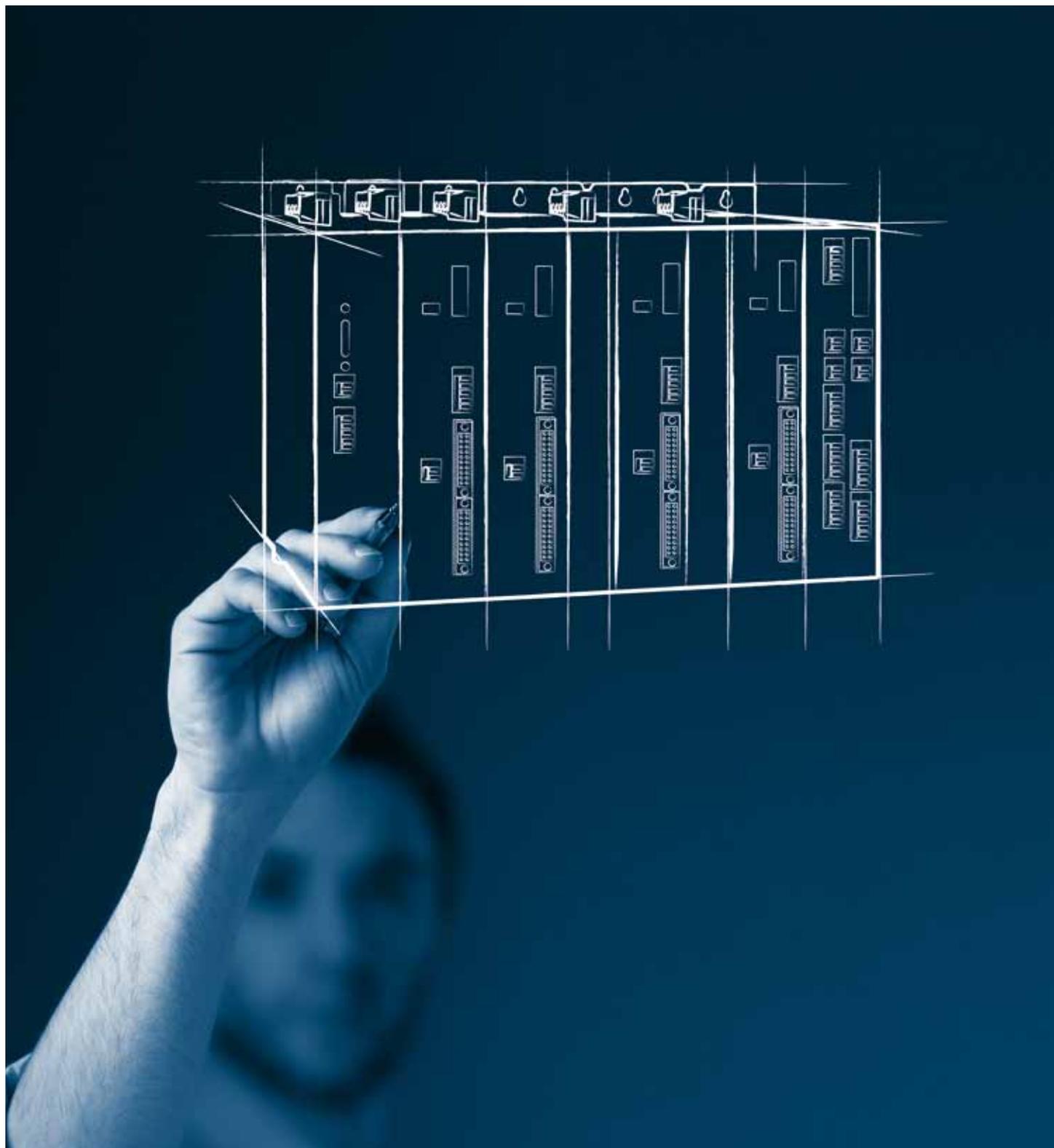


MODULAR SERVODRIVE SYSTEM

SIEIDrive AXV300

GEFRAN





Gefran is a leading manufacturer
of automation components



More than forty-five years of experience, an extensive know-how, a structure precisely geared to our customers' requirements and continued **investment in R&D**, make Gefran a leader in the field of components for automation and industrial process control systems.

Customers know they can always depend on Gefran to provide the best solution for all their needs in terms of sensors, components, automation and motion control.



By working in partnership with **qualified Research Centres and Universities** and continuously **investing in R&D**, the Gefran Group is at the forefront of technology, developing products that anticipate its customers' needs.



Gefran is based in Italy, where it has three engineering and production facilities. The Group has some 800 employees. It is directly present in 12 countries with 7 production plants and a global sales network with more than 70 authorised dealers around the world.

