if possible) disconnecting the power supplies at least 200 ms after removing the torque command.

As regards power-off, the following procedure is recommended (if possible):

- remove the torque command (Enable Drive SW)
- wait at least 200 ms then disconnect the power supply to the enable relay (24 V at P2)
- wait at least 200 ms then disconnect the voltage supply (400 V_{AC})

11.1. CAN interface - CANopen/DeviceNet communication

11.1.1. Introduction

To use this communication interface you will need a basic knowledge of CANopen and DeviceNet, see the following manuals:

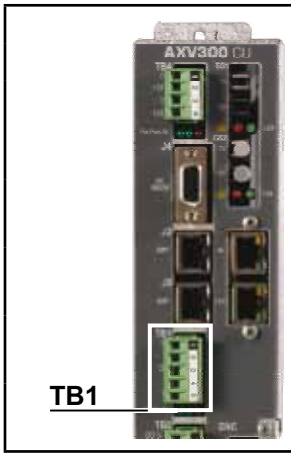
- CANopen CAL-Base COMMUNICATION PROFILE for Industrial Systems; CiA Draft Standard 301 Version 4.2 Date 13 February 2002 by CAN in Automation e. V.
- DeviceNet Specifications. Volume 1 - DeviceNet Communication Model and Protocol (Pubblicato da ODVA).
- DeviceNet Specifications. Volume 2 - DeviceNet Device Profiles and Object Library (Pubblicato da ODVA).

11.1.2. Connection

Wire sizesi: _____ 0.2 ... 2.5 mm² (AWG 24 ... 12)

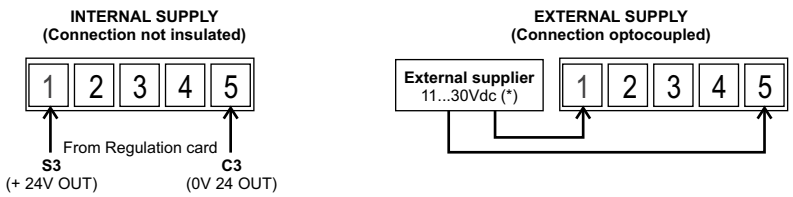
Opto-isolated connection _____ Data rate up to 1Mbaud

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



TB1 connector			
Terminal	**Designation**	**Function**	**Max**
1	V+	CAN external positive supply (dedicated for supply of transceiver and optocouplers)	11...30V
2	CAN_H	Linea bus Can_H (dominante alta)	-
3	CAN_SHLD	CAN shield	-
4	CAN_L	Can_L busline (dominant low)	-
5	V-	Ground / 0V / V-	0V

BUS terminal : allows to connect the card to the CANopen or DeviceNet network



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

Important

Note on terminating resistor :

The first and last termination on the network must have a 120 ohm resistor between pins 2 and 4.

Caution

Terminals 1-5 must be powered if using an external power supply the mains is galvanically isolated.

The connection among the single cards is performed with a shielded cable as shown in the following figure.

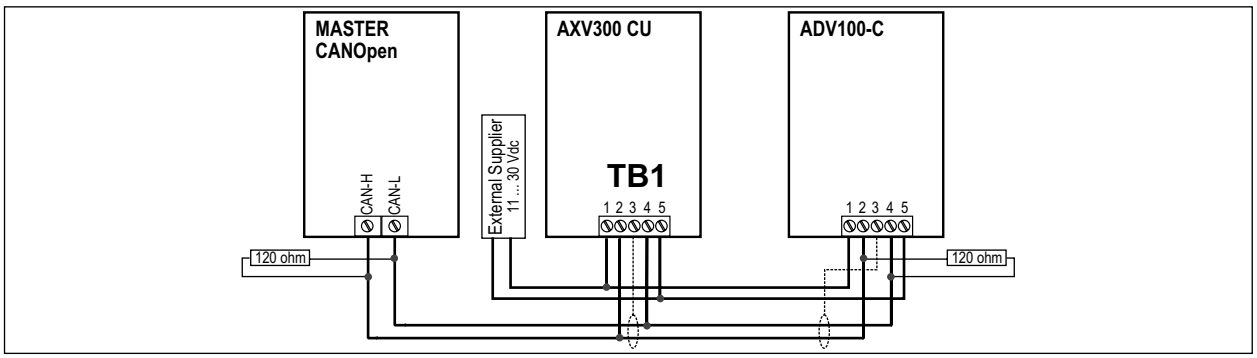
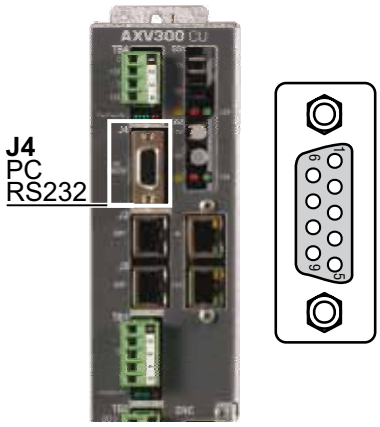


Figure 50: CANopen connection

11.2. Serial interface RS232 - Modbus communication

The **AXV300** 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).



J4 connector on AXV300 CU module			
PIN	**Function**	**Elect. Interface**	**I / O**
1	-	-	-
2	TxD	RS232	Input
3	RxD	RS232	Output
4	-	-	-
5	0V (Ground)	Supply	-
6	-	-	-
7	-	-	-
8	-	-	-
9	+5V	Supply	-

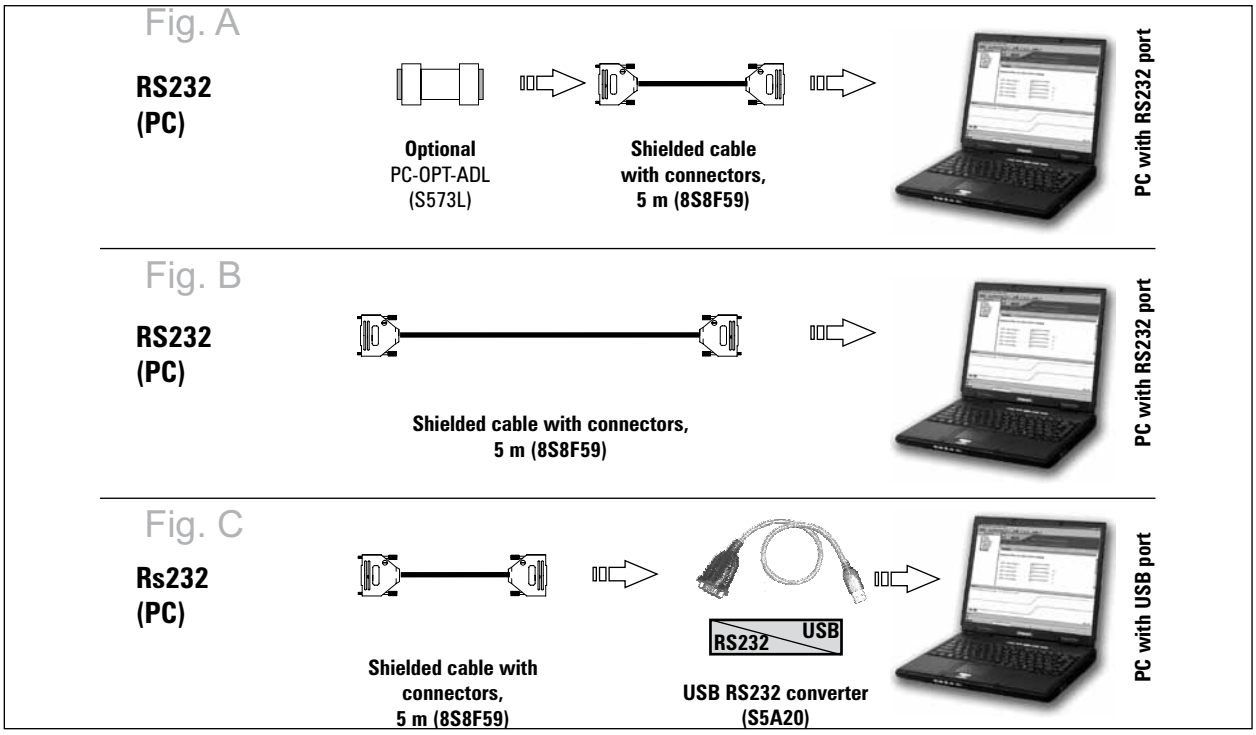


Figure 51: Drive point-to-point communication / RS232 serial line

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

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 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 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 C.

General criteria for drive/brushless motor

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

In particular, the following considerations are important:

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

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

In case of axis applications, where the system dynamic performance is fundamental, the required torque is often equal to the sum of the motor and load inertial torques. The use of a reduction ratio in the transmission reduces, on one side, the load inertia influence, but, on the other, it increases the motor side. In such applications, therefore, direct coupling is normally used.

With direct coupling, the system dynamics are influenced by the shaft torsional rigidity and by the relative resonance frequency. The drive and motor are capable of much higher bandwidth than the mechanics.

After choosing the motor and the transmission, it is necessary to check the application.

In case of applications whose speed and load are constant or variable for periods longer than the motor time constant, it is sufficient to check that the maximum load is within the capacity limits stated for the motor and the drive.

On the contrary, in applications where the load changes according to a faster cycle, do the following:

- Trace a cycle speed/time diagram, remembering that the reaching of a precise position or speed value requires, apart from the time set by the system limit accelerations, a settling period equal to 3 times the period of the system passband.
- Refer the system inertia and loads back to the motor axis.
- Calculate the acceleration cycle and the cycle of the relative inertial torques.
- State the cycle torque/time diagram by adding the inertial torques to the loads.
- Calculate from the torque/time diagram the cycle effective torque. If the cycle is made up of n duration segments t1, t2, ... tn, and of their corresponding torques C1, C2, ... Cn, the cycle effective torque is given by:

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

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

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

12.1. Motor Check

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

Check of the demagnetization current

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

$$I_{PK} = \sqrt{2}\,\frac{C_{PK}}{k_T}$$

Where:

C_{PK} = cycle peak torque

K_T = motor torque constant

Check of the thermal sizing

Check first that the point C_{EFF} , ω_{EFF} is within the area of the motor continuous operating range.

In particular, calculate the motor temperature increase, given by the relation:

$$\Delta T_{MAX} = \frac{65}{L_N}\left[\left(\frac{C_{EFF}}{T_N}\right)L_n + \left(\frac{\omega_{EFF}}{\omega n}\right)L_0\right]$$

Where:

L_N = motor rated losses

T_N = motor rated torque

ω_N = motor rated speed

L_0 = motor rated losses in ω_N

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

Check of the electric sizing

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

$$V_{MAX} = \sqrt{\left(K_E\,\omega_{PK} + R_W\,\frac{C_{PK}}{K_T}\right)^2 + \left(\frac{C_{PK}}{K_T}\,\frac{P_N}{2}\,\omega_{PK}\,L_W\right)^2} \le E_{MIN}$$

Where:

E_{MIN} = minimum voltage supplied by the drive

K_E = motor voltage constant

ω_{PK} = cycle maximum speed

R_W = motor terminal to terminal resistance

C_{PK} = cycle maximum torque

K_T = motor torque constant

P_N = motor pole number

L_W = motor terminal to terminal inductance

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

12.2. Check of the Drive Size

The drive size is chosen according to the torque to be supplied to the motor with a specific winding, from where the needed energy is derived.

The peak and average currents required by the drive are provided by:

$$I_{MAX} = \frac{C_{PK}}{k_T} \qquad I_{med} = \frac{C_{AVE}}{k_T}$$

Where:

C_{PK} = cycle maximum torque

C_{AVE} = cycle average torque

K_T = motor torque constant

The drive must be in a position to develop continuous and peak currents higher than the calculated values; remember that the drive maximum current must be compared to I_{MAX} only if the relative time is lower than 2 seconds; if not, the drive must have a rated current higher than I_{MAX}. See **"Table 2: I2T overload data for AXV300 axis sizes" on page 86**.

12.3. Dimensioning of braking resistor for AXV300 SM supply modules

The choice of braking resistor depends on a number of factors, the most important of which are:

- maximum current that can be supplied by the supply module;
- rated and peak braking resistor operating conditions;
- machine operating cycle.

The supply module

The maximum current that can be supplied, which corresponds to the minimum resistor value that can be connected, must be checked.

Minimum ohmic value

The minimum value depends on the characteristics of the power supply module:

AXV300 SM 12040 = 33 Ohm (minimum)

AXV300 SM 24080 = 9 Ohm (minimum)

AXV300 SM 380140 = 6 Ohm (minimum)

Since braking resistors have a wide tolerance range, values should be increased by at least 20%.

At these resistance values the supply modules can continuously deliver current at:

$$I_{BU} = \frac{700\ [V]}{R_{min}\ [ohm]} = [A]$$

The following machine operating cycle data must be obtained:

P_{MFR} = Peak power [W]

T_{FR} = braking time [s]

T_C = repeat time [s]

E_{FR} = Braking energy [J]

P_{NFR} = Rated braking power [W]

Ratios:

$$P_{NFR} = 0.5 * P_{MFR} * \frac{T_{FR}}{T_C} = [W] \quad \text{or} \quad P_{NFR} = \frac{E_{FR}}{T_C} = [W]$$

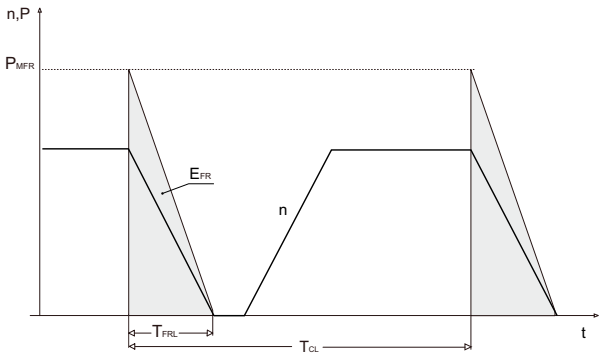


Figure 52: Limit operating braking cycle with typical triangular power profile

Checking the resistor:

Once the operating cycle has been established, the following must be checked:

- power rating $P_{NFR} < P_{NBR}$
- maximum power that can be absorbed $E_{FR} < E_{BR}$

Example of how to select the braking resistor

"Table 3: Braking resistors and combinations" on page 124 contains data about the braking resistors available in the catalogue for 2 operating cycles:

(1) 1s every 10s

(2) 30s every 120s.

Consider one of the two examples. As a general rule, consider cycle (1) for short braking cycles and cycle (2) for long braking cycles.

Operating cycle data:

P_{MFR} = 10 kW

T_{FR} = 3 s

T_C = 15 s

Use these to calculate the braking energy value

$$E_{FR} = 0.5 * P_{MFR} * T_{FR} = 15 \text{ [kJ]}$$

AXV300 SM 12040 supply module data

Rmin = 33 Ohm -> Rmin20% = 39 Ohm

I would choose the 42 ohm resistor: **BR T2K0-42R**

$E_{BR}1$ = 20 kJ

$E_{BR}2$ = 82 kJ

P_{NBR} = 2 kW

Maximum peak power dissipated by the resistor connected to the supply module:

$$P_{PSM} = \frac{700^2 \text{ [V}^2\text{]}}{\text{Rmin [ohm]}} = 11.7 \text{ [kW]}$$

This must be greater than P_{PFR}.

If not, you will need to install additional or different braking systems (e.g. Buy etc..).

Cycle (1)

Maximum possible braking time:

$$T_{BRL}1 = 2 * \frac{E_{BR}1}{P_{PSM}} = 3.4 \text{ [s]}$$

Cycle (2)

Maximum possible braking time:

$$T_{BRL}2 = 2 * \frac{E_{BR}2}{P_{PSM}} = 14.0 \text{ [s]}$$

For the selected cycle, the braking time Tfr must be less than these maximum values:

T_{FR} = 3 [s] < T_{BR}L1 o T_{BR}L2.

If not, select a braking resistor with a higher energy absorption capacity (E_{BR}).

The power rating of the braking resistor must be at least equal to that of the cycle:

$$P_{NFR} = 0.5 * P_{MFR} * \frac{T_{FR}}{T_C} = \frac{E_{FR}}{T_C} = [W]$$

Cycle (1)

$$P_{NFR1} = \frac{15000}{10} = 1500 [W]$$

Cycle (2)

$$P_{NFR1} = \frac{15000}{120} = 125 [W]$$

The results of these calculations reveal that the selected resistor meets all the necessary operating conditions.

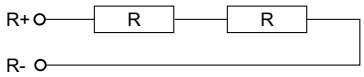
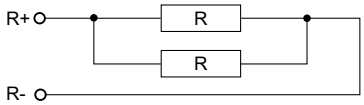
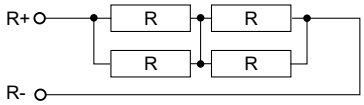
Type	Code	P_{NBR} [W]	R_{BR} [Ohm]	E_{BR} (1) [kJ]	E_{BR} (2) [kJ]	P_{PSM} [kW]	T_{BRL1} [s]	T_{BRL2} [s]	AXV300 SM-		
									12040	24080	380160
BR T2K0-28R	S8T00F	2000	28	20	82	17.5	2.3	9.4		•	•
BR T2K0-42R	S8T00M	2000	42	20	82	11.7	3.4	14.1	•	•	•
BR T4K0-11R6	S8T00H	4000	11.6	40	150	42.2	1.9	7.1		•	•
BR T4K0-15R4	S8T00G	4000	15.4	40	150	31.8	2.5	9.4		•	•
BR T4k0-18R	S8T00O	4000	18	40	150	27.2	2.9	11.0		•	•
BR T8K0-23R	S8T00N	8000	23	40	150	21.3	3.8	14.1		•	•
BR T8K0-11R6	S8T00R	8000	11.6	80	220	42.2	3.8	10.4		•	•
BR T8K0-9R2	S8T00Q	8000	9.2	80	220	53.3	3.0	8.3			•
RF 100 T 360R	S8S81	100	360	0.7	5	1.4	1.0	7.3	•	•	•
RF 150 T 100R	S8S82	150	100	1	9	4.9	0.4	3.7	•	•	•
RF 200 T 50R	S6F65	200	50	1.5	11	9.8	0.3	2.2	•	•	•
RF 200 T 75R	S8S83	200	75	1.5	11	6.5	0.5	3.4	•	•	•
RF 200 T 100R	S6F60	200	100	1.5	11	4.9	0.6	4.5	•	•	•
RF 200 T 200R	S6F61	200	200	1.5	11	2.5	1.2	9.0	•	•	•
RF 220 T 68R	S8T00T	220	68	1.5	11	7.2	0.4	3.1	•	•	•
RF 220 T 100R	S8T0CE	220	100	1.5	11	4.9	0.6	4.5	•	•	•
RF 220 T 140R	S8T0CN	220	140	1.5	11	3.5	0.9	6.3	•	•	•
RF 300 DT 100R	S8T0CB	300	100	2.5	19	4.9	1.0	7.8	•	•	•
RF 300 DT 140R	S8T0CO	300	140	2.5	19	3.5	1.4	10.9	•	•	•
RFPD 750 DT 68R	S8T0CD	750	68	7.5	38	7.2	2.1	10.5	•	•	•
RFPD 750 DT 100R	S8SY4	750	100	7.5	38	4.9	3.1	15.5	•	•	•
RFPD 900 DT 68R	S8SY5	900	68	9	48	7.2	2.5	13.3	•	•	•
RFPD 900 DT 100R	S8T0CM	900	100	9	48	4.9	3.7	19.6	•	•	•
RFPD 1100 DT 40R	S8SY6	1100	40	11	58	12.3	1.8	9.5	•	•	•
RFPD 1100 DT 74R	S8T0CL	1100	74	11	58	6.6	3.3	17.5	•	•	•
RFPR 750 D 68R	S8SZ3	750	68	7.5	28	7.2	2.1	7.8	•	•	•
RFPR 750 D 80R	S8SZ0	750	80	7.5	28	6.1	2.4	9.1	•	•	•
RFPR 1200 D 10R	S8ST6	1200	10	12	43	49.0	0.5	1.8			•
RFPR 1200 D 49R	S8SZ4	1200	49	12	43	10.0	2.4	8.6	•	•	•
RFPR 1900 D 12R	S8ST7	1900	12	19	75	40.8	0.9	3.7		•	•
RFPR 1900 D 15R	S8ST8	1900	15	19	75	32.7	1.2	4.6		•	•
RFPR 1900 D 25R	S8SZ2	1900	25	19	75	19.6	1.9	7.7		•	•
RFPR 1900 D 28R	S8SZ5	1900	28	19	75	17.5	2.2	8.6		•	•

Table 3: Braking resistors and combinations

Nota: For the resistors dimensions and weights see the Gefran Accessories catalogue (1S9I09).

If certain conditions are not met, other possible solutions may consist of equivalent resistors connected in series and/or parallel.

In that case the tests are the same where the equivalent resistor data are:

	R_{BR}	P_{PSM}	P_{NBR}	E_{BR}
R series R 	2	½	2	2
R parallel R 	½	2	2	2
2R parallel 2R 	1	1	4	4

The table sums up the multiplier that can be used with simple parallel/series configurations.

Warning

Remember to include temperature sensor management as part of the machine management system, to avoid the risk of fire in case of an electrical fault in the supply module.

12.4. System check (supply module + axes)

12.4.1. 24 V external supply module consumption

The voltage to supply to the various modules to ensure correct operation must be set to 24 VDC -10%/+20%.

Caution

Correct module operation is not guaranteed with supply voltages of less than 21 VDC and the control of axis modules is always disabled with voltages of less than 17 VDC.

The current required by the external supply module to power the necessary modules and accessories is stated in the Input/Output specifications of the various modules.

The dimensions of a system's 24 V supply module are determined from the sum of the following:

Module type	Specification data [A]	Example [A]	External cooling [A]
AXV300 SM-xxxxx supply modules	0.5 A + power contactor absorption (E.g.: power contactor consumption 0.2 A)	0.7	---
AXV300 SR-xxxxx module	0.5 A + power contactor absorption (E.g.: power contactor consumption 0.2A)	0.7	---
AXV300-xxxxx axis module	0.650 A + 0.3 x Iencoder A (E.g. Iencoder A= 0.25 A)	0.725	---
AXV300 CU module	0.8 A (average absorption)	0.8 A	---
AXV300 AFE-SR module	0.5 A	---	---
AXV300-480160 fan units AXV300 SR-480160 fan units	---	---	1
AXV300-5100200 fan units AXV300 SR-5100200 fan units	---	---	2
AXV300-5140210 fan units AXV300 SR-5140210 fan units	---	---	3
AXV300-6200250 fan units AXV300-6200320 fan units AXV300 SR-6200250 fan units AXV300 SR-6200320 fan units	---	---	4

Bear in mind when determining supply module dimensions that fans are inductive loads and require high current at start-up, especially in heavy duty applications using high-power inverter modules with several fans. This high current may be required for relatively long periods of time and must either be considered in the system start-up sequence or a separate supply module must be provided.

Given the power absorbed, the 24 VDC power supply causes considerable heating of the front of the inverter module metal containers. This is normal.

Fans on large axes have independent terminals and can thus be powered separately.

Examples of configuration

Example 1, system comprising:

System modules	Amount	24 VDC power consumption module [A]	Power consumption 24 VDC fan [A]
AXV300 SM-380140	1	0.7	0
AXV300 CU-...	1	0.8	0
AXV300-21020	1	0.75	0
AXV300-33570	1	0.75	0
AXV300-10413	1	0.75	0
AXV300-22040	1	0.75	0
TOTAL	**6**	**4.5**	**0**

Example 2, system comprising:

System modules	Amount	24 VDC power consumption module [A]	Power consumption 24 VDC fan [A]
AXV300 AFE-SR-1	1	0.5	0
AXV300 SR-5140210	1	0.75	3
AXV300 CU-...	1	0.8	0
AXV300-21020	1	0.75	0
AXV300-33570	1	0.75	0
AXV300-500200	1	0.75	2
TOTAL	**6**	**4.3**	**5**

12.5. Examples of application

This section provides some examples of applications, from the simplest, single-motor configuration to more complex ones.

The choice of supply module (conventional **AXV300 SM** or regenerative **AXV300 SR**) depends on the application, power rating, energy regenerated and machine cycles.

In the following examples, both conventional (**AXV300 SM**) and regenerative (**AXV300 SR**) solutions are used.

As a general rule, the **AXV300 SM** or **AXV300 SR** supply module must be at least the same size as the axis (or the sum of the axis power ratings).

In certain cases the size can be chosen according to the work cycles and load profiles of each drive, in both motor or generator mode.

3 examples are provided below:

- Single-axis calculation, based on motor output power.
- Single-axis calculation, based on axis output power.
- Multi-axis calculation, based on the work cycle defined by the load profile.

Key to symbols:

P_{OUTM}	Motor output power (continuous operation)
P_{OUTD}	Drive output power (light or heavy overload)
η_M	Typical motor efficiency
η_D	Typical drive efficiency
P_{DC}	Power requested by the DC-link

12.5.1. Single-motor calculation based on motor output power

Example of calculation of a single-motor system connected to a motor having a defined power.

The DC-link input power is a function of the output power on the drive shaft. The same output power is requested for the **AXV300 SM** or **AXV300 SR** supply module.

$$\mathbf{P_{DC}} = \frac{\mathbf{P_{OUTM}}}{\mathbf{\eta_M * \eta_D}}$$

E.g. :

with an SBM 77.30.3 motor

Given the torque in Nm, angular speed in rpm, power in Watt on the drive shaft (mechanical power)

P = speed*torque

$$\mathbf{[W]} = \frac{\mathbf{Nm * 2\pi * rpm}}{\mathbf{60}} = \frac{\mathbf{18.8 * 2\pi * 3000}}{\mathbf{60}} = 5.9 \text{ kW (Power at rated speed)}$$

P_{OUTM} = 5.9kW

η_M = 0,90

η_D = 0,97

$$P_{DC} = \frac{5.9}{0.9 * 0.97} = 6.76 \text{ kW}$$

- Choice of axis: **AXV300-22040**

The rated torque is that of the motor chosen — Tn [Nm] = 18.8

The requested current is — 18.8 / 1.56 = 12 Arms

The maximum torque available for this axis is: — Tmax = 40*1.56 =62.4Nm

I must make sure that the load requires an overload (I2T or IxT) that is less than or equal to that of the axis chosen, otherwise I must choose a bigger size.

- Supply module chosen: **AXV300SM 12040**

This supply module is capable of generating a rated DC power of 11 KW OK

The requested DC current is valid:

$$I_{DC} = \frac{P_{DC}}{V_{DC}} = \frac{6.76\ kW}{565\ V} = 12\ A$$

It is within the values of the module that was chosen.

12.5.2. Single-motor calculation based on axis data

Example of calculation for an axis of a known size.

The axis is associated with a motor to enable all the requested machine functions (in terms of continuous torque and overload).

The power requested by the axis at the DC input is equal to the output power in the desired overload mode. In that case the following applies:

$$\mathbf{P_{DC}} = \frac{\mathbf{P_{OUTD}}}{\boldsymbol{\eta_D}}$$

E.g. :

Axis **AXV300 13570**

The overload curves for this axis are:

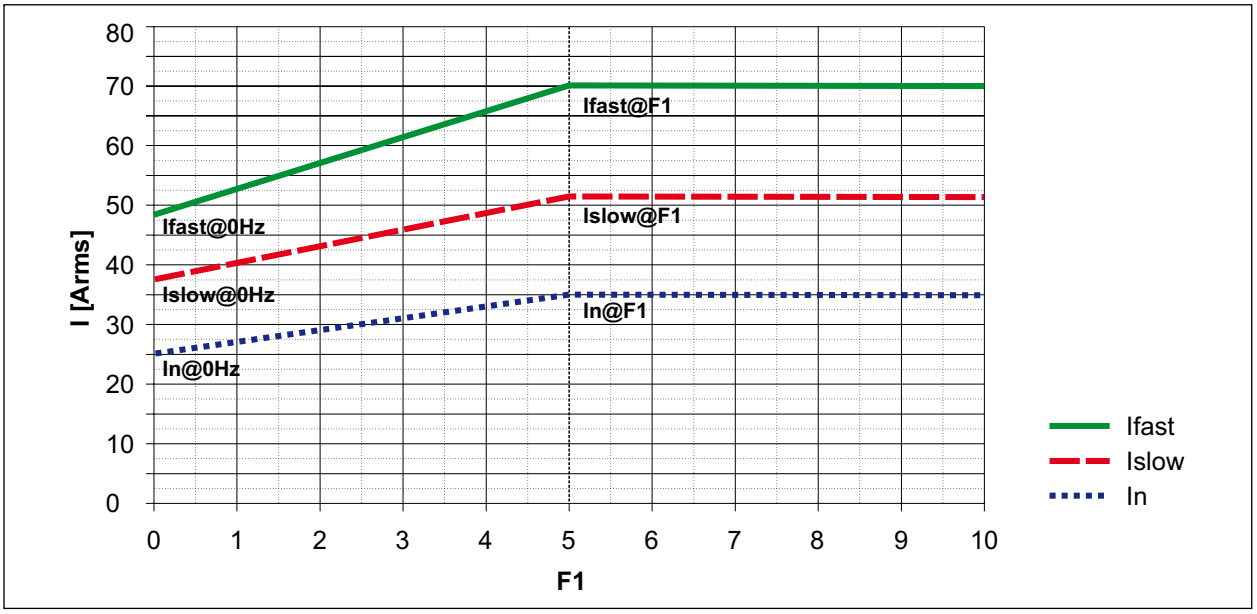


Figure 53: Algorithm I2T, example for module AXV300 33570

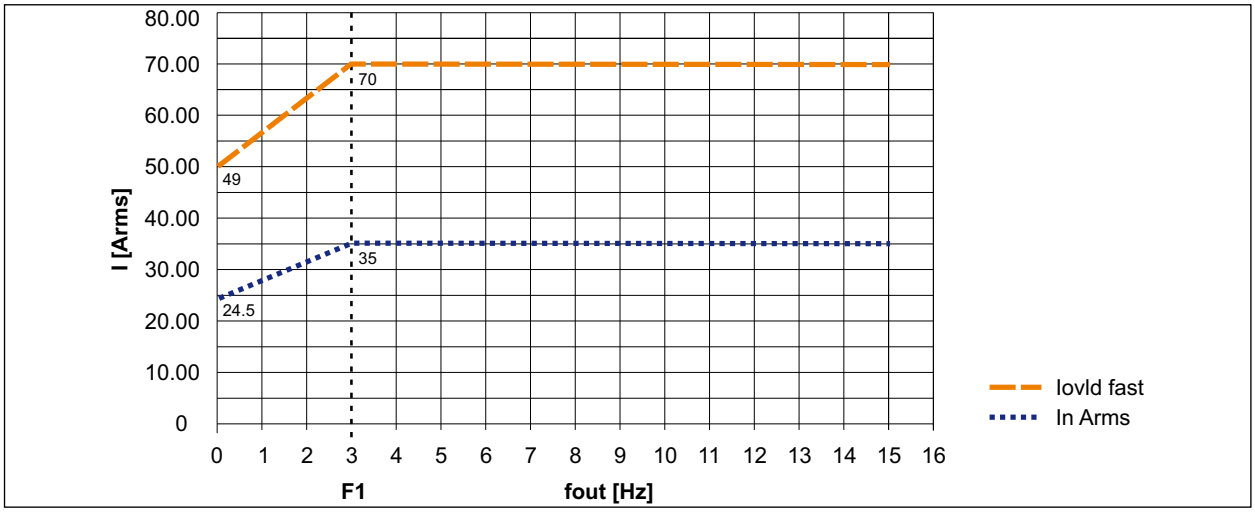


Figure 54: Algorithm IxT: example for module AXV300 33570

SBM82… F .30.3 motor data
Kt = 1.58Nm/A
Nominal torque Tn 77.8Nm -> In 49.6Arms
Max. motor torque Tmax= 126Nm -> Imax =77.4Arms

Axis AXV300 33570
Nominal torque Inom 35 Arms -> Tnom = 55.3Nm
Max. motor torque Imax =70 Arms -> Tmax 110.6Nm

Thus, the torques available on the motor axis are:
Tn = 55.3Mn
Tmax = 110.6

η_P =0.97
According to module technical data:
P_{OUTD}= 21kW continuous power

$$P_{DC} = \frac{21\ kW}{0.97} = 21.65\ kW$$

$$I_{DC} = \frac{P_{DC}}{V_{DC}} = \frac{21.65\ kW}{565\ V} = 38.3\ A$$

AXV300 SM supply module:
According to specifications (see section **"4.5. Input/output specifications" on page 36**) we know that:
AXV300 SM 24080 (rated power 22kW)
In this case:

38.3 A < 40A Ok

$$I_{DC} = \frac{P_{DC}}{V_{DC}} = \frac{21.65\ kW}{565\ V} = 38.3\ A$$

AXV300 SR supply module:
If I choose AXV300 SR 33570

$$I_{DC} = \frac{P_{DC}}{V_{DC}} = \frac{21.65\ kW}{625\ V} = 34.64\ A$$

34.64 < 35 Ok

12.5.3. Calculation for multi-motor system

In a typical multi-motor application, the single modules (e.g. **AXV300 33570**) control the motors following different load profiles. Dimensioning must allow for the fact that the power requested by the load is normally lower than the total power of the drives installed.

The total output power requested by the **AXV300 SM** or **AXV300 SR** supply module can be calculated on the basis of the total power as a function of time (by adding all the load profiles) and the maximum power requested.

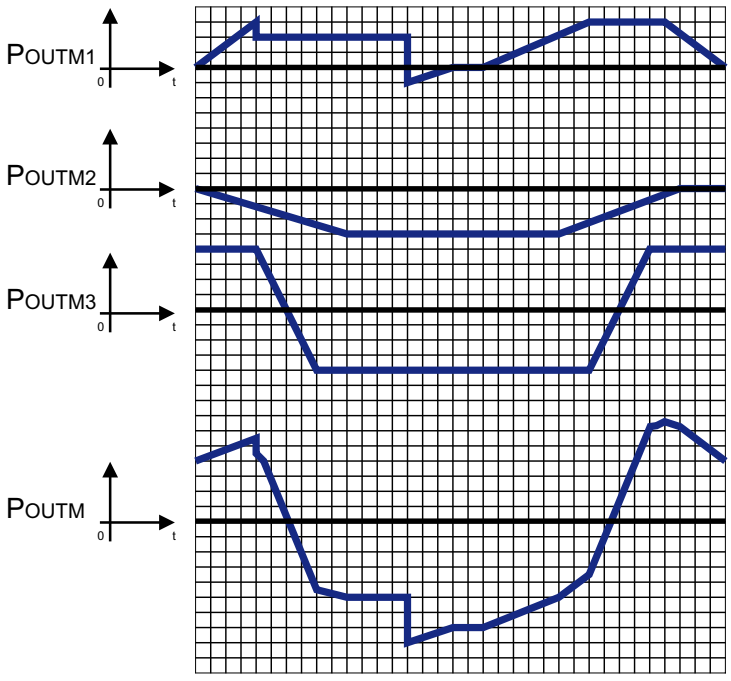
E.g.: considering an application with n-profiles, the total output power is:

$$\mathbf{P_{DCTOT}} = \max \left[\frac{\mathbf{P_{OUTM1}}}{\boldsymbol{\eta_{M1} * \eta_{D1}}} + \frac{\mathbf{P_{OUTM2}}}{\boldsymbol{\eta_{M2} * \eta_{D2}}} + \ldots + \frac{\mathbf{P_{OUTMn}}}{\boldsymbol{\eta_{M2n} * \eta_{Dn}}} \right]$$

E.g. :

Axis modules: 3 **AXV300 480160**-type devices

AC input voltage (side AC)	V_{IN} = 400V
Recommended motor output power	P_{OUTM} = 48 kW
Typical motor efficiency	η_M = 0.95
Typical axis module efficiency	η_D = 0.97



Vertical scale 5 kW/division

Figure 55: Load profiles of single drives and total as a function of time

The load profiles of the single drives and the total load profile are shown in the figure. The peak load shown in the figure is in regeneration mode and is 40 kW. As all the motors and all the inverters are of the same type, the total power/current requested can be calculated as follows:

$$P_{DCTOT} = \frac{MAX\ [P_{OUTM}]}{\eta_M * \eta_D} = \frac{40\ kW}{0.95 * 0.97} = 43.4\ kW$$

AXV300 SM supply module:

I choose: **AXV300 SM 380140** (rated power 44kW)

$$I_{DC} = \frac{P_{DC}}{V_{DC}} = \frac{43.4\ kW}{565\ V} = 76.8\ A \qquad < 80A\ Ok$$

AXV300 SR supply module:

I choose: **AXV300 SR 480160**

$$I_{DC} = \frac{P_{DC}}{V_{DC}} = \frac{43.4\ kW}{625\ V} = 69.44\ A \qquad < 80A\ Ok$$

Note ! For special applications or more detailed calculations please contact technohelp@gefran.com.

13.1. AXV300 SM supply module external fuses

The protection fuses installed after the mains circuit breaker or overload switch only protect the supply module from serious damage if the power modules break, causing short circuits that request instant currents that are disproportionate in relation to the rectifier bridge in the supply module.

Their use is strongly recommended to prevent any power module faults from also damaging the supply module.

Specific semi-conductor protection fuses must be used.

Overload switch dimensioning can be performed by the machine tool manufacturer according to the type of load requested.

If these fuses are tripped, run the simple checks listed in the appendix to test the power semi-conductors in the power supply and power modules before switching the machine on again, to prevent further damage when re-connecting the system.

Use fast-acting fuses only.

Connections with a three-phase choke on the mains side increase the service life of intermediate circuit capacitors.

Module type	Fuse models	Code	Type
AXV300 SM-12040	Z14gR40 A70QS40-14F	F4M13	14 x 51 - UL Recognized - 40A/600V
AXV300 SM-24080	A70QS80-22 FWP-80A22Fa	F4M19	22 x 58- UL Recognized - 80A/600V
AXV300 SM-380140	CP URQ 27x60/160	S85D4	27 x 60.3 - UL Recognized - 160A/690V

Fuse manufacturer FWP ... Bussmann = A70 ... , CP... = Ferraz Shawmut; Z14 ... = Jean Mueller

Table 4: External fuses, connections with and without three-phase input choke

Caution

The input choke is mandatory on AXV300 SM modules if the output current exceeds the maximum limits given in paragraph "8.2. I2xT overload for AXV300 SM modules" on page 92.

13.2. AXV300 SR supply module external fuses

The fuses protect the supply module, especially the module associated with the AXV300 SR module, against short circuits in the axis modules connected to the DC-link, which can lead to excessive current absorption by the mains.

The fuses also reduce the possibility of damage to other power modules in the event of an axis module fault.

They limit the damage and prevent the risk of fire.

Fast-acting gL fuses must be used, specified for 500 VAC, of a suitable size in relation to the maximum power and average power absorbed by the drives.

Their use is strongly recommended to prevent a fault in a power module also damaging other modules.

If these fuses are tripped, run the simple checks listed in the appendix to test the power semi-conductors in the power supply and power modules before switching the machine on again, to prevent further damage when re-connecting the system.

Module type	Fuse models	Code	Type
AXV300 SR-10413	Z14gR16 A70QS16-14F (*)	F4M05	14 x 51- UL Recognized (*) - 16A/600V
AXV300 SR-21020	Z14gR20 A70QS20-14F (*)	F4M07	14 x 51- UL Recognized (*) - 20A/600V
AXV300 SR-22040	Z14gR40 A70QS40-14F (*)	F4M13	14 x 51- UL Recognized (*) - 40A/600V
AXV300 SR-33570	A70QS80-22 FWP-80A22Fa	F4M19	22 x 58- UL Recognized - 80A/600V
AXV300 SR-350100	A70QS100-22F FWP-100A22Fa	F4M21	22 x 58- UL Recognized - 100A/600V
AXV300 SR-480160	CP URQ 27x60/160	S85D4	27 x 60.3 - UL Recognized - 160A/690V
AXV300 SR-5100200	S00üF1/80/200A/660V	F4G23	200A/690V
AXV300 SR-5140210			
AXV300 SR-6200250	S1üF1/110/315A/660V	F4G30	315A/690V
AXV300 SR-6200320			

Fuse manufacturer FWP ... Bussmann = A70 ..., CP... = Ferraz Shawmut; S..., Z14 ... = Jean Mueller

Table 5: External fuses, Connections with input regeneration choke

13.3. External mains filters

The **AXV300** modules must be equipped with an external EMI filter to limit radio-frequency emissions on the mains line in accordance with European standards.

The filter must be selected according to the drive size and installation environment.

The guide also provides instructions for installing the electrical panel (connection of filters and mains chokes, cable shielding, ground connections, etc.) to make it EMC compliant according to EMC Directive EN 61800-3.

This document describes the applicable electromagnetic compatibility requirements and illustrates the EC conformity tests carried out on the drives.