Gefran Spa has been listed on the Milan Stock Exchange since 1998 and has been traded on the Star segment of high requirement shares since 2002.



The **Gefran Drive & Motion Control Unit**, based in Gerezano (Varese, Italy), designs, develops and manufactures **electric drives and power regeneration systems** used to control motors and application systems in the main industrial sectors, including: plastics, civil lift engineering, water treatment and ventilation, as well as control architectures for renewable energy systems.

The AXV300, a complete range of solutions dedicated to the most advanced industrial automation systems, are the fruit of this experience.



The GEFRAN “Modular Servodrive System” range

The next generation ...

The new range of **SIEDrive AXV300** modular drives is the result of over 30 years of experience working with leading automation manufactures.

On and off boards panels have been engineered and **optimised** resulting in an **extremely compact mechanical foot print**.

The **AXV300** offers maximum performance for controlling brushless synchronous and asynchronous motors in **high precision, dynamic applications**.

Thanks to the standard use of Active Front End technology powering each “multi-axis” system by means of a “common DC bus” ensures the Gefran **clean power** formula, of increased dynamic performance with guaranteed **energy efficiency**. Regeneration into the grid also avoids unnecessary energy waste on brake resistors.

With 6 mechanical sizes and rated currents from **5A to 200A** the **AXV300** offers a wide choice of power combinations for up to a total of 120 kW.

Regenerative or AC/DC power supply modules complete the range .

The **AXV300** implements advanced application solutions based on **positioning and interpolation**, structured in IEC 61131-3 programming environments.

Communication via Ethernet or CAN bus enables total integration into the most commonly-used PLC system architectures.

The Speed-Torque application for controlling the speed reference and torque current limit of all 8 axes via I/O is factory-integrated into the **AXV300**.

Certified quality

Quality Management System complies with the requirements of ISO 9001:2008.

**Space optimisation**

A modular structure and power ratings of 3 kW to 120 kW (5-200 Arms) give maximum flexibility in multi-motor applications.

Speed of use

The AXV300 features multi-axis control which makes installation simple, fast and economical with fewer system connections.

Energy efficiency and optimisation

Common axis power supply for reduced energy consumption. Active Front End technology delivers clean power with THD < 3% and a power factor of 1.

High-level performance

For controlling brushless synchronous and asynchronous motors used in application systems characterised by high dynamics, when precision and axis coordination are required.

Integrated IEC 61131-3 environment

Can be programmed using the main standard languages with the powerful MDPLc tool, to develop custom solutions or Gefran proprietary application libraries.

Communication with the main fieldbus systems

System management via the most commonly-used PLC communication environments such as EtherCat, CANopen, GD-Net, ProfiNet, ...



Italian Technology



System Specifications

Power supply	400Vac \pm 10%, 50/60Hz
Performance	
• Current loop closing	16KHz (62,5 μ sec)
• Speed loop closing	4KHz (250 μ sec)
• GStar optical fibre communication with axes	max 8 axes (2 lines x 4 axes) 250 μ Sec cycle
I _{2t} Overload	slow : 150% I _n x 60 sec fast: 200% I _n x 0.5 sec
I _{xT} Overload	200% I _n x 10 sec
Operating temperature	0 ... +40°C; +40°C...+50°C with derating
Protection degree	IP21, IP54 with dedicated tool

Installation position	Pollution degree 2 or lower
Altitude	Max 200 metres above sea level
Atmospheric pressure	[kPa] 86 to 106 (class 3K3 according to EN50178)
Climate	3K3 EN0178
Isolation distance	EN 50178, UL508C
Vibration	EN 60721-3-3 Class 3M1
EMC compatibility	EN61800-3
Certification	CE ; UL cUL _{us} (in progress)

AXV300: modular solution

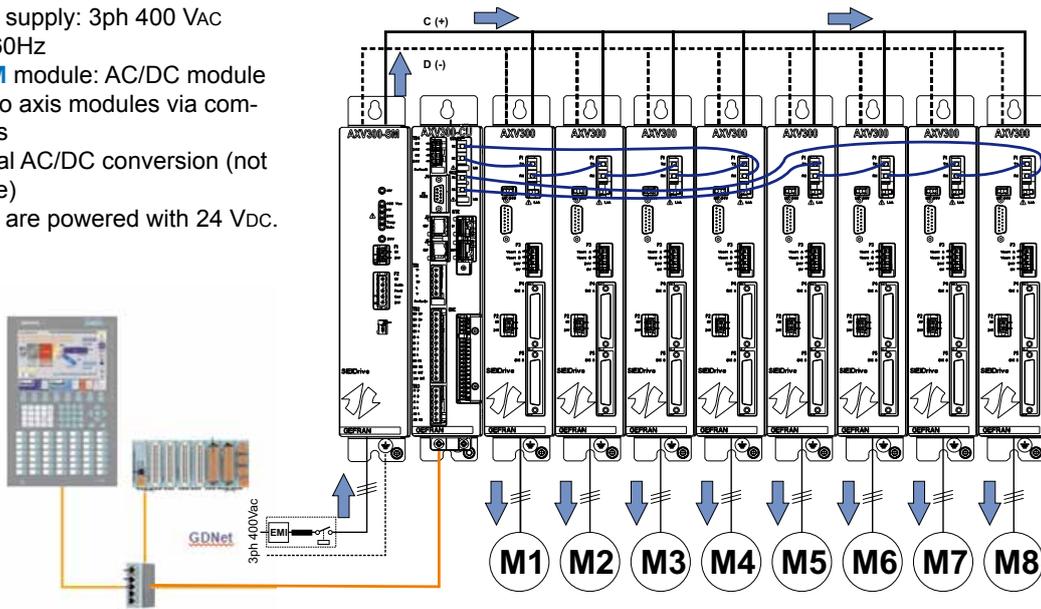
The system features a power supply module and a common DC bus that powers a series of axis modules installed side by side (max. 8 axes).

The axis receives the references and commands from an **AXV300 CU** control module.

The machine control panel exchanges data with the **AXV300 CU** control module via fieldbus.

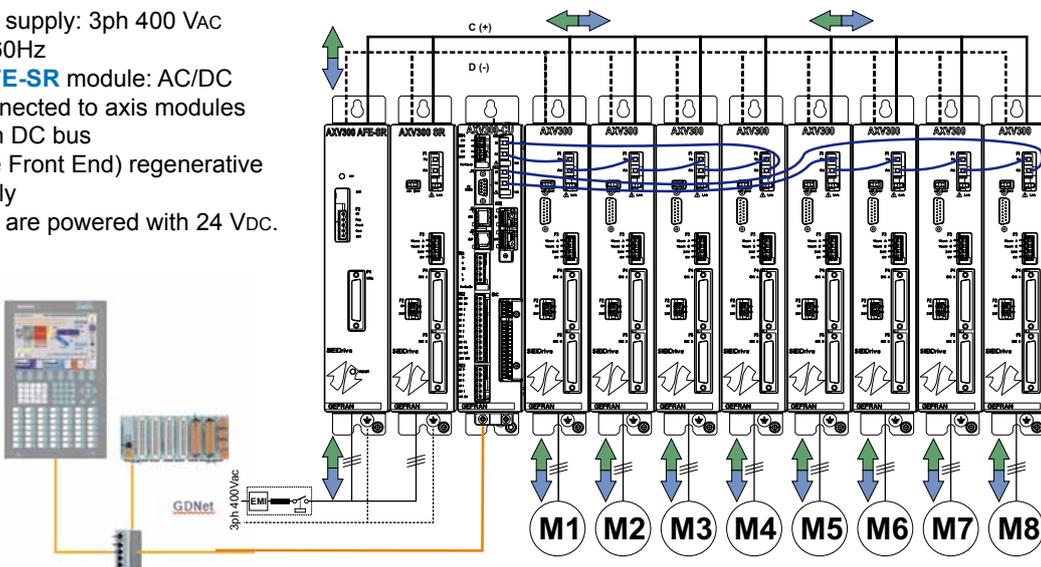
System with AXV300 SM power supply module

- Main power supply: 3ph 400 V_{ac} ± 10%, 50/60Hz
- **AXV300 SM** module: AC/DC module connected to axis modules via common DC bus
- Conventional AC/DC conversion (not regenerative)
- All modules are powered with 24 V_{dc}.



System with AXV300 AFE-SR regenerative power supply module

- Main power supply: 3ph 400 V_{ac} ± 10%, 50/60Hz
- **AXV300 AFE-SR** module: AC/DC module connected to axis modules via common DC bus
- AFE (Active Front End) regenerative power supply
- All modules are powered with 24 V_{dc}.