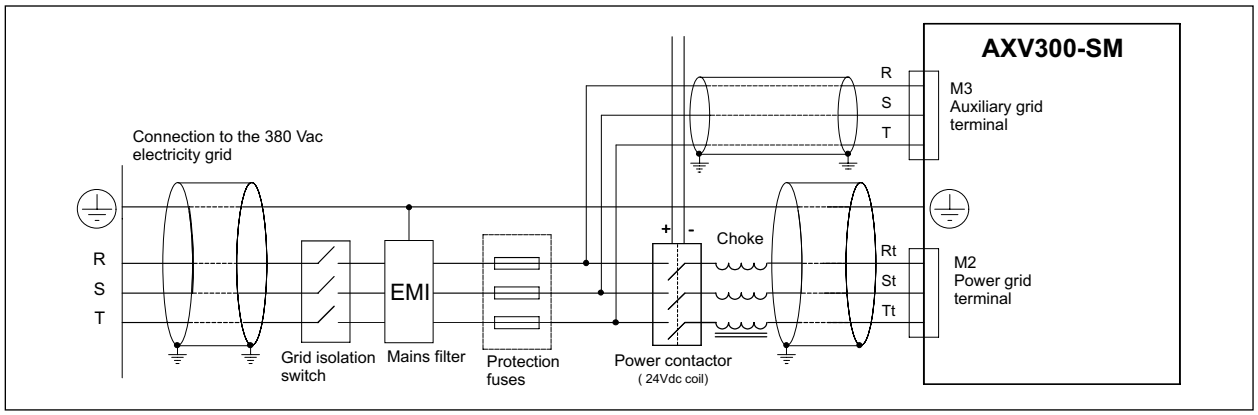


Figure 56: Connection to AXV300 SM-12040, AXV300 SM -24080,AXV300 SM-380140 type modules

Module type	Filter models	Code	EN61300-3 Category / Environment / Length of motor cables	Remarks
AXV300 SM-12040	EMI FTF 480-30	S7GHP	C3/2°/100m	
AXV300 SM-24080	EMI FTF 480-42	S7GOA	C3/2°/100m	
AXV300 SM-380140	EMI FTF 480-75	S7GOC	C3/2°/100m	For lower loads
	EMI FTF 480-100	S7GOD	C3/2°/100m	For other loads

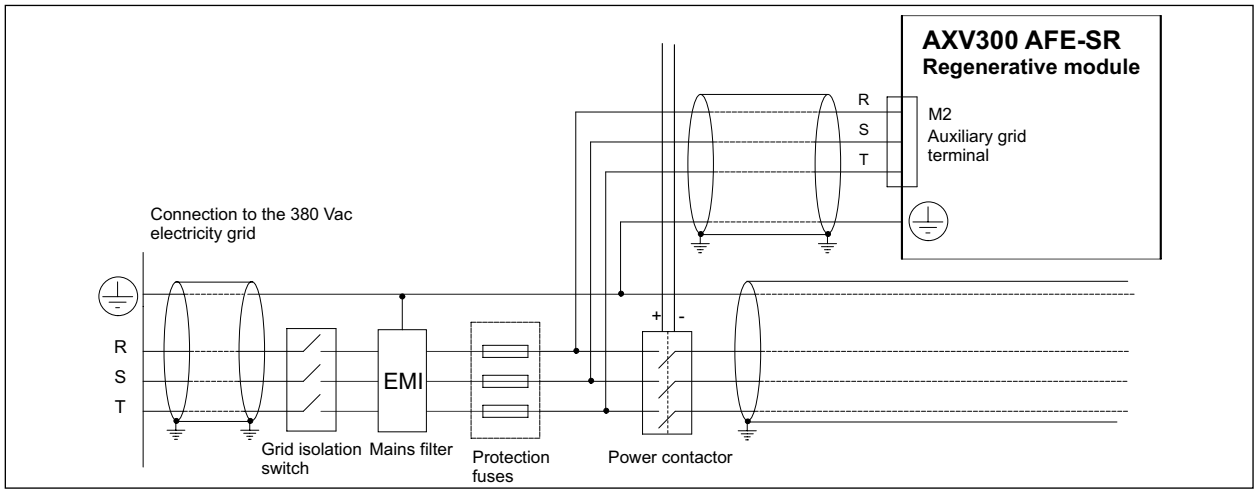


Figure 57: Connection to AXV300 SR regenerative modules

Module type	Filter models	Code	EN61300-3 Category / Environment / Length of motor cables	Remarks
AXV300 SR-10413	EMI-FN3120H-480V-25A	S7GHE	C3/2°/100m	
AXV300 SR-21020	EMI-FN3120H-480V-25A	S7GHE	C3/2°/100m	
AXV300 SR-22040	EMI-FN3120H-480V-25A	S7GHE	C3/2°/100m	For lower loads, overload < 150% * 1'
	EMI FN 3120-480-50	S7DGV	C3/2°/100m	For other loads
AXV300 SR-33570	EMI FN 3120-480-50	S7DGV	C3/2°/100m	
AXV300 SR-350100	EMI FN 3120-480-50	S7DGV	C3/2°/100m	For lower loads, overload < 150% * 1'
	EMI FN 3120-480-80	S73EE	C3/2°/100m	For other loads
AXV300 SR-480160	EMI FN 3120-480-80	S73EE	C3/2°/100m	For lower loads, overload < 150% * 1'
	EMI FN 3120-480-110	S7DGZ	C3/2°/100m	For other loads

Module type	Filter models	Code	EN61300-3 Category / Environment / Length of motor cables	Remarks
AXV300 SR-5100200	EMI FN 3120-480-110	S7DGZ	C3/2°/100m	For lower loads, overload < 150% * 1'
	EMI FN 3120-480-150	S7EMI18	C3/2°/100m	For other loads
AXV300 SR-5140210	EMI FN 3120-480-150	S7EMI18	C3/2°/100m	
AXV300 SR-6200250	EMI FN 3120-480-230	S74EE	C3/2°/100m	
AXV300 SR-6200320	EMI FN 3120-480-230	S74EE	C3/2°/100m	

Overall dimensions of the various filter models and relative mechanical drawings are provided in the table below.

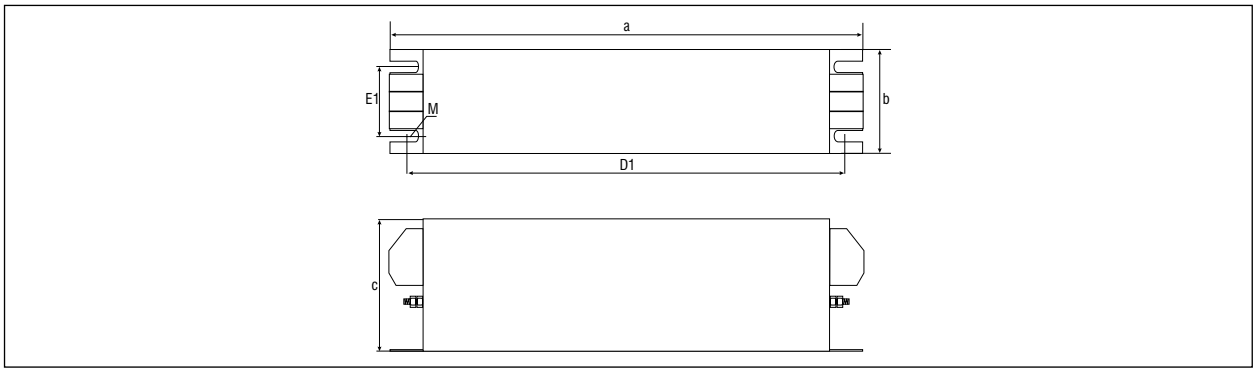


Figure 58: Dimensions of EMI FTF-480-30 ... EMI FTF-480-100 series filters

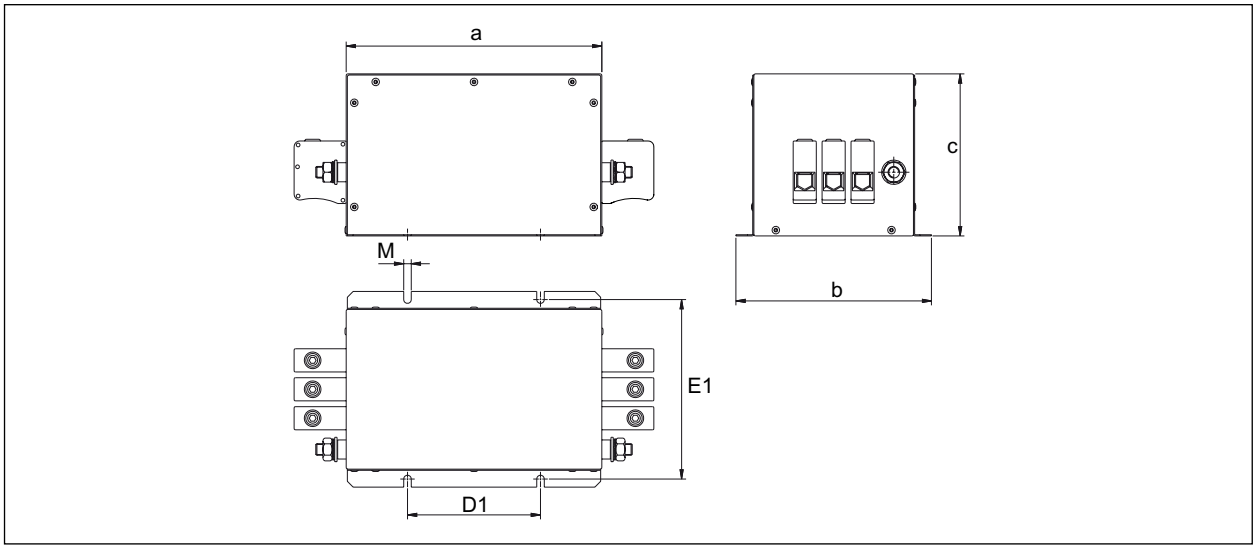


Figure 59: Dimensions of EMI FN 3120... series filters

Filter type	Code	a mm [inches]	b (mm [inches]	c mm [inches]	D1 mm [inches]	E1 mm [inches]	M	Weight kg [lbs]
EMI FTF 480-30	S7GHP	270 [10.63]	50 [1.97]	85 [3.35]	255 [10.04]	30 [1.18]	Ø6	1 [2.2]
EMI FTF 480-42	S7GOA	310 [12.20]	50 [1.97]	85 [3.35]	295 [11.61]	30 [1.18]	Ø6	1.3 [2.9]
EMI FTF 480-75	S7GOC	270 [10.63]	80 [3.15]	135 [5.31]	255 [10.04]	60 [2.36]	Ø6.7	2.6 [5.7]
EMI FTF 480-100	S7GOD	270 [10.63]	90 [3.54]	150 [5.91]	255 [10.04]	65 [2.56]	Ø6.7	3 [6.6]
EMI-FN3120H-480V-25A	S7GHE	214 [8.42]	159[6.26]	64 [2.52]	115 [4.52]	145 [5.7]	6.5	2.7 [5.9]
EMI FN 3120-480-50	S7DGV	214 [8.42]	159[6.26]	64 [2.52]	115 [4.52]	145 [5.7]	6.5	2.7 [5.9]
EMI FN 3120-480-80	S73EE	221 [8.7]	169 [6.65]	64 [2.52]	115 [4.52]	155 [6.1]	6.5	5.0 [11]
EMI FN 3120-480-110	S7DGZ	221 [8.7]	169 [6.65]	140 [5.51]	115 [4.52]	155 [6.1]	6.5	6.1 [13.44]
EMI FN 3120-480-150	S7EMI18	221 [8.7]	169 [6.65]	140 [5.51]	115 [4.52]	155 [6.1]	6.5	6.3 [13.89]
EMI FN 3120-480-230	S74EE	300 [11.81]	168 [6.61]	140 [5.51]	115 (82.5/82.5*) [4.52 - 3.24/3.24]	155 [6.1]	6.5	13.3 [29.32]

* EMI FN 3120-480-230 has two additional anchor slots at the centre of the slots shown in the figure.

Table 6: Dimensions of EMI-.. series filters

13.4. Regeneration chokes for AXV300 SR supply modules

Like the **AXV300 SM** series of non-regenerative supply modules, the **AXV300 SR** series also uses EMI filters on the input mains.

Unlike with non-regenerative systems, chokes are also installed as functional components of the power supply system and must therefore be selected carefully and specifically.

The regeneration chokes recommended for the various regenerative supply modules are listed in the table below.

Type module	Rated chokes (mH)	Rated current (A)	Current saturation (A)	Chokes type	Code
AXV300 SR-10413	1.5-3.5	5	13	LR3 AXV-04-R	S7AD3
AXV300 SR-21020	1.5-3.5	10	20	LR3 AXV-10-R	S7AC7
AXV300 SR-22040	2.7	20	40	LR3 AXV-20-R	S778DD
AXV300 SR-33570	1.2	60	100	LR3 AXV-35-R	S7AL01
AXV300 SR-350100	0.6	60	?	LR3 AXV-80-R	S7LR02
AXV300 SR-480160	0.6	60	?	LR3 AXV-80-R	S7LR02
AXV300 SR-5100200	0.25	140	?	LR3 AXV-140-R	S7LR03
AXV300 SR-5140210	0.25	140	?	LR3 AXV-140-R	S7LR03
AXV300 SR-6200250	0.25	200	?	LR3 AXV-200-R	S7LR04
AXV300 SR-6200320	0.25	200	?	LR3 AXV-200-R	S7LR04

(1) Light duty cycles. (2): Heavy duty cycles.

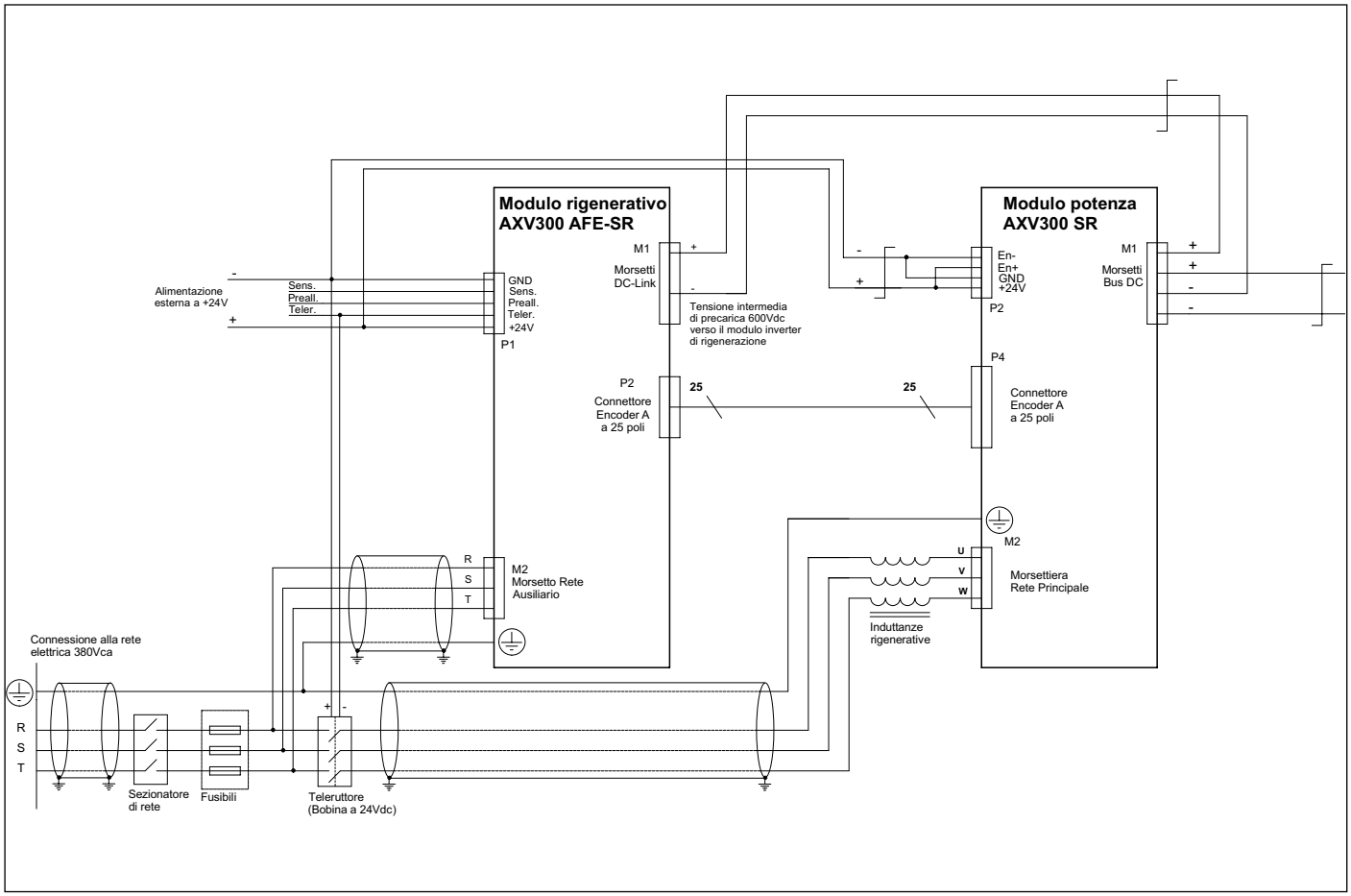


Figure 60: Connection to AXV300 SR regenerative modules

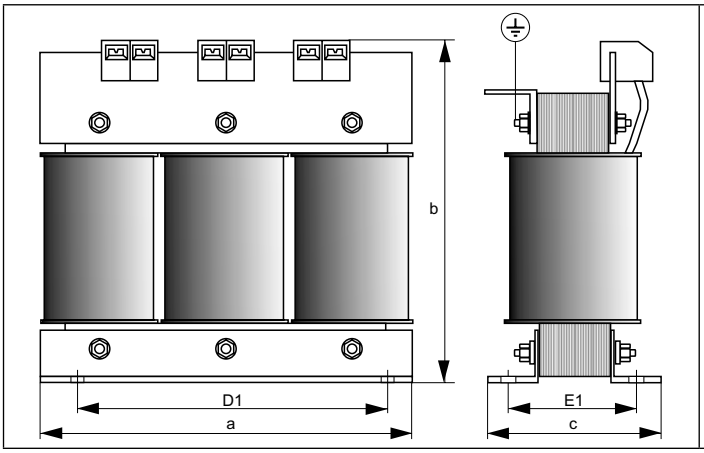


Figure 61: LR3-AXV-04-R, LR3-AXV-10-R regeneration chokes

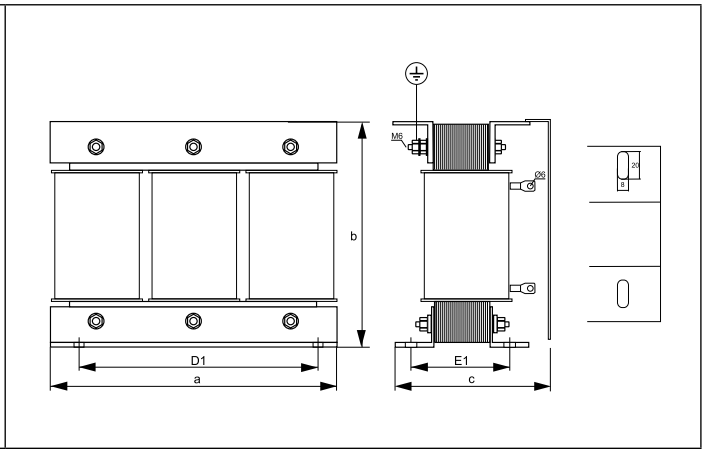


Figure 62: LR3-AXV-140-R regeneration chokes

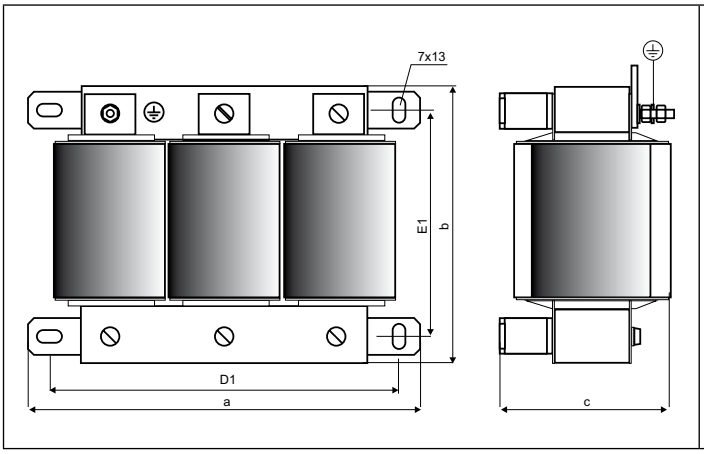


Figure 63: Induttanze Rigenerative LR3 AXV-20-R regeneration chokes

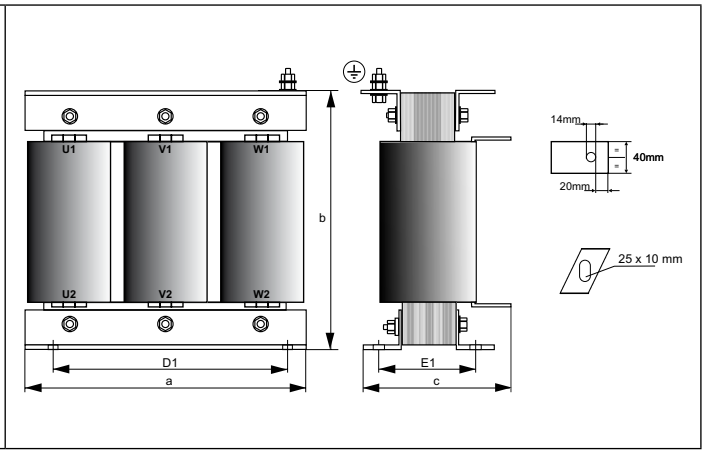


Figure 64: LR3-AXV-200-R regeneration chokes

Chokes type	Code	a mm [inches]	b mm [inches]	c mm [inches]	D1 mm [inches]	E1 mm [inches]	Weight kg [lbs]
LR3 AXV-04-R	S7AD3	120 [4,72]	125 [4,92]	85 [3,34]	100 [3,94]	52 [2,05]	2,7 [5,9]
LR3 AXV-10-R	S7AC7	150 [5,90]	152 [5,98]	80 [3,15]	90 [3,54]	55 [2,16]	5 [11,0]
LR3 AXV-20-R	S778DD	206 [8,11]	154,5 [6,1]	90 [3,54]	184 [7,24]	126 [4,96]	13 [28,6]
LR3 AXV-35-R	S7AL01	240 [9,45]	216 [8,50]	220 [8,66]	200 [7,87]	115 [4,53]	28 [61,7]
LR3 AXV-80-R	S7LR02	180 [7,1]	165 [6,5]	170 [6,7]	150 [5,9]	94 [3,7]	12 [26,45]
LR3 AXV-140-R	S7LR03	300 [11,8]	270 [10,6]	270 [10,6]	250 [9,84]	145 [5,7]	43 [94,8]
LR3 AXV-200-R	S7LR04	360 [14,2]	240 [9,45]	260 [10,23]	240 [9,45]	150 [5,9]	66 [145,5]

Table 7: Regeneration choke dimensions

13.5. Input chokes for AXV300 SM modules

Caution

The input choke is mandatory on AXV300 SM modules if the output current exceeds the maximum limits given in paragraph "8.2. I2xT overload for AXV300 SM modules" on page 92.

Module name AXV300 SM-	12040	24080	380140
Chokes type	LR3y-2075	LR3-022	LR3-037
Chokes code	S7AB6	S7FF4	S7FF2

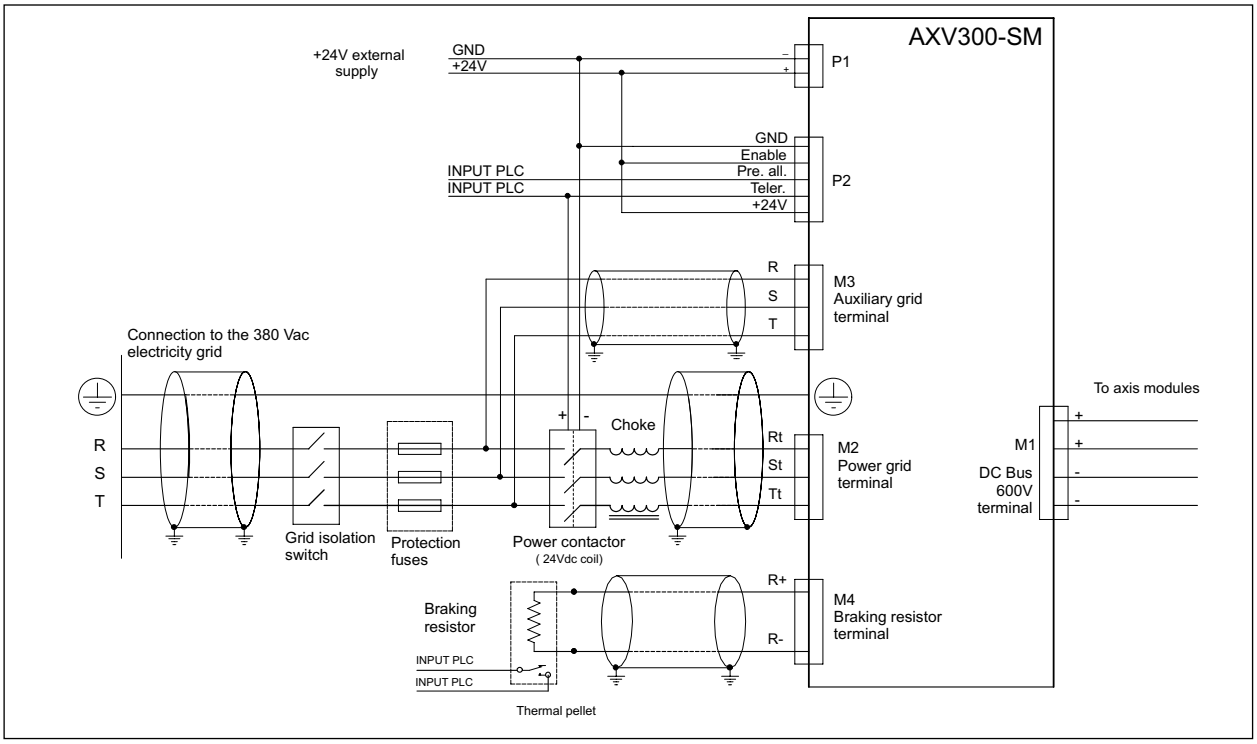


Figure 65: Connection diagram for AXV200 SM-xxxx modules

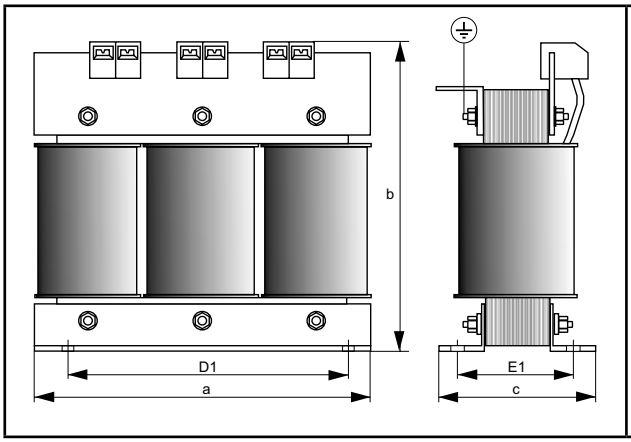


Figure 66: LR3y-2075 / LR3-022 choke dimensions

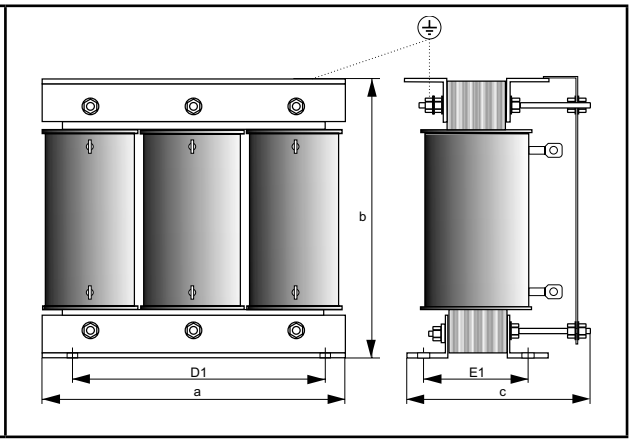


Figure 67: LR3-037 choke dimensions

Chokes type	Code	a mm [inches]	b mm [inches]	c mm [inches]	D1 mm [inches]	E1 mm [inches]	Weight kg [lbs]
LR3y-2075	S7AB6	150 [5.9]	155 [6.1]	79 [3.1]	90 [3.5]	54 [2.1]	4.9 [10.8]
LR3-022	S7FF4	180 [7.1]	182 [7.2]	130 [5.1]	150 [5.9]	74 [2.9]	7.8 [17.2]
LR3-037	S7FF2	180 [7.1]	160 [6.3]	180 [7.1]	150 [5.9]	80 [3.1]	9.5 [20.9]

13.6. Output Chokes

An output choke is recommended with long connections (motor cable runs of over 30 metres) to maintain the voltage waveform within the specified limits. The specific codes are listed in the table below.

The choke's rated current must be higher than the rated current of the **AXV300** axis module to allow for additional losses due to the PWM waveform.

Note ! With the drive powered at the rated current and 50 Hz frequency, the output chokes cause an output voltage drop of approx. 2%. The drop is smaller at 60 Hz frequency.

AXV300 axis module	Rated chokes (mH)	Rated current (A)	Current saturation (A)	Chokes type	Code
AXV300 10413	1.4	9.5	20	LU3-003	S7FG2
AXV300 21020	0.87	16	34	LU3-005	S7FG3
AXV300 22040	0.51	27	57	LU3-011	S7FG4
AXV300 33570	0.33	42	72	LU3-022	S7FH3
AXV300 350100	0.18	76	130	LU3-037	S7FH5
AXV300 480160	0.12	110	192	LU3-055	S7FH6
AXV300 5100200	0.07	180	310	LU3-090	S7FIO
AXV300 5140210	0.07	180	310	LU3-090	S7FIO
AXV300 6200250	0.041	310	540	LU3-160	S7FH8
AXV300 6200320	0.041	310	540	LU3-160	S7FH8

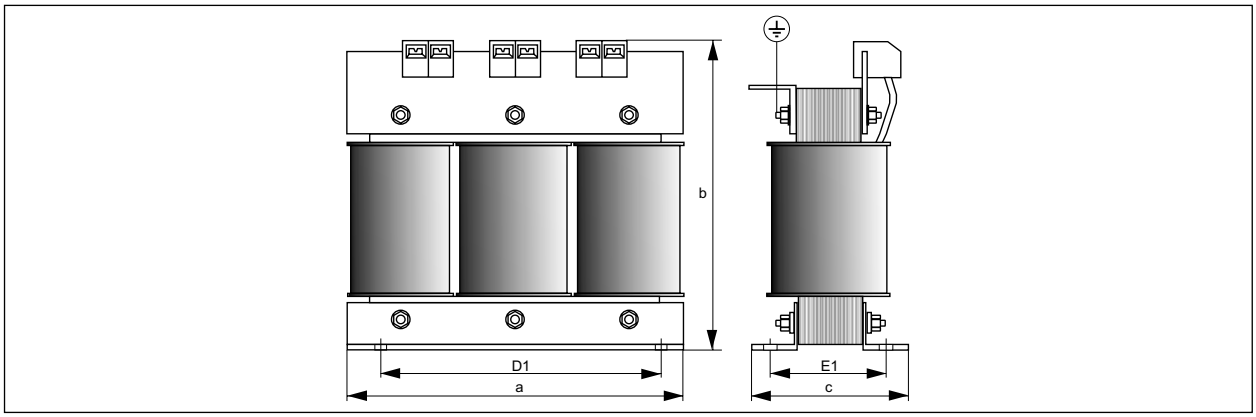


Figure 68: Output choke

Tipo Induttanza	Codice	a mm [inch]	b mm [inch]	c mm [inch]	D1 mm [inch]	E1 mm [inch]	Peso kg (lbs
LU3-003	S7FG2	180 [7.1]	170 [6.7]	110 [4.3]	150 [5.9]	60 [2.4]	5.2 [11.5]
LU3-005	S7FG3	180 [7.1]	170 [6.7]	110 [4.3]	150 [5.9]	60 [2.4]	5.8 [12.8]
LU3-011	S7FG4	180 [7.1]	180 [7.1]	130 [5.1]	150 [5.9]	70 [2.8]	8 [17.6]
LU3-022	S7FH3	180 [7.1]	160 [6.3]	170 [6.3]	150 [5.9]	70 [2.8]	8 [17.6]
LU3-037	S7FH5	180 [7.1]	160 [6.3]	180 [7.1]	150 [5.9]	80 [3.1]	9.7 [21.4]
LU3-055	S7FH6	240 [9.4]	210 [8.3]	180 [7.1]	200 [7.9]	80 [3.1]	14 [30.9]
LU3-090	S7FH7	240 [9.4]	210 [8.3]	200 [7.9]	200 [7.9]	80 [3.1]	18.5 [40.8]
LU3-160	S7FH8	300 [11.8]	260 [10.2]	240 [9.4]	250 [9.8]	90 [3.5]	27.5 [60.6]

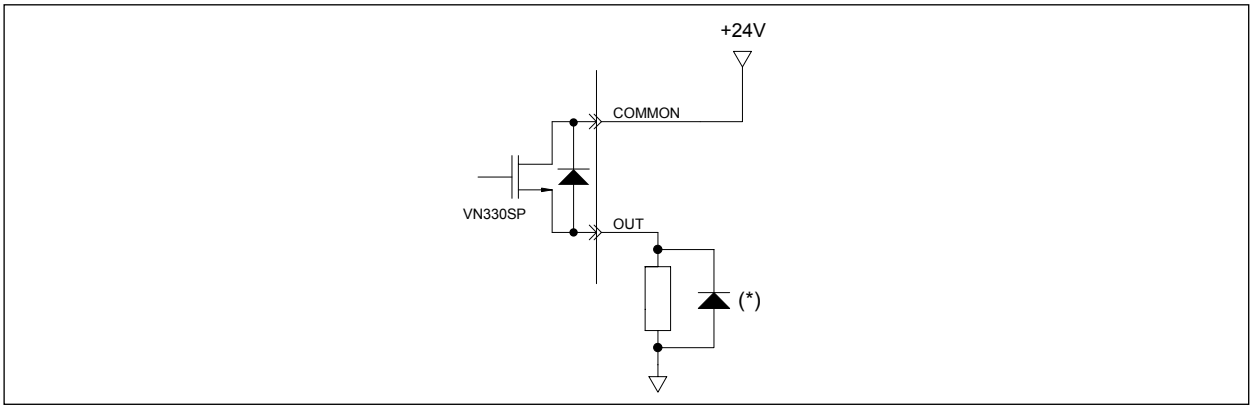
Table 8: Output choke dimensions

13.7. Input power contactor

The mains must be connected to the supply module via a power contactor. This power contactor is controlled directly by the **AXV300 SM** or **AXV300 SR** supply module, which sends the enable signal (24 V 2 A Max output) when the enable sequence is complete.

Caution

We recommend the use of a power contactor that already incorporates a recirculation diode or inserting one of these on the power contactor contacts to damp opening surges.



(*) diode mandatory for inductive loads.

Figure 69: Power contactor output

Power contactor sizes and conductor cross-sections must be proportional to the power absorbed by the machine.

13.8. Cables

13.8.1. Optical fibre link connection (P1)

This refers to the optical fibre connection (link) between the **AXV300 CU** module and the **AXV300** power modules and between the various power modules.

Use 980/1000 µm plastic optical fibres for the **GStar** line optical fibre link.

The minimum curvature radius is approx. 20 mm for optical fibres with polyethylene sheathing and 2.2 mm outside diameter (for optical fibres with different sheathings, consult the optical fibre manufacturer's specifications).

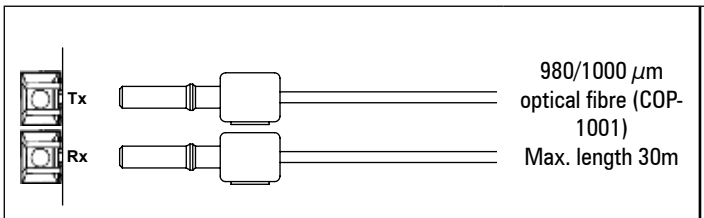
Each section of optical fibre cable must not be more than 30 m long; the optical fibre must be provided with "HFBR-4501" connectors (1).

(1) Supplied by Avago Technologies.
Alternatively: Avago Technologies HFBR-450x, HFBR-451x, HFBR-453x series; TE-Connectivity Optimate 228087 series

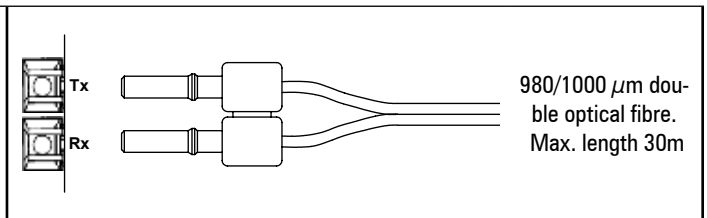
Instructions for optical fibre termination

Fit the “HFBR-4501” connector to the optical fibre according to the following instructions. You might find some specific accessories useful (cutting tools, polishing set):

- Cut the cable to the required length.
- Use a blade to cut and remove the protective sheathing at the ends of the cable so as to expose the fibre.
- Insert the fibre deep into the connector so that the end of the sheathing touches the inside of the connector (the fibre must protrude by at least 1÷2 mm from the connector).
- Fix the connector to the sheathing by folding the two halves of the connector along the hinge and pushing until they fit into one another.
- Two single connectors can be joined (one on the other without folding them along the hinge) to form a double connector.
- Cut the excess fibre leading out from the front of the connector, leaving just a small protruding length. Use a sharp blade to cut the fibre (the cut must be a clean with no burring).
- Polish the fibre with paper or a specific slightly abrasive sheet.



N=2 single "HFBR-4501" connectors
(Cod. S727701 : Cable + n.2 connectors 6S8V83, Length 40 cm)



N=2 "HFBR-4501" connectors joined together
(Cod. S727702: Cable + n.2 connectors 6S8V83, Length 2 metres)

Connector TX on the single **AXV300** axis module must be connected to connector RX on another **AXV300** power module or to connector RX on the **AXV300 CU** module; likewise, connector RX on the single **AXV300** power module must be connected to connector TX on another AXV300 power module or to connector TX on the **AXV300 CU** module.

The connection creates one or 2 "loops" comprising the **AXV300 CU** module and up to 4 **AXV300** power modules (per loop).

The order of the modules (to be specified when defining settings) is such that the first module of each loop is the one connected, via its RX connector, to connector TX on the **AXV300 CU** module.

Caution

The optical fibre connectors RX and TX must be left open (with no cap or connection) as little as possible. If any dust or oil enters these it could damage the optical fibre connection and prevent reliable data transmission. Since it is very difficult to clean the inside of the connectors, we recommend keeping the caps supplied with the unit and using these whenever the fibre is disconnected.

13.8.2. Encoder cables

Detailed specifications for cable dimensions and receptacle connector pins are provided in section **"10.1.1. Encoder connection interface" on page 99**

13.9. Braking unit and resistor

In generator operating mode, the frequency-controlled three-phase motor supplies energy to the DC-link circuit via the relative axis module. This increases the DC-link voltage.

The external braking resistors are connected when using **AXV300 SM** non-regenerative supply modules to keep the DC voltage within the allowed range. When a specific voltage level is reached, the braking unit of the **AXV300 SM** module activates the braking resistor by dissipating energy into heat (R_{BR}).

This makes it possible to achieve very short deceleration times and operation in all four quadrants.

If using **AXV300 SR** regenerative supply modules, the energy is fed directly back to the mains. Bu and Br are not present.

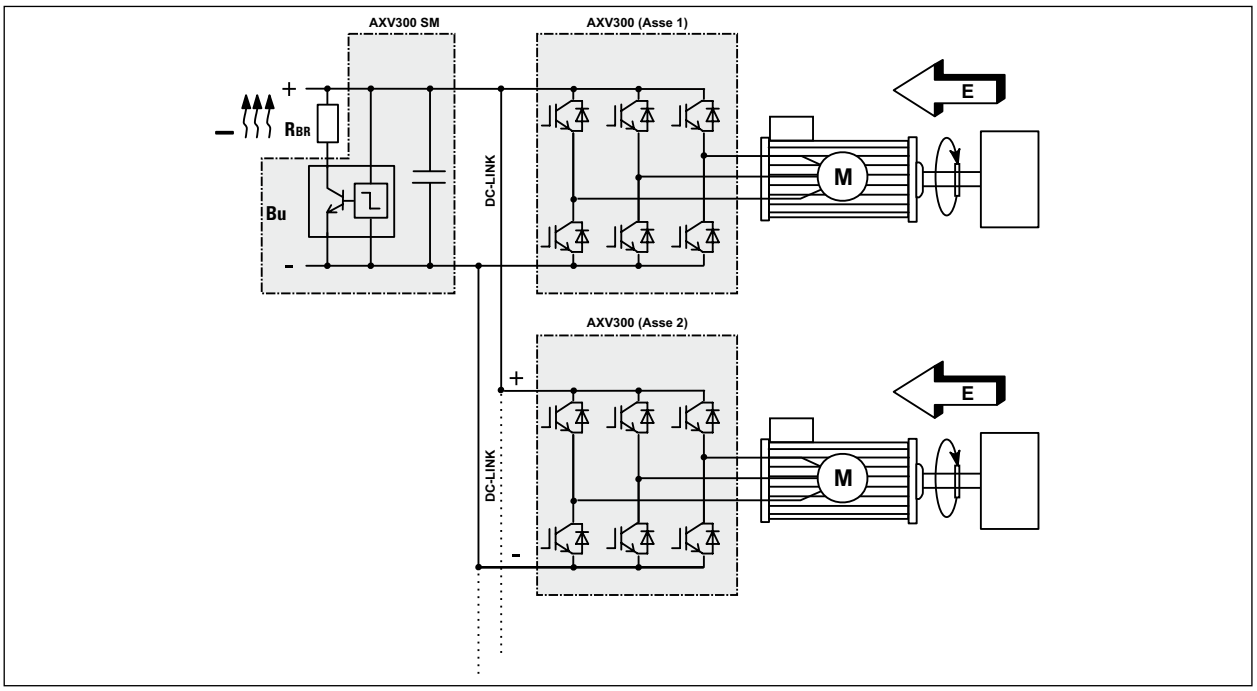


Figure 70: Operation with braking unit (circuit diagram)

Supply modules with resistor braking (**AXV300 SM**) need an external braking resistor to work properly. If this is not present, disconnected or has an incorrect value the active component in the module could be damaged during normal system operation.

This paragraph describes the specific resistor for each supply module. See the relative supply module paragraph for details about types and performance.

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.

The figure below shows the connection diagram in supply modules with resistor braking.

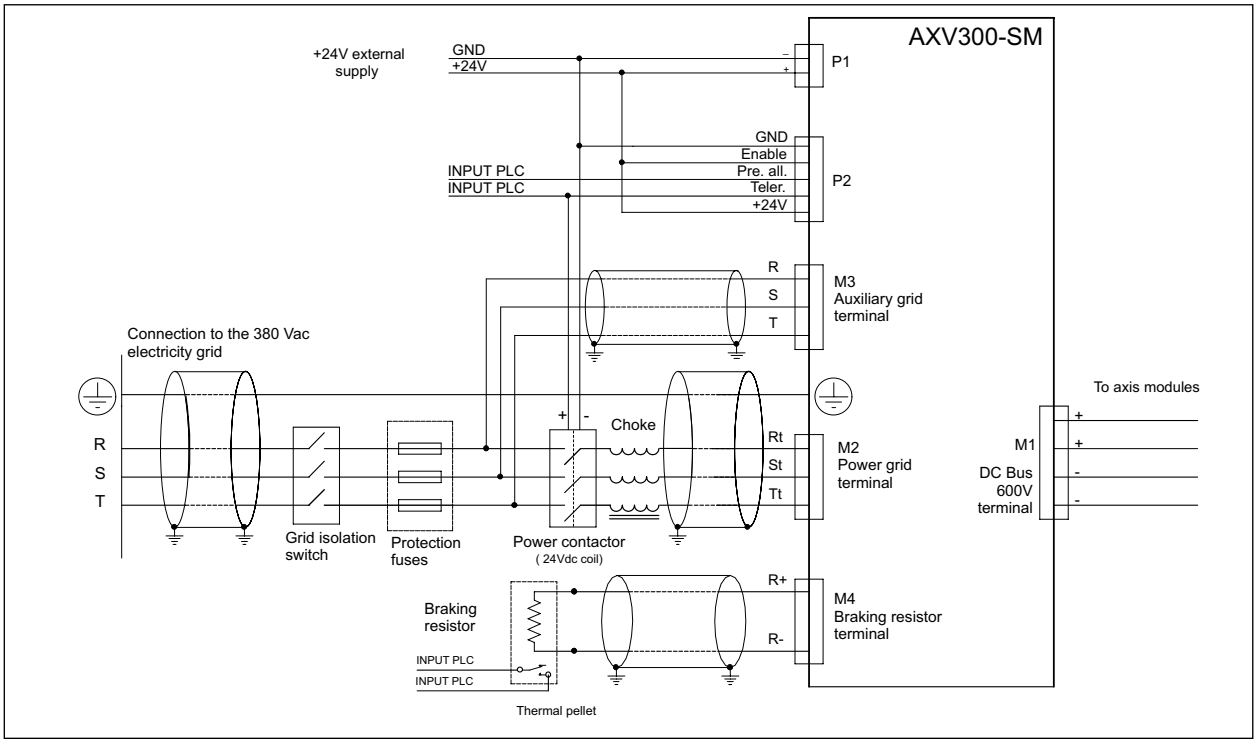


Figure 71: Connection diagram of supply modules with braking resistor

AXV300 SM- Module			12040	24080	380140
Minimum R_{BR}		[ohm]	33	9	6
Suggested R_{BR}		[ohm]	42	15.4	9.2
Continuative power		[kW]	2	4	8
$E_{BR}1$ (1)		[kJ]	20	40	82
$E_{BR}2$ (2)		[kJ]	82	150	220
Braking resistor	**Model**		BRT2k0-42R	BRT4k0-15R4	BRT8k0-9R2
	Code		S8T00M	S8T00G	S8T00Q

(1) Maximum overload 1" - 10% service.

(2) Maximum overload 30" - 25% service.

Table 9: Braking resistors that can be used with AXV300 SM modules

Resistors type	Code	Lenght mm [inches]	Height mm [inches]	Width mm [inches]	Weight kg [lbs]
BRT2k0-42R	S8T00M	625 [24.60]	100 [3.94]	250 [9.84]	6.2 [13.7]
BRT4k0-15R4	S8T00G	625 [24.60]	100 [3.94]	250 [9.84]	7.0 [15.4]
BRT8k0-9R2	S8T00Q	625 [24.60]	200 [7.9]	250 [9.84]	11.5 [25.3]

Table 10: Braking resistor dimensions

Table 7 refers to operating cycles (1) and (2). With heavy duty cycles, it may be possible to use equivalent resistors conencted in series and/or parallel, see chapter **"12.3. Dimensioning of braking resistor for AXV300 SM supply modules" on page 122**.

AXV300 SM-Module	Resistors type	(1) Massimo sovraccarico 1" - servizio 10%.		(2) Massimo sovraccarico 30" - servizio 25%.	
		Tovld [sec]	Trecovery [sec]	Tovld [sec]	Trecovery [sec]
12040	**BRT2k0-42R**	1.7	10	6.8	120
24080	**BRT4k0-15R4**	1.3	10	4.7	120
380140	**BRT8k0-9R2**	1.5	10	4.15	120

Table 11: Overload with suggested resistances

Characteristics of the **GStar** communication system:

- High-speed serial communication with optical fibre loop (link)
- 2 communication links (GS1 and GS2)
- Supports up to 4 axis modules per link
- Basic cycle time of 250 us synchronised with the fastest system task
- Enables synchronisation of motor control tasks resident on axis modules
- 16-bit data transfer and fully configurable mappable data
- Different types of data exchange for real-time and service data

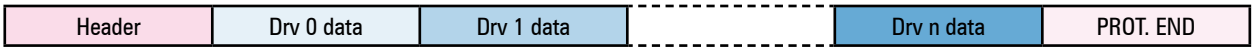


Figure 72: Data package composition managed by a link in TX and RX

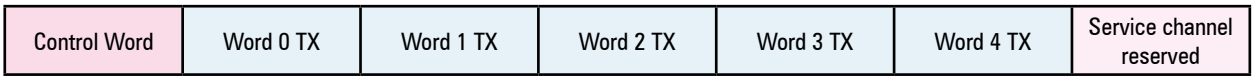


Figure 73: Composition of data sent at each step (250 us) for a single drive in the link

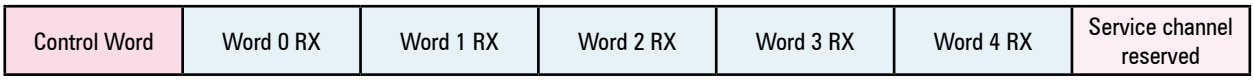


Figure 74: Composition of data received at each step (250 us) by a single drive in the link

14.1. Basic configuration

To perform basic communication system configuration, enter the number of drives connected per optical fibre link in the parameters:

IPA	Name
1	Net 0 drives
2	Net 1 drives

The axis modules, starting from the last in the link, are associated with a number starting from 0 and increasing by 1 for each axis up to a maximum of 3 (see figure below).

The same applies for the second link, except that the numbers start from 4 instead of 0.

The drive's position in the **GStar** link does not affect operation.

This method unequivocally associates each axis module with the configuration parameters of the drives available on the control module.

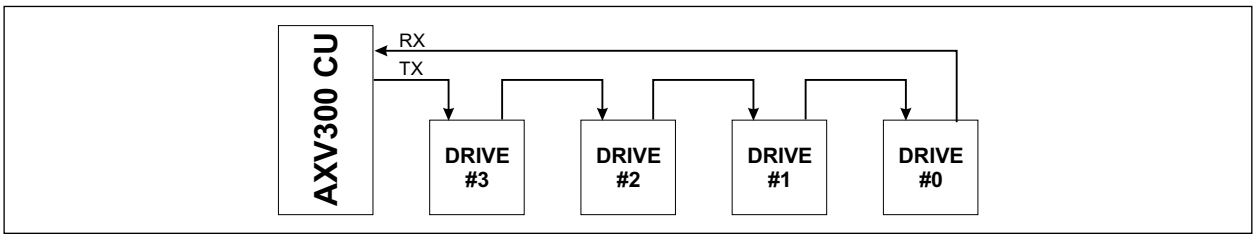


Figure 75: Numerical association based on the drive's position in a link of the GStar optical fibre link

14.2. GStar link channels

The **GStar** link is managed to provide 3 communication channels:

- Fast channel
- Slow channel
- Service channel

Each package also always includes a Control word (TX direction) and a Status word (RX direction).

Error management is based on CRC calculation for the entire link communication package. An error in one package cancels the entire link communication cycle.

14.2.1. Fast channel

This channel enables bi-directional and real-time transmission of up to 4 data words to all drives every 250 μs.

14.2.2. Slow channel

This channel is based on the use of words not used by the fast channel. It enables bi-directional and real-time transmission of up to 16 data words to all the drives, with a cycle step that is a multiple of the fast channel.

14.2.3. Service channel

This is a bi-directional non-real-time channel and does not depend on the configuration of the other channels. It is used by the control module to configure the drives and read their status in all operating modes.

14.3. Configuration of real-time channels

The fast and slow real-time channels make drive data available to the **AXV300 CU** module and send references to the axes. The variables to map in **GStar** may therefore differ because they depend on the motion application to be implemented and are specific to each drive.

Configuration is performed by setting, for each drive:

A) the following two parameters:

IPA	Name	Description
X800	Drvx slow per	Slow channel cycle time (min 500 μs, max 4 ms)
X801	Drvx fast num objs	Number of words used in the fast channel (min 0, max 5)

Where x identifies the drive's position in the optical link, and X = (x +1).

These two parameters unequivocally define the word exchange mode to be used by **GStar**.

B) configuring the variables to exchange in parameters:

Fast RX:

IPA	Name	Description
X810	Drvx RX 0 obj	Drive x datum to exchange in fast mode in position 0
X811	Drvx RX 1 obj	Drive x datum to exchange in fast mode in position 1
X812	Drvx RX 2 obj	Drive x datum to exchange in fast mode in position 2
X813	Drvx RX 3 obj	Drive x datum to exchange in fast mode in position 3
X814	Drvx RX 4 obj	Drive x datum to exchange in fast mode in position 4

Fast TX:

IPA	Name	Description
X820	Drvx RX 0 obj	Drive x datum to exchange in fast mode in position 0
X821	Drvx RX 1 obj	Drive x datum to exchange in fast mode in position 1
X822	Drvx RX 2 obj	Drive x datum to exchange in fast mode in position 2
X823	Drvx RX 3 obj	Drive x datum to exchange in fast mode in position 3
X824	Drvx RX 4 obj	Drive x datum to exchange in fast mode in position 4

Slow RX:

IPA	Name	Description
X830	Drvx RX slow 0 obj	Drive x datum to exchange in Slow mode num 0
X831	Drvx RX slow 1 obj	Drive x datum to exchange in Slow mode num 1
X832	Drvx RX slow 2 obj	Drive x datum to exchange in Slow mode num 2
..	..	..
X849	Drvx RX slow 19 obj	Drive x datum to exchange in Slow mode num 19

Slow TX:

IPA	Name	Description
X850	Drvx TX slow 0 obj	Drive x datum to exchange in Slow mode num 0
X851	Drvx TX slow 1 obj	Drive x datum to exchange in Slow mode num 1
X852	Drvx TX slow 2 obj	Drive x datum to exchange in Slow mode num 2
..	..	..
X869	Drvx TX slow 19 obj	Drive x datum to exchange in Slow mode num 19

The configuration of these parameters is very important to ensure correct application functioning. For this reason this is not usually done manually by the operator, but implemented in the boot task of the user PLC program (see the MdPLC programming guide).

14.3.1. Example

Example of **GStar** configuration

IPA	Name	Value
1800	Drv0 slow per	1ms
1801	Drv0 fast num objs	2

This means the slow data cycle is repeated every 1 ms (4 250 μs steps) and the data exchanged are:
GStar TX packages:

Package No.	Data cycle	Word 0	Word 1	Word 2	Word 3	Word 4
1	1	Drv0 TX 0 obj	Drv0 TX 1 obj	Drv0 TX Slow 0 obj	Drv0 TX Slow 1 obj	Drv0 TX Slow 2 obj
2	2	Drv0 TX 0 obj	Drv0 TX 1 obj	Drv0 TX Slow 3 obj	Drv0 TX Slow 4 obj	Drv0 TX Slow 5 obj
3	3	Drv0 TX 0 obj	Drv0 TX 1 obj	Drv0 TX Slow 6 obj	Drv0 TX Slow 7 obj	Drv0 TX Slow 8 obj
4	4	Drv0 TX 0 obj	Drv0 TX 1 obj	Drv0 TX Slow 9 obj	Drv0 TX Slow 10 obj	Drv0 TX Slow 11 obj
5	1	Drv0 TX 0 obj	Drv0 TX 1 obj	Drv0 TX Slow 0 obj	Drv0 TX Slow 1 obj	Drv0 TX Slow 2 obj
..	..	..	..	..	..	

Drv 0 Control Word	Drv 0 TX 0 Obj	Drv 0 TX 1 Obj	Drv 0 TX 0 Slow 0 Obj	Drv 0 TX 0 Slow 1 Obj	Drv 0 TX 0 Slow 2 Obj	Service channel reserved
Drv 0 Control Word	Drv 0 TX 0 Obj	Drv 0 TX 1 Obj	Drv 0 TX 0 Slow 3 Obj	Drv 0 TX 0 Slow 4 Obj	Drv 0 TX 0 Slow 5 Obj	Service channel reserved
Drv 0 Control Word	Drv 0 TX 0 Obj	Drv 0 TX 1 Obj	Drv 0 TX 0 Slow 6 Obj	Drv 0 TX 0 Slow 7 Obj	Drv 0 TX 0 Slow 8 Obj	Service channel reserved
Drv 0 Control Word	Drv 0 TX 0 Obj	Drv 0 TX 1 Obj	Drv 0 TX 0 Slow 9 Obj	Drv 0 TX 0 Slow 10 Obj	Drv 0 TX 0 Slow 11 Obj	Service channel reserved

Figure 76: Composition of packages transmitted according to the configuration in the example

Data are exchanged in the RX direction in the same way.

Drv 0 Control Word	Drv 0 RX 0 Obj	Drv 0 RX 1 Obj	Drv 0 RX 0 Slow 0 Obj	Drv 0 RX 0 Slow 1 Obj	Drv 0 RX 0 Slow 2 Obj	Service channel reserved
Drv 0 Control Word	Drv 0 RX 0 Obj	Drv 0 RX 1 Obj	Drv 0 RX 0 Slow 3 Obj	Drv 0 RX 0 Slow 4 Obj	Drv 0 RX 0 Slow 5 Obj	Service channel reserved
Drv 0 Control Word	Drv 0 RX 0 Obj	Drv 0 RX 1 Obj	Drv 0 RX 0 Slow 6 Obj	Drv 0 RX 0 Slow 7 Obj	Drv 0 RX 0 Slow 8 Obj	Service channel reserved
Drv 0 Control Word	Drv 0 RX 0 Obj	Drv 0 RX 1 Obj	Drv 0 RX 0 Slow 9 Obj	Drv 0 RX 0 Slow 10 Obj	Drv 0 RX 0 Slow 11 Obj	Service channel reserved

Figure 77: Composition of packages received according to the configuration in the example

It is important to note that the slow and fast channels are closely connected.

In this configuration, a maximum of 12 words can be exchanged via the slow channel.

The general rule is as follows:

Max Slow Objs = (5 - Num Fast Obj) * (Slow Per / 250 us);

In the example

Max Slow Objs = (5 - 2) * (1 ms / 250 us) = 3 * 4 = 12.

14.4. 32-bit variables

32-bit variables are mapped by breaking them down into two 16-bit parts, with the low part of the 32-bit variable ending in Lo and the high part in Hi.

To ensure time consistency of the 32-bit variables (e.g.: speed) these two components must be mapped in the same **GStar** package.

Particular attention must therefore be paid when mapping 32-bit variables on the slow channel.

14.5. Axis Modules

The axis modules are concerned with the following aspects:

- **GStar** communication (data synchronisation and exchange)
- Hardware initialisation
- motor current check
- motor speed check
- encoder management
- alarm management:
  - power section alarms
  - power section overload
  - loss of encoder check
  - **GStar** communication error check

14.5.1. Axis configuration

Each axis has a set of system parameters which allow you to interact with the motor control and axis functions. There are three main types:

- boot parameters
- par parameters
- mon parameters

All parameters are managed by the **AXV300 CU** module. The system cannot be used without the CU module.

Boot parameters define the specific drive initialisation procedure that is only launched at drive start-up.

E.g. :

PWM settings, type of overload algorithm, encoder parameters.

Boot parameters can be changed but are only used and sent to the drive when a **Reboot Drives** command is sent.

Par parameters are always configuration parameters and can also be changed while the drive is working (e.g.: regulator gains).

Monitor variables are read-only values used by the system to monitor drive status.

None of the above parameters is permanently resident on the axes. All are managed by the **AXV300 CU** module, which is the system's intelligence: saving in flash memory, min max scale, etc.

Drive parameters are grouped into 8 menus, each containing the group of parameters relating to the single axis. Their numerical association follows the rule described in chapter **"14.3. Configuration of real-time channels" on page 146**.

14.6. AXV300 CU control module

The control module is the intelligent part of the system and controls the following:

- **GStar** communication;
- system configuration;
- drive configuration (drive boot);
- execution of application control tasks;
- management of local I/O;
- fieldbus management;
- Modbus serial communication management.

The **AXV300** system assumes that the CU card has been programmed by the user to implement a given motion application. It therefore contains the data structures and programming mechanisms and the Mdplc development software.

The **AXV300** system would not be able to implement any motion application without an application program.

However, the **AXV300 CU** module software includes some pre-installed applications that can be used to test axis configuration and system operation:

- Phasing;
- Test Generator;
- Speed;
- Speed-Torque.

Phasing, **Test Generator** and **Speed** are tuning applications that are always present in the basic **AXV300** firmware.

They can be used to perform motor encoder phasing, stimulate control using alternating speed and current references and move the motor in speed control mode.

Tuning applications are designed for commissioning the system and must therefore be used to control one drive at a time.

Speed-Torque is an actual application programmed in the same way by the user. It is used to control the speed reference and torque current limit using the available I/O of all the possible 8 axes.

This means system operation can be tested in the current operating setup with up to 8 axes at the same time.

The user must, of course, program the system to implement the motion application. In this way, the **Speed-Torque** application is overwritten by the user program.

14.7. Description of System States

This paragraph describes the phases of **AXV300** system initialisation.

Initialisation involves the **AXV300 CU** module and at least one axis module.

1) AXV300 CU module

The **AXV300 CU** module is powered by the 24 V applied at its terminals regardless of whether or not voltage is present on the DC-link. When the module is started it moves to the BOOT state.

BOOT

The software initialises the system, parameter database, peripheral hardware devices and **GStar** link.

In this condition, the system uses the set configuration parameters to configure the **GStar** link and moves to the LINK ALARM state.

LINK ALARM

The system waits until the **GStar** link is OK. More specifically, it waits until the drives are synchronised and respond correctly, verifying the number of drives present and the correctness of data.

If no errors are detected the system moves to the IDLE state.

If errors are detected, these are probably due to the **GStar** settings (e.g.: set to 2 drives but there are 3, etc.) and the system stays in the LINK ALARM state.

IDLE

In this condition, the system can communicate correctly with the drives. It reads the information identifying the axis module connected:

- size,
- hardware release,
- software release,
- module identification codes (serial number).

This information is compared with the copy in the parameter database to make sure none of the **GStar** network configuration parameters have been changed and/or replaced

In that case, simply send a **Take Configuration** command to copy the parameters read by the drive to the internal **AXV300 CU** module parameters for use at the next start-up.

If the match is positive, the system moves to the SERVICE state, otherwise it remains in the IDLE state.

SERVICE

In this condition the system brings the drives to the service state and configures them using the parameters that have been saved.

If any parameter communication errors (e.g.: parameter not recognised by the drive) and/or data exchange configuration errors (e.g.: read variable not allowed) are detected, the system returns to the IDLE state.

When the parameters have been sent, the **AXV300 CU** module tells the drive to apply the parameters. The drive then runs its initialisation routines, mainly for boot parameters, and signals the end of initialisation.

The **AXV300 CU** module moves to the RUN state.

RUN

In this condition the communication system is fully enabled (fast, slow and service channels) and real-time data are exchanged correctly between the **AXV300 CU** module and the axis modules.

The **AXV300 CU** module moves to the LINK ALARM state in case of a communication error and to the SYSTEM ERROR state in case of an unforeseen error.

SYSTEM ERROR

The module only enters this state in the event of a serious system malfunction.

The **AXV300** CU module does not manage drive alarms as there is no way of knowing in advance how the system will be used. This depends on the specific application.

A number of the main system configuration commands are listed below. Some of these directly involve **AXV300 CU** module operation:

- load default parameters
- take configuration
- reboot
- reset

Load default parameters

The “load default parameters” command must be sent when the **GStar** network configuration is changed with the addition of a new drive. This is because the size of the drive is only known once communication is enabled and drive data have been read and positively matched with the set internal values.

If that is not the case, the drive values could be incorrect and should therefore be set to the default values for each size.

Take configuration

The user sends this command to inform the **AXV300 CU** module that the connected drives are the right ones. After receiving this command, the **AXV300 CU** module updates its copy of the drives present.

Reboot

When applying the parameter configuration received via **GStar**, the drive might not be initialised properly due to incorrect parameters. A read-only drive parameter indicates which initialisation was not successful.

In that case, correct the drive parameters and launch a new drive boot command. The reboot command executes this by moving the system back to the IDLE state and then through each of the states.

When rebooting, the **AXV300 CU** module is able to check whether the drive configuration has changed compared to the previous drive boot. If not, the **AXV300 CU** module skips the drive configuration procedure, since it is not necessary.

Reset

Reset sends an **AXV300 CU** module hardware reset command and is equivalent to a new **AXV300 CU** module start-up.

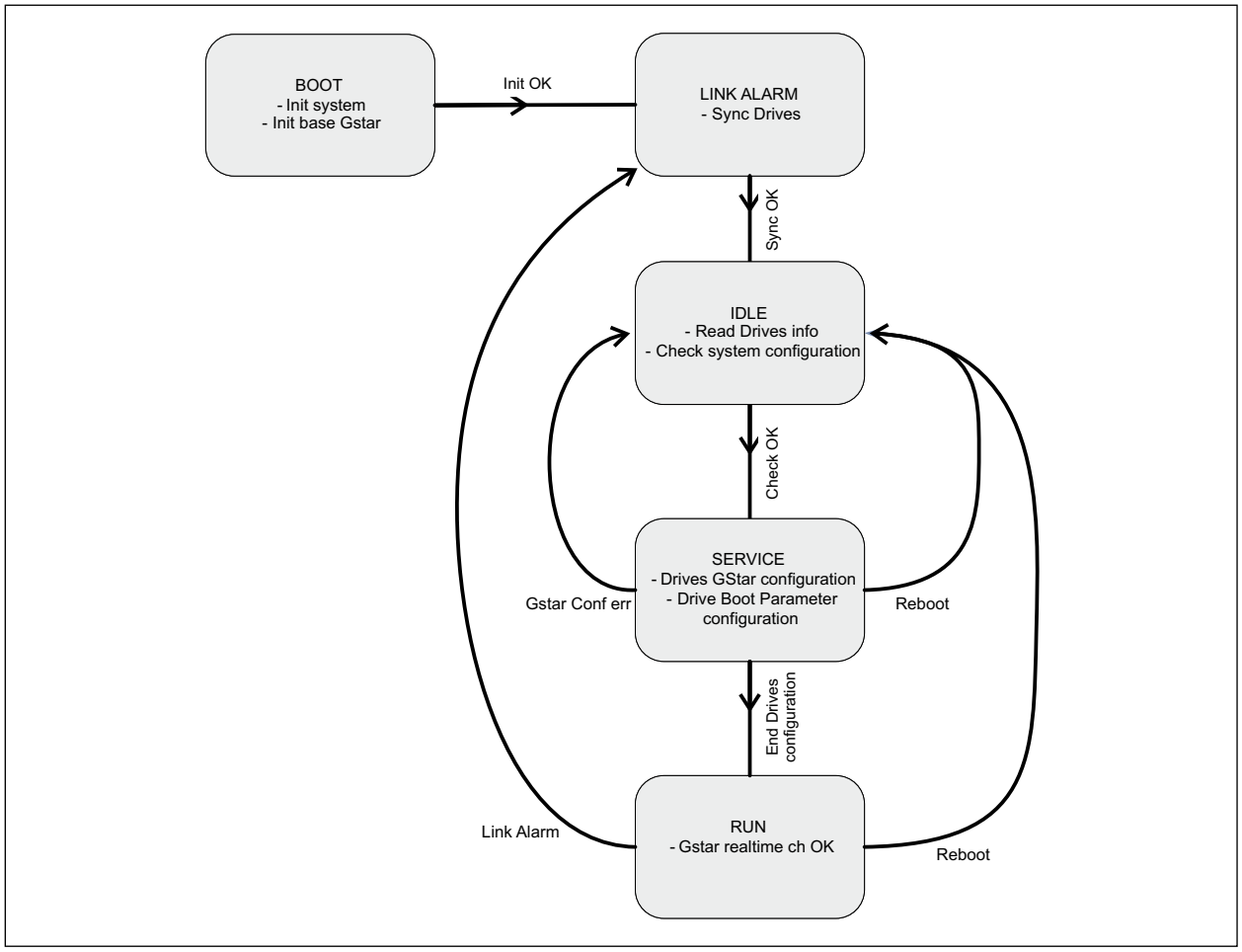


Figure 78: AXV300 CU module machine control states

2) Axis module

The axis module has 3 main parts:

- Power section
- Power command section
- Regulation section

The power section consists of the IGBT modules and 600 V command circuits. It is powered via the DC-link generated by the power supply or regenerative module.

The power command section consists of an interface card between the regulation section and the power section that processes the power signals such as current, DC voltage and alarm measurements, makes these available to the regulation section and receives the commands from the latter to start the IGBT modules.

This section is able to interrupt IGBT control in case of overcurrent, incorrect control or other faults.

This section must have a 24 V power supply.

The regulation section consists of a regulation card with 24 V power supply. It is the intelligent part of the axis module. It manages the encoders, **GStar** link, inverter bridge control signals, drive alarms and motor control.

The axis module is only connected to the **AXV300 CU** module and thus with the outside, via the **GStar** link.

The axis module moves to the BOOT state when switched on.

BOOT

The axis module initialises the peripheral modules that do not depend on configuration, initialises the basic **GStar** link functions and moves to the IDLE state.

IDLE

In this condition the drive waits for the **GStar** link packages with which it synchronises the execution of its control tasks.

The **AXV300 CU** moves the drive to the SERVICE state before starting to configure the drive.

SERVICE

In this condition the drive receives the configuration parameters.

If any parameter communication errors (e.g.: parameter not recognised by the drive) and/or data exchange configuration errors (e.g.: read variable not allowed) are detected, the **AXV300 CU** module leaves the drive in the SERVICE state. Otherwise at the end of configuration the **AXV300 CU** module sends a command to apply the parameters, the drive applies the parameters by executing the initialisation routines and signals completion of the procedure to the **AXV300 CU** module.

The **AXV300 CU** module removes the service state command and the axis module automatically moves to the RUN state.

RUN

This state indicates that the drive is communicating with the **AXV300 CU** module via **GStar** and exchanging data correctly.

If configuration parameter application is not completed successfully, the drive signals the ALARM condition.

ALARM

The ALARM condition occurs for two reasons:

1. an error or fault occurred during operation: overcurrent, encoder error, overtemperature, DC-link voltage, etc.
2. configuration parameter application was not completed successfully;

In case 1, send a Reset Alarms command via the ControlWord to remove the error and move the drive back to the RUN state.

In case 2, the configuration parameters are probably incorrect. The user must correct them and launch a new reboot **AXV300 CU** module command.

In that case a Reset Alarms command is ineffective.

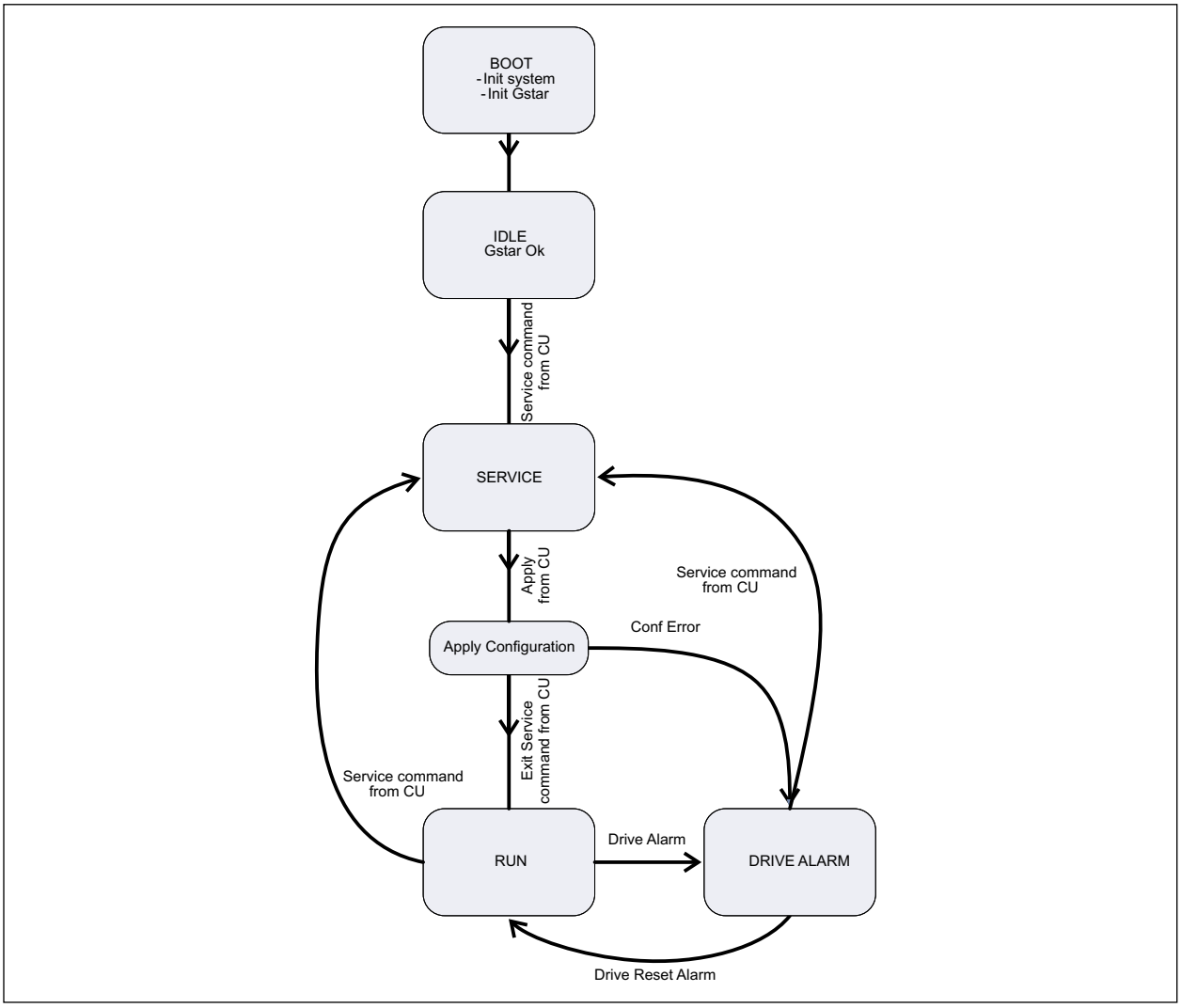


Figure 79: Axis module state machine

The **AXV300** system must be configured correctly so that it can then be programmed by the user. This involves the following steps:

- **GStar** network configuration
- Loading default parameters
- Axis parameter configuration
- Checking axis operation

The system can only be configured if the drives to be used are available and the motors and encoders are appropriately wired.

Hardware check:

- presence of 24 V power supply to all system modules,
- reliability of equipotential bonding connections at all required points,
- supply module power supply,
- supply module braking resistor,
- external power contactor for controlling the supply module power line,
- connection of motor cables and encoder cables to the specific drive.

15.1. Basic GStar communication parameter configuration

1- Switch the **AXV300 CU** module and the axis modules on,
2- connect the **GStar** optical fibres
3- connect to the **AXV300 CU** module via the Gf_eXpress configuration tool and serial communication port
4- Enter the number of drives in the parameters

IPA	Name
1	Net 0 drives
2	Net 1 drives

1- Send the **Save parameters** command and then **Reset Drive**.
2- After restarting, send a **Take configuration** command.

IPA	Name
54	Take Net Cfg

15.2. System Parameter Settings

1- Send the **Load default** parameters from Configuration tool
2- Send the **Save parameters** command and then **Reset Drive.**

The system has been initialised correctly and the drive configuration parameters can now be set.

15.3. Axis Parameter Configuration

It may help to concentrate on one axis at a time.

Drive monitor data are displayed in the Drives/Drive x menu.

- Configure the parameters in the Drive Config menu
- Configure the parameters in the Encoder Param menu
- Configure the parameters in the Motor Data menu (including the **Mot Ls** choke)
- In the Reg Gains menu set the **Drvx IGains Calc** command to ON

You can use the **Drvx dia LEDS** parameter to display which drive is being configured (see the **"Drives \ Drive 0 \ Service" on page 195**), The green and red LEDs on the corresponding axis module will flash if this is set to ON.

- Send the Save parameters command and then Reset Drive.
- Check drive status.

If in the **Alarm** condition, the parameters in the Alarms menu provide information about the alarm or current configuration error. If necessary, these can be modified, saved and reset.

If there are no parameter configuration alarms, the system can be powered and you can proceed with commissioning.

If using a motor supplied by Gefran, the encoder assembly is known and the offset value necessary for controlling the motor is the 0.0° default value of the **Drvx Enc Offset** parameter.

Otherwise, if the motor is not known or if in any doubt about encoder assembly following repairs to the motor, the encoder **Phasing** procedure must be performed.

15.3.1. Phasing Procedure

Set the parameters in the Tuning menu:

IPA	Name	
600	Application Sel	Defines the application to be performed. Enter the Phasing selection
602	Appl Drive Sel	Enter the axis to be controlled
606	Appl FullScaleSpd	Defines the maximum speed value allowed. This parameter is not used for the Phasing application.
608	Appl FullScaleCur	Defines the maximum current that can be used in the application. We recommend entering a value that is equal to the rated current of the motor.

Send the **Save parameters** command and then **Reset Drive** to enable the changes to the parameters.

Set the application program parameters:

IPA	Name	
620	Phasing Speed	Defines the motor speed during this procedure. We recommend the default value, which may be reduced in case of oscillations when the motor is started or stops running.

Use **Digital Input 0** to enable the procedure.

If any alarms are present, use **Digital Input 3** to send a **Reset Alarms** command to the selected drive.

IWhen enabled, the motor prepares to turn in one direction. It then starts to turn in the positive phase direction, turns one revolution and stops with a delay of a few seconds.

Check while turning that the **Drives\Drivex\Monitor\Drvx Motor Speed** monitor parameter is positive and equal to the value entered in **Phasing Speed** (oscillations are allowed).

If the sign is different the motor phase sequence and encoder counter direction do not correspond. Change one of the two parts until these match and repeat the procedure.

If the value read differs from the expected value, check the parameters relating to the number of encoder impulses and number of motor poles.

Check that the motor completes 1 full revolution.

If not, the number of motor poles has been entered incorrectly. Correct and repeat the procedure.

At the end of the procedure the value of the **Drives\Drivex\Encoder Param\Drvx Enc Offset** parameter, which represents the encoder assembly phase angle with respect to the rotor, is calculated.

Send a **Save parameters** command to save the offset value found.

15.3.2. Operation in Speed mode

Reset the parameters in the Tuning menu:

IPA	Name	
600	Application Sel	Defines the application to be performed. Enter the Speed selection
602	Appl Drive Sel	This should already be configured with the axis in question
606	Appl FullScaleSpd	Defines the maximum speed value allowed. Set the speed value corresponding to 10 V of the desired analog input.
608	Appl FullScaleCur	Defines the maximum current that can be used in the application. Select the appropriate value.

Send the **Save parameters** command and then **Reset Drive** to enable the changes to the parameters.
Set the application program parameters:

IPA	Name	
680	Speed Ramp Time	Defines the ramp time as the time necessary to bring the motor from zero to the speed Appl FullScaleSpd.
682	Speed En AnaInp	Indicates whether the speed reference is to be calculated by the analog input
684	Speed Speed Ref	Current speed reference
686	Speed Ana Spd Filt	Time constant of the filter for the speed reference from the analog input

Use **Digital Input 0** to send the enable drive command, Motor stopped at torque and **Digital Input 1** to send the start command. The motor follows the speed reference set in the **Speed Ref** parameter.
If the drive is in an alarm condition, use Digital Input 3 to send a Reset Alarms command to the selected drive.
The **TestGenCur** and **TestGenSpd** applications can be used to optimise the speed regulator parameters by stimulating the motor with alternating torque current and speed signals.

15.3.3. Test Generator

Reset the parameters in the Tuning menu:

IPA	Name	
600	Application Sel	Defines the application to be performed. Enter the TestGenCur or TestGenSpd selection
602	Appl Drive Sel	This should already be configured with the axis in question
606	Appl FullScaleSpd	Defines the speed range allowed. Set the speed value corresponding to 10 V of the desired analog input.
608	Appl FullScaleCur	Defines the maximum current that can be used in the application. Select the appropriate value.

Send the Save parameters command and then Reset Drive to enable the changes to the parameters.
The parameters for this application are in the Test Generator menu:

IPA	Name	
660	TestGen Type	Displays the current Test generator application
662	TestGen Per	Alternating signal period
664	TestGen Hi Ref	High value of the alternating reference
666	TestGen Lo Ref	Low value of the alternating reference

The current and speed outputs are displayed on analog output 0.

15.3.4. Other axes

Repeat the axis commissioning procedure for each axis in the system.

15.3.5. Operation of all axes: Speed-Torque application

The Speed-Torque application program in the default software of the **AXV300 CU** module can be used to verify simultaneous operation of several axes.

The purpose of the application program is to operate all the axes together without writing any user application. It is capable of operating each axis in speed control mode, with reference ramp and torque limit. It is, of course, important to check any mechanical limits between the axes to avoid damaging the machine being operated.

The application function diagram is illustrated in the figure below. The **Speed-Torque** application parameters are displayed in the Application menu.

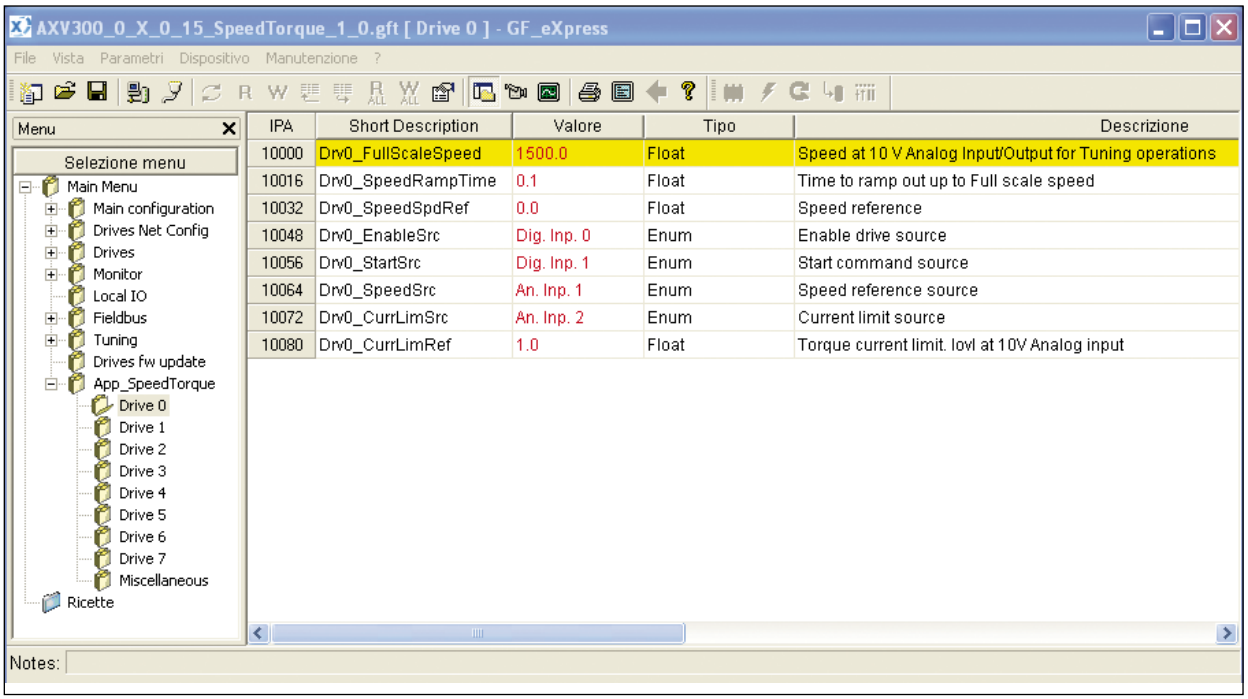


Figure 80: Application Menu

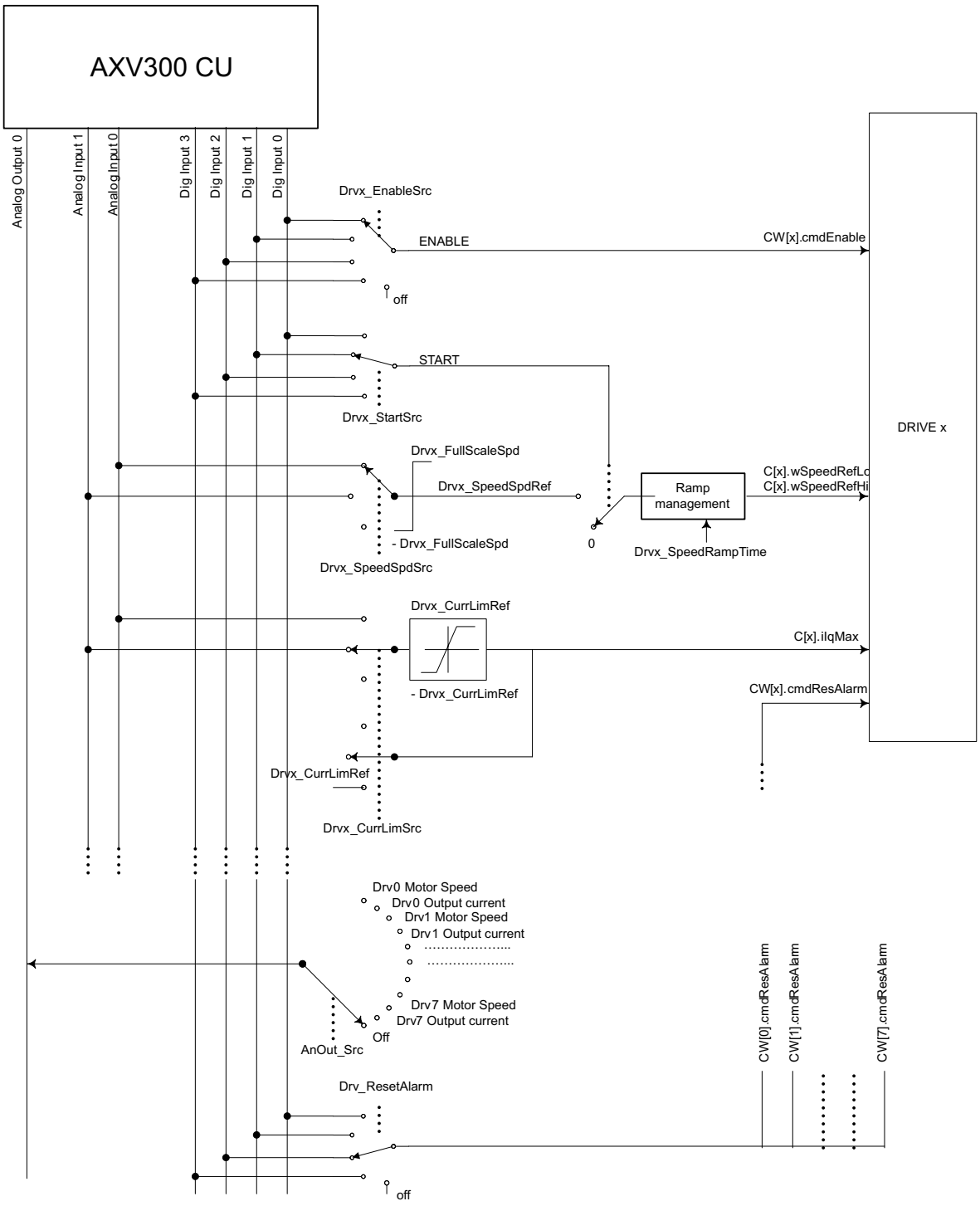


Figure 81: Speed-Torque application function diagram

15.4. Block diagram of the axis module control system

The regulation diagram implemented within the axis module is shown in the figure below.