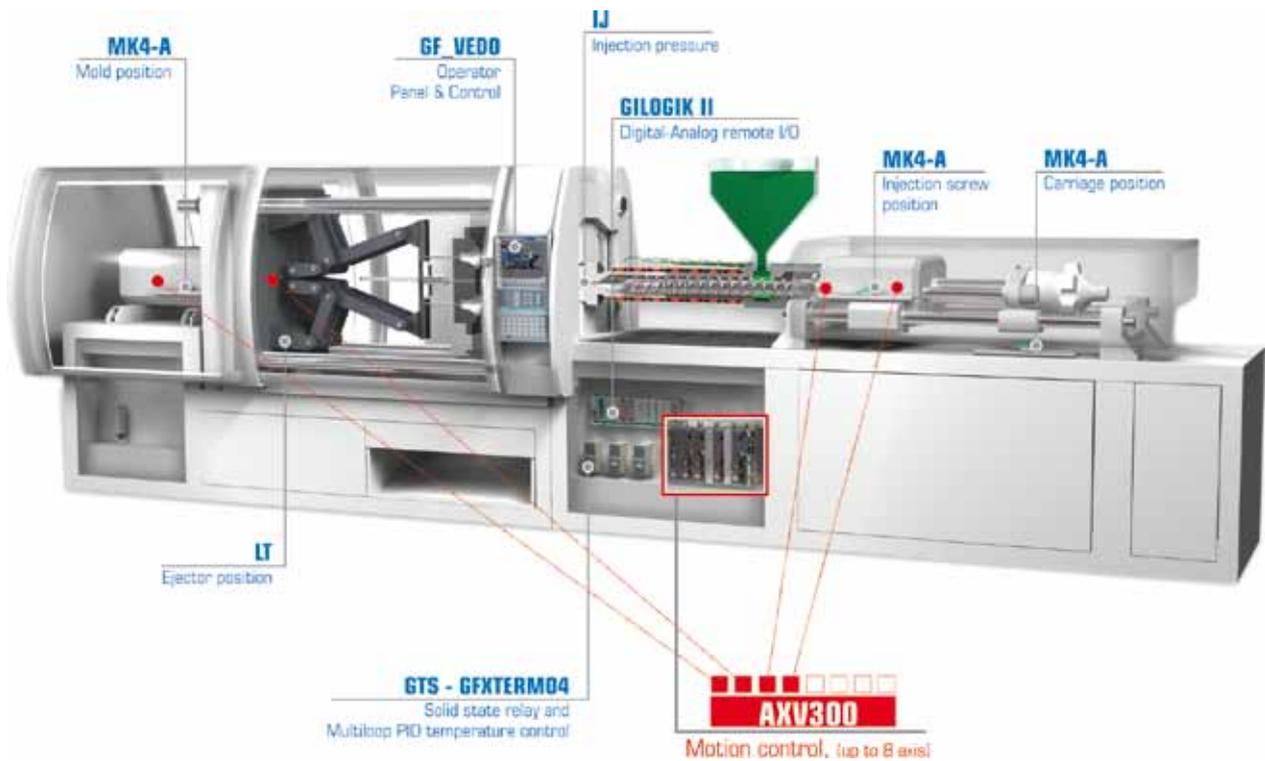


Application: "Full Electric" Injection molding machine

Gefran is a world leader in the field of automation solutions and industrial process controls. Gefran designs and produces sensors, systems, electronic components and drives intended for a wide variety of industrial markets and especially for plastic machines.

Its 30-year of experience lets Gefran offer the right solution for Injection molding machine of every kind, providing good injection, motion, pressure and temperature control:

The **AXV300** control uses electric motors to control injection and loading, mould opening and closing and ejector.



AXV300
• **Axis Module**

Features 11
 Input & Output data 11
 Weights and dimensions 14
 Product identification 19
 Order codes 20



AXV300

AXV300 SM
• **Power Supply Module**

Input & Output data 23
 Weights and dimensions 24
 Product identification 26
 Order codes 27



AXV300 SM

AXV300 AFE-SR
• **Regenerative power supply control module**

Input & Output data 28
 Weights and dimensions 29
 Product identification 30
 Order codes 30



AXV300 AFE-SR

AXV300 SR
• **Regenerative Power supply module**

Input & Output data 33
 Weights and dimensions 34
 Product identification 39
 Order codes 40



AXV300 SR

AXV300 CU
• **Control Unit Module**

Features 43
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 Order codes 45



AXV300 CU

Programming

"GF_eXpress" PC Configuration Tool ... 46
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PROGRAM.

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APPENDICE

1. AXV300 • Axis Module

AXV300 • Axis Module



AXV300 10413



AXV300 21020



AXV300 22040



AXV300 33570



AXV300 350100



AXV300 480160



AXV300 5100200



AXV300 5140210



AXV300 6200250



AXV300 6200320

AXV300 axis modules come in a wide range of current ratings, making them the ideal choice for building multi-axis systems.