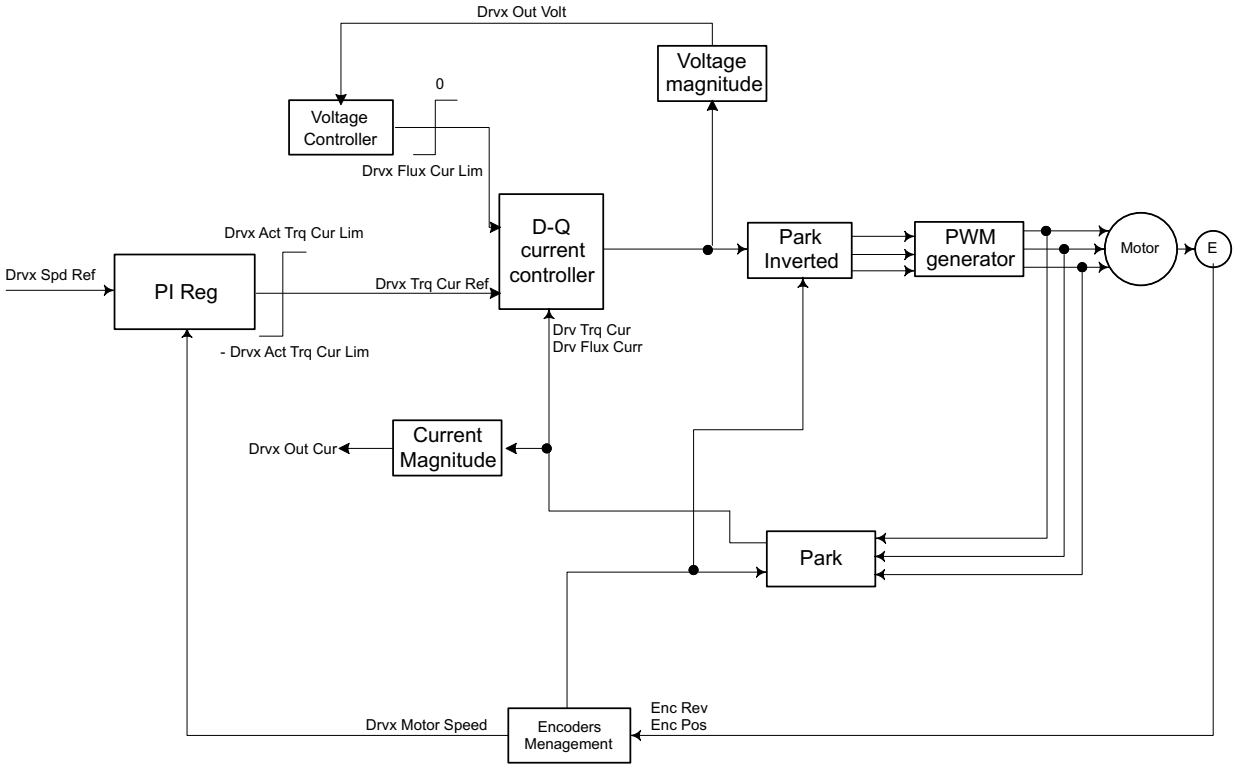


Figure 82: Brushless motor regulation diagram

The diagram and the variables used for programming are illustrated in the figure below.

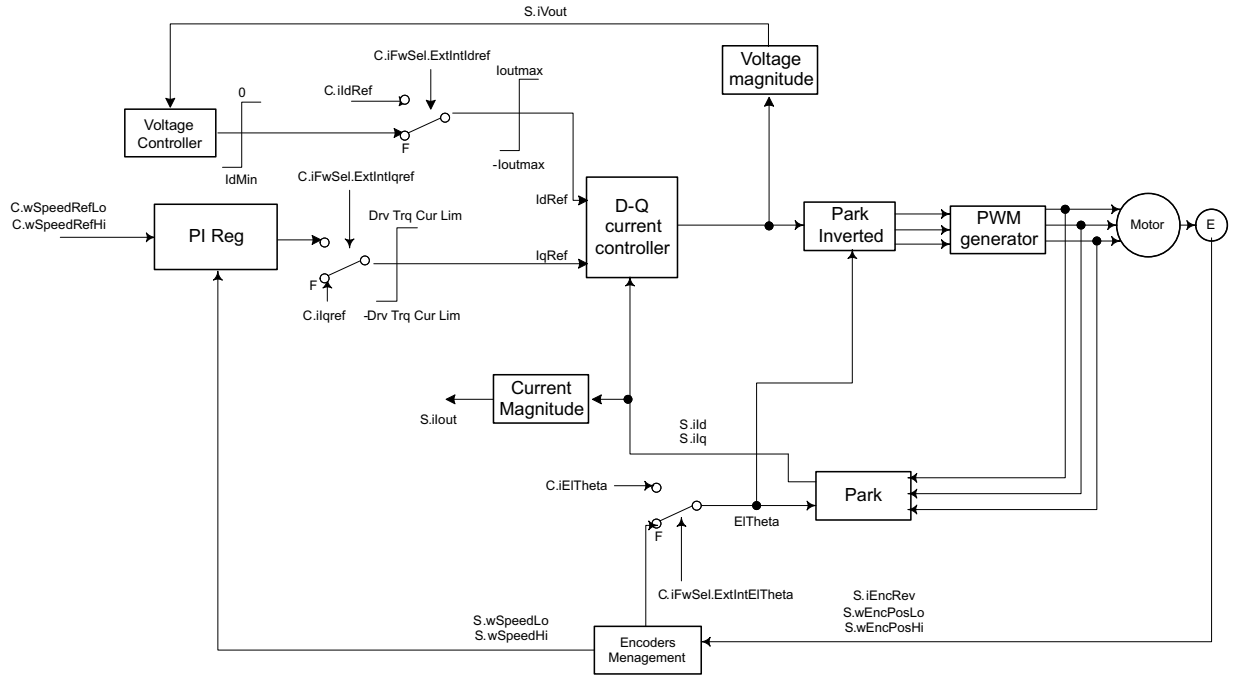


Figure 83: Brushless motor regulation diagram with programming variables

Torque current Limit

IoutMax = max available drive current = min (Drvx Max Cur PAR DriveOverload)

S.iActIqLim = Drv Trq Cur Lim = min (C.iIqMax , sqrt(iIoutMax^2 - iId^2))

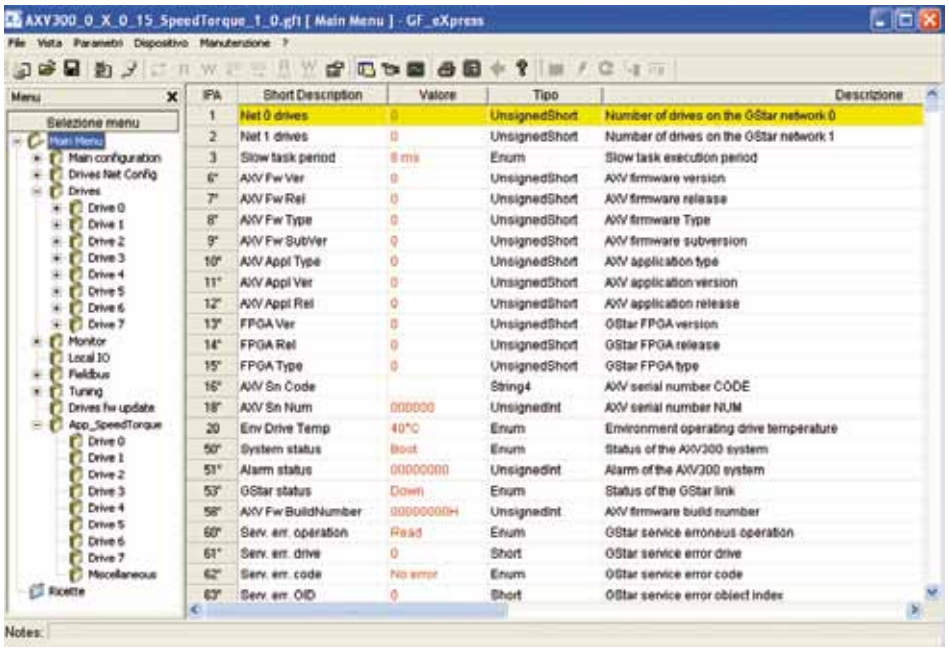
Key

C. = sysDriveControl

S. = sysDriveStatus

16.1. Parameters menu

GF-eXpress allows the **AXV300** parameter menu to be displayed:



16.2. Key

E.g. :

Par	Description	[unit]	Type	Def	Min	Max	Acc
1	**Net 0 Drives**		UShort	0	0	4	RW*

Par	Description	[unit]	Type	Def	Min	Max	Acc

Parameter identification number (IPA)

Parameter name

Unit of measure
Max: Maximum value allowed

Data format :

virtual	Virtual parameter
byte	Signed 8-bit integer
int	Signed 32-bit integer
short	Signed 16-bit integer
UnsignedInt	Unsigned 32-bit integer
float	Single precision floating point
UShort	Unsigned 16-bit integer
unsignedByte	Unsigned 8-bit integer
boolean	True/False value
double	Double precision floating point
Enum	Enumerative Type
Command	
string4	String

Default value

Minimum value allowed

Maximum value allowed

Parameter function type:

R : Read-only parameter
RW : Write parameter
B : Boot Drive parameter
* : Parameter only enabled by rebooting the drive

16.3. Description of Parameters and Functions

This chapter contains a list of the **AXV300** system configuration parameters.
It also includes a brief description and details of the parameter.

Parameters can be changed both manually, using the GF_eXpress configuration tool and directly by the PLC application being executed.
Tuning applications can also modify the parameters necessary for their functioning (e.g.: those concerning the **GStar** link and task execution).

Main configuration

The parameters in this menu regard general system configuration (also see chap...).
Changes to one of the **GStar Net 0 Drives** and **Net 1 Drives** configuration parameters result in a new system configuration. In that case we recommend following the commissioning procedure (**"15 - AXV300 system start-up procedure" on page 154**) to ensure correct system initialisation.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1	**Net 0 Drives**		UShort	0	0	4	RW*

Number of drives in the **GStar** link network 0.

Note ! The “Load Default target Values” command does not affect this parameter.

Par	Description	[unit]	Type	Def	Min	Max	Acc
2	**Net 1 Drives**		UShort	0	0	4	RW*

Number of drives in the **GStar** link network 1.

Note ! The “Load Default target Values” command does not affect this parameter.

Par	Description	[unit]	Type	Def	Min	Max	Acc
3	**Slow Task Period**	ms	Enum	8	-	-	RW*

Values allowed for the period of execution of Task Slow:

01 = 1ms
02 = 2ms
04 = 4ms
08 = 8ms (Default)
16 = 16ms

Par	Description	[unit]	Type	Def	Min	Max	Acc
20	**Env Drive Temp**		Enum	40°C	-	-	RWB*

Ambient temperature. Values allowed:

0 = 40°C
1 = 50°C (fixed derating see section **"3.4.1. Ambient temperature reduction factor" on page 18**)

Main configuration \ Comm Config

This menu contains the RS232 serial communication configuration parameters.

The factory setting is

Drive Address = 1

Drive Baud Rate = 38400 bit/s

Drive Line Conf = None,8,1

If these values are changed, we recommend labelling the drive to make the new serial port configuration visible and prevent any future problems in communication between the drive and the GF-eXpress configuration tool, which is set by default to 38400 (GF-eXpress window, see IPA 83).


Caution

The new serial port configuration is only enabled when the drive is reset. Remember to change the GF_eXpress software configuration accordingly.

Par	Description	[unit]	Type	Def	Min	Max	Acc
80	**Drive Address**		UShort	1	1	127	RW*

Drive address.

Par	Description	[unit]	Type	Def	Min	Max	Acc
81	**Drive Baud Rate**		Enum	38400	-	-	RW*

Communication speed (baud rate) configuration:

9600 = 9600 bit/s

19200 = 19200 bit/s

38400 = 38400 bit/s

57600 = 57600 bit/s

115200 = 115200bit/s

Par	Description	[unit]	Type	Def	Min	Max	Acc
83	**Drive Line Conf**		Enum	None,8,1	-	-	RW*

Drive serial port configuration. One of the following values can be set:

– 1 = N,8,1 (no parity, 8 data bits, 1 stop bit)

7 = E,8,1 (odd parity, 8 data bits, 1 stop bit)

9 = N,8,2 (no parity, 8 data bits, 2 stop bits)

4103 = O,8,1 (even parity, 8 data bits, 1 stop bit)

Main configuration \ AuxEncoder Config

The auxiliary encoder can be used for additional speed and position information.

If an encoder card is installed, it is recognised at start-up. If installed for the first time or replaced with a different type, the parameters that could cause conflict (power supply, encoder mode, etc.) are reset at start-up.

Par	Description	[unit]	Type	Def	Min	Max	Acc
150	**Encoder pulses**		UShort	1024	128	16384	RW

Setting of the number of incremental feedback encoder impulses. During setup, this value is set automatically for incremental sinusoidal encoders + EnDat absolute and Hiperface encoders by reading the number of incremental encoder impulses.

Par	Description	[unit]	Type	Def	Min	Max	Acc
151	**Encoder direction**		Enum	0	0	1	RW

Setting of the sign of the information obtained by the incremental or absolute encoder.

0 Off - Not inverted

1 On - Inverted

If set to Off the encoder feedback signals are not inverted.

If set to On the encoder feedback signals are inverted.

In accordance with international standards, a positive reference corresponds to clockwise motor rotation, seen from the command side (shaft).

To restore the correct speed measurement sign, invert the incremental encoder A+ and A- signals and the absolute encoder Sin+ and Sin- signals on the encoder connections. The absolute part cannot be inverted with Endat and Hiperface absolute encoders.

Par	Description	[unit]	Type	Def	Min	Max	Acc
152	**Encoder supply**	V	Float	5.2	5.2	20	RW

Setting of the encoder supply voltage supplied by the relative optional card.

Min and max values are modified according to the type of encoder card applied

Par	Description	[unit]	Type	Def	Min	Max	Acc
154	**Encoder input**		Enum	0	0	1	RW

Setting of the input configuration of the incremental digital encoder, TTL or HTL.

0 HTL

1 TTL

The value of this parameter is automatically set in HTL when the value entered in **PAR 151 Encoder supply** is more than 6.0 V.

Par	Description	[unit]	Type	Def	Min	Max	Acc
155	**Encoder mode**		Enum	0	0	8	RW

Setting of the method for measuring the speed of the encoder connected to the optional card.

0 None

1 Digital FP

2 Digital F

3 Sinus

4 Sinus SINCOS

5 Sinus ENDAT

6 Sinus SSI

7 Sinus HIPER

8 Resolver (not available)

The speed measurement procedure depends on the type of encoder card; minimum and maximum default values are set according to the type of feedback card that is applied

Par	Description	[unit]	Type	Def	Min	Max	Acc
156	**Encoder signal Vpp**	V	Float	1	0.8	1,2	RW

Setting of the encoder signal peak-to-peak voltage value.

Incremental sinusoidal encoders and absolute SinCos encoders normally produce signals with a peak-to-peak voltage of 1 Vpp. Due to voltage drops along the cable, the signal may have a lower peak-to-peak voltage when it reaches the feedback card, signalled in **PAR 165 Encoder error code**.

This parameter is used to configure the value of the peak-to-peak voltage of the incremental sinusoidal encoders and absolute SinCos encoders on the input terminals of the feedback card.

Par	Description	[unit]	Type	Def	Min	Max	Acc
158	**Encoder repetition**		Enum	0	0	3	RW

Setting of the divider to apply to the encoder repetition output frequency.

0 No division

1 Divided 2

2 Divided 4

3 Divided 8

Par	Description	[unit]	Type	Def	Min	Max	Acc
159	**Encoder signal Check**		Enum	1	0	3	RW

Configuration of which channels of the incremental digital encoder must be controlled for processing the "*Fbk loss*" error signal.

0 Disabled

1 Controll A-B

2 Controll A-B-Z

3 Controll A-B-Z-P

If set to 1, it checks that channels A-B arrive

If set to 2, it checks that channels A-B-Z arrive

If set to 3, it checks that channels A-B-Z arrive and the expected number of impulses at each turn.

Par	Description	[unit]	Type	Def	Min	Max	Acc
160	**Encoder SSI clocks**		UShort	13	11	25	RW

Setting of the length of the SSI package, defined as the number of clock cycles (the absolute SSI encoders on the market have package lengths varying from 13 to 25 bits).

Par	Description	[unit]	Type	Def	Min	Max	Acc
161	**Encoder SSI pos bits**		UShort	13	11	25	RW

Setting of the number of position bits in the SSI package.

Par	Description	[unit]	Type	Def	Min	Max	Acc
162	**Encoder Command**		Enum	0	0	3	RW

Commands to perform the following operations:

Reset — If an "*Encoder Error Code*" is present and the cause of the error has been removed, the error can be reset with this parameter.

Restart — The encoder initialisation procedure is repeated. It can also be used to signal to the AXV300 that the encoder is now connected correctly (for instance if the Endat, SSI, Hiperface encoder was not connected at start-up).

Set Pos — For Endat and Hiperface encoders only, executes a command to reset the absolute position.

0 No command

1 Enc Reset

2 Enc Restart

3 Enc Set Pos

Par	Description	[unit]	Type	Def	Min	Max	Acc
174	**Encoder Card S/N**		UnsignedInt				R

Serial number of the encoder card.

Par	Description	[unit]	Type	Def	Min	Max	Acc
178	**Encoder Type**		Enum	0	0	4	R

Type of encoder card installed.

0 Enc 1: Digital

1 Enc 2: Sinus

2 Enc 3: Sinus SINCOS

3 Enc 4: Sinus SSI / EnDAT

4 Enc 5: Sinus HIPER

Par	Description	[unit]	Type	Def	Min	Max	Acc
179	**Fw encoder ver rel**		UShort				R

Encoder firmware version

Par	Description	[unit]	Type	Def	Min	Max	Acc
180	**Fw encoder type**		UShort				R

Encoder firmware type.

Par	Description	[unit]	Type	Def	Min	Max	Acc
186	**Encoder spd filt**	ms	UShort	-			R

Setting of the time constant of the filter applied to the reading of the encoder impulses.
The filter is applied to the speed shown in **PAR 164 Encoder Speed**.

Drives Net Config

This menu contains the parameters used to recognise the **AXV300** system configuration.

When switched on, the **AXV300** CU module establishes the **GStar** communication with the drives according to the basic **GStar** configuration and reads specific data to unequivocally identify each module (serial number, drive size, hardware version, software version). It then compares these with the values stored in the permanent memory: if any discrepancies are found, the system stops and waits for the "Take Configuration" **Take Net Cfg** (IPA 54) command to recognise the situation or resumes the system initialisation procedure.

This mechanism prevents any incorrect movements and/or parameter settings due to: replacement of the module, different connection of optical fibres (resulting in different numbering) with different numbering of drives in the **GStar** network.

To facilitate the display of data, some parameters are displayed in the specific "Drives Net Config \ Drive x" menu as well as in the main "Drives Net Config" menu (the parameter IPA does not change).

Par	Description	[unit]	Type	Def	Min	Max	Acc
54	**Take Net Cfg**		Command	-	-	-	RW

The “Take Configuration” command accepts the new **GStar** configuration.

When this command is sent the **AXV300 CU** module copies the data read by the drives in the retaining parameters.

Note ! Run a Save Parameters command and Reset Drive to repeat system start-up.

Par	Description	[unit]	Type	Def	Min	Max	Acc
55	**Net cfg status**		Enum	Not match	-	-	R

Result of the system configuration check.

The following values are possible:

0	= Not match	- The drives that are connected have changed or are connected differently
1	= Ok	- system configuration has not changed

Par	Description	[unit]	Type	Def	Min	Max	Acc
340	**Drv0 cfg status**		Enum	Not match	-	-	R

Result of the system configuration check: particularly of drive 0.

The following values are possible:

0 = Not match	- the drive has been replaced
1 = Ok	- the drive is the one that was saved

Par	Description	[unit]	Type	Def	Min	Max	Acc
341	**Drv1 cfg status**		Enum	Not match	-	-	R

Result of the system configuration check: particularly of drive 1.

The following values are possible:

0 = Not match	- the drive has been replaced
1 = Ok	- the drive is the one that was saved

Par	Description	[unit]	Type	Def	Min	Max	Acc
342	**Drv2 cfg status**		Enum	Not match	-	-	R

Result of the system configuration check: particularly of drive 2.

The following values are possible:

0 = Not match	- the drive 0 has been replaced
1 = Ok	- the drive 0 is the one that was saved

Par	Description	[unit]	Type	Def	Min	Max	Acc
343	**Drv3 cfg status**		Enum	Not match	-	-	R

Result of the system configuration check: particularly of drive 3.

The following values are possible:

0 = Not match - the drive 0 has been replaced

1 = Ok - the drive 0 is the one that was saved

Par	Description	[unit]	Type	Def	Min	Max	Acc
344	**Drv4 cfg status**		Enum	Not match	-	-	R

Result of the system configuration check: particularly of drive 4.

The following values are possible:

0 = Not match - the drive 0 has been replaced

1 = Ok - the drive 0 is the one that was saved

Par	Description	[unit]	Type	Def	Min	Max	Acc
345	**Drv5 cfg status**		Enum	Not match	-	-	R

Result of the system configuration check: particularly of drive 5.

The following values are possible:

0 = Not match - the drive 0 has been replaced

1 = Ok - the drive 0 is the one that was saved

Par	Description	[unit]	Type	Def	Min	Max	Acc
346	**Drv6 cfg status**		Enum	Not match	-	-	R

Result of the system configuration check: particularly of drive 6.

The following values are possible:

0 = Not match - the drive 0 has been replaced

1 = Ok - the drive 0 is the one that was saved

Par	Description	[unit]	Type	Def	Min	Max	Acc
347	**Drv7 cfg status**		Enum	Not match	-	-	R

Result of the system configuration check: particularly of drive 7.

The following values are possible:

0 = Not match - the drive 0 has been replaced

1 = Ok - the drive 0 is the one that was saved

Drives Net Config \ Drive 0
Drives Net Config \ Drive 1
Drives Net Config \ Drive 2
Drives Net Config \ Drive 3
Drives Net Config \ Drive 4
Drives Net Config \ Drive 5
Drives Net Config \ Drive 6
Drives Net Config \ Drive 7

This sub-menu contains the information saved for drive X (with X = 0 .... 7) and the information read by drive X at start-up.

Par	Description	[unit]	Type	Def	Min	Max	Acc
360	**Drv0 Descr**		String4		-	-	RW
362	**Drv1 Descr**		String4		-	-	RW
364	**Drv2 Descr**		String4		-	-	RW

366	**Drv3 Descr**	String4	-	-	RW
368	**Drv4 Descr**	String4	-	-	RW
370	**Drv5 Descr**	String4	-	-	RW
372	**Drv6 Descr**	String4	-	-	RW
374	**Drv7 Descr**	String4	-	-	RW

User descriptive string associated with drive X.

Par	Description	[unit]	Type	Def	Min	Max	Acc
340	**Drv0 cfg status**		Enum	Not match	-	-	R
341	**Drv1 cfg status**		Enum	Not match	-	-	R
342	**Drv2 cfg status**		Enum	Not match	-	-	R
343	**Drv3 cfg status**		Enum	Not match	-	-	R
344	**Drv4cfg status**		Enum	Not match	-	-	R
345	**Drv5 cfg status**		Enum	Not match	-	-	R
346	**Drv6 cfg status**		Enum	Not match	-	-	R
348	**Drv7 cfg status**		Enum	Not match	-	-	R

Result of the system configuration check: particularly of drive X.

The following values are possible:

0 = Not match - the drive 0 has been replaced

1 = Ok - the drive 0 is the one that was saved

Par	Description	[unit]	Type	Def	Min	Max	Acc
280	**Drv0 cfgSN CodePart**		String4		-	-	RW
282	**Drv1 cfgSN Code Part**		String4		-	-	RW
284	**Drv2 cfgSN Code Part**		String4		-	-	RW
286	**Drv3 cfgSN Code Part**		String4		-	-	RW
288	**Drv4 cfgSN Code Part**		String4		-	-	RW
290	**Drv5 cfgSN Code Part**		String4		-	-	RW
292	**Drv6 cfgSN Code Part**		String4		-	-	RW
294	**Drv7 cfgSN Code Part**		String4		-	-	RW

First part of the alphanumerical component of the drive serial number: value saved in the flash memory.

E.g.: product serial number 31GA232455 -> Drv0 cfgSN Code Part = 31GA

Par	Description	[unit]	Type	Def	Min	Max	Acc
300	**Drv0 cfgSN NumPart**		String4		-	-	RW
302	**Drv1 cfgSN NumPart**		String4		-	-	RW
304	**Drv2 cfgSN NumPart**		String4		-	-	RW
306	**Drv3 cfgSN NumPart**		String4		-	-	RW
308	**Drv4 cfgSN NumPart**		String4		-	-	RW
310	**Drv5 cfgSN NumPart**		String4		-	-	RW
312	**Drv6 cfgSN NumPart**		String4		-	-	RW
314	**Drv7 cfgSN NumPart**		String4		-	-	RW

Second part of the alphanumerical component of the drive serial number: value saved in the flash memory.

E.g.: product serial number 31GA232455 -> Drv0 cfgSN Num Part = 232455

Par	Description	[unit]	Type	Def	Min	Max	Acc
320	**Drv0 cfg Size Code**		UDint		-	-	RW
322	**Drv1 cfg Size Code**		UDint		-	-	RW
324	**Drv2 cfg Size Code**		UDint		-	-	RW
326	**Drv3 cfg Size Code**		UDint		-	-	RW
328	**Drv4 cfg Size Code**		UDint		-	-	RW
330	**Drv5 cfg Size Code**		UDint		-	-	RW
332	**Drv6 cfg Size Code**		UDint		-	-	RW
334	**Drv7 cfg Size Code**		UDint		-	-	RW

Drive size code: value saved in the flash memory.

E.g. : AXV300 10413 -> Drv0 cfg Size Code = 10413

Par	Description	[unit]	Type	Def	Min	Max	Acc
1003	**Drv0 SN Code Part**		UDint	-	-	-	R
2003	**Drv1 SN Code Part**		UDint	-	-	-	R
3003	**Drv2 SN Code Part**		UDint	-	-	-	R
4003	**Drv3 SN Code Part**		UDint	-	-	-	R
5003	**Drv4 SN Code Part**		UDint	-	-	-	R
6003	**Drv5 SN Code Part**		UDint	-	-	-	R
7003	**Drv6 SN Code Part**		UDint	-	-	-	R
8003	**Drv7 SN Code Part**		UDint	-	-	-	R

Alphanumerical component of the drive serial number: value read by the drive.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1005	**Drv0 SN Num Part**		UDint	-	-	-	R
2005	**Drv1 SN Num Part**		UDint	-	-	-	R
3005	**Drv2 SN Num Part**		UDint	-	-	-	R
4005	**Drv3 SN Num Part**		UDint	-	-	-	R
5005	**Drv4 SN Num Part**		UDint	-	-	-	R
6005	**Drv5 SN Num Part**		UDint	-	-	-	R
7005	**Drv6 SN Num Part**		UDint	-	-	-	R
8005	**Drv7 SN Num Part**		UDint	-	-	-	R

Numerical component of the drive serial number: value read by the drive.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1306	**Drv0 Size Code**		UDint	-	-	-	R
2306	**Drv1 Size Code**		UDint	-	-	-	R
3306	**Drv2 Size Code**		UDint	-	-	-	R
4306	**Drv3 Size Code**		UDint	-	-	-	R
5306	**Drv4 Size Code**		UDint	-	-	-	R
6306	**Drv5 Size Code**		UDint	-	-	-	R
7306	**Drv6 Size Code**		UDint	-	-	-	R
8306	**Drv7 Size Code**		UDint	-	-	-	R

Drive size code: value read by the drive.

Drives

Drives \ Drive 0
Drives \ Drive 1
Drives \ Drive 2
Drives \ Drive 3
Drives \ Drive 4
Drives \ Drive 5
Drives \ Drive 6
Drives \ Drive 7

Par	Description	[unit]	Type	Def	Min	Max	Acc
1000	**Drv0 Status**		Enum	Not configured	-	-	R
2000	**Drv1 Status**		Enum	Not configured	-	-	R
3000	**Drv2 Status**		Enum	Not configured	-	-	R
4000	**Drv3 Status**		Enum	Not configured	-	-	R
5000	**Drv4 Status**		Enum	Not configured	-	-	R
6000	**Drv5 Status**		Enum	Not configured	-	-	R
7000	**Drv6 Status**		Enum	Not configured	-	-	R
8000	**Drv7 Status**		Enum	Not configured	-	-	R

Drive state. For further information refer to the status logic in paragraph "Description of axis module states".

Values allowed:

0 = Not configured	- drive not included in the **GStar** network
1 = Idle	- drive being synchronised
2 = Service	- drive in Service state
3 = Run	- drive in RUN state
4 = Alarm	- drive in Alarm state
5 = Reserved	
6 = Unknown	- drive state not recognised

Par	Description	[unit]	Type	Def	Min	Max	Acc
1001	**Drv0 Fw**		Float	-	-	-	R
2001	**Drv1 Fw**		Float	-	-	-	R
3001	**Drv2 Fw**		Float	-	-	-	R
4001	**Drv3 Fw**		Float	-	-	-	R
5001	**Drv4 Fw**		Float	-	-	-	R
6001	**Drv5 Fw**		Float	-	-	-	R
7001	**Drv6 Fw**		Float	-	-	-	R
8001	**Drv7 Fw**		Float	-	-	-	R

Drive firmware version (e.g. 0.15)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1002	**Drv0 Hw**		Float	-	-	-	R
2002	**Drv1 Hw**		Float	-	-	-	R
3002	**Drv2 Hw**		Float	-	-	-	R
4002	**Drv3 Hw**		Float	-	-	-	R
5002	**Drv4 Hw**		Float	-	-	-	
6002	**Drv5 Hw**		Float	-	-	-	R
7002	**Drv6 Hw**		Float	-	-	-	
8002	**Drv7 Hw**		Float	-	-	-	R

Drive hardware version (e.g. 1.00)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1003	**Drv0 SN Code Part**		UDint	-	-	-	R
2003	**Drv1 SN Code Part**		UDint	-	-	-	R
3003	**Drv2 SN Code Part**		UDint	-	-	-	R
4003	**Drv3 SN Code Part**		UDint	-	-	-	R
5003	**Drv4 SN Code Part**		UDint	-	-	-	R
6003	**Drv5 SN Code Part**		UDint	-	-	-	R
7003	**Drv6 SN Code Part**		UDint	-	-	-	R
8003	**Drv7 SN Code Part**		UDint	-	-	-	R

Alphanumerical component of the drive serial number (e.g. 31GA).

Par	Description	[unit]	Type	Def	Min	Max	Acc
1005	**Drv0 SN Num Part**		UDint	-	-	-	R
2005	**Drv1 SN Num Part**		UDint	-	-	-	R
3005	**Drv2 SN Num Part**		UDint	-	-	-	R
4005	**Drv3 SN Num Part**		UDint	-	-	-	R
5005	**Drv4 SN Num Part**		UDint	-	-	-	R
6005	**Drv5 SN Num Part**		UDint	-	-	-	R
7005	**Drv6 SN Num Part**		UDint	-	-	-	R
8005	**Drv7 SN Num Part**		UDint	-	-	-	R

Numerical component of the drive serial number (e.g. 012345).

Par	Description	[unit]	Type	Def	Min	Max	Acc
1007	**Drv0 fw name**		String4	-	-	-	R
2007	**Drv1 fw name**		String4	-	-	-	R
3007	**Drv2 fw name**		String4	-	-	-	R
4007	**Drv3 fw name**		String4	-	-	-	R
5007	**Drv4 fw name**		String4	-	-	-	R
6007	**Drv5 fw name**		String4	-	-	-	R
7007	**Drv6 fw name**		String4	-	-	-	R
8007	**Drv7 fw name**		String4	-	-	-	R

The parameter is a string of 4 characters and identifies the control firmware on the card of Drive 0...7.

Values allowed:

BR	brushless motor control firmware
AS	asynchronous motor control firmware
Boot	control firmware not present, control card still in the Boot state

Par	Description	[unit]	Type	Def	Min	Max	Acc
1306	**Drv0 Size Code**		UDint	-	-	-	R
2306	**Drv1 Size Code**		UDint	-	-	-	R
3306	**Drv2 Size Code**		UDint	-	-	-	R
4306	**Drv3 Size Code**		UDint	-	-	-	R
5306	**Drv4 Size Code**		UDint	-	-	-	R
6306	**Drv5 Size Code**		UDint	-	-	-	R
7306	**Drv6 Size Code**		UDint	-	-	-	R
8306	**Drv7 Size Code**		UDint	-	-	-	R

Drive size code (e.g. 10413).

Par	Description	[unit]	Type	Def	Min	Max	Acc
1310	**Drv0 Nom Curr**	Arms	Float	-	-	-	R
2310	**Drv1 Nom Curr**	Arms	Float	-	-	-	R
3310	**Drv2 Nom Curr**	Arms	Float	-	-	-	R
4310	**Drv3 Nom Curr**	Arms	Float	-	-	-	R
5310	**Drv4 Nom Curr**	Arms	Float	-	-	-	R
6310	**Drv5 Nom Curr**	Arms	Float	-	-	-	R
7310	**Drv6 Nom Curr**	Arms	Float	-	-	-	R
8310	**Drv7 Nom Curr**	Arms	Float	-	-	-	R

Drive rated current (e.g. 4.5 Arms)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1312	**Drv0 Ovrl Curr**	Arms	Float	-	-	-	R
2312	**Drv1 Ovrl Curr**	Arms	Float	-	-	-	R
3312	**Drv2 Ovrl Curr**	Arms	Float	-	-	-	R
4312	**Drv3 Ovrl Curr**	Arms	Float	-	-	-	R
5312	**Drv4 Ovrl Curr**	Arms	Float	-	-	-	R
6312	**Drv5 Ovrl Curr**	Arms	Float	-	-	-	R
7312	**Drv6 Ovrl Curr**	Arms	Float	-	-	-	R
8312	**Drv7 Ovrl Curr**	Arms	Float	-	-	-	R

Drive max overload current (e.g. 13.5 Arms).

Par	Description	[unit]	Type	Def	Min	Max	Acc
1314	**Drv0 0Hz Curr**	Arms	Float	-	-	-	R
2314	**Drv1 0Hz Curr**	Arms	Float	-	-	-	R
3314	**Drv2 0Hz Curr**	Arms	Float	-	-	-	R
4314	**Drv3 0Hz Curr**	Arms	Float	-	-	-	R
5314	**Drv4 0Hz Curr**	Arms	Float	-	-	-	R
6314	**Drv5 0Hz Curr**	Arms	Float	-	-	-	R
7314	**Drv6 0Hz Curr**	Arms	Float	-	-	-	R
8314	**Drv7 0Hz Curr**	Arms	Float	-	-	-	R

Drive current rating with output frequency of 0 Hz (e.g. 4.5 Arms).

Drives \ Drive 0 \ Monitor
Drives \ Drive 1 \ Monitor
Drives \ Drive 2 \ Monitor
Drives \ Drive 3 \ Monitor
Drives \ Drive 4 \ Monitor
Drives \ Drive 5 \ Monitor
Drives \ Drive 6 \ Monitor
Drives \ Drive 7 \ Monitor

Par	Description	[unit]	Type	Def	Min	Max	Acc
1100	**Drv0 Enc Rev**		Short	-	-	-	R
2100	**Drv1 Enc Rev**		Short	-	-	-	R
3100	**Drv2 Enc Rev**		Short	-	-	-	R
4100	**Drv3 Enc Rev**		Short	-	-	-	R
5100	**Drv4 Enc Rev**		Short	-	-	-	R
6100	**Drv5 Enc Rev**		Short	-	-	-	R
7100	**Drv6 Enc Rev**		Short	-	-	-	R
8100	**Drv7 Enc Rev**		Short	-	-	-	R

Number of motor revolutions derived from the encoder position.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1312	**Drv0 EncA pos**	°	Float	-	-	-	R
2312	**Drv1 EncA pos**	°	Float	-	-	-	R
3312	**Drv2 EncA pos**	°	Float	-	-	-	R
4312	**Drv3 EncA pos**	°	Float	-	-	-	R
5312	**Drv4 EncA pos**	°	Float	-	-	-	R
6312	**Drv5 EncA pos**	°	Float	-	-	-	R
7312	**Drv6 EncA pos**	°	Float	-	-	-	R
8312	**Drv7 EncA pos**	°	Float	-	-	-	R

Position of encoder connected to drive X (mechanical degrees).

Par	Description	[unit]	Type	Def	Min	Max	Acc
1103	**Drv0 VdcLink**	V	Short	-	-	-	R
2103	**Drv1 VdcLink**	V	Short	-	-	-	R
3103	**Drv2 VdcLink**	V	Short	-	-	-	R
4103	**Drv3 VdcLink**	V	Short	-	-	-	R
5103	**Drv4 VdcLink**	V	Short	-	-	-	R
6103	**Drv5 VdcLink**	V	Short	-	-	-	R
7103	**Drv6 VdcLink**	V	Short	-	-	-	R
8103	**Drv7 VdcLink**	V	Short	-	-	-	R

Drive DC-LINK voltage.

Note ! The value shown is not correct if the DC-link voltage is less than 440 V (undervoltage alarm threshold).

Par	Description	[unit]	Type	Def	Min	Max	Acc
1732	**Drv0 Flx Curr**	Arms	Float	-	-	-	R
2732	**Drv1 Flx Curr**	Arms	Float	-	-	-	R
3732	**Drv2 Flx Curr**	Arms	Float	-	-	-	R
4732	**Drv3 Flx Curr**	Arms	Float	-	-	-	R
5732	**Drv4 Flx Curr**	Arms	Float	-	-	-	R
6732	**Drv5 Flx Curr**	Arms	Float	-	-	-	R
7732	**Drv6 Flx Curr**	Arms	Float	-	-	-	R
8732	**Drv7 Flx Curr**	Arms	Float	-	-	-	R

Measured flux current Id.

Note ! The value shown is not correct if the DC-link voltage is less than 440 V (undervoltage alarm threshold).

Par	Description	[unit]	Type	Def	Min	Max	Acc
1734	**Drv0 Trq Curr**	Arms	Float	-	-	-	R
2734	**Drv1 Trq Curr**	Arms	Float	-	-	-	R
3734	**Drv2 Trq Curr**	Arms	Float	-	-	-	R
4734	**Drv3 Trq Curr**	Arms	Float	-	-	-	R
5734	**Drv4 Trq Curr**	Arms	Float	-	-	-	R
6734	**Drv5 Trq Curr**	Arms	Float	-	-	-	R
7734	**Drv6 Trq Curr**	Arms	Float	-	-	-	R
8734	**Drv7 Trq Curr**	Arms	Float	-	-	-	R

Measured torque current Iq.

Note ! The value shown is not correct if the DC-link voltage is less than 440 V (undervoltage alarm threshold).

Par	Description	[unit]	Type	Def	Min	Max	Acc
1736	**Drv0 Out Curr**	Arms	Float	-	-	-	R
2736	**Drv1 Out Curr**	Arms	Float	-	-	-	R
3736	**Drv2 Out Curr**	Arms	Float	-	-	-	R
4736	**Drv3 Out Curr**	Arms	Float	-	-	-	R
5736	**Drv4 Out Curr**	Arms	Float	-	-	-	R
6736	**Drv5 Out Curr**	Arms	Float	-	-	-	R
7736	**Drv6 Out Curr**	Arms	Float	-	-	-	R
8736	**Drv7 Out Curr**	Arms	Float	-	-	-	R

Drive X output current.

Note ! The value shown is not correct if the DC-link voltage is less than 440 V (undervoltage alarm threshold).

Par	Description	[unit]	Type	Def	Min	Max	Acc
1738	**Drv0 Out Volt**	Vrms	Float	-	-	-	R
2738	**Drv1 Out Volt**	Vrms	Float	-	-	-	R
3738	**Drv2 Out Volt**	Vrms	Float	-	-	-	R
4738	**Drv3 Out Volt**	Vrms	Float	-	-	-	R
5738	**Drv4 Out Volt**	Vrms	Float	-	-	-	R
6738	**Drv5 Out Volt**	Vrms	Float	-	-	-	R
7738	**Drv6 Out Volt**	Vrms	Float	-	-	-	R
8738	**Drv7 Out Volt**	Vrms	Float	-	-	-	R

Drive X output voltage.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1740	**Drv0 Mot Speed**	rpm	Float	-	-	-	R
2740	**Drv1 Mot Speed**	rpm	Float	-	-	-	R
3740	**Drv2 Mot Speed**	rpm	Float	-	-	-	R
4740	**Drv3 Mot Speed**	rpm	Float	-	-	-	R
5740	**Drv4 Mot Speed**	rpm	Float	-	-	-	R
6740	**Drv5 Mot Speed**	rpm	Float	-	-	-	R
7740	**Drv6 Mot Speed**	rpm	Float	-	-	-	R
8740	**Drv7 Mot Speed**	rpm	Float	-	-	-	R

Axis X motor speed.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1742	**Drv0 Speed Ref**	rpm	Float	-	-	-	R
2742	**Drv1 Speed Ref**	rpm	Float	-	-	-	R
3742	**Drv2 Speed Ref**	rpm	Float	-	-	-	R
4742	**Drv3 Speed Ref**	rpm	Float	-	-	-	R
5742	**Drv4 Speed Ref**	rpm	Float	-	-	-	R
6742	**Drv5 Speed Ref**	rpm	Float	-	-	-	R
7742	**Drv6 Speed Ref**	rpm	Float	-	-	-	R
8742	**Drv7 Speed Ref**	rpm	Float	-	-	-	R

Current motor speed reference.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1746	**Drv0 Trq Cur Ref**	Arms	Float	-	-	-	R
2746	**Drv1 Trq Cur Ref**	Arms	Float	-	-	-	R
3746	**Drv2 Trq Cur Ref**	Arms	Float	-	-	-	R
4746	**Drv3 Trq Cur Ref**	Arms	Float	-	-	-	R
5746	**Drv4 Trq Cur Ref**	Arms	Float	-	-	-	R
6746	**Drv5 Trq Cur Ref**	Arms	Float	-	-	-	R
7746	**Drv6 Trq Cur Ref**	Arms	Float	-	-	-	R
8746	**Drv7 Trq Cur Ref**	Arms	Float	-	-	-	R

Torque current reference IqRef.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1754	**Drv0 Trq Cur Lim**	Arms	Float	-	-	-	R
2754	**Drv1 Trq Cur Lim**	Arms	Float	-	-	-	R
3754	**Drv2 Trq Cur Lim**	Arms	Float	-	-	-	R
1754	**Drv3 Trq Cur Lim**	Arms	Float	-	-	-	R
5754	**Drv4 Trq Cur Lim**	Arms	Float	-	-	-	R
6754	**Drv5 Trq Cur Lim**	Arms	Float	-	-	-	R
7754	**Drv6 Trq Cur Lim**	Arms	Float	-	-	-	R
8754	**Drv7 Trq Cur Lim**	Arms	Float	-	-	-	R

Maximum torque current value allowed.

This value is calculated continuously and represents the value available according to:

- maximum current for size
- module overload state
- flux currents used
- maximum drive current value set by the user (**Drvx Max Curr,** IPA x302)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1756	**Drv0 Out Freq**	Hz	Float	-	-	-	R
2756	**Drv1 Out Freq**	Hz	Float	-	-	-	R
3756	**Drv2 Out Freq**	Hz	Float	-	-	-	R
4756	**Drv3 Out Freq**	Hz	Float	-	-	-	R
5756	**Drv4 Out Freq**	Hz	Float	-	-	-	R
6756	**Drv5 Out Freq**	Hz	Float	-	-	-	R
7756	**Drv6 Out Freq**	Hz	Float	-	-	-	R
8756	**Drv7 Out Freq**	Hz	Float	-	-	-	R

Drive output voltage frequency.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1758	**Drv0 Overload**	%	Float	-	-	-	R
2758	**Drv1 Overload**	%	Float	-	-	-	R
3758	**Drv2 Overload**	%	Float	-	-	-	R
4758	**Drv3 Overload**	%	Float	-	-	-	R
5758	**Drv4 Overload**	%	Float	-	-	-	R
6758	**Drv5 Overload**	%	Float	-	-	-	R
7758	**Drv6 Overload**	%	Float	-	-	-	R
8758	**Drv7 Overload**	%	Float	-	-	-	R

Drive overload percentage: when this reaches 100%, the drive automatically limits the output current to the rated current of the drive.

To deliver the maximum peak current again, the current delivered by the drive must be lowered to a value that is less than the rated value for the necessary time according to the selected I2T or IxT protection algorithm (see section **"3.4.1. Ambient temperature reduction factor" on page 18**).

Drives \ Drive 0 \ Drive Config
Drives \ Drive 1 \ Drive Config
Drives \ Drive 2 \ Drive Config
Drives \ Drive 3 \ Drive Config
Drives \ Drive 4 \ Drive Config
Drives \ Drive 5 \ Drive Config
Drives \ Drive 6 \ Drive Config
Drives \ Drive 7 \ Drive Config

Par	Description	[unit]	Type	Def	Min	Max	Acc
1300	**Drv0 fsw**		Enum	4kHz	-	-	RWB*
2300	**Drv1 fsw**		Enum	4kHz	-	-	RWB*
3300	**Drv2 fsw**		Enum	4kHz	-	-	RWB*
4300	**Drv3 fsw**		Enum	4kHz	-	-	RWB*
5300	**Drv4 fsw**		Enum	4kHz	-	-	RWB*
6300	**Drv5 fsw**		Enum	4kHz	-	-	RWB*
7300	**Drv6 fsw**		Enum	4kHz	-	-	RWB*
8300	**Drv7 fsw**		Enum	4kHz	-	-	RWB*

Drive IGBT bridge switching frequency.

Values allowed:

4 = 4kHz (default)

8 = 8kHz

Par	Description	[unit]	Type	Def	Min	Max	Acc
1302	**Drv0 Max Curr**	Arms	Float		-	-	RW

2302	**Drv1 Max Curr**	Arms	Float		-	-	RW
3302	**Drv2 Max Curr**	Arms	Float		-	-	RW
4302	**Drv3 Max Curr**	Arms	Float		-	-	RW
5302	**Drv4 Max Curr**	Arms	Float		-	-	RW
6302	**Drv5 Max Curr**	Arms	Float		-	-	RW
7302	**Drv6 Max Curr**	Arms	Float		-	-	RW
8302	**Drv7 Max Curr**	Arms	Float		-	-	RW

Maximum drive output current.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1303	**Drv0 Ovl Type**		Enum	Ixt	-	-	RWB*
2303	**Drv1 Ovl Type**		Enum	Ixt	-	-	RWB*
3303	**Drv2 Ovl Type**		Enum	Ixt	-	-	RWB*
4303	**Drv3 Ovl Type**		Enum	Ixt	-	-	RWB*
5303	**Drv4 Ovl Type**		Enum	Ixt	-	-	RWB*
6303	**Drv5 Ovl Type**		Enum	Ixt	-	-	RWB*
7303	**Drv6 Ovl Type**		Enum	Ixt	-	-	RWB*
8303	**Drv7 Ovl Type**		Enum	Ixt	-	-	RWB*

Drive overload type:

Values allowed:

0 = IxT (default)

1 = I2T

For information about the current characteristics available in the two cases, see chapter **"8 - Rated and overload currents" on page 86** .

Drives \ Drive 0 \ Encoder Parameter
Drives \ Drive 1 \ Encoder Parameter
Drives \ Drive 2 \ Encoder Parameter
Drives \ Drive 3 \ Encoder Parameter
Drives \ Drive 4 \ Encoder Parameter
Drives \ Drive 5 \ Encoder Parameter
Drives \ Drive 6 \ Encoder Parameter
Drives \ Drive 7 \ Encoder Parameter

Par	Description	[unit]	Type	Def	Min	Max	Acc
1200	**Drv0 Enc Type**		Enum	SinCos	-	-	RWB*
2200	**Drv1 Enc Type**		Enum	SinCos	-	-	RWB*
3200	**Drv2 Enc Type**		Enum	SinCos	-	-	RWB*
4200	**Drv3 Enc Type**		Enum	SinCos	-	-	RWB*
5200	**Drv4 Enc Type**		Enum	SinCos	-	-	RWB*
6200	**Drv5 Enc Type**		Enum	SinCos	-	-	RWB*
7200	**Drv6 Enc Type**		Enum	SinCos	-	-	RWB*
8200	**Drv7 Enc Type**		Enum	SinCos	-	-	RWB*

Drive X encoder type.

The following values are allowed:

0 = SinCos (Default)

5 = EnDat

8 = SSI

Par	Description	[unit]	Type	Def	Min	Max	Acc
1201	**Drv0 Enc Pulses**		UShort	2048	-	-	RWB*
2201	**Drv1 Enc Pulses**		UShort	2048	-	-	RWB*
3201	**Drv2 Enc Pulses**		UShort	2048	-	-	RWB*
4201	**Drv3 Enc Pulses**		UShort	2048	-	-	RWB*

5201	**Drv4 Enc Pulses**	UShort	2048	-	-	RWB*
6201	**Drv5 Enc Pulses**	UShort	2048	-	-	RWB*
7201	**Drv6 Enc Pulses**	UShort	2048	-	-	RWB*
8201	**Drv7 Enc Pulses**	UShort	2048	-	-	RWB*

Number of drive X encoder impulses/revolutions.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1203	**Drv0 Abs Rev**		UShort	4096	-	-	RWB*
2203	**Drv1 Abs Rev**		UShort	4096	-	-	RWB*
3203	**Drv2 Abs Rev**		UShort	4096	-	-	RWB*
4203	**Drv3 Abs Rev**		UShort	4096	-	-	RWB*
5203	**Drv4 Abs Rev**		UShort	4096	-	-	RWB*
6203	**Drv5 Abs Rev**		UShort	4096	-	-	RWB*
7203	**Drv6 Abs Rev**		UShort	4096	-	-	RWB*
8203	**Drv7 Abs Rev**		UShort	4096	-	-	RWB*

Number of revolutions distinguishable by the absolute encoder connected to the drive.

E.g.: Single-turn Endat encoder -> Drv0 Abs Rev = 1.

Multi-turn Endat Encoder ECN 1325 -> Drvx Abs Rev = 4096

Par	Description	[unit]	Type	Def	Min	Max	Acc
1204	**Drv0 Abs Step**		UDint	8192	-	-	RWB*
2204	**Drv1 Abs Step**		UDint	8192	-	-	RWB*
3204	**Drv2 Abs Step**		UDint	8192	-	-	RWB*
4204	**Drv3 Abs Step**		UDint	8192	-	-	RWB*
5204	**Drv4 Abs Step**		UDint	8192	-	-	RWB*
6204	**Drv5 Abs Step**		UDint	8192	-	-	RWB*
7204	**Drv6 Abs Step**		UDint	8192	-	-	RWB*
8204	**Drv7 Abs Step**		UDint	8192	-	-	RWB*

Number of steps distinguishable by the absolute encoder within the turn.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1210	**Drv0 Enc Offset**	°	Float	0.0	-	-	RW
2210	**Drv1 Enc Offset**	°	Float	0.0	-	-	RW
3210	**Drv2 Enc Offset**	°	Float	0.0	-	-	RW
4210	**Drv3 Enc Offset**	°	Float	0.0	-	-	RW
5210	**Drv4 Enc Offset**	°	Float	0.0	-	-	RW
6210	**Drv5 Enc Offset**	°	Float	0.0	-	-	RW
7210	**Drv6 Enc Offset**	°	Float	0.0	-	-	RW
8210	**Drv7 Enc Offset**	°	Float	0.0	-	-	RW

Drive X encoder monitoring offset (electrical degrees).

This value is extremely important for correct motor control and is calculated using the "Phasing" tuning procedure.

The encoders installed in motors supplied by Gefran have an offset of 0. Phasing is not therefore necessary.

Drives \ Drive 0 \ Motor Data
Drives \ Drive 1 \ Motor Data
Drives \ Drive 2 \ Motor Data
Drives \ Drive 3 \ Motor Data
Drives \ Drive 4 \ Motor Data
Drives \ Drive 5 \ Motor Data
Drives \ Drive 6 \ Motor Data
Drives \ Drive 7 \ Motor Data

Par	Description	[unit]	Type	Def	Min	Max	Acc
1500	**Drv0 Mot Ppairs**		UShort	4	-	-	RWB*
2500	**Drv1 Mot Ppairs**		UShort	4	-	-	RWB*
3500	**Drv2 Mot Ppairs**		UShort	4	-	-	RWB*
4500	**Drv3 Mot Ppairs**		UShort	4	-	-	RWB*
5500	**Drv4 Mot Ppairs**		UShort	4	-	-	RWB*
6500	**Drv5 Mot Ppairs**		UShort	4	-	-	RWB*
7500	**Drv6 Mot Ppairs**		UShort	4	-	-	RWB*
8500	**Drv7 Mot Ppairs**		UShort	4	-	-	RWB*

Number of pole pairs of the motor connected to the drive.

E.g. for 8-pole SBM motors ->Drv0 Mot Ppairs = 4

Par	Description	[unit]	Type	Def	Min	Max	Acc
1501	**Drv0 Mot Ls**	H	Float	0.005	-	-	RW
2501	**Drv1 Mot Ls**	H	Float	0.005	-	-	RW
3501	**Drv2 Mot Ls**	H	Float	0.005	-	-	RW
4501	**Drv3 Mot Ls**	H	Float	0.005	-	-	RW
5501	**Drv0 Mot Ls**	H	Float	0.005	-	-	RW
6501	**Drv0 Mot Ls**	H	Float	0.005	-	-	RW
7501	**Drv6 Mot Ls**	H	Float	0.005	-	-	RW
8501	**Drv7 Mot Ls**	H	Float	0.005	-	-	RW

Leakage inductance of the motor connected to drive X.

This value is used to calculate the current gains if the **Drvx Igains Calc** parameter (IPA x425) is set to On.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1503	**Drv0 Mot INom**	Arms	Float	5.0	-	-	RW
2503	**Drv1 Mot INom**	Arms	Float	5.0	-	-	RW
3503	**Drv2 Mot INom**	Arms	Float	5.0	-	-	RW
4503	**Drv3 Mot INom**	Arms	Float	5.0	-	-	RW
5503	**Drv4 Mot INom**	Arms	Float	5.0	-	-	RW
6503	**Drv5 Mot INom**	Arms	Float	5.0	-	-	RW
7503	**Drv6 Mot INom**	Arms	Float	5.0	-	-	RW
8503	**Drv7 Mot INom**	Arms	Float	5.0	-	-	RW

Rated current of the motor connected to drive X.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1505	**Drv0 Max Speed**	Rpm	Float	1500.0	-	-	RW
2505	**Drv1 Max Speed**	Rpm	Float	1500.0	-	-	RW
3505	**Drv2 Max Speed**	Rpm	Float	1500.0	-	-	RW
4505	**Drv3 Max Speed**	Rpm	Float	1500.0	-	-	RW
5505	**Drv4 Max Speed**	Rpm	Float	1500.0	-	-	RW
6505	**Drv5 Max Speed**	Rpm	Float	1500.0	-	-	RW
7505	**Drv6 Max Speed**	Rpm	Float	1500.0	-	-	RW
8505	**Drv7 Max Speed**	Rpm	Float	1500.0	-	-	RW

Maximum speed allowed for the motor connected to drive X.

This value is used as the positive and negative absolute limit of the speed references directly on the drive.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1508	**Drv0 Mot Temp Sens**		Enum	No Sensor	-	-	RW
2508	**Drv1 Mot Temp Sens**		Enum	No Sensor	-	-	RW
3508	**Drv2 Mot Temp Sens**		Enum	No Sensor	-	-	RW
4508	**Drv3 Mot Temp Sens**		Enum	No Sensor	-	-	RW
5508	**Drv4 Mot Temp Sens**		Enum	No Sensor	-	-	RW
6508	**Drv5 Mot Temp Sens**		Enum	No Sensor	-	-	RW
7508	**Drv6 Mot Temp Sens**		Enum	No Sensor	-	-	RW
8508	**Drv7 Mot Temp Sens**		Enum	No Sensor	-	-	RW

Type of motor temperature sensor.

Values allowed:

0 = No Sensor

1 = NC Concact

2 = PTC

3 = KTY84

Par	Description	[unit]	Type	Def	Min	Max	Acc
1510	**Drv0 Mot K Torque**	Nm/Arms	Float	1.70	-	-	RW
2510	**Drv1 Mot K Torque**	Nm/Arms	Float	1.70	-	-	RW
3510	**Drv2 Mot K Torque**	Nm/Arms	Float	1.70	-	-	RW
4510	**Drv3 Mot K Torque**	Nm/Arms	Float	1.70	-	-	RW
5510	**Drv4 Mot K Torque**	Nm/Arms	Float	1.70	-	-	RW
6510	**Drv5 Mot K Torque**	Nm/Arms	Float	1.70	-	-	RW
7510	**Drv6 Mot K Torque**	Nm/Arms	Float	1.70	-	-	RW
8510	**Drv7 Mot K Torque**	Nm/Arms	Float	1.70	-	-	RW

Drive X motor torque constant.

Drives \ Drive 0 \ Reg Gains
Drives \ Drive 1 \ Reg Gains
Drives \ Drive 2 \ Reg Gains
Drives \ Drive 3 \ Reg Gains
Drives \ Drive 4 \ Reg Gains
Drives \ Drive 5 \ Reg Gains
Drives \ Drive 6 \ Reg Gains
Drives \ Drive 7 \ Reg Gains

This menu contains the motor regulation parameters.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1400	**Drv0 I Ki Gain**		Short	0.0	-	-	RW
2400	**Drv1 I Ki Gain**		Short	0.0	-	-	RW
3400	**Drv2 I Ki Gain**		Short	0.0	-	-	RW
4400	**Drv3 I Ki Gain**		Short	0.0	-	-	RW
5400	**Drv4 I Ki Gain**		Short	0.0	-	-	RW
6400	**Drv5 I Ki Gain**		Short	0.0	-	-	RW
7400	**Drv6 I Ki Gain**		Short	0.0	-	-	RW
8400	**Drv7 I Ki Gain**		Short	0.0	-	-	RW

Integral gain of the Id and Iq PI current regulators (values in internal units).
The system automatically calculates this value when the **Drvx igains Calc** parameter (IPA x425) is set to On.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1401	**Drv0 I Kp Gain**		Short	0.0	-	-	RW
2401	**Drv1 I Kp Gain**		Short	0.0	-	-	RW
3401	**Drv2 I Kp Gain**		Short	0.0	-	-	RW
4401	**Drv3 I Kp Gain**		Short	0.0	-	-	RW
5401	**Drv4 I Kp Gain**		Short	0.0	-	-	RW
6401	**Drv5 I Kp Gain**		Short	0.0	-	-	RW
7401	**Drv6 I Kp Gain**		Short	0.0	-	-	RW
8401	**Drv7 I Kp Gain**		Short	0.0	-	-	RW

Proportional gain of the Id and Iq PI current regulators (values in internal units).
The system automatically calculates this value when the **Drvx igains Calc** parameter (IPA x425) is set to On.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1405	**Drv0 Spd Ki Gain**		Short	0.0	-	-	RW
2405	**Drv1 Spd Ki Gain**		Short	0.0	-	-	RW
3405	**Drv2 Spd Ki Gain**		Short	0.0	-	-	RW
4405	**Drv3 Spd Ki Gain**		Short	0.0	-	-	RW

5405	**Drv4 Spd Ki Gain**		Short	0.0	-	-	RW
6405	**Drv5 Spd Ki Gain**		Short	0.0	-	-	RW
7405	**Drv6 Spd Ki Gain**		Short	0.0	-	-	RW
8405	**Drv0 Spd Ki Gain**		Short	0.0	-	-	RW

Integral gain of the PI speed regulator (values in internal units).

Par	Description	[unit]	Type	Def	Min	Max	Acc
1408	**Drv0 Trq Filt tau**	**ms**	float	0.0	-	-	RW
2408	**Drv1 Trq Filt tau**	**ms**	float	0.0	-	-	RW
3408	**Drv2 Trq Filt tau**	**ms**	float	0.0	-	-	RW
4408	**Drv3 Trq Filt tau**	**ms**	float	0.0	-	-	RW
5408	**Drv4 Trq Filt tau**	**ms**	float	0.0	-	-	RW
6408	**Drv5 Trq Filt tau**	**ms**	float	0.0	-	-	RW
7408	**Drv6 Trq Filt tau**	**ms**	float	0.0	-	-	RW
8408	**Drv7 Trq Filt tau**	**ms**	float	0.0	-	-	RW

Time constant of the filter entered in the Iq torque current regulation input.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1406	**Drv0 Spd Kp Gain**		Short	0.0	-	-	RW
2406	**Drv1 Spd Kp Gain**		Short	0.0	-	-	RW
3406	**Drv2 Spd Kp Gain**		Short	0.0	-	-	RW
4406	**Drv3 Spd Kp Gain**		Short	0.0	-	-	RW
5406	**Drv4 Spd Kp Gain**		Short	0.0	-	-	RW
6406	**Drv5 Spd Kp Gain**		Short	0.0	-	-	RW
7406	**Drv6 Spd Kp Gain**		Short	0.0	-	-	RW
8406	**Drv7 Spd Kp Gain**		Short	0.0	-	-	RW

Proportional gain of the PI speed regulator (values in internal units).

Par	Description	[unit]	Type	Def	Min	Max	Acc
1420	**Drv0 VL Ki Gain**		Short	0.0	-	-	RW
2420	**Drv1 VL Ki Gain**		Short	0.0	-	-	RW
3420	**Drv2 VL Ki Gain**		Short	0.0	-	-	RW
4420	**Drv3 VL Ki Gain**		Short	0.0	-	-	RW
5420	**Drv4 VL Ki Gain**		Short	0.0	-	-	RW
6420	**Drv5 VL Ki Gain**		Short	0.0	-	-	RW
7420	**Drv6 VL Ki Gain**		Short	0.0	-	-	RW
8420	**Drv7 VL Ki Gain**		Short	0.0	-	-	RW

Integral gain of the voltage regulator (values in internal units).

Par	Description	[unit]	Type	Def	Min	Max	Acc
1421	**Drv0 VL Kp Gain**		Short	0.0	-	-	RW
2421	**Drv1 VL Kp Gain**		Short	0.0	-	-	RW
3421	**Drv2 VL Kp Gain**		Short	0.0	-	-	RW
4421	**Drv3 VL Kp Gain**		Short	0.0	-	-	RW
5421	**Drv4 VL Kp Gain**		Short	0.0	-	-	RW
6421	**Drv5 VL Kp Gain**		Short	0.0	-	-	RW
7421	**Drv6 VL Kp Gain**		Short	0.0	-	-	RW
8421	**Drv7 VL Kp Gain**		Short	0.0	-	-	RW

Proportional gain of the voltage regulator (values in internal units) .

Par	Description	[unit]	Type	Def	Min	Max	Acc
1422	**Drv0 Flx Cur Lim**	Arms	Float	0.0	-	-	RW
2422	**Drv1 Flx Cur Lim**	Arms	Float	0.0	-	-	RW
3422	**Drv2 Flx Cur Lim**	Arms	Float	0.0	-	-	RW
4422	**Drv3 Flx Cur Lim**	Arms	Float	0.0	-	-	RW

5422	**Drv4 Flx Cur Lim**	Arms	Float	0.0	-	-	RW
6422	**Drv5 Flx Cur Lim**	Arms	Float	0.0	-	-	RW
7422	**Drv6 Flx Cur Lim**	Arms	Float	0.0	-	-	RW
8422	**Drv7 Flx Cur Lim**	Arms	Float	0.0	-	-	RW

Id flux current limit value.

Note ! If this value is null the motor cannot work in the flux reduction zone.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1425	**Drv0 IGains Calc**		Boolean	Off	-	-	RW
2425	**Drv1 IGains Calc**		Boolean	Off	-	-	RW
3425	**Drv2 IGains Calc**		Boolean	Off	-	-	RW
4425	**Drv3 IGains Calc**		Boolean	Off	-	-	RW
5425	**Drv4 IGains Calc**		Boolean	Off	-	-	RW
6425	**Drv5 IGains Calc**		Boolean	Off	-	-	RW
7425	**Drv6 IGains Calc**		Boolean	Off	-	-	RW
8425	**Drv7 IGains Calc**		Boolean	Off	-	-	RW

Calculates the current gains using the drive and motor configuration parameters:

- Drvx Mot Ls;
- Drvx fsw;
- Drvx SizeCode;

Par	Description	[unit]	Type	Def	Min	Max	Acc
1426	**Drv0 Usr Vlt Max**	Vrms	Float	0.0	-	-	RW
2426	**Drv1 Usr Vlt Max**	Vrms	Float	0.0	-	-	RW
3426	**Drv2 Usr Vlt Max**	Vrms	Float	0.0	-	-	RW
4426	**Drv3 Usr Vlt Max**	Vrms	Float	0.0	-	-	RW
5426	**Drv4 Usr Vlt Max**	Vrms	Float	0.0	-	-	RW
6426	**Drv5 Usr Vlt Max**	Vrms	Float	0.0	-	-	RW
7426	**Drv6 Usr Vlt Max**	Vrms	Float	0.0	-	-	RW
8426	**Drv7 Usr Vlt Max**	Vrms	Float	0.0	-	-	RW

User value for maximum motor output voltage allowed. This value is usually set to the rated motor value.

Drives \ Drive 0 \ Alarms
Drives \ Drive 1 \ Alarms
Drives \ Drive 2 \ Alarms
Drives \ Drive 3 \ Alarms
Drives \ Drive 4 \ Alarms
Drives \ Drive 5 \ Alarms
Drives \ Drive 6 \ Alarms
Drives \ Drive 7 \ Alarms

Par	Description	[unit]	Type	Def	Min	Max	Acc
1744	**Drv0 Active Alarms**		UShort	-	-	-	R
2744	**Drv1 Active Alarms**		UShort	-	-	-	R
3744	**Drv2 Active Alarms**		UShort	-	-	-	R
4744	**Drv3 Active Alarms**		UShort	-	-	-	R
5744	**Drv4 Active Alarms**		UShort	-	-	-	R
6744	**Drv5 Active Alarms**		UShort	-	-	-	R
7744	**Drv6 Active Alarms**		UShort	-	-	-	R
8744	**Drv7 Active Alarms**		UShort	-	-	-	R

There are two types of axis module alarms:

- configuration alarm
- operation alarm.

The configuration alarm is enabled if drive configuration by the **AXV300 CU** module is not completed successfully. To correct this situation, check that the drive parameters are correct, change these as necessary and repeat system start-up (modify incorrect parameter, save parameters and reset the system).

The operation alarm indicates a malfunction or incorrect condition due, for instance, to a fault. The operation alarm can be reset be sending the ysDriveCW[x].cmdResAlarm command to the drive (variable available for the PLC user application).

Note ! Since the CU and axis modules are physically different, the start-up procedure might also differ and the drive module could indicate faults due to the different module start-up procedures. In that case, simply send a reset alarms command to the drive the first time it is switched on.

Bitwords of active drive alarms.

Bit 0 = Drive undervoltage (VdcLink > 750 Vdc)
Bit 1 = Drive overvoltage (VdcLink > 440 Vdc)
Bit 2 = Encoder alarm
Bit 3 = Over/Under Temperature
Bit 4 = PowerFail
Bit 5 = Link Error
Bit 6 = Motor Overtemperature

Par	Description	[unit]	Type	Def	Min	Max	Acc
1745	**Drv0 Alarms Mask**		UShort	0000H	-	-	RW
2745	**Drv1 Alarms Mask**		UShort	0000H	-	-	RW
3745	**Drv2 Alarms Mask**		UShort	0000H	-	-	RW
4745	**Drv3 Alarms Mask**		UShort	0000H	-	-	RW
5745	**Drv4 Alarms Mask**		UShort	0000H	-	-	RW
6745	**Drv5 Alarms Mask**		UShort	0000H	-	-	RW
7745	**Drv6 Alarms Mask**		UShort	0000H	-	-	RW
8745	**Drv7 Alarms Mask**		UShort	0000H	-	-	RW

Bitword mask for disabling alarms. Only the undervoltage and encoder alarms can be masked.

Bitwords of the active drive alarms mask.

Bit 0 = Drive undervoltage (VdcLink > 750 Vdc)
Bit 1 = Drive overvoltage (VdcLink > 440 Vdc)
Bit 2 = Encoder alarm
Bit 3 = Over/Under Temperature
Bit 4 = PowerFail
Bit 5 = Link Error
Bit 6 = Motor Overtemperature

Par	Description	[unit]	Type	Def	Min	Max	Acc
1748	**Drv0 Alarms Warning**		UShort	-	-	-	R
2748	**Drv1 Alarms Warning**		UShort	-	-	-	R
3748	**Drv2 Alarms Warning**		UShort	-	-	-	R
4748	**Drv3 Alarms Warning**		UShort	-	-	-	R
5748	**Drv4 Alarms Warning**		UShort	-	-	-	R
6748	**Drv5 Alarms Warning**		UShort	-	-	-	R
7748	**Drv6 Alarms Warning**		UShort	-	-	-	R
8748	**Drv7 Alarms Warning**		UShort	-	-	-	R

Active warning bitwords. If not masked, the warnings become alarms. Warnings that are no longer active are automatically removed.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1760	**Drv0 Conf Error**		UShort	-	-	-	R
2760	**Drv1 Conf Error**		UShort	-	-	-	R
3760	**Drv2 Conf Error**		UShort	-	-	-	R
4760	**Drv3 Conf Error**		UShort	-	-	-	R

5760	**Drv4 Conf Error**	UShort	-	-	-	R
6760	**Drv5 Conf Error**	UShort	-	-	-	R
7760	**Drv6 Conf Error**	UShort	-	-	-	R
8760	**Drv7 Conf Error**	UShort	-	-	-	R

Drive configuration error bitwords:

Bit 0 = PWM modulator initialisation error

Bit 1 = encoder initialisation error

Bit 2 = drive overload algorithm initialisation error

Drives \ Drive 0 \ Data Mapping
Drives \ Drive 1 \ Data Mapping
Drives \ Drive 2 \ Data Mapping
Drives \ Drive 3 \ Data Mapping
Drives \ Drive 4 \ Data Mapping
Drives \ Drive 5 \ Data Mapping
Drives \ Drive 6 \ Data Mapping
Drives \ Drive 7 \ Data Mapping

This menu contains the parameters used to define operation and information exchanged via **GStar** link .

Since the data exchanged are closely tied to the PLC user application, these parameters are often set directly by the application.

They are only used at system start-up (see chapter **"10.5. GStar Communication System" on page 112**)

The two **Drvx slow per** (IPA x800) and **Drvx fast num objs** (IPA x801) parameters are subject to the ratio described in section **"14.3.1. Example" on page 147**.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1800	**Drv0 slow per**	ms	Enum	-	-	-	RWB
2800	**Drv1 slow per**	ms	Enum	-	-	-	RWB
3800	**Drv2 slow per**	ms	Enum	-	-	-	RWB
4800	**Drv3 slow per**	ms	Enum	-	-	-	RWB
5800	**Drv4 slow per**	ms	Enum	-	-	-	RWB
6800	**Drv5 slow per**	ms	Enum	-	-	-	RWB
7800	**Drv6 slow per**	ms	Enum	-	-	-	RWB
8800	**Drv7 slow per**	ms	Enum	-	-	-	RWB

GStar slow channel cycle time

Values allowed:

2 = 500 usec

4 = 1msec

8 = 2msec

16 = 4 msec

Par	Description	[unit]	Type	Def	Min	Max	Acc
1801	**Drv0 fast num objs**		Short	0	0	4-	RWB
2801	**Drv1 fast num objs**		Short	0	0	4-	RWB
3801	**Drv2 fast num objs**		Short	0	0	4-	RWB
4801	**Drv3 fast num objs**		Short	0	0	4-	RWB
5801	**Drv4 fast num objs**		Short	0	0	4-	RWB
6801	**Drv5 fast num objs**		Short	0	0	4-	RWB
7801	**Drv6 fast num objs**		Short	0	0	4-	RWB
8801	**Drv7 fast num objs**		Short	0	0	4-	RWB

Number of objects exchanged on the **GStar** fast channel.

Drives \ Drive 0 \ Data Mapping \ Fast Channel
Drives \ Drive 1 \ Data Mapping \ Fast Channel
Drives \ Drive 2 \ Data Mapping \ Fast Channel
Drives \ Drive 3 \ Data Mapping \ Fast Channel
Drives \ Drive 4 \ Data Mapping \ Fast Channel
Drives \ Drive 5 \ Data Mapping \ Fast Channel
Drives \ Drive 6 \ Data Mapping \ Fast Channel
Drives \ Drive 7 \ Data Mapping \ Fast Channel

The parameters of this menu define the data mapped on the **GStar** fast channel.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1810	**Drv0 RX 0 obj**		ENUM	Null	-	-	RW
2810	**Drv1 RX 0 obj**		ENUM	Null	-	-	RW
3810	**Drv2 RX 0 obj**		ENUM	Null	-	-	RW
4810	**Drv3 RX 0 obj**		ENUM	Null	-	-	RW
5810	**Drv4 RX 0 obj**		ENUM	Null	-	-	RW
6810	**Drv5 RX 0 obj**		ENUM	Null	-	-	RW
7810	**Drv6 RX 0 obj**		ENUM	Null	-	-	RW
8810	**Drv7 RX 0 obj**		ENUM	Null	-	-	RW

Object mapped on position 0 of the fast channel.

Values allowed:

(List 1 start)
0 = Null
2 = Abs A Enc position loword
3 = Abs A Enc position hiword
11 = Enc A revolutions
12 = Enc A position loword
13 = Enc A position hiword
17 = Actual torque current ref
18 = Actual flux current ref
20 = MotorSpeed loword
21 = MotorSpeed hiword
22 = Act Speed Ref loword
23 = Act Speed Ref hiword
33 = Flux Current
34 = Torque current
35 = Output Current
36 = Output Voltage
39 = Output Frequency
40 = Drive overload %
41 = Filtered actual speed loword
42 = Filtered actual speed hiword
43 = Filtered actual torque current
50 = Enc A Idx revolutions
51 = Enc A Idx position loword
52 = Enc A Idx position hiword
53 = Abs A Enc revolutions
60 = Enc A Idx captured revolutions
61 = Enc A Idx captured position loword
62 = Enc A Idx captured position hiword
103 = DC link voltage
104 = Drive Temperature
200 = Actual torque current limit
600 = Drive Alarm
602 = Drive Alarm warnings
610 = Drive configuration error

(List 1 end)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1811	**Drv0 RX 1 obj**		ENUM	Null	-	-	RW
2811	**Drv1 RX 1 obj**		ENUM	Null	-	-	RW
3811	**Drv2 RX 1 obj**		ENUM	Null	-	-	RW
4811	**Drv3 RX 1 obj**		ENUM	Null	-	-	RW
5811	**Drv0 RX 1 obj**		ENUM	Null	-	-	RW

6811	**Drv5 RX 1 obj**	ENUM	Null	-	-	RW
7811	**Drv6 RX 1 obj**	ENUM	Null	-	-	RW
8811	**Drv7 RX 1 obj**	ENUM	Null	-	-	RW

Object mapped on position 1 of the fast channel.

Values allowed: (List 1)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1812	**Drv0 RX 2 obj**		ENUM	Null	-	-	RW
2812	**Drv1 RX 2 obj**		ENUM	Null	-	-	RW
3812	**Drv2 RX 2 obj**		ENUM	Null	-	-	RW
4812	**Drv3 RX 2 obj**		ENUM	Null	-	-	RW
5812	**Drv4 RX 2 obj**		ENUM	Null	-	-	RW
1812	**Drv5 RX 2 obj**		ENUM	Null	-	-	RW
7812	**Drv6 RX 2 obj**		ENUM	Null	-	-	RW
8812	**Drv7 RX 2 obj**		ENUM	Null	-	-	RW

Object mapped on position 2 of the fast channel.

Values allowed: (List 1)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1813	**Drv0 RX 3 obj**		ENUM	Null	-	-	RW
2813	**Drv1 RX 3 obj**		ENUM	Null	-	-	RW
3813	**Drv2 RX 3 obj**		ENUM	Null	-	-	RW
4813	**Drv3 RX 3 obj**		ENUM	Null	-	-	RW
5813	**Drv4 RX 3 obj**		ENUM	Null	-	-	RW
6813	**Drv5 RX 3 obj**		ENUM	Null	-	-	RW
7813	**Drv6 RX 3 obj**		ENUM	Null	-	-	RW
8813	**Drv7 RX 3 obj**		ENUM	Null	-	-	RW

Object mapped on position 3 of the fast channel.

Values allowed: (List 1)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1814	**Drv0 RX 4 obj**		ENUM	Null	-	-	RW
2814	**Drv1 RX 4 obj**		ENUM	Null	-	-	RW
3814	**Drv2 RX 4 obj**		ENUM	Null	-	-	RW
4814	**Drv3 RX 4 obj**		ENUM	Null	-	-	RW
5814	**Drv4 RX 4 obj**		ENUM	Null	-	-	RW
6814	**Drv5 RX 4 obj**		ENUM	Null	-	-	RW
7814	**Drv6 RX 4 obj**		ENUM	Null	-	-	RW
8814	**Drv7 RX 4 obj**		ENUM	Null	-	-	RW

Object mapped on position 4 of the fast channel.

Values allowed: (List 1)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1820	**Drv0 TX 0 obj**		ENUM	Null	-	-	RW
2820	**Drv1 TX 0 obj**		ENUM	Null	-	-	RW
3820	**Drv2 TX 0 obj**		ENUM	Null	-	-	RW
4820	**Drv3 TX 0 obj**		ENUM	Null	-	-	RW
5820	**Drv4 TX 0 obj**		ENUM	Null	-	-	RW
6820	**Drv5 TX 0 obj**		ENUM	Null	-	-	RW
7820	**Drv6 TX 0 obj**		ENUM	Null	-	-	RW
8820	**Drv7 TX 0 obj**		ENUM	Null	-	-	RW

Object mapped on position 0 Tx of the fast channel.

Values allowed:

(List 2)

19 = Firmware selectors

14 = SpeedRefLo

15 = SpeedRefHi

903 = Ext Flux Current Ref

904 = Ext Torque Current Ref

902 = Ext electrical theta ref
1302 = User Trq Cur Lim
(Lista 2 end)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1821	**Drv0 TX 1 obj**		ENUM	Null	-	-	RW
2821	**Drv1 TX 1 obj**		ENUM	Null	-	-	RW
3821	**Drv2 TX 1 obj**		ENUM	Null	-	-	RW
4821	**Drv3 TX 1 obj**		ENUM	Null	-	-	RW
5821	**Drv4 TX 1 obj**		ENUM	Null	-	-	RW
6821	**Drv5 TX 1 obj**		ENUM	Null	-	-	RW
7821	**Drv6 TX 1 obj**		ENUM	Null	-	-	RW
8821	**Drv7 TX 1 obj**		ENUM	Null	-	-	RW

Object mapped on position 1 Tx of the fast channel.

Values allowed: (List 2)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1822	**Drv0 TX 2 obj**		ENUM	Null	-	-	RW
2822	**Drv1 TX 2 obj**		ENUM	Null	-	-	RW
3822	**Drv2 TX 2 obj**		ENUM	Null	-	-	RW
4822	**Drv3 TX 2 obj**		ENUM	Null	-	-	RW
5822	**Drv4 TX 2 obj**		ENUM	Null	-	-	RW
6822	**Drv5 TX 2 obj**		ENUM	Null	-	-	RW
7822	**Drv6 TX 2 obj**		ENUM	Null	-	-	RW
8822	**Drv7 TX 2 obj**		ENUM	Null	-	-	RW

Object mapped on position 2 Tx of the fast channel.

Values allowed: (List 2)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1823	**Drv0 TX 3 obj**		ENUM	Null	-	-	RW
2823	**Drv1 TX 3 obj**		ENUM	Null	-	-	RW
3823	**Drv2 TX 3 obj**		ENUM	Null	-	-	RW
4823	**Drv3 TX 3 obj**		ENUM	Null	-	-	RW
5823	**Drv4 TX 3 obj**		ENUM	Null	-	-	RW
6823	**Drv5 TX 3 obj**		ENUM	Null	-	-	RW
7823	**Drv6 TX 3 obj**		ENUM	Null	-	-	RW
8823	**Drv7 TX 3 obj**		ENUM	Null	-	-	RW

Object mapped on position 3 Tx of the fast channel.

Values allowed: (List 2)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1824	**Drv0 TX 4 obj**		ENUM	Null	-	-	RW
2824	**Drv1 TX 4 obj**		ENUM	Null	-	-	RW
3824	**Drv2 TX 4 obj**		ENUM	Null	-	-	RW
4824	**Drv3 TX 4 obj**		ENUM	Null	-	-	RW
5824	**Drv4 TX 4 obj**		ENUM	Null	-	-	RW
6824	**Drv5 TX 4 obj**		ENUM	Null	-	-	RW
7824	**Drv6 TX 4 obj**		ENUM	Null	-	-	RW
8824	**Drv7 TX 4 obj**		ENUM	Null	-	-	RW

Object mapped on position 4 Tx of the fast channel.

Values allowed: (List 2)

Drives \ Drive 0 \ Data Mapping \ Slow Channel
Drives \ Drive 1 \ Data Mapping \ Slow Channel

Drives \ Drive 2 \ Data Mapping \ Slow Channel
Drives \ Drive 3 \ Data Mapping \ Slow Channel
Drives \ Drive 4 \ Data Mapping \ Slow Channel
Drives \ Drive 5 \ Data Mapping \ Slow Channel
Drives \ Drive 6 \ Data Mapping \ Slow Channel
Drives \ Drive 7 \ Data Mapping \ Slow Channel

Par	Description	[unit]	Type	Def	Min	Max	Acc
1830	**Drv0 RX Slow 0 obj**		ENUM	Null	-	-	RW
2830	**Drv1 RX Slow 0 obj**		ENUM	Null	-	-	RW
3830	**Drv2 RX Slow 0 obj**		ENUM	Null	-	-	RW
4830	**Drv3 RX Slow 0 obj**		ENUM	Null	-	-	RW
5830	**Drv4 RX Slow 0 obj**		ENUM	Null	-	-	RW
6830	**Drv5 RX Slow 0 obj**		ENUM	Null	-	-	RW
7830	**Drv6 RX Slow 0 obj**		ENUM	Null	-	-	RW
8830	**Drv7 RX Slow 0 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 0 of the Slow channel.

Values allowed: (List 1)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1831	**Drv0 RX Slow 1 obj**		ENUM	Null	-	-	RW
2831	**Drv1 RX Slow 1 obj**		ENUM	Null	-	-	RW
3831	**Drv2 RX Slow 1 obj**		ENUM	Null	-	-	RW
4831	**Drv3 RX Slow 1 obj**		ENUM	Null	-	-	RW
5831	**Drv4 RX Slow 1 obj**		ENUM	Null	-	-	RW
6831	**Drv5 RX Slow 1 obj**		ENUM	Null	-	-	RW
7831	**Drv6 RX Slow 1 obj**		ENUM	Null	-	-	RW
8831	**Drv7 RX Slow 1 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 1 of the Slow channel.