1.1 Features

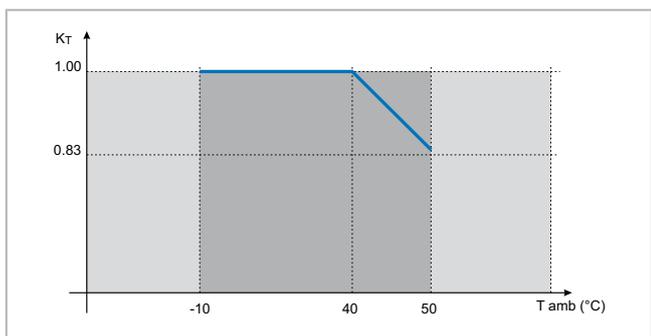
- motor control loop (brushless or asynchronous);
- current loop closing: 16 KHz (62.5 µsec);
- speed loop closing: 4 KHz (250 µsec);
- overload 12t: slow (150% I_n x 60 sec) and fast (200% I_n x 0.5 sec);
- management of local encoder for closing current/speed loops;
- alarm management;
- management of GStar communication from/to the AXV300-CU control module;
- all AXV300 modules need a 24 VDC supply voltage to power the regulation card/internal logic and fans.

1.2 Input & Output data

Module code - AXV300		10413	21020	22040	33570	350100	480160	5100200	5140210	6200250	6200320
Average dissipated power (*)	[W]	30	75	140	240	360	550	780	1120	1850	1850
INPUT											
V _{DC} Input voltage	[V _{DC}]	600 (±10%)									
I _{DC} 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											
V _L	[V _{AC}]	400 V _{AC} ±10%. 50/60Hz									
V _{DC} BUS	[V _{DC}]	600									
Rated current, I _N	[Arms]	4.5	10	20	35	50	80	100	140	200	200
Peak current, I _{PEAK}	[Arms]	13.5	20	40	70	100	160	200	210	250	320
Rated power, P _N	[kW]	2.7	6	12	21	30	48	60	84	120	120
Peak power P _{PEAK}	[kW]	8.1	12	24	42	60	96	120	126	150	192
Output frequency, f _{OUT}	[Hz]	400Hz (PWM 4kHz) / 450Hz (PWM 8kHz)									
External auxiliary voltage, V _{EXT AUX}	[V _{DC}]	24									
Output voltage.	[V _{AC}]	0 ... 400									
Switching frequency (Default)	[kHz]	4									
Switching frequency (Higher)	[kHz]	8 (K _F = 0.7)									
Cooling											
Fans with internal supply	[n.]	-	-	1	1	2	-	-	-	-	-
Fans with external supply 24V	[n.]	-	-	-	-	-	2	2	4	7	7
Average fan absorption with separate 24 V power supply	[A]	-	-	-	-	-	1	1.6	3.2	3.2	3.2
Fan capacity	[m ³ /h]	-	-	20	60	120	400	600	1200	1300	1300

(*) At nominal condition.