Values allowed: (List 1)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1832	**Drv0 RX Slow 2 obj**		ENUM	Null	-	-	RW
2832	**Drv1 RX Slow 2 obj**		ENUM	Null	-	-	RW
3832	**Drv2 RX Slow 2 obj**		ENUM	Null	-	-	RW
4832	**Drv3 RX Slow 2 obj**		ENUM	Null	-	-	RW
5832	**Drv4 RX Slow 2 obj**		ENUM	Null	-	-	RW
6832	**Drv5 RX Slow 2 obj**		ENUM	Null	-	-	RW
7832	**Drv6 RX Slow 2 obj**		ENUM	Null	-	-	RW
8832	**Drv7 RX Slow 2 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 2 of the Slow channel.

Values allowed: (List 1)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1833	**Drv0 RX Slow 3 obj**		ENUM	Null	-	-	RW
2833	**Drv1 RX Slow 3 obj**		ENUM	Null	-	-	RW
3833	**Drv2 RX Slow 3 obj**		ENUM	Null	-	-	RW
4833	**Drv3 RX Slow 3 obj**		ENUM	Null	-	-	RW
5833	**Drv4 RX Slow 3 obj**		ENUM	Null	-	-	RW
6833	**Drv5 RX Slow 3 obj**		ENUM	Null	-	-	RW
7833	**Drv6 RX Slow 3 obj**		ENUM	Null	-	-	RW
8833	**Drv7 RX Slow 3 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 3 of the Slow channel.

Valori Previsti: (Lista 1)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1834	**Drv0 RX Slow 4 obj**		ENUM	Null	-	-	RW

2834	**Drv1 RX Slow 4 obj**	ENUM	Null	-	-	RW
3834	**Drv2 RX Slow 4 obj**	ENUM	Null	-	-	RW
4834	**Drv3 RX Slow 4 obj**	ENUM	Null	-	-	RW
5834	**Drv4 RX Slow 4 obj**	ENUM	Null	-	-	RW
6834	**Drv5 RX Slow 4 obj**	ENUM	Null	-	-	RW
7834	**Drv6 RX Slow 4 obj**	ENUM	Null	-	-	RW
8834	**Drv7 RX Slow 4 obj**	ENUM	Null	-	-	RW

Object mapped as received in position 4 of the Slow channel.

Values allowed: (List 1)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1835	**Drv0 RX Slow 5 obj**		ENUM	Null	-	-	RW
2835	**Drv1 RX Slow 5 obj**		ENUM	Null	-	-	RW
3835	**Drv2 RX Slow 5 obj**		ENUM	Null	-	-	RW
4835	**Drv3 RX Slow 5 obj**		ENUM	Null	-	-	RW
5835	**Drv4 RX Slow 5 obj**		ENUM	Null	-	-	RW
6835	**Drv5 RX Slow 5 obj**		ENUM	Null	-	-	RW
7835	**Drv6 RX Slow 5 obj**		ENUM	Null	-	-	RW
8835	**Drv7 RX Slow 5 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 5 of the Slow channel.

Values allowed: (List 1)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1836	**Drv0 RX Slow 6 obj**		ENUM	Null	-	-	RW
2836	**Drv1 RX Slow 6 obj**		ENUM	Null	-	-	RW
3836	**Drv2 RX Slow 6 obj**		ENUM	Null	-	-	RW
4836	**Drv3 RX Slow 6 obj**		ENUM	Null	-	-	RW
5836	**Drv4 RX Slow 6 obj**		ENUM	Null	-	-	RW
6836	**Drv5 RX Slow 6 obj**		ENUM	Null	-	-	RW
7836	**Drv6 RX Slow 6 obj**		ENUM	Null	-	-	RW
8836	**Drv7 RX Slow 6 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 6 of the Slow channel.

Values allowed: (List 1)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1837	**Drv0 RX Slow 7 obj**		ENUM	Null	-	-	RW
2837	**Drv1 RX Slow 6 obj**		ENUM	Null	-	-	RW
3837	**Drv2 RX Slow 6 obj**		ENUM	Null	-	-	RW
4837	**Drv3 RX Slow 6 obj**		ENUM	Null	-	-	RW
5837	**Drv4 RX Slow 6 obj**		ENUM	Null	-	-	RW
6837	**Drv5 RX Slow 6 obj**		ENUM	Null	-	-	RW
7837	**Drv6 RX Slow 6 obj**		ENUM	Null	-	-	RW
8837	**Drv7 RX Slow 6 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 7 of the Slow channel.

Values allowed: (List 1)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1838	**Drv0 RX Slow 8 obj**		ENUM	Null	-	-	RW
2838	**Drv1 RX Slow 6 obj**		ENUM	Null	-	-	RW
3838	**Drv2 RX Slow 6 obj**		ENUM	Null	-	-	RW
4838	**Drv3 RX Slow 6 obj**		ENUM	Null	-	-	RW
5838	**Drv4 RX Slow 6 obj**		ENUM	Null	-	-	RW
6838	**Drv5 RX Slow 6 obj**		ENUM	Null	-	-	RW
7838	**Drv6 RX Slow 6 obj**		ENUM	Null	-	-	RW
8838	**Drv7 RX Slow 6 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 8 of the Slow channel.

Values allowed: (List 1)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1839	**Drv0 RX Slow 9 obj**		ENUM	Null	-	-	RW
2839	**Drv1 RX Slow 9 obj**		ENUM	Null	-	-	RW
3839	**Drv2 RX Slow 9 obj**		ENUM	Null	-	-	RW
4839	**Drv3 RX Slow 9 obj**		ENUM	Null	-	-	RW
5839	**Drv4 RX Slow 9 obj**		ENUM	Null	-	-	RW
6839	**Drv5 RX Slow 9 obj**		ENUM	Null	-	-	RW
7839	**Drv6 RX Slow 9 obj**		ENUM	Null	-	-	RW
8839	**Drv7 RX Slow 9 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 9 of the Slow channel.

Values allowed: (List 1)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1840	**Drv0 RX Slow 10 obj**		ENUM	Null	-	-	RW
2840	**Drv1 RX Slow 10 obj**		ENUM	Null	-	-	RW
3840	**Drv2 RX Slow 10 obj**		ENUM	Null	-	-	RW
4840	**Drv3 RX Slow 10 obj**		ENUM	Null	-	-	RW
5840	**Drv4 RX Slow 10 obj**		ENUM	Null	-	-	RW
6840	**Drv5 RX Slow 10 obj**		ENUM	Null	-	-	RW
7840	**Drv6 RX Slow 10 obj**		ENUM	Null	-	-	RW
8840	**Drv7 RX Slow 10 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 10 of the Slow channel.

Values allowed: (List 1)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1841	**Drv0 RX Slow 11 obj**		ENUM	Null	-	-	RW
2841	**Drv1 RX Slow 11 obj**		ENUM	Null	-	-	RW
3841	**Drv2 RX Slow 11 obj**		ENUM	Null	-	-	RW
4841	**Drv3 RX Slow 11 obj**		ENUM	Null	-	-	RW
5841	**Drv4 RX Slow 11 obj**		ENUM	Null	-	-	RW
6841	**Drv5 RX Slow 11 obj**		ENUM	Null	-	-	RW
7841	**Drv6 RX Slow 11 obj**		ENUM	Null	-	-	RW
8841	**Drv7 RX Slow 11 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 11 of the Slow channel.

Values allowed: (List 1)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1842	**Drv0 RX Slow 12 obj**		ENUM	Null	-	-	RW
2842	**Drv1 RX Slow 12 obj**		ENUM	Null	-	-	RW
3842	**Drv2 RX Slow 12 obj**		ENUM	Null	-	-	RW
4842	**Drv3 RX Slow 12 obj**		ENUM	Null	-	-	RW
5842	**Drv4 RX Slow 12 obj**		ENUM	Null	-	-	RW
6842	**Drv5 RX Slow 12 obj**		ENUM	Null	-	-	RW
7842	**Drv6 RX Slow 12 obj**		ENUM	Null	-	-	RW
8842	**Drv7 RX Slow 12 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 12 of the Slow channel.

Values allowed: (List 1)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1843	**Drv0 RX Slow 13 obj**		ENUM	Null	-	-	RW
2843	**Drv1 RX Slow 13 obj**		ENUM	Null	-	-	RW
3843	**Drv2 RX Slow 13 obj**		ENUM	Null	-	-	RW
4843	**Drv3 RX Slow 13 obj**		ENUM	Null	-	-	RW
5843	**Drv4 RX Slow 13 obj**		ENUM	Null	-	-	RW
6843	**Drv5 RX Slow 13 obj**		ENUM	Null	-	-	RW
7843	**Drv6 RX Slow 13 obj**		ENUM	Null	-	-	RW
8843	**Drv7 RX Slow 13 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 13 of the Slow channel.

Values allowed: (List 1)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1844	**Drv0 RX Slow 14 obj**		ENUM	Null	-	-	RW
2844	**Drv1 RX Slow 14 obj**		ENUM	Null	-	-	RW
3844	**Drv2 RX Slow 14 obj**		ENUM	Null	-	-	RW
4844	**Drv3 RX Slow 14 obj**		ENUM	Null	-	-	RW
5844	**Drv4 RX Slow 14 obj**		ENUM	Null	-	-	RW
6844	**Drv5 RX Slow 14 obj**		ENUM	Null	-	-	RW
7844	**Drv6 RX Slow 14 obj**		ENUM	Null	-	-	RW
8844	**Drv7 RX Slow 14 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 14 of the Slow channel.

Values allowed: (List 1)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1845	**Drv0 RX Slow 15 obj**		ENUM	Null	-	-	RW
2845	**Drv1 RX Slow 15 obj**		ENUM	Null	-	-	RW
3845	**Drv2 RX Slow 15 obj**		ENUM	Null	-	-	RW
4845	**Drv3 RX Slow 15 obj**		ENUM	Null	-	-	RW
5845	**Drv4 RX Slow 15 obj**		ENUM	Null	-	-	RW
6845	**Drv5 RX Slow 15 obj**		ENUM	Null	-	-	RW
7845	**Drv6 RX Slow 15 obj**		ENUM	Null	-	-	RW
8845	**Drv7 RX Slow 15 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 15 of the Slow channel.

Values allowed: (List 1)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1846	**Drv0 RX Slow 16 obj**		ENUM	Null	-	-	RW
2846	**Drv1 RX Slow 16 obj**		ENUM	Null	-	-	RW
3846	**Drv2 RX Slow 16 obj**		ENUM	Null	-	-	RW
4846	**Drv3 RX Slow 16 obj**		ENUM	Null	-	-	RW
5846	**Drv4 RX Slow 16 obj**		ENUM	Null	-	-	RW
6846	**Drv5 RX Slow 16 obj**		ENUM	Null	-	-	RW
7846	**Drv6 RX Slow 16 obj**		ENUM	Null	-	-	RW
8846	**Drv7 RX Slow 16 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 16 of the Slow channel.

Values allowed: (List 1)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1847	**Drv0 RX Slow 17 obj**		ENUM	Null	-	-	RW
2847	**Drv1 RX Slow 17 obj**		ENUM	Null	-	-	RW
3847	**Drv2 RX Slow 17 obj**		ENUM	Null	-	-	RW
4847	**Drv3 RX Slow 17 obj**		ENUM	Null	-	-	RW
5847	**Drv4 RX Slow 17 obj**		ENUM	Null	-	-	RW
6847	**Drv5 RX Slow 17 obj**		ENUM	Null	-	-	RW
7847	**Drv6 RX Slow 17 obj**		ENUM	Null	-	-	RW
8847	**Drv7 RX Slow 17 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 17 of the Slow channel.

Values allowed: (List 1)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1848	**Drv0 RX Slow 18 obj**		ENUM	Null	-	-	RW
2848	**Drv1 RX Slow 18 obj**		ENUM	Null	-	-	RW
3848	**Drv2 RX Slow 18 obj**		ENUM	Null	-	-	RW
4848	**Drv3 RX Slow 18 obj**		ENUM	Null	-	-	RW
5848	**Drv4 RX Slow 18 obj**		ENUM	Null	-	-	RW
6848	**Drv5 RX Slow 18 obj**		ENUM	Null	-	-	RW
7848	**Drv6 RX Slow 18 obj**		ENUM	Null	-	-	RW
8848	**Drv7 RX Slow 18 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 18 of the Slow channel.

Values allowed: (List 1)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1849	**Drv0 RX Slow 19 obj**		ENUM	Null	-	-	RW
2849	**Drv1 RX Slow 19 obj**		ENUM	Null	-	-	RW
3849	**Drv2 RX Slow 19 obj**		ENUM	Null	-	-	RW
4849	**Drv3 RX Slow 19 obj**		ENUM	Null	-	-	RW
5849	**Drv4 RX Slow 19 obj**		ENUM	Null	-	-	RW
6849	**Drv5 RX Slow 19 obj**		ENUM	Null	-	-	RW
7849	**Drv6 RX Slow 19 obj**		ENUM	Null	-	-	RW
8849	**Drv7 RX Slow 19 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 19 of the Slow channel.

Values allowed: (List 1)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1850	**Drv0 TX Slow 0 obj**		ENUM	Null	-	-	RW
2850	**Drv1 TX Slow 0 obj**		ENUM	Null	-	-	RW
3850	**Drv2 TX Slow 0 obj**		ENUM	Null	-	-	RW
4850	**Drv3 TX Slow 0 obj**		ENUM	Null	-	-	RW
5850	**Drv4 TX Slow 0 obj**		ENUM	Null	-	-	RW
6850	**Drv5 TX Slow 0 obj**		ENUM	Null	-	-	RW
7850	**Drv6 TX Slow 0 obj**		ENUM	Null	-	-	RW
8850	**Drv7 TX Slow 0 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 0 of the Slow channel.

Values allowed: (List 2)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1851	**Drv0 TX Slow 1 obj**		ENUM	Null	-	-	RW
2851	**Drv1 TX Slow 1 obj**		ENUM	Null	-	-	RW
3851	**Drv2 TX Slow 1 obj**		ENUM	Null	-	-	RW
4851	**Drv3 TX Slow 1 obj**		ENUM	Null	-	-	RW
5851	**Drv4 TX Slow 1 obj**		ENUM	Null	-	-	RW
6851	**Drv5 TX Slow 1 obj**		ENUM	Null	-	-	RW
7851	**Drv6 TX Slow 1 obj**		ENUM	Null	-	-	RW
8851	**Drv7 TX Slow 1 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 1 of the Slow channel.

Values allowed: (List 2)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1852	**Drv0 TX Slow 2 obj**		ENUM	Null	-	-	RW
2852	**Drv1 TX Slow 2 obj**		ENUM	Null	-	-	RW
3852	**Drv2 TX Slow 2 obj**		ENUM	Null	-	-	RW
4852	**Drv3 TX Slow 2 obj**		ENUM	Null	-	-	RW
5852	**Drv4 TX Slow 2 obj**		ENUM	Null	-	-	RW
6852	**Drv5 TX Slow 2 obj**		ENUM	Null	-	-	RW
7852	**Drv6 TX Slow 2 obj**		ENUM	Null	-	-	RW
8852	**Drv7 TX Slow 2 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 2 of the Slow channel.

Values allowed: (List 2)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1853	**Drv0 TX Slow 3 obj**		ENUM	Null	-	-	RW
2853	**Drv1 TX Slow 3 obj**		ENUM	Null	-	-	RW
3853	**Drv2 TX Slow 3 obj**		ENUM	Null	-	-	RW
4853	**Drv3 TX Slow 3 obj**		ENUM	Null	-	-	RW
5853	**Drv4 TX Slow 3 obj**		ENUM	Null	-	-	RW
6853	**Drv5 TX Slow 3 obj**		ENUM	Null	-	-	RW
7853	**Drv6 TX Slow 3 obj**		ENUM	Null	-	-	RW
8853	**Drv7 TX Slow 3 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 3 of the Slow channel.

Values allowed: (List 2)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1854	**Drv0 TX Slow 4 obj**		ENUM	Null	-	-	RW
2854	**Drv1 TX Slow 4 obj**		ENUM	Null	-	-	RW
3854	**Drv2 TX Slow 4 obj**		ENUM	Null	-	-	RW
4854	**Drv3 TX Slow 4 obj**		ENUM	Null	-	-	RW
5854	**Drv4 TX Slow 4 obj**		ENUM	Null	-	-	RW
6854	**Drv5 TX Slow 4 obj**		ENUM	Null	-	-	RW
7854	**Drv6 TX Slow 4 obj**		ENUM	Null	-	-	RW
8854	**Drv7 TX Slow 4 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 4 of the Slow channel.

Values allowed: (List 2)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1855	**Drv0 TX Slow 5 obj**		ENUM	Null	-	-	RW
2855	**Drv1 TX Slow 5 obj**		ENUM	Null	-	-	RW
3855	**Drv2 TX Slow 5 obj**		ENUM	Null	-	-	RW
4855	**Drv3 TX Slow 5 obj**		ENUM	Null	-	-	RW
5855	**Drv4 TX Slow 5 obj**		ENUM	Null	-	-	RW
6855	**Drv5 TX Slow 5 obj**		ENUM	Null	-	-	RW
7855	**Drv6 TX Slow 5 obj**		ENUM	Null	-	-	RW
8855	**Drv7 TX Slow 5 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 5 of the Slow channel.

Values allowed: (List 2)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1856	**Drv0 TX Slow 6 obj**		ENUM	Null	-	-	RW
2856	**Drv1 TX Slow 6 obj**		ENUM	Null	-	-	RW
3856	**Drv2 TX Slow 6 obj**		ENUM	Null	-	-	RW
4856	**Drv3 TX Slow 6 obj**		ENUM	Null	-	-	RW
5856	**Drv4 TX Slow 6 obj**		ENUM	Null	-	-	RW
6856	**Drv5 TX Slow 6 obj**		ENUM	Null	-	-	RW
7856	**Drv6 TX Slow 6 obj**		ENUM	Null	-	-	RW
8856	**Drv7 TX Slow 6 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 6 of the Slow channel.

Values allowed: (List 2)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1857	**Drv0 TX Slow 7 obj**		ENUM	Null	-	-	RW
2857	**Drv1 TX Slow 7 obj**		ENUM	Null	-	-	RW
3857	**Drv2 TX Slow 7 obj**		ENUM	Null	-	-	RW
4857	**Drv3 TX Slow 7 obj**		ENUM	Null	-	-	RW
5857	**Drv4 TX Slow 7 obj**		ENUM	Null	-	-	RW
6857	**Drv5 TX Slow 7 obj**		ENUM	Null	-	-	RW
7857	**Drv6 TX Slow 7 obj**		ENUM	Null	-	-	RW
8857	**Drv7 TX Slow 7 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 7 of the Slow channel.

Values allowed: (List 2)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1858	**Drv0 TX Slow 8 obj**		ENUM	Null	-	-	RW
2858	**Drv1 TX Slow 8 obj**		ENUM	Null	-	-	RW
3858	**Drv2 TX Slow 8 obj**		ENUM	Null	-	-	RW
4858	**Drv3 TX Slow 8 obj**		ENUM	Null	-	-	RW
5858	**Drv4 TX Slow 8 obj**		ENUM	Null	-	-	RW
6858	**Drv5 TX Slow 8 obj**		ENUM	Null	-	-	RW
7858	**Drv6 TX Slow 8 obj**		ENUM	Null	-	-	RW
8858	**Drv7 TX Slow 8 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 8 of the Slow channel.

Values allowed: (List 2)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1859	**Drv0 TX Slow 9 obj**		ENUM	Null	-	-	RW
2859	**Drv1 TX Slow 9 obj**		ENUM	Null	-	-	RW
3859	**Drv2 TX Slow 9 obj**		ENUM	Null	-	-	RW
4859	**Drv3 TX Slow 9 obj**		ENUM	Null	-	-	RW
5859	**Drv4 TX Slow 9 obj**		ENUM	Null	-	-	RW
6859	**Drv5 TX Slow 9 obj**		ENUM	Null	-	-	RW
7859	**Drv6 TX Slow 9 obj**		ENUM	Null	-	-	RW
8859	**Drv7 TX Slow 9 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 9 of the Slow channel.

Values allowed: (List 2)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1860	**Drv0 TX Slow 10 obj**		ENUM	Null	-	-	RW
2860	**Drv1 TX Slow 10 obj**		ENUM	Null	-	-	RW
3860	**Drv2 TX Slow 10 obj**		ENUM	Null	-	-	RW
4860	**Drv3 TX Slow 10 obj**		ENUM	Null	-	-	RW
5860	**Drv4 TX Slow 10 obj**		ENUM	Null	-	-	RW
6860	**Drv5 TX Slow 10 obj**		ENUM	Null	-	-	RW
7860	**Drv6 TX Slow 10 obj**		ENUM	Null	-	-	RW
8860	**Drv7 TX Slow 10 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 10 of the Slow channel.

Values allowed: (List 2)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1861	**Drv0 TX Slow 11 obj**		ENUM	Null	-	-	RW
2861	**Drv1 TX Slow 11 obj**		ENUM	Null	-	-	RW
3861	**Drv2 TX Slow 11 obj**		ENUM	Null	-	-	RW
4861	**Drv3 TX Slow 11 obj**		ENUM	Null	-	-	RW
5861	**Drv4 TX Slow 11 obj**		ENUM	Null	-	-	RW
6861	**Drv5 TX Slow 11 obj**		ENUM	Null	-	-	RW
7861	**Drv6 TX Slow 11 obj**		ENUM	Null	-	-	RW
8861	**Drv7 TX Slow 11 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 11 of the Slow channel.

Values allowed: (List 2)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1862	**Drv0 TX Slow 12 obj**		ENUM	Null	-	-	RW
2862	**Drv1 TX Slow 12 obj**		ENUM	Null	-	-	RW
3862	**Drv2 TX Slow 12 obj**		ENUM	Null	-	-	RW
4862	**Drv3 TX Slow 12 obj**		ENUM	Null	-	-	RW
5862	**Drv4 TX Slow 12 obj**		ENUM	Null	-	-	RW
6862	**Drv5 TX Slow 12 obj**		ENUM	Null	-	-	RW
7862	**Drv6 TX Slow 12 obj**		ENUM	Null	-	-	RW
8862	**Drv7 TX Slow 12 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 12 of the Slow channel.

Values allowed: (List 2)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1863	**Drv0 TX Slow 13 obj**		ENUM	Null	-	-	RW
2863	**Drv1 TX Slow 13 obj**		ENUM	Null	-	-	RW
3863	**Drv2 TX Slow 13 obj**		ENUM	Null	-	-	RW
4863	**Drv3 TX Slow 13 obj**		ENUM	Null	-	-	RW
5863	**Drv4 TX Slow 13 obj**		ENUM	Null	-	-	RW
6863	**Drv5 TX Slow 13 obj**		ENUM	Null	-	-	RW
7863	**Drv6 TX Slow 13 obj**		ENUM	Null	-	-	RW
8863	**Drv7 TX Slow 13 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 13 of the Slow channel.

Values allowed: (List 2)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1864	**Drv0 TX Slow 14 obj**		ENUM	Null	-	-	RW
2864	**Drv1 TX Slow 14 obj**		ENUM	Null	-	-	RW
3864	**Drv2 TX Slow 14 obj**		ENUM	Null	-	-	RW
4864	**Drv3 TX Slow 14 obj**		ENUM	Null	-	-	RW
5864	**Drv4 TX Slow 14 obj**		ENUM	Null	-	-	RW
6864	**Drv5 TX Slow 14 obj**		ENUM	Null	-	-	RW
7864	**Drv6 TX Slow 14 obj**		ENUM	Null	-	-	RW
8864	**Drv7 TX Slow 14 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 14 of the Slow channel.

Values allowed: (List 2)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1865	**Drv0 TX Slow 15 obj**		ENUM	Null	-	-	RW
2865	**Drv1 TX Slow 15 obj**		ENUM	Null	-	-	RW
3865	**Drv2 TX Slow 15 obj**		ENUM	Null	-	-	RW
4865	**Drv3 TX Slow 15 obj**		ENUM	Null	-	-	RW
5865	**Drv4 TX Slow 15 obj**		ENUM	Null	-	-	RW
6865	**Drv5 TX Slow 15 obj**		ENUM	Null	-	-	RW
7865	**Drv6 TX Slow 15 obj**		ENUM	Null	-	-	RW
8865	**Drv7 TX Slow 15 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 15 of the Slow channel.

Values allowed: (List 2)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1866	**Drv0 TX Slow 16 obj**		ENUM	Null	-	-	RW
2866	**Drv1 TX Slow 16 obj**		ENUM	Null	-	-	RW
3866	**Drv2 TX Slow 16 obj**		ENUM	Null	-	-	RW
4866	**Drv3 TX Slow 16 obj**		ENUM	Null	-	-	RW
5866	**Drv4 TX Slow 16 obj**		ENUM	Null	-	-	RW
6866	**Drv5 TX Slow 16 obj**		ENUM	Null	-	-	RW
7866	**Drv6 TX Slow 16 obj**		ENUM	Null	-	-	RW
8866	**Drv7 TX Slow 16 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 16 of the Slow channel.

Values allowed: (List 2)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1867	**Drv0 TX Slow 17 obj**		ENUM	Null	-	-	RW
2867	**Drv1 TX Slow 17 obj**		ENUM	Null	-	-	RW
3867	**Drv2 TX Slow 17 obj**		ENUM	Null	-	-	RW
4867	**Drv3 TX Slow 17 obj**		ENUM	Null	-	-	RW
5867	**Drv4 TX Slow 17 obj**		ENUM	Null	-	-	RW
6867	**Drv5 TX Slow 17 obj**		ENUM	Null	-	-	RW
7867	**Drv6 TX Slow 17 obj**		ENUM	Null	-	-	RW
8867	**Drv7 TX Slow 17 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 17 of the Slow channel.

Values allowed: (List 2)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1868	**Drv0 TX Slow 18 obj**		ENUM	Null	-	-	RW
2868	**Drv1 TX Slow 18 obj**		ENUM	Null	-	-	RW
3868	**Drv2 TX Slow 18 obj**		ENUM	Null	-	-	RW
4868	**Drv3 TX Slow 18 obj**		ENUM	Null	-	-	RW
5868	**Drv4 TX Slow 18 obj**		ENUM	Null	-	-	RW
6868	**Drv5 TX Slow 18 obj**		ENUM	Null	-	-	RW
7868	**Drv6 TX Slow 18 obj**		ENUM	Null	-	-	RW
8868	**Drv7 TX Slow 18 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 18 of the Slow channel.

Values allowed: (List 2)

Par	Description	[unit]	Type	Def	Min	Max	Acc
1869	**Drv0 TX Slow 19 obj**		ENUM	Null	-	-	RW
2869	**Drv1 TX Slow 19 obj**		ENUM	Null	-	-	RW
3869	**Drv2 TX Slow 19 obj**		ENUM	Null	-	-	RW
4869	**Drv3 TX Slow 19 obj**		ENUM	Null	-	-	RW
5869	**Drv4 TX Slow 19 obj**		ENUM	Null	-	-	RW
6869	**Drv5 TX Slow 19 obj**		ENUM	Null	-	-	RW
7869	**Drv6 TX Slow 19 obj**		ENUM	Null	-	-	RW
8869	**Drv7 TX Slow 19 obj**		ENUM	Null	-	-	RW

Object mapped as received in position 19 of the Slow channel.

Values allowed: (List 2)

Drives \ Drive 0 \ Service
Drives \ Drive 1 \ Service
Drives \ Drive 2 \ Service
Drives \ Drive 3 \ Service
Drives \ Drive 4 \ Service
Drives \ Drive 5 \ Service
Drives \ Drive 6 \ Service
Drives \ Drive 7 \ Service

Par	Description	[unit]	Type	Def	Min	Max	Acc
1104	**Drv0 Temp**	°C	Short	-	-	-	R
2104	**Drv1 Temp**	°C	Short	-	-	-	R
3104	**Drv2 Temp**	°C	Short	-	-	-	R
4104	**Drv3 Temp**	°C	Short	-	-	-	R
5104	**Drv4 Temp**	°C	Short	-	-	-	R
6104	**Drv5 Temp**	°C	Short	-	-	-	R
7104	**Drv6 Temp**	°C	Short	-	-	-	R
8104	**Drv7 Temp**	°C	Short	-	-	-	R

Drive inverter module temperature.

Note ! The value shown is not correct if the DC-link voltage is less than 440 V (undervoltage alarm threshold).

Par	Description	[unit]	Type	Def	Min	Max	Acc
1316	**Drv0 Cnts 2Arms**	Arms	Float	-	-	-	R
2316	**Drv1 Cnts 2Arms**	Arms	Float	-	-	-	R
3316	**Drv2 Cnts 2Arms**	Arms	Float	-	-	-	R
4316	**Drv3 Cnts 2Arms**	Arms	Float	-	-	-	R
5316	**Drv4 Cnts 2Arms**	Arms	Float	-	-	-	R
6316	**Drv5 Cnts 2Arms**	Arms	Float	-	-	-	R
7316	**Drv6 Cnts 2Arms**	Arms	Float	-	-	-	R
8316	**Drv7 Cnts 2Arms**	Arms	Float	-	-	-	R

Conversion factor from counts to amps.
This monitor parameter is only read correctly if the drive is present and initialised.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1318	**Drv0 Cnts 2Rpm**	Rpm	Float	-	-	-	R
2318	**Drv1 Cnts 2Rpm**	Rpm	Float	-	-	-	R
3318	**Drv2 Cnts 2Rpm**	Rpm	Float	-	-	-	R
4318	**Drv3 Cnts 2Rpm**	Rpm	Float	-	-	-	R
5318	**Drv4 Cnts 2Rpm**	Rpm	Float	-	-	-	R
6318	**Drv5 Cnts 2Rpm**	Rpm	Float	-	-	-	R

7318	**Drv6 Cnts 2Rpm**	Rpm	Float	-	-	-	R
8318	**Drv7 Cnts 2Rpm**	Rpm	Float	-	-	-	R

Conversion factor from counts to drive X rpm.
This monitor parameter is only read correctly if the drive is present and initialised.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1750	**Drv0 Enc Mod Thr**	V	Float	0.4	-	-	RW
2750	**Drv1 Enc Mod Thr**	V	Float	-	-	-	RW
3750	**Drv2 Enc Mod Thr**	V	Float	-	-	-	RW
4750	**Drv3 Enc Mod Thr**	V	Float	-	-	-	RW
5750	**Drv4 Enc Mod Thr**	V	Float	-	-	-	RW
6750	**Drv5 Enc Mod Thr**	V	Float	-	-	-	RW
7750	**Drv6 Enc Mod Thr**	V	Float	-	-	-	RW
8750	**Drv7 Enc Mod Thr**	V	Float	-	-	-	RW

Minimum threshold allowed for absolute encoder sine/cosine analog signals due to loss of encoder.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1752	**Drv0 EncA Inc Thr**	V	Float	0.4	-	-	RW
2752	**Drv1 EncA Inc Thr**	V	Float	-	-	-	RW
3752	**Drv2 EncA Inc Thr**	V	Float	-	-	-	RW
4752	**Drv3 EncA Inc Thr**	V	Float	-	-	-	RW
5752	**Drv4 EncA Inc Thr**	V	Float	-	-	-	RW
6752	**Drv5 EncA Inc Thr**	V	Float	-	-	-	RW
7752	**Drv6 EncA Inc Thr**	V	Float	-	-	-	RW
8752	**Drv7 EncA Inc Thr**	V	Float	-	-	-	RW

Minimum threshold allowed for incremental encoder analog sine/cosine signals due to loss of encoder.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1770	**Drv0 EncIdx pos**	°	Float	0.0	-	-	R
2770	**Drv1 EncIdx pos**	°	Float	0.0	-	-	R
3770	**Drv2 EncIdx pos**	°	Float	0.0	-	-	R
4770	**Drv3 EncIdx pos**	°	Float	0.0	-	-	R
5770	**Drv4 EncIdx pos**	°	Float	0.0	-	-	R
6770	**Drv5 EncIdx pos**	°	Float	0.0	-	-	R
7770	**Drv6 EncIdx pos**	°	Float	0.0	-	-	R
8770	**Drv7 EncIdx pos**	°	Float	0.0	-	-	R

Position in which the zero reference in degrees was detected.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1772	**Drv0 EncIdx rev**		Short	0	-	-	R
2772	**Drv1 EncIdx rev**		Short	0	-	-	R
3772	**Drv2 EncIdx rev**		Short	0	-	-	R
4772	**Drv3 EncIdx rev**		Short	0	-	-	R
5772	**Drv4 EncIdx rev**		Short	0	-	-	R
6772	**Drv5 EncIdx rev**		Short	0	-	-	R
7772	**Drv6 EncIdx rev**		Short	0	-	-	R
8772	**Drv7 EncIdx rev**		Short	0	-	-	R

Number of the turn in which the zero reference was detected.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1773	**Drv0 EncAbs rev**		Short	0	-	-	R
2773	**Drv1 EncAbs rev**		Short	0	-	-	R
3773	**Drv2 EncAbs rev**		Short	0	-	-	R
4773	**Drv3 EncAbs rev**		Short	0	-	-	R
5773	**Drv4 EncAbs rev**		Short	0	-	-	R
6773	**Drv5 EncAbs rev**		Short	0	-	-	R
7773	**Drv6 EncAbs rev**		Short	0	-	-	R
8773	**Drv7 EncAbs rev**		Short	0	-	-	R

Encoder turns obtained with the absolute tracks.

Note! With SinCos and single-turn encoders, this value is always null.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1774	**Drv0 EncAbs pos**	°	Float	0.0	-	-	R
2774	**Drv1 EncAbs pos**	°	Float	0.0	-	-	R
3774	**Drv2 EncAbs pos**	°	Float	0.0	-	-	R
4774	**Drv3 EncAbs pos**	°	Float	0.0	-	-	R
5774	**Drv4 EncAbs pos**	°	Float	0.0	-	-	R
6774	**Drv5 EncAbs pos**	°	Float	0.0	-	-	R
7774	**Drv6 EncAbs pos**	°	Float	0.0	-	-	R
8774	**Drv7 EncAbs pos**	°	Float	0.0	-	-	R

Encoder position obtained with the absolute tracks in degrees.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1776	**Drv0 Abs Sin**	V	Float	0.0	-	-	R
2776	**Drv1 Abs Sin**	V	Float	0.0	-	-	R
3776	**Drv2 Abs Sin**	V	Float	0.0	-	-	R
4776	**Drv3 Abs Sin**	V	Float	0.0	-	-	R
5776	**Drv4 Abs Sin**	V	Float	0.0	-	-	R
6776	**Drv5 Abs Sin**	V	Float	0.0	-	-	R
7776	**Drv6 Abs Sin**	V	Float	0.0	-	-	R
8776	**Drv7 Abs Sin**	V	Float	0.0	-	-	R

Value in Volts at the terminals of the Sincos encoder Sin+/Sin- absolute track.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1778	**Drv0 Abs Cos**	V	Float	0.0	-	-	R
2778	**Drv1 Abs Cos**	V	Float	0.0	-	-	R
3778	**Drv2 Abs Cos**	V	Float	0.0	-	-	R
4778	**Drv3 Abs Cos**	V	Float	0.0	-	-	R
5778	**Drv4 Abs Cos**	V	Float	0.0	-	-	R
6778	**Drv5 Abs Cos**	V	Float	0.0	-	-	R
7778	**Drv6 Abs Cos**	V	Float	0.0	-	-	R
8778	**Drv7 Abs Cos**	V	Float	0.0	-	-	R

Value in Volts at the terminals of the Sincos encoder Cos+/Cos- absolute track.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1780	**Drv0 Inc Sin**	V	Float	0.0	-	-	R
2780	**Drv1 Inc Sin**	V	Float	0.0	-	-	R
3780	**Drv2 Inc Sin**	V	Float	0.0	-	-	R
4780	**Drv3 Inc Sin**	V	Float	0.0	-	-	R
5780	**Drv4 Inc Sin**	V	Float	0.0	-	-	R
6780	**Drv5 Inc Sin**	V	Float	0.0	-	-	R
7780	**Drv6 Inc Sin**	V	Float	0.0	-	-	R
8780	**Drv7 Inc Sin**	V	Float	0.0	-	-	R

Value in Volts at the terminals of the encoder Sin+/Sin- incremental track.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1782	**Drv0 Inc Cos**	V	Float	0.0	-	-	R
2782	**Drv1 Inc Cos**	V	Float	0.0	-	-	R
3782	**Drv2 Inc Cos**	V	Float	0.0	-	-	R
4782	**Drv3 Inc Cos**	V	Float	0.0	-	-	R
5782	**Drv4 Inc Cos**	V	Float	0.0	-	-	R
6782	**Drv5 Inc Cos**	V	Float	0.0	-	-	R
7782	**Drv6 Inc Cos**	V	Float	0.0	-	-	R
8782	**Drv7 Inc Cos**	V	Float	0.0	-	-	R

Value in Volts at the terminals of the encoder Cos+/Cos- incremental track.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1784	**Drv0 Iq Filt Tau**	mS	Float	4.0	-	-	RW
2784	**Drv1 Iq Filt Tau**	mS	Float	4.0	-	-	RW
3784	**Drv2 Iq Filt Tau**	mS	Float	4.0	-	-	RW
4784	**Drv3 Iq Filt Tau**	mS	Float	4.0	-	-	RW
5784	**Drv4 Iq Filt Tau**	mS	Float	4.0	-	-	RW
6784	**Drv5 Iq Filt Tau**	mS	Float	4.0	-	-	RW
7784	**Drv6 Iq Filt Tau**	mS	Float	4.0	-	-	RW
8784	**Drv7 Iq Filt Tau**	mS	Float	4.0	-	-	RW

Time constant of the filter applied to the torque current (variable IqFilt).

Par	Description	[unit]	Type	Def	Min	Max	Acc
1901	**Drv0 dia LEDS**		Enum	Off	-	-	RW
2901	**Drv1 dia LEDS**		Enum	Off	-	-	RW
3901	**Drv2 dia LEDS**		Enum	Off	-	-	RW
4901	**Drv3 dia LEDS**		Enum	Off	-	-	RW
5901	**Drv4 dia LEDS**		Enum	Off	-	-	RW
6901	**Drv5 dia LEDS**		Enum	Off	-	-	RW
7901	**Drv6 dia LEDS**		Enum	Off	-	-	RW
8901	**Drv7 dia LEDS**		Enum	Off	-	-	RW

When this parameter is set to On the green and red LEDs of the corresponding drive flash rapidly and alternately. This function is useful for checking that you are configuring the right drive.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1902	**Drv0 Reset Cmd**		Enum	Off	-	-	RW
2902	**Drv1 Reset Cmd**		Enum	Off	-	-	RW
3902	**Drv2 Reset Cmd**		Enum	Off	-	-	RW
4902	**Drv3 Reset Cmd**		Enum	Off	-	-	RW
5902	**Drv4 Reset Cmd**		Enum	Off	-	-	RW
6902	**Drv5 Reset Cmd**		Enum	Off	-	-	RW
7902	**Drv6 Reset Cmd**		Enum	Off	-	-	RW
8902	**Drv7 Reset Cmd**		Enum	Off	-	-	RW

Drive 0...7 reset software command: the drive must not be enabled to execute the reset command:

0 = Off

1 = On

Par	Description	[unit]	Type	Def	Min	Max	Acc
1903	**Drv0 FW Checksum**		UnsignedShort	-	-	---	R
2903	**Drv1 FW Checksum**		UnsignedShort	-	-	---	R
3903	**Drv2 FW Checksum**		UnsignedShort	-	-	---	R
4903	**Drv3 FW Checksum**		UnsignedShort	-	-	---	R
5903	**Drv4 FW Checksum**		UnsignedShort	-	-	---	R
6903	**Drv5 FW Checksum**		UnsignedShort	-	-	---	R
7903	**Drv6 FW Checksum**		UnsignedShort	-	-	---	R
8903	**Drv7 FW Checksum**		UnsignedShort	-	-	---	R

Checksum of the control firmware installed on the drive.

Menù Monitor

Par	Description	[unit]	Type	Def	Min	Max	Acc
6	**AXV Fw Ver**		UShort	0	-	-	R

Parameter dedicated to the firmware version loaded on the **AXV300 CU** module.

Par	Description	[unit]	Type	Def	Min	Max	Acc
7	**AXV Fw Rel**		UShort	-	-	-	R

Parameter dedicated to the firmware revision loaded on the **AXV300 CU** module.

Par	Description	[unit]	Type	Def	Min	Max	Acc
8	**AXV Fw Type**		UShort	0	-	-	R

Parameter dedicated to the firmware type loaded on the **AXV300 CU** module.

Par	Description	[unit]	Type	Def	Min	Max	Acc
9	**AXV Sub Ver**		UShort	13	-	-	R

Parameter dedicated to the SubVer field of the firmware loaded on the **AXV300 CU** module.

Par	Description	[unit]	Type	Def	Min	Max	Acc
10	**AXV Appl Type**		UShort	Speed Torque	-	-	R

Parameter dedicated to the Application type field of the firmware loaded on the **AXV300 CU** module.
Reserved for GEFRAN applications.

Par	Description	[unit]	Type	Def	Min	Max	Acc
11	**AXV Appl Ver**		UShort	1	-	-	R

Parameter dedicated to the Version field of the application of the firmware loaded on the **AXV300 CU** module.

Par	Description	[unit]	Type	Def	Min	Max	Acc
12	**AXV Appl Rel**		UShort	0	-	-	R

Parameter dedicated to the revision of the application of the firmware loaded on the **AXV300 CU** module.

Par	Description	[unit]	Type	Def	Min	Max	Acc
13	**FPGA Ver**		UShort	1	-	-	R

FPGA version of the **GStar** communication of the **AXV300 CU** module.

Par	Description	[unit]	Type	Def	Min	Max	Acc
14	**FPGA Rel**		UShort	0	-	-	R

FPGA revision of the **GStar** communication of the **AXV300 CU** module.

Par	Description	[unit]	Type	Def	Min	Max	Acc
15	**FPGA Type**		UShort	0	-	-	R

Type of FPGA firmware of the **GStar** communication of the **AXV300 CU** module.

Par	Description	[unit]	Type	Def	Min	Max	Acc
16	**AXV Sn Code**		Strig4	-	-	-	R

Alphanumerical part of the **AXV300 CU** module serial number.

Par	Description	[unit]	Type	Def	Min	Max	Acc
18	**AXV Sn Num**		UDint	-	-	-	R

Numerical part of the **AXV300 CU** module serial number.

Par	Description	[unit]	Type	Def	Min	Max	Acc
50	**System Status**		Enum	-	-	-	R

AXV300 CU module state. For further information about status logic, see **"Figure 80: Application Menu" on page 157**.

Values allowed:

0 = Boot
1 = Idle
2 = Service
3 = Run
4 = Link Alarm
5 = reserved Deb GStar nolink
6 = reserved Deb GStar error
7 = reserved Deb GStar OK
15 = system error

Par	Description	[unit]	Type	Def	Min	Max	Acc
53	**GStar Status**		Enum	Down	-	-	R

GStar link state.

Values allowed:

0 = Down
1 = Up

Par	Description	[unit]	Type	Def	Min	Max	Acc
58	**AXV Fw BuildNumber**		UDint	xxxxxxxxH	-	-	R

Firmware Build Number of the software loaded on the **AXV300 CU** module.

Monitor \ System

Par	Description	[unit]	Type	Def	Min	Max	Acc
51	**Alarm Status**	**ms**	Unsignedint	-	-	-	R

Bitword of the AXV300 CU module alarms that are active/have occurred.

Values allowed:

Bit 0 = Invalid Flash Parameter	(Card with parameters that are null or not valid)
Bit 1 = Trap error	(Contact the technical service centre)
Bit 2 = OSE system error	(Contact the technical service centre)
Bit 3 = OSE user error	(Contact the technical service centre)
Bit 4 = Watchdog	(Contact the technical service centre)
Bit 5 = Fast Task Overtime	(Duration of fast task > 180us)
Bit 6 = Slow Task Overtime	(Duration of Slow Task > 90% Slow Period)
Bit 7 = Gstar Link	(GSTAR optical link error)

Par	Description	[unit]	Type	Def	Min	Max	Acc
710	**Fast Task Time**	ms	Float	-	-	-	R

Fast Task Execution Time.

Par	Description	[unit]	Type	Def	Min	Max	Acc
712	**Slow Task Time**	ms	Float	-	-	-	R

Slow Task Execution Time.

Monitor \ GStar

Par	Description	[unit]	Type	Def	Min	Max	Acc
60	**Serv. err. operation**		Enum	Read	-	-	R

GStar service channel operation.

Par	Description	[unit]	Type	Def	Min	Max	Acc
61	**Serv. err. drive**		Short	Read	-	-	R

Drive for which the service channel error occurred.

Par	Description	[unit]	Type	Def	Min	Max	Acc
62	**Serv. err. code**		Enum	NoError	-	-	R

Service channel error code.

Values allowed:

0 – No error
1 – Link error
2 – Invalid Call
3 – Drive error
4 – Time Out

Par	Description	[unit]	Type	Def	Min	Max	Acc
63	**Serv. err. OID**		Short	-	-	-	R

Index of the object where the error occurred during transfer via the service channel.

Par	Description	[unit]	Type	Def	Min	Max	Acc
70	**Data err code**		Enum	Data Ok	-	-	R

Error found in the mapping of the fast and slow **GStar** channels.

Values allowed:

0 = no operation
1 = Mapping fast RX data
2 = Mapping fast TX data
3 = Mapping slow RX data
4 = Mapping Slow Tx data

IIn case of an error, check that the parameters that define the configuration of the data exchanged via **GStar** are correct and within the limits listed in chapter **"10.5. GStar Communication System" on page 112**).

Par	Description	[unit]	Type	Def	Min	Max	Acc
71	**Data drive nr**		Short	-	-	-	R

Data Mapping drive number.

Par	Description	[unit]	Type	Def	Min	Max	Acc
72	**Data operation**		Enum	No operation	-	-	R

Operation in which the error occurred during mapping.

Par	Description	[unit]	Type	Def	Min	Max	Acc
73	**Data elem. Nr**		Short	-	-	-	R

Element in which the error occurred.

Par	Description	[unit]	Type	Def	Min	Max	Acc
74	**Data obj. Idx**		Short	-	-	-	R

Index of the object in which the error occurred during mapping.

Par	Description	[unit]	Type	Def	Min	Max	Acc
700	**Status of net 0**		UShort	-	-	-	R

Status register network 0 **GStar**.

Par	Description	[unit]	Type	Def	Min	Max	Acc
701	**Status of net 1**		UShort	-	-	-	R

Status register network 1 **GStar**.

Par	Description	[unit]	Type	Def	Min	Max	Acc
702	**N. drive rx net 0**		Enum	-	-	-	R

Number of drives detected on **GStar** network 0.

Par	Description	[unit]	Type	Def	Min	Max	Acc
703	**N. drive rx net 1**		Enum	-	-	-	R

Number of drives detected on **GStar** network 1

Par	Description	[unit]	Type	Def	Min	Max	Acc
64014	**GStar tot err**		Enum	-	-	-	R

Total **GStar** link errors.
This value indicates the errors since start-up.

Par	Description	[unit]	Type	Def	Min	Max	Acc
64015	**GStar Cons err**		Enum	-	-	-	R

Number of consecutive **GStar** link errors.

Par	Description	[unit]	Type	Def	Min	Max	Acc
64016	**GStar Cons err Reset**		Enum	-	-	-	R

Number of consecutive **GStar** link error resets.

Par	Description	[unit]	Type	Def	Min	Max	Acc
64017	**GStar cons err max**		Enum	-	-	-	R

Max number of consecutive errors that have occurred **GStar** link.

Monitor \ AuxEncoder

Par	Description	[unit]	Type	Def	Min	Max	Acc
164	**Encoder speed**	rpm	Short		-16384	+16384	R

Encoder speed reading, in rpm. The value is filtered according to parameter 186 "Encoder spd filt".

Par	Description	[unit]	Type	Def	Min	Max	Acc
166	**Encoder Pos**	°	Float		0	360	R

Reading of the position within one turn (0...360°), in degrees.

Par	Description	[unit]	Type	Def	Min	Max	Acc
168	**Encoder Rev**		Int				R

Reading of the number of turns.

Par	Description	[unit]	Type	Def	Min	Max	Acc
170	**Encoder Abs Pos**		Float				R

Reading of the absolute position within one turn (0...360°), in degrees (Endat, SSI, Hiperface encoders only).

Par	Description	[unit]	Type	Def	Min	Max	Acc
172	**Encoder Abs Rev**		Int				R

Reading of absolute number of turns (Endat, SSI, Hiperface multi-turn encoders only).

Par	Description	[unit]	Type	Def	Min	Max	Acc
188	**Encoder Error Code**		UnsignedInt				R

For the correct interpretation of the cause of the alarm trigger, it is necessary to transform the hex code indicated in parameter **PAR 188 Encoder Error Code** in the corresponding binary and verify in the encoder table that the active bits and related description are used.

Example with encoder Endat:

PAR 188 = A0H (hex value)

In the table "***Encoder Error Code*** with absolute encoder EnDat" A0 is not indicated in the value column.
A0 should be contemplated as a bitword with meaning A0 -> 10100000 -> bit 5 and bit 7 .

The following causes simultaneously intervene:

Bit 5 = 20H Cause: the SSI signal interferences cause an error in the CKS or parity.

Bit 7 = 20H Cause: Encoder has detected malfunction and signals this to the drive via Error bit. Bits 16..31 contain the type of malfunction detected by the encoder.

Table 12: *"Encoder Error Code"* 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 **152 Encoder supply**, check parameter **154 Encoder Input**.
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 **152 Encoder supply**, check parameter **154 Encoder Inputr**.
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 **152 Encoder supply**, check parameter 154 E**ncoder Input** check parameter **159 Encoder Signal Check.**

Table 13: *"Encoder Error Code"* with Sinus digital incremental encoder

Bit	Value	Name	Description
3	**0x08**	**MOD_INCR**	**Cause:** voltage level not correct or disturbance on signals of incremental channels A-B.
			Solution: Check the connection of the encoder-drive channels A-B, check the connection of the screen, check the encoder supply voltage, check parameter **152 Encoder supply,** check parameter **156 Encoder signal Vpp.**

Table 14: *"Encoder Error Code"* with SinCos encoder

Bit	Value	Name	Description
3	**0x08**	**MOD_INCR**	**Cause:** Voltage level not correct or disturbance on signals of incremental channels A-B.
			Solution: Check the connection of the encoder-drive channels A-B, check the connection of the screen, check the encoder supply voltage, check parameter **152 Encoder supply**, check parameter **156 Encoder signal Vpp**.
4	**0x10**	**MOD_ABS**	**Cause:** Voltage level not correct or disturbance on signals of absolute SinCos channels.
			Solution: Check the connection of the encoder-drive channels A-B, check the connection of the screen, check the encoder supply voltage, check parameter **152 Encoder supply**, check parameter **156 Encoder signal Vpp**.

Table 15: *"Encoder Error Code"* with absolute SSI encoder

Bit	Value	Name	Description
3	**0x08**	**MOD_INCR**	**Cause:** Voltage level not correct or disturbance on signals of incremental channels A-B.
			Solution: Check the connection of the encoder-drive channels A-B, check the connection of the screen, check the encoder supply voltage, check parameter **152 Encoder supply**, check parameter **156 Encoder signal Vpp**.
5	**0x20**	**CRC_CKS_P**	**Cause:** SSI signals not present or disturbed.
			Solution: Check the connection of the clock and encoder-drive data, check the connection of the screen, check the encoder supply voltage, check parameter **160 Encoder SSI clocks**.
8	**0x100**	**Setup error**	**Cause:** An error occurred during setup.
			Solution: Check the connection of the clock and encoder-drive data, check the connection of the screen, check the encoder supply voltage, check parameter **152 Encoder supply**, check parameter **160 Encoder SSI clocks**.

Table 16: *"Encoder Error Code"* with absolute EnDat encoder

Bit	Value	Name	Description
3	**0x08**	**MOD_INCR**	**Cause:** Voltage level not correct or disturbance on signals of incremental channels A-B
			Solution: Check the connection of the the encoder-drive channels A-B, check the connection of the screen, check the encoder supply voltage, check parameter**152 Encoder supply**, check parameter **156 Encoder signal Vpp**.
5	**0x20**	**CRC_CKS_P**	**Cause:** SSI signals not present or disturbed cause an error on CRC

Bit	Value	Name	Description
			Solution: Check the connection of the clock and encoder-drive data, check the connection of the screen, check the encoder supply voltage, check parameter **152 Encoder supply**.
8	**0x100**	**Setup error**	**Cause:** An error occurred during setup.
			Solution: Check the connection of the clock and encoder-drive data, check the connection of the screen, check the encoder supply voltage, check parameter **152 Encoder supply**.

The following conditions occur while resetting the encoder following **"Aux Encoder error"** activation:

Bit	Value	Name	Description			
6	**0x40**	**ACK_TMO**	**Cause:** SSI signals not present or disturbed cause an error on CRC			
			Solution: Check the connection of the clock and encoder-drive data, check the connection of the screen, check the encoder supply voltage, check parameter **152 Encoder supply**.			
7	**0x80**	**DT1_ERR**	**Cause:** Encoder has detected malfunction and signals this to the drive via bit DT1. Bits 16..31 contain the type of malfunction detected by the encoder.			
			Solution: See the encoder manufacturer's technical guide.			
16.31			**Bit**		**=0**	**=1**
			0	Light source	OK	Failure (1)
			1	Signal amplitude	OK	Erroneous (1)
			2	Position value	OK	Erroneous (1)
			3	Over voltage	NO	Yes (1)
			4	Under voltage	NO	Under voltage supply (1)
			5	Over current	NO	Yes (1)
			6	Battery	OK	Change the battery (2)
			7..15			
			(1) Can also be set after the power supply is switched off or on. (2) Only for battery-buffered encoders			

Table 17: *"Encoder Error Code"* with absolute Hiperface encoder

Bit	Value	Name	Description
3	**0x08**		**Cause:** Voltage level not correct or disturbance on signals of incremental channels A-B.
			Solution: Check the connection of the the encoder-drive channels A-B, check the connection of the screen, check the encoder supply voltage, check parameter **152 Encoder supply**, check parameter **156 Encoder signal Vpp**.
5	**0x20**		**Cause:** disturbed SSI signals cause a CKS error or Parity
			Solution: Check the connection of the clock and encoder-drive data, check the connection of the screen, check the encoder supply voltage, check parameter **152 Encoder supply**.
6	**0x40**		**Cause:** Encoder does not recognise the command that has been sent to it and replies with ACK. The SSI signals not present cause a TMO error.
			Solution: Check the connection of the clock and encoder-drive data, check the connection of the screen, check the encoder supply voltage, check parameter **152 Encoder supply.**
8	**0x100**		**Cause:** An error occurred during setup.
			Solution: Check the connection of the clock and encoder-drive data, check the connection of the screen, check the encoder supply voltage, check parameter **152 Encoder supply**.

The following conditions occur while resetting the encoder following **"Aux Encoder error"** activation.

Bit	Value	Name	Description
7	**0x80**	**DT1_ERR**	**Cause:** Encoder has detected malfunction and signals this to the drive via Error bit. Bits 16..31 contain the type of malfunction detected by the encoder.
			Solution: See the encoder manufacturer's technical guide

Bit	Value	Name	Description		
16.31			**Type**	**Code**	**Description**
			Tranmission	09h	Transmitted parity bit is incorrect
				0AH	Checksum of transmitted data is wrong
				0BH	Incorrect command code
				0CH	Wrong number of transmitted data
				0DH	Illegal transmitted command argument
				0FH	Wrong access authorization specified
				0EH	Selected field has READ ONLY status
				10H	Data field (re) definition not executable due to field size
				11H	Specified address is not available in selected field
				12H	Selected field does not yet exist
				00H	No encoder error, no error message
				03H	Data field operations disabled
				04H	Analog monitoring inoperative
				08H	Counting register overflow
				01H	Encoder analog signal are unreliable
				02H	Wrong synchronization or offset
				05H-07H	Encoder-internal hardware fault, no operation possible
				1CH-1DH	Error in sampling, no operation possible
				1EH	Permissible operation temperature is exceeded
			(1) Can also be set after the power supply is switched off or on. (2) Only for battery-buffered encoders		

Service

Par	Description	[unit]	Type	Def	Min	Max	Acc
64	**GStar pars offline**		Boolean	Off	-	-	RW

Reserved: Work in **GStar** Offline mode (parameter not exchanged with drives)

Par	Description	[unit]	Type	Def	Min	Max	Acc
65	**Reboot**		Command	-	-	-	RW

AXV300 CU module reboot command.

Par	Description	[unit]	Type	Def	Min	Max	Acc
66	**Trace Mask**		UShort	0	-	-	RW

Reserved: Do not use.

Par	Description	[unit]	Type	Def	Min	Max	Acc
822	**Gstar debug**	Boolean		Off	-	-	RW

Reserved: **GStar** debug mode.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1786	**Drv0 MotSpd NoFilt**	Float		Off	-	-	R

Measured motor speed, not filtered.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1788	**Drv0 TrqCur NoFilt**	Float		Off	-	-	R

Motor torque current, not filtered.

Par	Description	[unit]	Type	Def	Min	Max	Acc
1904	**Drv0 Reset Alarms**	Command		Off	-	-	RW

Required reset to Drive 0.

Local IO

Par	Description	[unit]	Type	Def	Min	Max	Acc
100	**Dig Inp 1**		Boolean	Off	-	-	R

Digital input 1 status.

Par	Description	[unit]	Type	Def	Min	Max	Acc
101	**Dig Inp 2**		Boolean	Off	-	-	R

Digital input 2 status.

Par	Description	[unit]	Type	Def	Min	Max	Acc
102	**Dig Inp 3**		Boolean	Off	-	-	R

Digital input 3 status.

Par	Description	[unit]	Type	Def	Min	Max	Acc
103	**Dig Inp 4**		Boolean	Off	-	-	R

Digital input 4 status.

Par	Description	[unit]	Type	Def	Min	Max	Acc
110	**Dig Out 1**		Boolean	Off	-	-	R

Digital output 1 status.

Par	Description	[unit]	Type	Def	Min	Max	Acc
111	**Dig Out 2**		Boolean	Off	-	-	R

Digital output 2 status.

Par	Description	[unit]	Type	Def	Min	Max	Acc
112	**Dig Out 3**		Boolean	Off	-	-	R

Digital output 3 status.

Par	Description	[unit]	Type	Def	Min	Max	Acc
120	**An Inp 1**		Short	--	-	-	R

Analog input 1 status.

Par	Description	[unit]	Type	Def	Min	Max	Acc
121	**An Inp 2**		Short	--	-	-	R

Analog input 2 status.

Par	Description	[unit]	Type	Def	Min	Max	Acc
122	**AnInp 1 Offset**		Short	0	-	-	RW

Analog input 1 offset.

Par	Description	[unit]	Type	Def	Min	Max	Acc
123	**AnInp 2 Offset**		Short	0	-	-	RW

Analog input 2 offset.

Par	Description	[unit]	Type	Def	Min	Max	Acc
124	**AnInp 1 Gain**		Float	0	-	-	RW

Analog input 1 gain.

Par	Description	[unit]	Type	Def	Min	Max	Acc
126	**AnInp 2 Gain**		Float	0	-	-	RW

Analog input 2 gain.

Par	Description	[unit]	Type	Def	Min	Max	Acc
130	**An Out 1**		Short	--	-2048	2047	R

Analog output 1 status.

Par	Description	[unit]	Type	Def	Min	Max	Acc
132	**AnOut1 Offset**		Short	0	-	-	RW

Analog output 1 offset.

Par	Description	[unit]	Type	Def	Min	Max	Acc
134	**AnOut 1 Gain**		Float	0	-	-	RW

Analog output 1 gain.

Fieldbus

The parameters of this menu configure data exchange via one of the available fieldbus interfaces, which can be enabled separately. The system can only be controlled by one protocol.

Process data up to a maximum of 44 input words and 44 output words can be read and written and the protocol's specific configuration channel can be used to access the other parameters.

The time required to exchange process data depends on the protocol and parameter:

- with the integrated CANopen interface, parameters with the same internal and external type are managed in Task Slow, thus with a minimum cycle time that depends on parameter 3 "Slow period";
- with the RTE expansion card, parameters with the same internal and external type are managed in Task Fast, with a minimum cycle time of 250 us;
- parameters where the external and internal type differ are always updated in background, in times that depend on the CPU instant load, thus with a minimum cycle that is not guaranteed.

Process parameters are configured in the **M2S** (input data, written by the PLC to the **AXV300**) and **S2M** (output data, read by the PLC) sub-menus.

Each of the 44 channels available enable one of the AXV300 parameters to be assigned to the process area of the fieldbus, in the order given by the channel number. It is important to remember than each channel represents a parameter, the length of which can be one or two words (float or int type), which also defines the occupation of the process area.

The maximum number of channels that are configurable in each direction depends on the sum of the words used by the parameters, with a maximum size of 44 words.

The system also requires the words that are exchanged to be divided into sub-groups of 4. The use of a 32-bit parameter (float or int) is not allowed in an intermediate position between two groups of 4 words, otherwise an error is generated (code 111 for **M2Sn->dest** and 112 **S2Mn->src**).

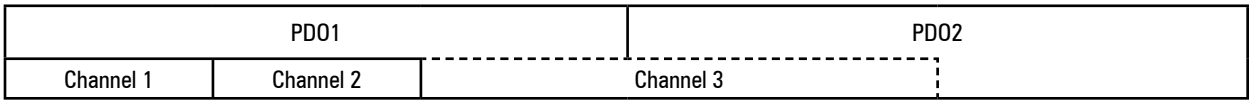
E.g. :

Channel 1 (M->S1) with 16 bits

Channel 2 (M->S2) with 32 bits

Channel 3 (M->S3) with 32 bits

Configuration not valid! The first PDO cannot contain more than 4 words. Channel 3 datum is half way between the first and second PDO.



Channel 1 (M->S1) with 32 bits

Channel 2 (M->S2) with 32 bits

Channel 3 (M->S3) with 16 bits

Configuration valid. Channels 1 and 2 occupy the first PDO, channel 3 occupies part of the second.

The parameters in the **Fieldbus** menu and sub-menus **M2S** and **S2M** are only processed at system start-up. Any changes must be saved and the system rebooted (or reset) to enable the new parameters.

Par	Description	[unit]	Type	Def	Min	Max	Acc
140	**Fb Type**		Enum	Off	-	-	RW*

Fieldbus type

Values allowed:

0 = Off

2= CANopen

4 = RTE

Par	Description	[unit]	Type	Def	Min	Max	Acc
141	**Fb Addr**		UShort	1	1	127	RW*

Fieldbus node address

Par	Description	[unit]	Type	Def	Min	Max	Acc
142	**Fb Baud**	Kbit/s	UShort	250	0	12000	RW*

Fieldbus baud rate

Par	Description	[unit]	Type	Def	Min	Max	Acc
143	**Fb State**		Enum	Init	-	-	R*

Fieldbus status:

Values allowed:

1 = init

2 = SafeOp

4 = Stopped

5 = Operational

127 = Pre-operational

Par	Description	[unit]	Type	Def	Min	Max	Acc
145	**Fb Error**		UShort	-	-	-	R

Contains an error code relating to the status of the fieldbus installed. The following codes are common to all the fieldbuses. They occur when the system is re-started and indicate a parameter configuration error in the **Fieldbus**, **M2S** and **S2M** menus. If one of these errors is present the fieldbus is not active.

Code	Description	Actions
2	Wrong assign M2S	M2Sn->sys wrong selection
3	Wrong assign S2M	S2Mn->sys wrong selection
4	No IPA Rx	M2Sn->dest parameter not found
5	No IPA Tx	S2Mn->src parameter not found
6	Wrong format RX	M2Sn->dest wrong parameter type
7	Wrong format TX	S2Mn->src wrong parameter type
8	RX area is full	More than 44 words mapped in M2S
9	TX area is full	More than 44 words mapped in S2M
10	RX is readonly	M2Sn->dest parameter is not writable
12	RX not available	M2Sn->dest parameter not available
13	TX not available	S2Mn->src parameter not available
111	RX wrong PDO mapping	M2Sn->dest does not fit in PDO
112	TX wrong PDO mapping	S2Mn->src does not fit in PDO

Par	Description	[unit]	Type	Def	Min	Max	Acc
147	**RTE Protocol**		Enum	-	-	-	R

Type of Real-Time Ethernet Protocol.

Values allowed:

0 = None

1= Ethercat

2 =EthernetIp

3=GdNet

4=Profinet

5=ModbusTCP

6=Powerlink

Fieldbus \ M2S

Par	Description	[unit]	Type	Def	Min	Max	Acc
400	**M->S1 sys**		Enum	Not assigned	-	-	RW
401	**M->S2 sys**		Enum	Not assigned	-	-	RW
402	**M->S3 sys**		Enum	Not assigned	-	-	RW
403	**M->S4 sys**		Enum	Not assigned	-	-	RW
404	**M->S5 sys**		Enum	Not assigned	-	-	RW
405	**M->S6 sys**		Enum	Not assigned	-	-	RW
406	**M->S7 sys**		Enum	Not assigned	-	-	RW
407	**M->S8 sys**		Enum	Not assigned	-	-	RW
408	**M->S9 sys**		Enum	Not assigned	-	-	RW
409	**M->S10 sys**		Enum	Not assigned	-	-	RW
410	**M->S11 sys**		Enum	Not assigned	-	-	RW
411	**M->S12 sys**		Enum	Not assigned	-	-	RW
412	**M->S13 sys**		Enum	Not assigned	-	-	RW
413	**M->S14 sys**		Enum	Not assigned	-	-	RW
414	**M->S15 sys**		Enum	Not assigned	-	-	RW
415	**M->S16 sys**		Enum	Not assigned	-	-	RW
416	**M->S17 sys**		Enum	Not assigned	-	-	RW
417	**M->S18 sys**		Enum	Not assigned	-	-	RW
418	**M->S19 sys**		Enum	Not assigned	-	-	RW
419	**M->S20 sys**		Enum	Not assigned	-	-	RW
420	**M->S21 sys**		Enum	Not assigned	-	-	RW
421	**M->S22 sys**		Enum	Not assigned	-	-	RW
422	**M->S23 sys**		Enum	Not assigned	-	-	RW
423	**M->S24 sys**		Enum	Not assigned	-	-	RW
424	**M->S25 sys**		Enum	Not assigned	-	-	RW
425	**M->S26 sys**		Enum	Not assigned	-	-	RW
426	**M->S27 sys**		Enum	Not assigned	-	-	RW
427	**M->S28 sys**		Enum	Not assigned	-	-	RW
428	**M->S29 sys**		Enum	Not assigned	-	-	RW
429	**M->S30 sys**		Enum	Not assigned	-	-	RW
430	**M->S31 sys**		Enum	Not assigned	-	-	RW
431	**M->S32 sys**		Enum	Not assigned	-	-	RW
432	**M->S33 sys**		Enum	Not assigned	-	-	RW
433	**M->S34 sys**		Enum	Not assigned	-	-	RW
434	**M->S35 sys**		Enum	Not assigned	-	-	RW
435	**M->S36 sys**		Enum	Not assigned	-	-	RW
436	**M->S37 sys**		Enum	Not assigned	-	-	RW
437	**M->S38 sys**		Enum	Not assigned	-	-	RW
438	**M->S39 sys**		Enum	Not assigned	-	-	RW
439	**M->S40 sys**		Enum	Not assigned	-	-	RW
440	**M->S41 sys**		Enum	Not assigned	-	-	RW
441	**M->S42 sys**		Enum	Not assigned	-	-	RW
442	**M->S43 sys**		Enum	Not assigned	-	-	RW
443	**M->S44 sys**		Enum	Not assigned	-	-	RW

Setting of the assignment of the channel to the process area, selected from the following list:

0 = Not Assigned The channel is not assigned, nor are any subsequent ones (regardless of their assignment). The process area ends with the previous channel.

1 = Assigned The channel is included in the process area. The parameter indicated by the value of the corresponding "dest" is exchanged via fieldbus.

2 = Fill word The channel is included in the process area and occupies a 16-bit word but is not associated with any system parameter.

Par	Description	[unit]	Type	Def	Min	Max	Acc
450	**M->S1 dest**		UShort	0	-	-	RW
451	**M->S2 dest**		UShort	0	-	-	RW
452	**M->S3 dest**		UShort	0	-	-	RW
453	**M->S4 dest**		UShort	0	-	-	RW

454	**M->S5 dest**	UShort	0	-	-	RW
455	**M->S6 dest**	UShort	0	-	-	RW
456	**M->S7 dest**	UShort	0	-	-	RW
457	**M->S8 dest**	UShort	0	-	-	RW
458	**M->S9 dest**	UShort	0	-	-	RW
459	**M->S10 dest**	UShort	0	-	-	RW
460	**M->S11 dest**	UShort	0	-	-	RW
461	**M->S12 dest**	UShort	0	-	-	RW
462	**M->S13 dest**	UShort	0	-	-	RW
463	**M->S14 dest**	UShort	0	-	-	RW
464	**M->S15 dest**	UShort	0	-	-	RW
465	**M->S16 dest**	UShort	0	-	-	RW
466	**M->S17 dest**	UShort	0	-	-	RW
467	**M->S18 dest**	UShort	0	-	-	RW
468	**M->S19 dest**	UShort	0	-	-	RW
469	**M->S20 dest**	UShort	0	-	-	RW
470	**M->S21 dest**	UShort	0	-	-	RW
471	**M->S22 dest**	UShort	0	-	-	RW
472	**M->S23 dest**	UShort	0	-	-	RW
473	**M->S24 dest**	UShort	0	-	-	RW
474	**M->S25 dest**	UShort	0	-	-	RW
475	**M->S26 dest**	UShort	0	-	-	RW
476	**M->S27 dest**	UShort	0	-	-	RW
477	**M->S28 dest**	UShort	0	-	-	RW
478	**M->S29 dest**	UShort	0	-	-	RW
479	**M->S30 dest**	UShort	0	-	-	RW
480	**M->S31 dest**	UShort	0	-	-	RW
481	**M->S32 dest**	UShort	0	-	-	RW
482	**M->S33 dest**	UShort	0	-	-	RW
483	**M->S34 dest**	UShort	0	-	-	RW
484	**M->S35 dest**	UShort	0	-	-	RW
485	**M->S36 dest**	UShort	0	-	-	RW
486	**M->S37 dest**	UShort	0	-	-	RW
487	**M->S38 dest**	UShort	0	-	-	RW
488	**M->S39 dest**	UShort	0	-	-	RW
489	**M->S40 dest**	UShort	0	-	-	RW
490	**M->S41 dest**	UShort	0	-	-	RW
491	**M->S42 dest**	UShort	0	-	-	RW
492	**M->S43 dest**	UShort	0	-	-	RW
493	**M->S44 dest**	UShort	0	-	-	RW

Setting of the number of the parameter exchanged in the channel, if the relative "sys" parameter is "Assigned".

Fieldbus \ S2M

Par	Description	[unit]	Type	Def	Min	Max	Acc
500	**S->M1 sys**		UShort	Not assigned	-	-	RW
501	**S->M2 sys**		UShort	Not assigned	-	-	RW
502	**S->M3 sys**		UShort	Not assigned	-	-	RW
503	**S->M4 sys**		UShort	Not assigned	-	-	RW
504	**S->M5 sys**		UShort	Not assigned	-	-	RW
505	**S->M6 sys**		UShort	Not assigned	-	-	RW
506	**S->M7 sys**		UShort	Not assigned	-	-	RW
507	**S->M8 sys**		UShort	Not assigned	-	-	RW
508	**S->M9 sys**		UShort	Not assigned	-	-	RW
509	**S->M10 sys**		UShort	Not assigned	-	-	RW
510	**S->M11 sys**		UShort	Not assigned	-	-	RW
511	**S->M12 sys**		UShort	Not assigned	-	-	RW
512	**S->M13 sys**		UShort	Not assigned	-	-	RW
513	**S->M14 sys**		UShort	Not assigned	-	-	RW

514	**S->M15 sys**		UShort	Not assigned	-	-	RW
515	**S->M16 sys**		UShort	Not assigned	-	-	RW
516	**S->M17 sys**		UShort	Not assigned	-	-	RW
517	**S->M18 sys**		UShort	Not assigned	-	-	RW
518	**S->M19 sys**		UShort	Not assigned	-	-	RW
519	**S->M20 sys**		UShort	Not assigned	-	-	RW
520	**S->M21 sys**		UShort	Not assigned	-	-	RW
521	**S->M22 sys**		UShort	Not assigned	-	-	RW
522	**S->M23 sys**		UShort	Not assigned	-	-	RW
523	**S->M24 sys**		UShort	Not assigned	-	-	RW
524	**S->M25 sys**		UShort	Not assigned	-	-	RW
525	**S->M26 sys**		UShort	Not assigned	-	-	RW
526	**S->M27 sys**		UShort	Not assigned	-	-	RW
527	**S->M28 sys**		UShort	Not assigned	-	-	RW
528	**S->M29 sys**		UShort	Not assigned	-	-	RW
529	**S->M30 sys**		UShort	Not assigned	-	-	RW
530	**S->M31 sys**		UShort	Not assigned	-	-	RW
531	**S->M32 sys**		UShort	Not assigned	-	-	RW
532	**S->M33 sys**		UShort	Not assigned	-	-	RW
533	**S->M34 sys**		UShort	Not assigned	-	-	RW
534	**S->M35 sys**		UShort	Not assigned	-	-	RW
535	**S->M36 sys**		UShort	Not assigned	-	-	RW
536	**S->M37 sys**		UShort	Not assigned	-	-	RW
537	**S->M38 sys**		UShort	Not assigned	-	-	RW
538	**S->M39 sys**		UShort	Not assigned	-	-	RW
539	**S->M40 sys**		UShort	Not assigned	-	-	RW
540	**S->M41 sys**		UShort	Not assigned	-	-	RW
541	**S->M42 sys**		UShort	Not assigned	-	-	RW
542	**S->M43 sys**		UShort	Not assigned	-	-	RW
543	**S->M44 sys**		UShort	Not assigned	-	-	RW

Setting of the assignment of the channel to the process area, selected from the following list:

0 = Not Assigned	The channel is not assigned, nor are any subsequent ones (regardless of their assignment). The process area ends with the previous channel.
1 = Assigned	The channel is included in the process area. The parameter indicated by the value of the corresponding "src" is exchanged via fieldbus.
2 = Fill word	The channel is included in the process area and occupies a 16-bit word but is not associated with any system parameter.

Par	Description	[unit]	Type	Def	Min	Max	Acc
550	**S->M1 src**		UShort	0	-	-	RW
551	**S->M2 src**		UShort	0	-	-	RW
552	**S->M3 src**		UShort	0	-	-	RW
553	**S->M4 src**		UShort	0	-	-	RW
554	**S->M5 src**		UShort	0	-	-	RW
555	**S->M6 src**		UShort	0	-	-	RW
556	**S->M7 src**		UShort	0	-	-	RW
557	**S->M8 src**		UShort	0	-	-	RW
558	**S->M9 src**		UShort	0	-	-	RW
559	**S->M10 src**		UShort	0	-	-	RW
560	**S->M11 src**		UShort	0	-	-	RW
561	**S->M12 src**		UShort	0	-	-	RW
562	**S->M13 src**		UShort	0	-	-	RW
563	**S->M14 src**		UShort	0	-	-	RW
564	**S->M15 src**		UShort	0	-	-	RW
565	**S->M16 src**		UShort	0	-	-	RW
566	**S->M17 src**		UShort	0	-	-	RW
567	**S->M18 src**		UShort	0	-	-	RW
568	**S->M19 src**		UShort	0	-	-	RW
569	**S->M20 src**		UShort	0	-	-	RW
570	**S->M21 src**		UShort	0	-	-	RW
571	**S->M22 src**		UShort	0	-	-	RW
572	**S->M23 src**		UShort	0	-	-	RW

573	**S->M24 src**	UShort	0	-	-	RW
574	**S->M25 src**	UShort	0	-	-	RW
575	**S->M26 src**	UShort	0	-	-	RW
576	**S->M27 src**	UShort	0	-	-	RW
577	**S->M28 src**	UShort	0	-	-	RW
578	**S->M29 src**	UShort	0	-	-	RW
579	**S->M30 src**	UShort	0	-	-	RW
580	**S->M31 src**	UShort	0	-	-	RW
581	**S->M32 src**	UShort	0	-	-	RW
582	**S->M33 src**	UShort	0	-	-	RW
583	**S->M34 src**	UShort	0	-	-	RW
584	**S->M35 src**	UShort	0	-	-	RW
585	**S->M36 src**	UShort	0	-	-	RW
586	**S->M37 src**	UShort	0	-	-	RW
587	**S->M38 src**	UShort	0	-	-	RW
588	**S->M39 src**	UShort	0	-	-	RW
589	**S->M40 src**	UShort	0	-	-	RW
590	**S->M41 src**	UShort	0	-	-	RW
591	**S->M42 src**	UShort	0	-	-	RW
592	**S->M43 src**	UShort	0	-	-	RW
593	**S->M44 src**	UShort	0	-	-	RW

Setting of the number of the parameter exchanged in the channel, if the relative "sys" parameter is "Assigned".

Tuning

This menu contains the parameters for using the Tuning functions:

- Phasing
- TestGenerator Speed and Current
- Speed

This menu also contains the **Application Sel** parameter (IPA 50000) which can be used to select the application to be executed by the **AXV300 CU** module.

If Mdplc, it executes the application that has been loaded.

Otherwise it executes one of the Tuning functions.

The Tuning functions use the parameters in the Tuning menu and in the application-specific sub-menu.

The Tuning functions move one axis at a time to enable commissioning (see chapter **"15 - AXV300 system start-up procedure" on page 154**).

Par	Description	[unit]	Type	Def	Min	Max	Acc
600	**Application Sel**		Enum	Mdplc	-	-	RW*

Selection of the application to be executed.

Values allowed:

0 = Null
1 = Mdplc
2 = Phasing
3 = Speed
4 = TestGenCur
5 = TestGenSpd

Par	Description	[unit]	Type	Def	Min	Max	Acc
602	**Appl Drive Sel**		Short	0	0	7	RW*

Drive selected for firmware application.

Par	Description	[unit]	Type	Def	Min	Max	Acc
606	**Appl FullScaleSpd**	rpm	Float	1500	0.0	120000	RW

Speed corresponding to 10 V of the analog input for Tuning operations.

This value is also used as the maximum value allowed.

Par	Description	[unit]	Type	Def	Min	Max	Acc
608	**Appl FullScaleCur**	Arms	Float	5.0	0.0	0	RW

Current corresponding to 10 V of the analog input for Tuning operations.

This value is also used as the maximum value allowed.

Tuning \ Phasing

See section **"15.3.1. Phasing Procedure" on page 155**.

Par	Description	[unit]	Type	Def	Min	Max	Acc
620	**Phasing Speed**	rpm	Float	5.0	0.0	100	RW

Speed used during the phasing procedure.

Tuning \ Test Generator

Par	Description	[unit]	Type	Def	Min	Max	Acc
660	**TestGenType**		Enum	--	0.0	0	R

Selection of the test generator type.

Values allowed:

0 = Speed

1 = Current

Par	Description	[unit]	Type	Def	Min	Max	Acc
662	**TestGen Per**	ms	Float	500.0	8	60000	RW

Test generator period in mSec.

Par	Description	[unit]	Type	Def	Min	Max	Acc
664	**TestGen Hi Ref**	%	Float	20.0	-100	100	RW

High reference for test generator in perc.

Par	Description	[unit]	Type	Def	Min	Max	Acc
666	**TestGen Lo Ref**	%	Float	0.0	-100	100	RW

Low reference for test generator in perc.

Tuning \ Speed

Par	Description	[unit]	Type	Def	Min	Max	Acc
680	**Speed Ramp Time**	S	Float	1	-	-	RW

Time of the output ramp up to **Appl FullScaleSpd**, PAR 50006.

Par	Description	[unit]	Type	Def	Min	Max	Acc
682	**Speed En AnaInp**		Boolean	Off	-	-	RW

Enabling of analog input 1 output reference.

Par	Description	[unit]	Type	Def	Min	Max	Acc
684	**Speed Speed ref**	rpm	Float	100.0	-	-	RW

Speed reference.

Par	Description	[unit]	Type	Def	Min	Max	Acc
686	**Speed Ana Spd Filt**	ms	Float	1	1	1000	RW

Time constant of the filter on the analog speed reference.

Drives Fw update

See **"Appendix C – Axis module firmware update by CU module" on page 236**

Par	Description	[unit]	Type	Def	Min	Max	Acc
830	**DSP upg run**		Boolean	Off	-	-	RW

Start DSP firmware update..

Par	Description	[unit]	Type	Def	Min	Max	Acc
890	**FW upg idx**		Unsignedint	255	-	-	RW

Drive address for firmware update.

The 255 default value is used to make sure the user sets the correct drive index (values 0..7).

Par	Description	[unit]	Type	Def	Min	Max	Acc
891	**FW upg phase**		Enum	-	-	-	R

DSP firmware update phase.

Values allowed:

0=Idle

1= enter DSP boot

2= Erase DSP Flash

3= DSP Flash Program

4= DSP reset

5= Upgrade Completed

6= Error

Par	Description	[unit]	Type	Def	Min	Max	Acc
892	**FW upgrade errcode**		Enum	-	-	-	R

DSP firmware update error code.

Values allowed:

0= No err

1= Invalid Drive Address

2= Drive Boot error

3= Flash Erase error

4= Flash Program error

5= Drive Reset error

Par	Description	[unit]	Type	Def	Min	Max	Acc
893	**FW upg mem addr**		Unsignedint	-	-	-	R

DSP firmware update memory address.

Par	Description	[unit]	Type	Def	Min	Max	Acc
894	**FwName upg inner**		String4	-	-	-	R

DSP firmware name in the CU module

String that identifies the Axis Control firmware copied in the AXV300 CU module.

Par	Description	[unit]	Type	Def	Min	Max	Acc
896	**FWRel upg inner**		Float	-	-	-	R

Axis Control firmware revision copied in the AXV300 CU module.

Application

The Speed-Torque application parameters are described (see paragraph **"15.3.5. Operation of all axes: Speed-Torque application" on page 157**).

Application \ Drive 0
Application \ Drive 1
Application \ Drive 2
Application \ Drive 3
Application \ Drive 4
Application \ Drive 5
Application \ Drive 6
Application \ Drive 7

Par	Description	[unit]	Type	Def	Min	Max	Acc
10000	**Drv0_FullScaleSpeed**	rpm	Float	1500	-	-	RW
10002	**Drv1_FullScaleSpeed**	rpm	Float	1500	-	-	RW
10004	**Drv2_FullScaleSpeed**	rpm	Float	1500	-	-	RW
10006	**Drv3_FullScaleSpeed**	rpm	Float	1500	-	-	RW
10008	**Drv4_FullScaleSpeed**	rpm	Float	1500	-	-	RW
10010	**Drv5_FullScaleSpeed**	rpm	Float	1500	-	-	RW
10012	**Drv6_FullScaleSpeed**	rpm	Float	1500	-	-	RW
10014	**Drv7_FullScaleSpeed**	rpm	Float	1500	-	-	RW

Speed with 10 V on analog input.

Par	Description	[unit]	Type	Def	Min	Max	Acc
10016	**Drv0_SpeedRampTime**	s	Float	0.1	-	-	RW
10018	**Drv1_SpeedRampTime**	s	Float	0.1	-	-	RW
10020	**Drv2_SpeedRampTime**	s	Float	0.1	-	-	RW
10022	**Drv3_SpeedRampTime**	s	Float	0.1	-	-	RW
10024	**Drv4_SpeedRampTime**	s	Float	0.1	-	-	RW
10026	**Drv5_SpeedRampTime**	s	Float	0.1	-	-	RW
10028	**Drv6_SpeedRampTime**	s	Float	0.1	-	-	RW
10030	**Drv7_SpeedRampTime**	s	Float	0.1	-	-	RW

Ramp time for **DrvX_FullScaleSpeed**, PAR 10000 ... 10014.