Ambient temperature reduction factor

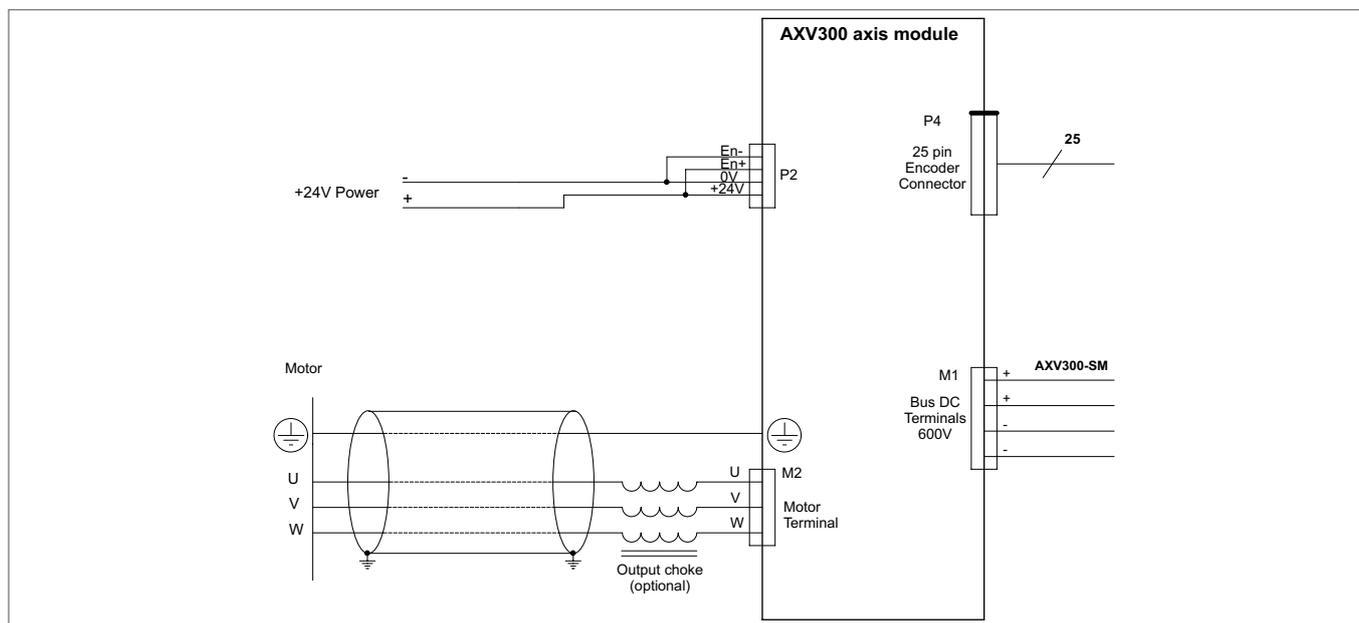


Module code - AXV300	10413	21020	22040	33570	350100	480160	5100200	5140210	6200250	6200320
Operating temperature	-10°C ... +50°C (100% up to 40°C)									

K_t = 0,83 (1,7 % ogni °C superiore a 40°C)

- Function not allowed
- Range of ambient temperatures allowed

Connection diagram of an AXV300 axis module



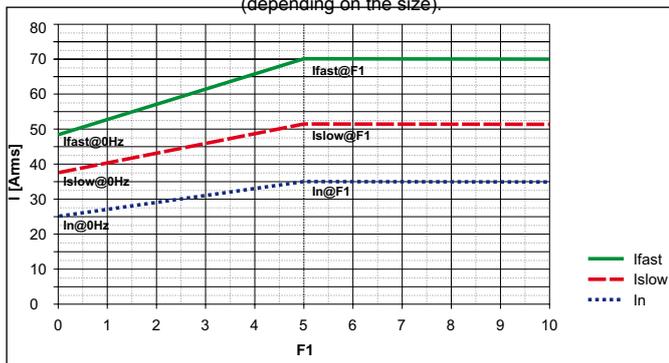
Overload for AXV300 axis modules

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

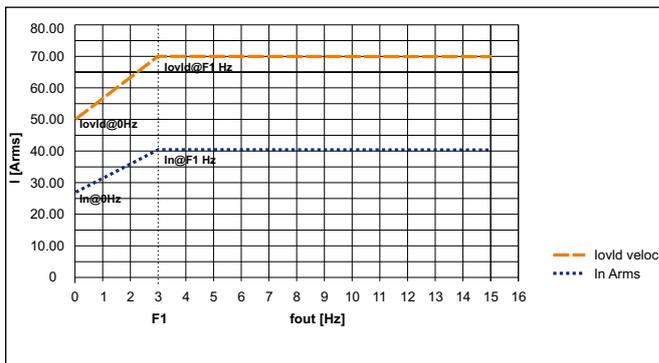
- Algorithm I²xT for applications that require a limited overload but for longer (150% I_n for 60 sec for sizes up to AXV300 5100200 see table I²xT);
- Algorithm I xT for highly dynamic applications (200% I_n for 10 sec up to size AXV300 5100200 see table I xT).

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

Algorithm I²xT: current and frequency values are those shown in the table (depending on the size).



Algorithm I xT: current and frequency values are those shown in the table.



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% I_n for 60 sec);
- Fast overload (typically 200% I_n 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% I_n.

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.

Module code - 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 @ F ₁ Hz	[Arms]	4.5	10	20	35	50	80	100	140	200	200
I _{ovld} Slow @ 0 Hz	[Arms]	4.7	10.5	18.0	36.8	45.0	84.0	105.0	122.5	154.0	182.0
I _{ovld} Slow @ F ₁ Hz	[Arms]	6.75	15.00	30.00	52.50	75.00	120.00	150.00	175.00	220.00	260.00
Overload time	[s]	60	60	60	60	60	60	60	60	60	60
Recovery Time @90%I _n	[s]	395	395	395	395	395	395	395	178	66	218
F ₁	[Hz]	3	3	5	3	5	3	3	3	3	3
I _{ovld} Fast @ 0 Hz	Arms	9.45	14	24	49	60	112	140	147	182	224
I _{ovld} Fast @ F ₁ 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%I _n	[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