Par	Description	[unit]	Type	Def	Min	Max	Acc
10032	**Drv0_SpeedSpdRef**	rpm	Float	0.0	-	-	RW
10034	**Drv1_SpeedSpdRef**	rpm	Float	0.0	-	-	RW
10036	**Drv2_SpeedSpdRef**	rpm	Float	0.0	-	-	RW
10038	**Drv3_SpeedSpdRef**	rpm	Float	0.0	-	-	RW
10040	**Drv4_SpeedSpdRef**	rpm	Float	0.0	-	-	RW
10042	**Drv5_SpeedSpdRef**	rpm	Float	0.0	-	-	RW
10044	**Drv6_SpeedSpdRef**	rpm	Float	0.0	-	-	RW
10046	**Drv7_SpeedSpdRef**	rpm	Float	0.0	-	-	RW

Speed reference.

Par	Description	[unit]	Type	Def	Min	Max	Acc
10048	**Drv0_EnableSrc**		Enum	Dig. Inp 0	-	-	RW
10050	**Drv1_EnableSrc**		Enum	Dig. Inp 0	-	-	RW
10052	**Drv2_EnableSrc**		Enum	Dig. Inp 0	-	-	RW
10054	**Drv3_EnableSrc**		Enum	Dig. Inp 0	-	-	RW
10056	**Drv4_EnableSrc**		Enum	Dig. Inp 0	-	-	RW

10058	**Drv5_EnableSrc**	Enum	Dig. Inp 0	-	-	RW
10060	**Drv6_EnableSrc**	Enum	Dig. Inp 0	-	-	RW
10062	**Drv7_EnableSrc**	Enum	Dig. Inp 0	-	-	RW

Enable drive X command source.

0=Dig Inp 0
1=Dig Inp 1
2=DigInp 2
3=DigInp 3
4=Off

Par	Description	[unit]	Type	Def	Min	Max	Acc
10056	**Drv0_StartSrc**		Enum	Dig. Inp10	-	-	RW
10057	**Drv1_StartSrc**		Enum	Dig. Inp10	-	-	RW
10058	**Drv2_StartSrc**		Enum	Dig. Inp10	-	-	RW
10059	**Drv3_StartSrc**		Enum	Dig. Inp10	-	-	RW
10060	**Drv4_StartSrc**		Enum	Dig. Inp10	-	-	RW
10061	**Drv5_StartSrc**		Enum	Dig. Inp10	-	-	RW
10062	**Drv6_StartSrc**		Enum	Dig. Inp10	-	-	RW
10063	**Drv7_StartSrc**		Enum	Dig. Inp10	-	-	RW

Start drive X command source.

0=Dig Inp 0
1=Dig Inp 1
2=DigInp 2
3=DigInp 3
4=Off

Par	Description	[unit]	Type	Def	Min	Max	Acc
10064	**Drv0_Speed Src**		Enum	An. Inp 1	-	-	RW
10065	**Drv1_Speed Src**		Enum	An. Inp 1	-	-	RW
10066	**Drv2_Speed Src**		Enum	An. Inp 1	-	-	RW
10067	**Drv3_Speed Src**		Enum	An. Inp 1	-	-	RW
10068	**Drv4_Speed Src**		Enum	An. Inp 1	-	-	RW
10069	**Drv5_Speed Src**		Enum	An. Inp 1	-	-	RW
10070	**Drv6_Speed Src**		Enum	An. Inp 1	-	-	RW
10071	**Drv7_Speed Src**		Enum	An. Inp 1	-	-	RW

Speed reference source.

0=An Inp 1
1=An Inp 2
2=Parameter

Par	Description	[unit]	Type	Def	Min	Max	Acc
10072	**Drv0_CurrLim Src**		Enum	An. Inp 2	-	-	RW
10073	**Drv1_CurrLim Src**		Enum	An. Inp 2	-	-	RW
10074	**Drv2_CurrLim Src**		Enum	An. Inp 2	-	-	RW
10075	**Drv3_CurrLim Src**		Enum	An. Inp 2	-	-	RW
10076	**Drv4_CurrLim Src**		Enum	An. Inp 2	-	-	RW
10077	**Drv5_CurrLim Src**		Enum	An. Inp 2	-	-	RW
10078	**Drv6_CurrLim Src**		Enum	An. Inp 2	-	-	RW
10079	**Drv7_CurrLim Src**		Enum	An. Inp 2	-	-	RW

Current limit source.

0=An Inp 1
1=An Inp 2
2=Parameter

Par	Description	[unit]	Type	Def	Min	Max	Acc
10080	**Drv0_CurrLimRef**	Arms	Float	1.0	-	-	RW
10082	**Drv1_CurrLimRef**	Arms	Float	1.0	-	-	RW
10084	**Drv2_CurrLimRef**	Arms	Float	1.0	-	-	RW

10086	**Drv3_CurrLimRef**	Arms	Float	1.0	-	-	RW
10088	**Drv4_CurrLimRef**	Arms	Float	1.0	-	-	RW
10090	**Drv5_CurrLimRef**	Arms	Float	1.0	-	-	RW
10092	**Drv6_CurrLimRef**	Arms	Float	1.0	-	-	RW
10094	**Drv7_CurrLimRef**	Arms	Float	1.0	-	-	RW

Torque current limit corresponding to 10 V analog input.

Application \ Miscellaneus

Par	Description	[unit]	Type	Def	Min	Max	Acc
10096	**Drv_ResetAlarm**		Enum	Dig. Inp.3	-	-	RW

Reset Alarms.

0=Dig Inp 0
1=Dig Inp 1
2=DigInp 2
3=DigInp 3
4=Off

Par	Description	[unit]	Type	Def	Min	Max	Acc
10097	**AnOut_Src**		Enum	Off	-	-	RW

Configuration of analog output

0=Off
1=Drv0 Motor speed
2=Drv0 Out Current
3=Drv1 Motor speed
4=Drv1 Out Current
5=Drv2 Motor speed
6=Drv2 Out Current
7=Drv3 Motor speed
8=Drv3 Out Current
9=Drv4 Motor speed
10=Drv4 Out Current
11=Drv5 Motor speed
12=Drv5 Out Current
13=Drv6 Motor speed
14=Drv6 Out Current
15=Drv7 Motor speed
16=Drv7 Out Current

Error showed via	See section
AXV300 Axis module	
Parameter	**"Drives \ Drive 0 \ Alarms" on page 181**
AXV300 CU module	
Led	**"7.5.1. Indicator LEDs" on page 74**
Parameter	**"Monitor \ System" on page 200**
AXV300 CU with encoder module	**"Monitor \ AuxEncoder" a pagina 202**
Fielbus (CANopen / RTE)	See "Fb Error" parameter on **"Fieldbus" on page 209** menu.
AXV300 SM module	
Led	**"4.4. Indicator LEDs" on page 35**
"Pre Alarm" and "Cont" signals on P2 terminal.	**"10.6. Power-on, Power-off and Reset Supply Module Alarms Sequences" on page 113**
AXV300 AFE-SR module	
Led	**"5.4. Indicator LEDs, Display and Reset Button" on page 46**
"Pre Alarm" and "Cont" signals on P2 terminal.	**"10.6. Power-on, Power-off and Reset Supply Module Alarms Sequences" on page 113**
Display	Vedere **"10.3.3. Static operation" on page 109**

18.1. Care

AXV300 modules must be installed in accordance with the assembly instructions. No other particular care is required. Never use a wet or damp cloth to clean the modules. Disconnect the device from the mains before cleaning.

18.2. Assistance

Two weeks after initial start-up, tighten the screws on all the terminals on the device. Repeat this operation once a year.

If devices are stored for more than three years this could undermine the efficiency of the intermediate circuit capacitors. Before commissioning devices stored for such a long time, we recommend powering the drives for at least two hours to enable the capacitors to recover their original characteristics.

Do this by applying input voltage **without an output load**.

At the end of this procedure the device can be installed with no limitations.

18.3. Repairs

Modules should only be repaired by qualified technicians (recommended by the manufacturer).

If repairing a module yourself, please bear in mind the following:

- When ordering spare parts always specify the serial number of the module(s) as well as the type of device. It is also a good idea to specify the type and version of system software.
- When replacing cards, be very careful not to alter the position of any switches and jumpers!.

18.4. Customer Service

If you require assistance, please contact the relative Gefran office.

18.5. Warranty conditions

The warranty is valid from the date of delivery of the Gefran products.

The standard manufacturer’s warranty, included in the price of the product, is valid for 1 year starting from the date of delivery.

At the end of this period the warranty will automatically expire, without the need for notice and no further extension will be available.

GD-Net is a fieldbus developed for high-speed data transfer between sensors/actuators; the communication is established between a central master device (PLC or PC) and the slave devices, e.g. sensors, actuators, drive, etc.

Data are exchanged cyclically; the master reads the data sent by the slave device and writes output data to that slave.

The GD-Net card baud rate, defined according to specifications, is 100 Mbit/s.

The physical support is the Ethernet line; a maximum of 15 slave devices can be connected to the bus.

The address of the GD-Net node is selected using the hardware rotary switch on the front panel.

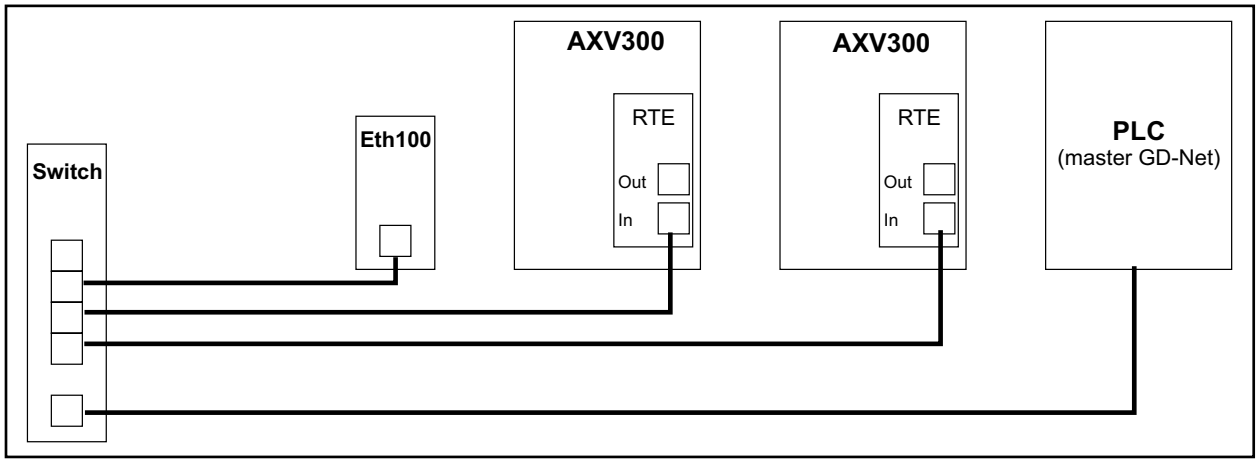


Figure 84: Example of connection in a GD-Net network

Use a standard category 6 shielded Ethernet cable according to TIA/EIA-568A for the bus connection.

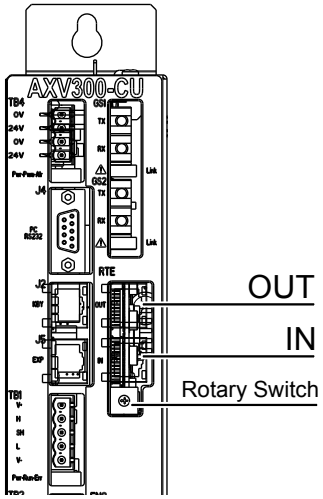


Figure 85: AXV300 CU module, IN-OUT connectors and Rotary switch

"In" connector

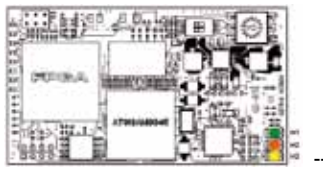
Ethernet network

- standard RJ45 connection
- 16-position rotary switch for node configuration during installation of the system and network:
  0: not connected to the network, not configured
  1...F select node 1…15

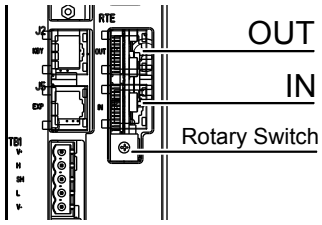
"OUT" connector

Not used by GD-Net, leave disconnected.

Diagnostics



GD-RTE card, internal to the AXV300 CU module (Leds not visible on outside)	
Yellow POWER LED (H3)	On: power supply connected
Green RUN LED (H1)	On: program running
Red FAIL LED (H2)	On: module or system alarm



IN connector (AXV300 CU module)	
Green DATA LED	Flashing: data transfer in progress
Yellow LINK LED	On: the system is online
OUT connector (AXV300 CU module)	
Green DATA LED	Not used by GD-Net.
Yellow LINK LED	

Parameters

Par	Description	[unit]	Type	Def	Min	Max	Acc

140 Fb Type"

This allows you to choose whether to use the RTE card installed.

None	card not enabled.
RTE	communication with GD-Net enabled.

Par	Description	[unit]	Type	Def	Min	Max	Acc

143 Fb State

Status of communication with GD-Net.

Stop, Init	Configuration error or card fault.
Pre-Operational	Communication has not started, check connection, configuration and faults on master.
SafeOP	Communication down.
Operational	Communication enabled, valid process data.

Par	Description	[unit]	Type	Def	Min	Max	Acc

144 Fb Error

Configuration or execution error code.

Code	Description	Action
FF65	Card not present	Verify if card is inserted. Replace card if error cannot be cleared
FF67	SW protocol version not match	Wrong software version on card. Replace with correct card
FF01	System error	Replace card
FF02	Vendor ID error	Replace card
FF10	Card not ready	Replace card
FF20	Write bus error	Replace card
FF30	Read bus error	Replace card

The configuration via the **M2S** and **S2M** sub-menus must be identical to that on the master device, both in terms of parameter number and dimension in words per channel, otherwise the transition to **Operational** is not allowed. Parameters configured in **M2S** correspond to the ODB of the GD-Net master, parameters in **S2M** to the IDB.

Parameters must be organised so as to comply with the division into contiguous groups of 4 words. If a 32-bit parameter is configured in an incorrect position, an error is generated during the configuration phase (111 for **M2Sn->dest** and 112 for **S2Mn->src**), see the example in the **Fieldbus** menu.

In addition to the IDB/ODB process data, the device also supports access via SDO, which allows single sequential read or write requests to be sent to each single parameter, via an “index” that is calculated as follows: index = parameter number + 2000h

(valid for parameters from 1 to 16483, the others are not supported by SDO data exchange).

GD-Net defines the following faults, followed by the meaning for **AXV300** :

- **Type H faults**

X	Y	Description
0	-	No communication between GD-Net node and AXV300 device application SW
1	-	Application SW identification code mismatch
2	-	IPA IDB configuration mismatch
3	-	IPA ODB configuration mismatch

These serious errors, which cannot usually be recovered in run-time, block the device or prevent it from being used.

If at least one type H fault is active, the StatusA and StatusB values are FALSE.

- **Type P faults**

X	Y	Description
0	-	Local errors signalled by the application SW

A firmware or application alarm is active.

If at least one type P fault is active, the CardStatus value is TRUE.

- **Type A faults**

X	Y	Description
0	0	SDO input management errors
0	1	SDO output management errors

These errors are detected in the master device manager. Errors that occur in I/O exchange via SDO do not result in the device being disconnected, the error is simply signalled; the manager that generated the error continues to process the next I/O exchange.

If at least one type P fault is active, the CardStatus value is TRUE.

A.1. EtherCAT

tbd

A.2. EthernetIP

tbd

A.3. CANopen Interface

CANopen is a communication profile for CAL-based industrial systems. The reference document is the CAN-open CAL-Base COMMUNICATION PROFILE for Industrial Systems; CiA Draft Standard 301 Version 3.0. Issue October 1996 by CAN in Automation e. V.

The CAN protocol (ISO 11898) is CAN2.0A with an 11-bit identifier.

The integrated CANopen interface is developed as a “Minimum Capabilty Device”.

The data exchange is cyclic; the Master unit reads the Slave input data and writes the Slave output data.

A.3.1. CANopen Functions

This chapter describes the controlled functions of the CANopen communication profile.

The main features are:

1) The “Minimum Boot-up” is managed; the “Extended Boot-up (CAL)” is not managed.
2) The SYNC function is implemented.
3) The PDO asynchronous assignment and the HeartBeat protocol.
4) The Node Guarding is managed.
5) The emergency message is managed (“EMERGENCY”).
6) The Dynamic ID distribution function (DBT slave) is not managed.
7) A “Pre-Defined Master/Slave connection” is implemented to simplify the Master tasks during the initialization phase. “Inhibit-Times” (in units of 100 uS) can be modified up to a value of 1 min.
8) The high-resolution synchronization is not supported.
9) “TIME STAMP” is not managed.
10) On the access of the structured parameters, the OFFhex option subindex (access to the whole object) is not managed.
11) In order to obtain a higher efficiency level, only the “Expedited” data transfer (max. 4 Bytes) of the SDO services is managed.

A.3.2. Pre-defined Master/Slave Connection

The “Pre-defined Master/Slave connection” allows a peer-to-peer communication between one Master and 127 Slaves; the Broadcast address is zero.

A.3.3. NMT Services (Network Management)

The NMT “mandatory” services are:

- Enter_Pre-Operational_State CS = 128
- Reset_Node CS = 129
- Reset_Communication CS = 130

Being that the “Minimum Boot-up” is used, also the following NMT services are managed:

- Start_Remote_Mode CS = 1
- Stop_Remote_Mode CS = 2

The COB-ID * of an initialization NMT service is always at 0; CS is the Command Specifier defining the NMT service.

A.3.4. Initialisation

The AXV300 system supports the Node Guarding and Heartbeat mechanism. Node Guarding configuration can be performed by the master using elements in the Object Dictionary according to the standard (1006h, 100Ch, 100Dh) and 1016h and 1017h objects for Heartbeat.

When the communication status is Operational, the system runs a timeout control according to the "Guard time"/"Heartbeat time", "Lifetime factor", "Communication cycle period" object settings.

In the default configuration, timeout is assessed by checking that the Node Guarding message (COB-ID 700h+NodeId, see **"Table 18: Timeout control objects" on page 229**) is sent by the master in a time that is not

more than the value of the 100C object multiplied by the Lifetime Factor 100D (default value 300ms). If necessary, use Heartbeat, configure 100C to 0 and specify the frequency of the Heartbeat message in object 1016: timeout is calculated by multiplying this time by the 100D Lifetime factor. In this mode a Heartbeat message can also be generated at the frequency indicated in object 1017.

An additional timeout is then assessed according to the Sync message (COB-ID 80h, see **"Table 18: Timeout control objects" on page 229**): the frequency of this message, indicated in us in object 1006, is multiplied by the LifeTime factor 100D. If necessary, disable the Communication cycle period timeout (for asynchronous network or non-periodic sync), simply by entering a value equal to 0 in object 1006.

Object name	Object index		Default
Communication cycle period	1006	us	64000us
Guard time	100C	ms	100ms
Consumer Heartbeat Time	1016	ms	0ms
Producer Heartbeat Time	1017	ms	0ms
Lifetime factor	100D		3

Table 18: Timeout control objects

A.3.5. Communication Object

This chapter describes the communication objects of the CANopen protocol; they are managed by the interface card. The managed communication objects are:

1) 1 SDO reception Server.
2) 1 SDO transmission Server.
3) 2 reception PDOs.
4) 2 transmission PDOs.
5) 1 Emergency Object.
6) 1 Node Guarding - Life Guarding.
7) 1 SYNC object.

The following table lists the used communication objects with their priority level and the Message Identifier; the “Resulting COB-ID” is obtained by adding the Node-ID (card address) to the number,141 “Fb Addr” parameter.

OBJECT	PRIORITY	MESSAGE ID
1st SDO rx	6	1536 600h+NodeId
1st SDO tx	6	1408 580h+NodeId
1st PDO rx	2	512 200h+NodeId
1st PDO tx	2	384 180h+NodeId
2nd PDO rx	2	768 300h+NodeId
2nd PDO tx	2	640 280h+NodeId
3st PDO rx	2	512 400h+NodeId
3st PDO tx	2	384 380h+NodeId
4th PDO rx	2	768 500h+NodeId
4th PDO tx	2	640 480h+NodeId
5th PDO tx to 11th		COBid defined by the application
5th PDO rx to 11th		COBid defined by the application
EMERGENCY	1	220 80h+NodeId
NODE GUARDING & HB	not used	1792 700h+NodeId
SYNC	0	128 80h

Table 19: Communication Objects

A.3.6. RX PDO Entries

The structure of the PDO Communication Parameter (index 1400h, 1401h) is:

1) Subindex 0 (Number of supported entries) = 2
2) The structure of Subindex 1 (COB-ID used by the PDO) is:
   - Bit 31 (valid/invalid PDO) can be set via SDO.
   - Bit 30 (RTR Remote Transmission Request) = 0 because this function is not supported.
   - Bit 29 = 0 because the 11-bit ID is used (CAN 2.0A).

- Bits 11-28 are not used.
- Bit 0-10 COB-ID (**"Table 19: Communication Objects" on page 229**).

3) Cyclic-synchronous Subindex 2 (Transmission Type), or synchronous according to the master performed setting (1 if SYNC has been foreseen, 254...255 if asynchronous). If not stated, the synchronous mode is active.

TX PDO Entries

The structure of the PDO Communication Parameter (index 1800h, 1801h) is:

1) Subindex 0 (Number of supported entries) = 3
2) The structure of Subindex 1 (COB-ID used by the PDO) is:
   - Bit 31 (valid/invalid PDO) can be set via SDO.
   - Bit 30 (RTR Remote Transmission Request) = 0 because this function is not supported.
   - Bit 29 = 0 because the 11-bit ID is used (CAN 2.0A).
   - Bits 11-28 are not used.
   - Bit 0-10 COB-ID **"Table 19: Communication Objects" on page 229**).
3) Cyclic-synchronous Subindex 2 (Transmission Type), or synchronous according to the master performed setting (1 if SYNC has been foreseen, 254...255 if asynchronous). If not stated, the synchronous mode is active.
4) Inhibit time.

A.3.7. SDO Entries

Only the “Expedited” data transfer mode (max. 4 Bytes) is used.

The structure of the SDO Communication Parameter is:

1) Subindex 0 (Number of supported entries) = 3 because the device is a Server of the SDO service.
2) The structure of the Subindex 1 and 2 (COB-ID used by the SDO) is:
   - Bit 31 (valid/invalid SDO); it is equal to 1 because just the Default SDOs are used.
   - Bit 30 reserved = 0.
   - Bit 29 = 0 because the 11-bit ID is used (CAN 2.0A).
   - Bits 11-28 are not used.
   - Bit 0-10 COB-ID **"Table 19: Communication Objects" on page 229**).

The element “node ID of SDO’s client resp. server” is not supported because just the Default SDOs are used.

A.3.8. COB-ID SYNC Entries

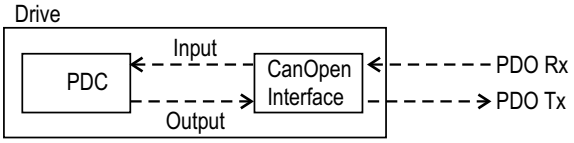
The structure of the 32 bits contained in the COB-ID SYNC communication parameter is:

- Bit 31 = 1 because the CANopen interface card is a “consumer” of SYNC messages.
- Bit 30 = 0 because the interface card does not create SYNC messages.
- Bit 29 = 0 because the 11-bit ID is used (CAN 2.0A).
- Bits 11-28 are not used.
- Bit 0-10 COB-ID (see **"Table 19: Communication Objects" on page 229**).

A.3.9. COB-ID Emergency

The structure of the 32 bits contained in the COB-ID Emergency Message communication parameter is:

- Bit 31 = 0 because the CANopen interface card is not a “consumer” of Emergency messages.
- Bit 30 = 0 because the interface card creates Emergency messages.
- Bit 29 = 0 because the 11-bit ID is used (CAN 2.0A).
- Bits 11-28 are not used.
- Bit 0-10 COB-ID (see **"Table 19: Communication Objects" on page 229**).



A.3.10. SDO Management

The SDO service is always available.

The drive parameters can be accessed via the “MSPA” Manufacturer Specific Profile Area (2000hex< index <5FFFhex).

The index to be shown in the SDO command to access a drive parameter is obtained via the following rules:

SDO index = PAR + 2000h

SDO subindex = 1

The Data field must contain the value of the drive parameter..

Example, using the Speed-Torque application:

Writing of the value 1000 in parameter PAR 10032 “Drv0_SpeedSpdRef” (10032 = 2730hex).

The **AXV300** has the address CANopen = 3

The following information is required:

1) The SDO index obtained with the formula is 2000hex + 2730hex = 4730h
   The sub-index is 0
2) Value to be written 1000.0 float, corresponding to 447A0000 hex.

In case an error occurs during the parameter reading or setting, the CANopen interface sends an Abort domain transfer message; the value of Application-error-codes has the following meanings::

Error class	Error code	(hex)	Error code Additional
6	0	0	Parameter doesn’t exist
8	0	22	Acces failed because of present device state
6	1	2	Read/Write only error
8	0	0	Generic error
6	9	32	Minimum value
6	9	31	Maximum value
5	4	0	SDO time_out
5	4	1	Invalid command
3	9	30	Invalid value

Parameters

Par	Description	[unit]	Type	Def	Min	Max	Acc

140 Fb Type

This allows you to choose whether to use the CANopen interface

None	The CANopen interface is not enabled
CANopen	CANopen communication is enabled

Par	Description	[unit]	Type	Def	Min	Max	Acc

141 Fb Addr

Selection of the node address of the CANopen network

Valid values:	from 0 to 127

Par	Description	[unit]	Type	Def	Min	Max	Acc

142 Fb baud

CANopen network baud rate. Selectable values:

125 kbps

250 kbps

500 kbps

1000 kbps (1Mbps)

Par	Description	[unit]	Type	Def	Min	Max	Acc

143 Fb State

Communication status

Stop

Pre-Operational

Operational Communication enabled, valid process data

Par	Description	[unit]	Type	Def	Min	Max	Acc

144 Fb Error

Configuration or execution error code.

Code	Description	Actions
2	Wrong assign M2S	M2Sn->sys wrong selection
3	Wrong assign S2M	S2Mn->sys wrong selection
4	No IPA Rx	M2Sn->dest parameter not found
5	No IPA Tx	S2Mn->src parameter not found
6	Wrong format RX	M2Sn->dest wrong parameter type
7	Wrong format TX	S2Mn->src wrong parameter type
8	RX area is full	More than 44 words mapped in M2S
9	TX area is full	More than 44 words mapped in S2M
10	RX is readonly	M2Sn->dest parameter is not writable
12	RX not available	M2Sn->dest parameter not available
13	TX not available	S2Mn->src parameter not available
101	Wrong Baudrate	Check 142 “Fb baud” for valid baudrate
102	Wrong Node Number	Check 141 “Fb node” for valid number
109	Bus Off	Hardware error on the CAN line. Check the cabling and terminations
111	RX wrong PDO mapping	M2Sn->dest does not fit in PDO
112	TX wrong PDO mapping	S2Mn->src does not fit in PDO
113	OP Timeout	Node Guarding, Heartbeat or SYNC message from master did not arrive on time. Check the connections and the settings on the master

Appendix B – CU module firmware update

B.1. Foreword

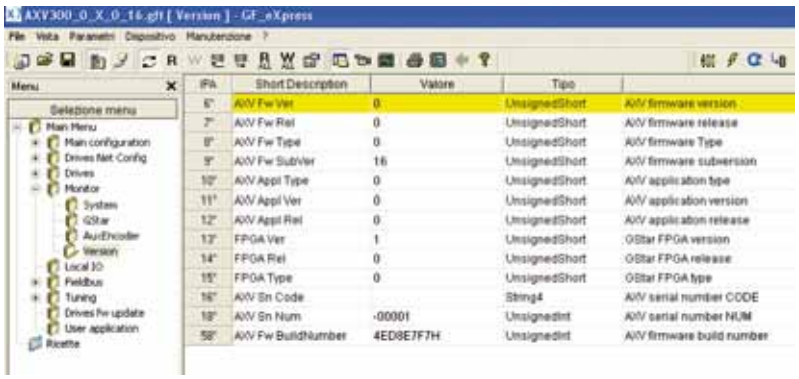
This document describes the steps for programming/updating the **AXV300** CU card firmware.

B.2. Programming files

The **AXV300 CU** module firmware has an *.fl2 extension and is in the GF-eXpress catalogue.

This is copied by sending the GF-eXpress “download firmware” command and following the procedure described in the next paragraph.

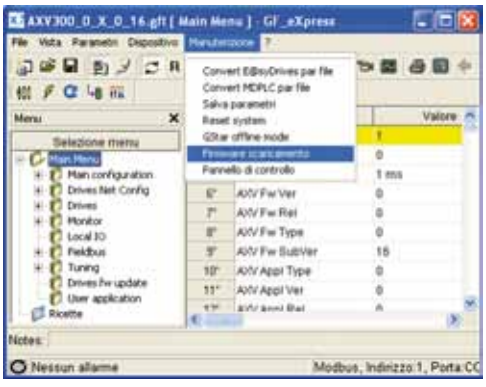
Data about the firmware version on the **AXV300 CU** card can be checked by reading the parameters in the **Monitor/Version** menu:

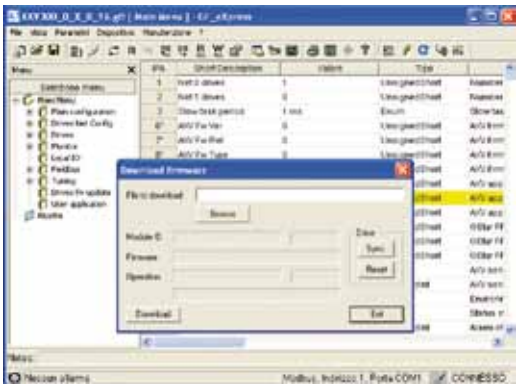


B.3. Procedure

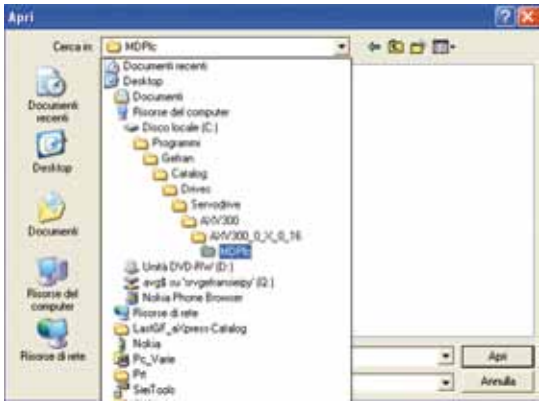
To load the firmware, proceed as follows:

- With GF-eXpress, connect the AXV300 CU via serial port.
- Send the “Service/Download Firmware” command:





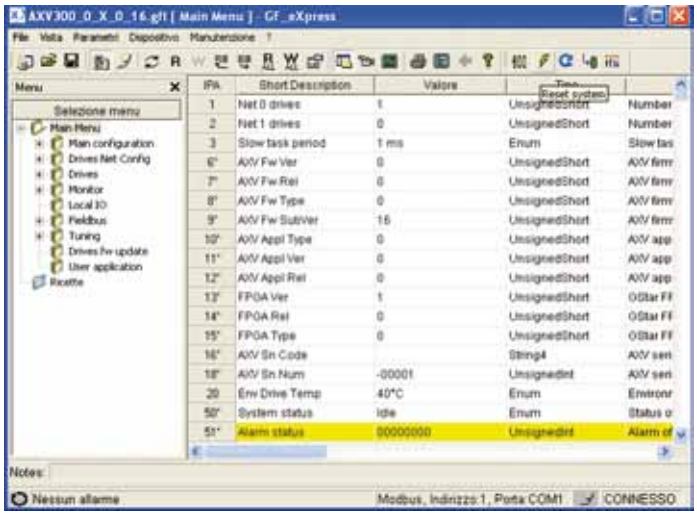
- “Browse”, select the *fl2 file in the appropriate folder:



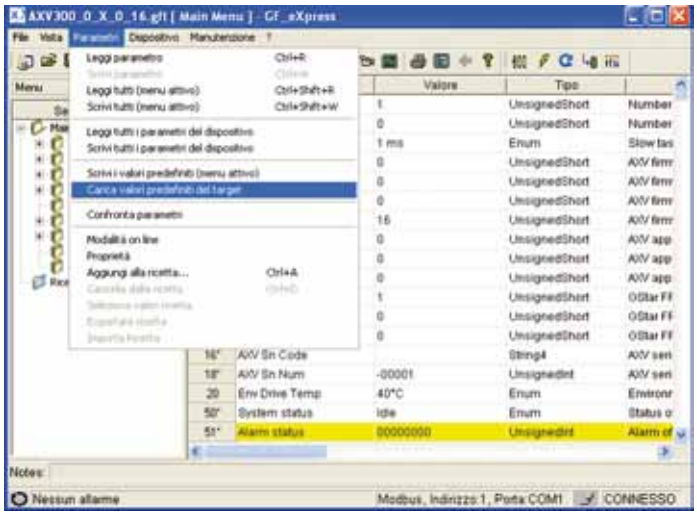
- Send the Download command:

- When downloading is complete confirm with “Loading completed OK”:

- Send a “Reset System” command to launch the new version:

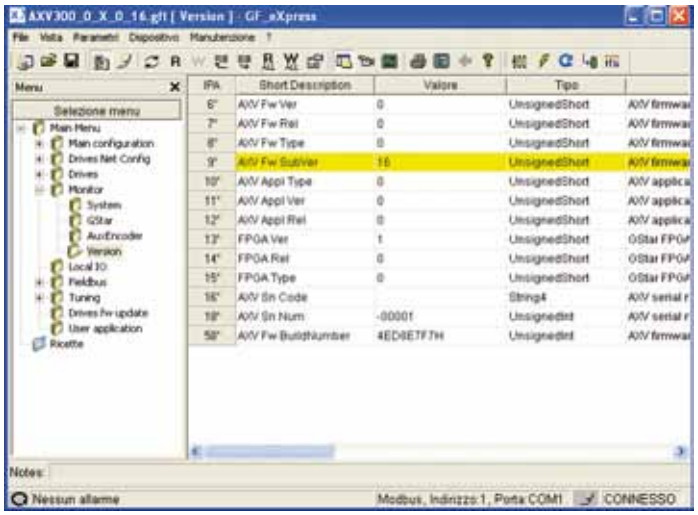


- Send “load predefined values to target”, load factory settings:



- Send “Reset System” to restart the **AXV300** with the new Fw version and factory settings.

- Check the version in the “Monitor/Version” menu:



Appendix C – Axis module firmware update by CU module

C.1. Foreword

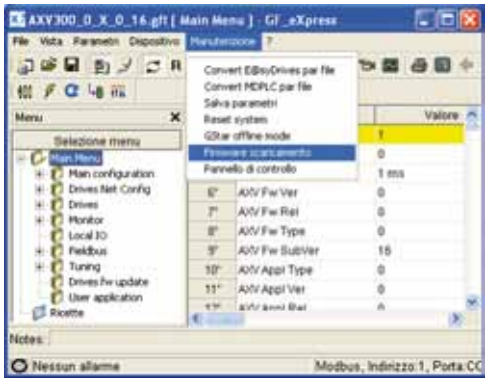
This document describes the steps for programming **AXV300** axis control firmware using the **AXV300 CU** card.

C.2. Programming files

The DSP firmware file has an *.fl2 extension (Es: DSP-BR-vv-rr.fl2).

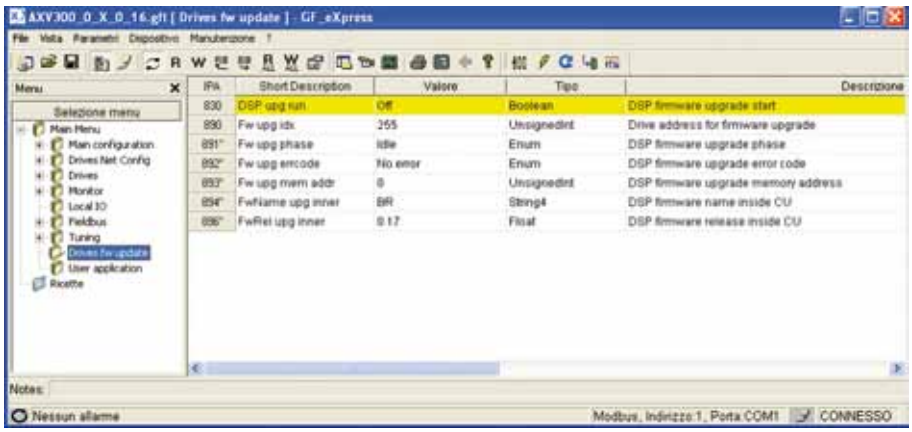
There must be a copy of the DSP firmware in a sector of the flash memory of the **AXV300 CU** card for the card to be used for programming.

This is copied by sending the GF-eXpress “download firmware” command in the same way as the **AXV300 CU** card programming file.



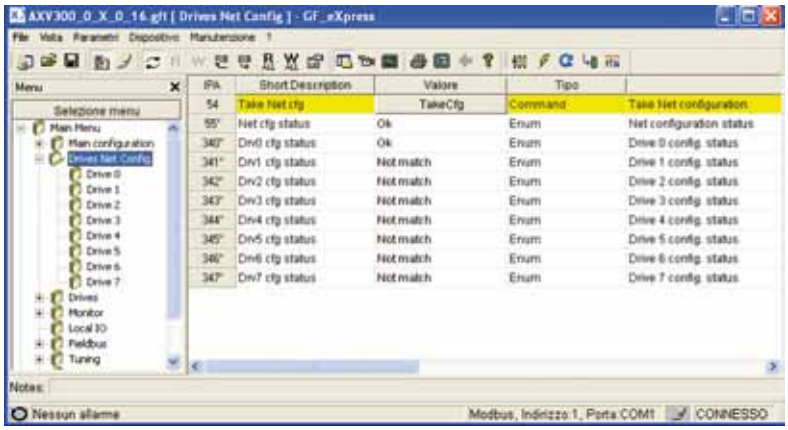
Data about the firmware on the CU card can be checked by reading two monitor parameters.

Example 1:		*Example 2:*
IPA 894 = None	->	IPA 894 = BR (Firmware)
IPA 896 = 0.00	->	IPA 896 = 0.17 (Ver.Rel)
Means there is no copy	->	There is a copy



C.3. Procedure

- Use the configurator to connect the **AXV300 CU** card via serial port.
- Configure la **GStar** network.
- check that communication with the drive is enabled.



- enter the DSP Firmware menu in Service (or Drives Fw Update).
- check in the monitor parameters whether the CU flash memory already contains the DSP firmware
- Download the *.fl2 programming file with the desired DSP firmware in the same way as the Tricore firmware programming file.

  Information about the software is displayed:

  E.g. :

  AXV 1.0

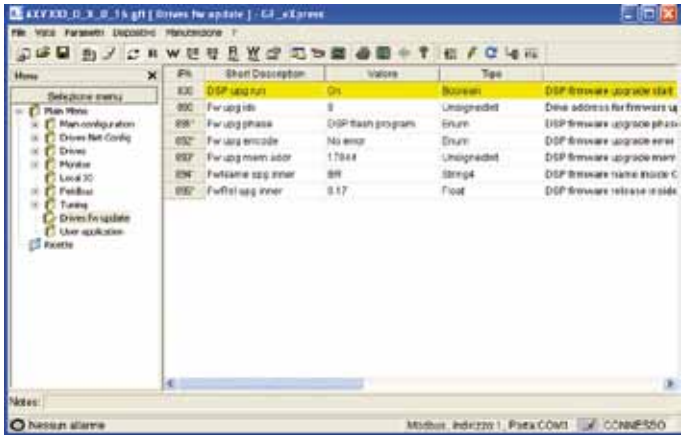
  BR 0.17

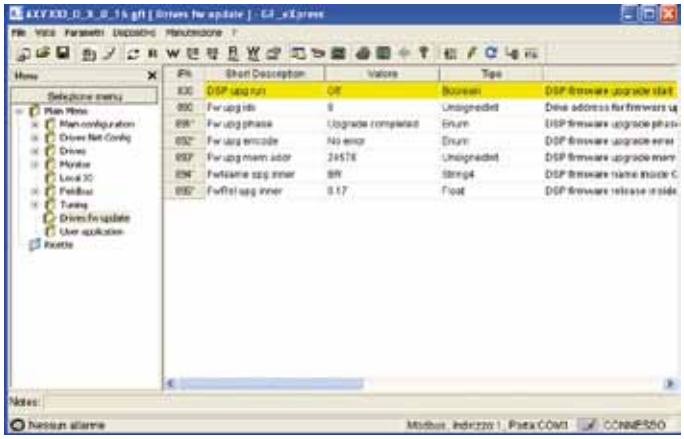
- Check the monitor parameters for the firmware loaded in the flash memory
- Set the index of the drive to be programmed
- Set parameter 65030 (830) “DSP Upg Run” to On.
- Check the programming steps:

  * DSP enter boot

  * DSP Erase Flash

  * DSP Program Flash





* Upgrade Completed

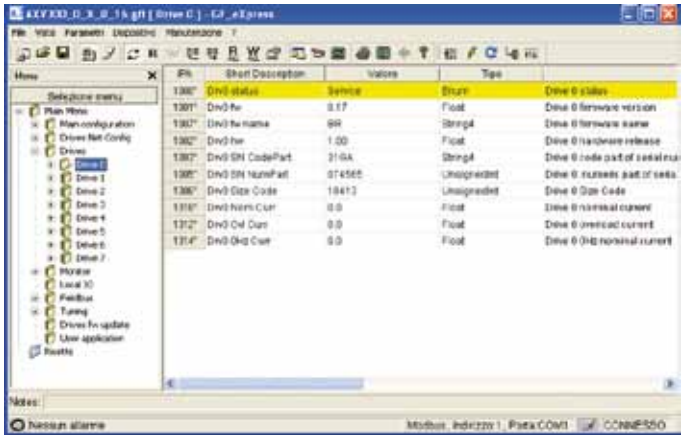
Note: Programming the Flash memory repeatedly interrupts the GSTAR optical link in the single axis output part. The ASV300 system must therefore repeatedly be re-synchronised. The re-synchronisation time for a single drive is very short, but increases if there are several drives. This is normal and means that the DSP programming time increases the higher the position of the drives in the GSTAR network.

E.g. :

Drive 0 is programmed in about ten seconds,

Drive 3 is programmed in just under 1 minute

Drive 4 is like drive 0.



- Check that the axis re-starts and executes the new firmware
- Send a Reset command to the **AXV300 CU**
- check that the Name firmware and drive release are correct.

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