I_xT overload for AXV300 axis modules

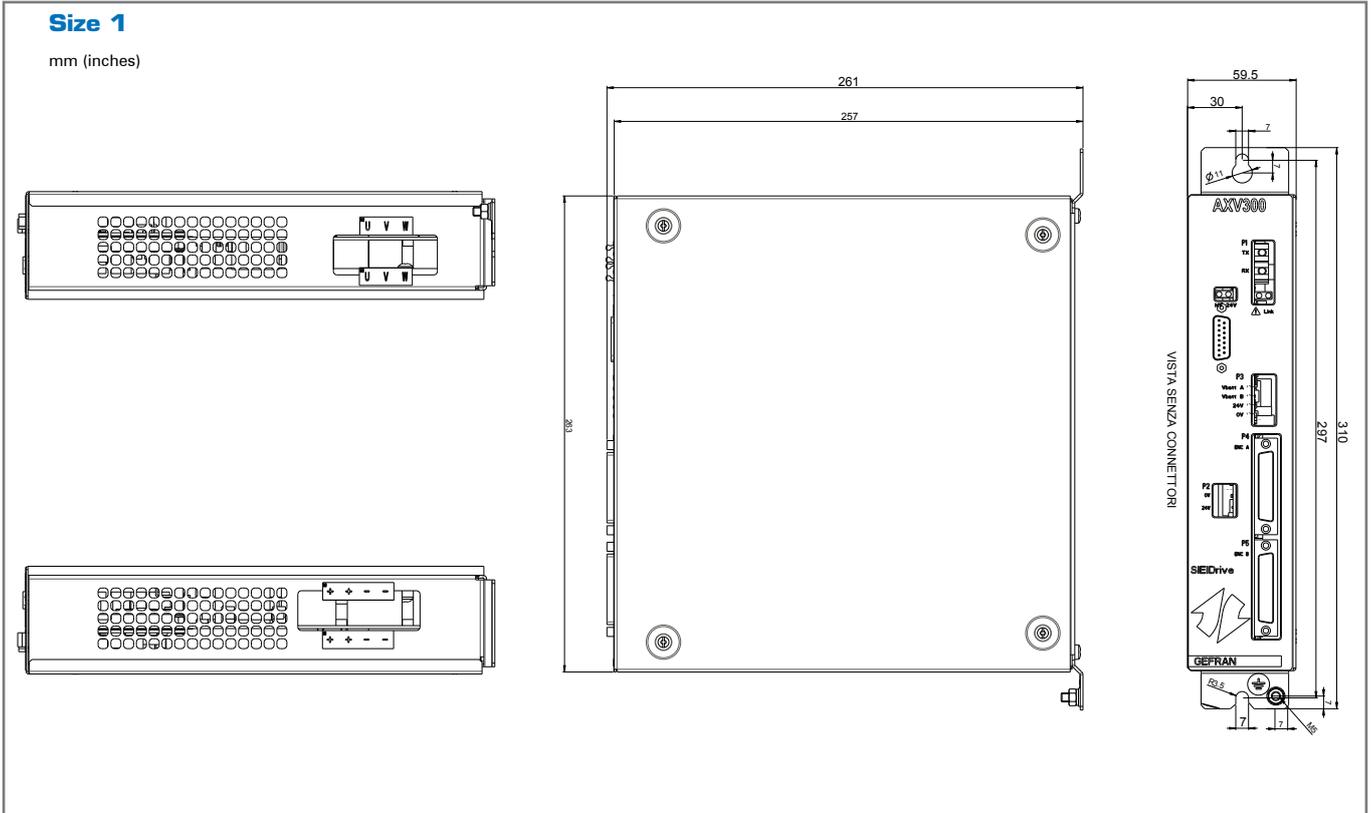
The I_xT overload function allows a typical overload of 200% I_n for 10 sec (sizes up to AXV300 5100200).

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% I_n.

Module code - 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 @ F ₁ Hz	[Arms]	4.5	10.0	20.0	35.0	50.0	80.0	100.0	140.0	200.0	200.0
I _{ovld} @ 0 Hz	[Arms]	13.5	14.0	28.0	49.0	50.0	160.0	200.0	147.0	182.0	224.0
I _{ovld} @ F ₁ 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
F ₁	[Hz]	--	3	3	3	3	--	--	3	3	3
Recovery Time @90%I _n	[s]	200	100	100	100	100	100	100	50	30	60
Overtemperature	[°C]	90	90	95	90	90	75	75	75	75	75

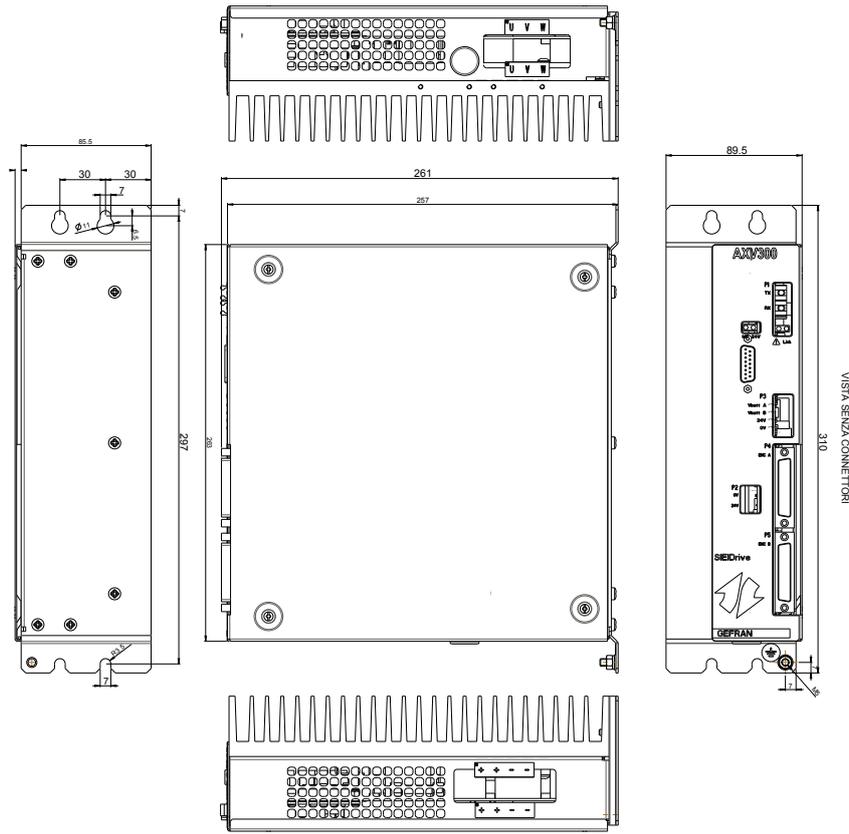
1.3 Weights and dimensions



Size	Dimensions: Width x Height x Depth		Weight	
	mm	inches	kg	lbs
AXV300 10413	59.5 x 310 x 261	2.34 x 12.2 x 10.3	3	6,6

Size 2

mm (inches)



Size

Dimensions: Width x Height x Depth

Weight

mm

inches

kg

lbs

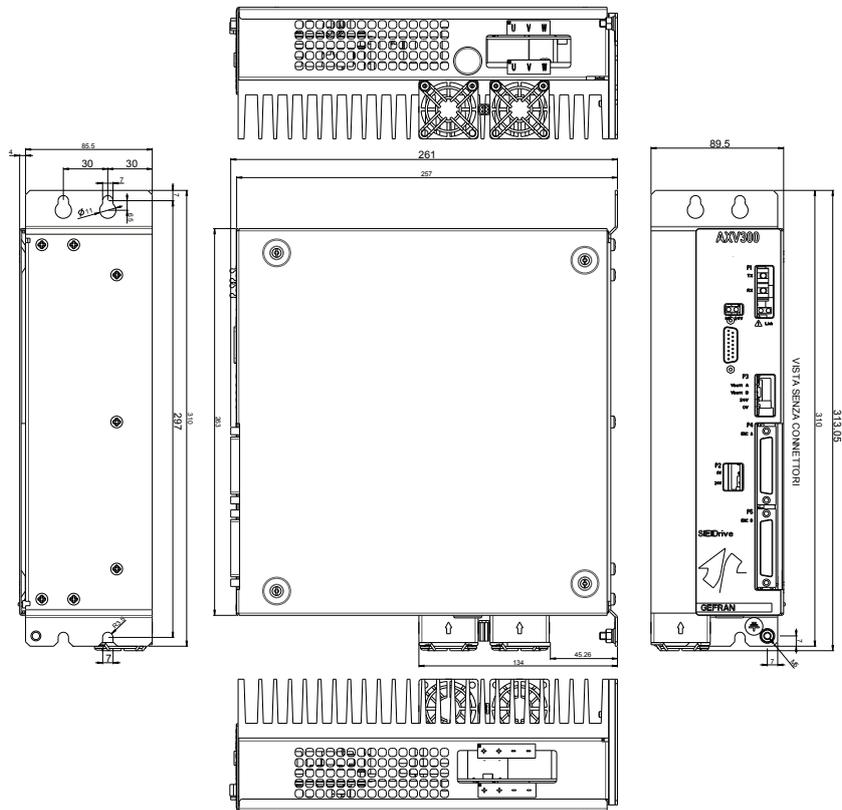
AXV300 21020

89.5 x 310 x 261

3.52 x 12.2 x 10.3

5

11



Size

Dimensions: Width x Height x Depth

Weight

mm

inches

kg

lbs

AXV300 22040

89.5 x 313 x 261

3.52 x 12.3 x 10.3

5

11

AXV300

AXV300 SM

AXV300 AFE-SR

AXV300 SR

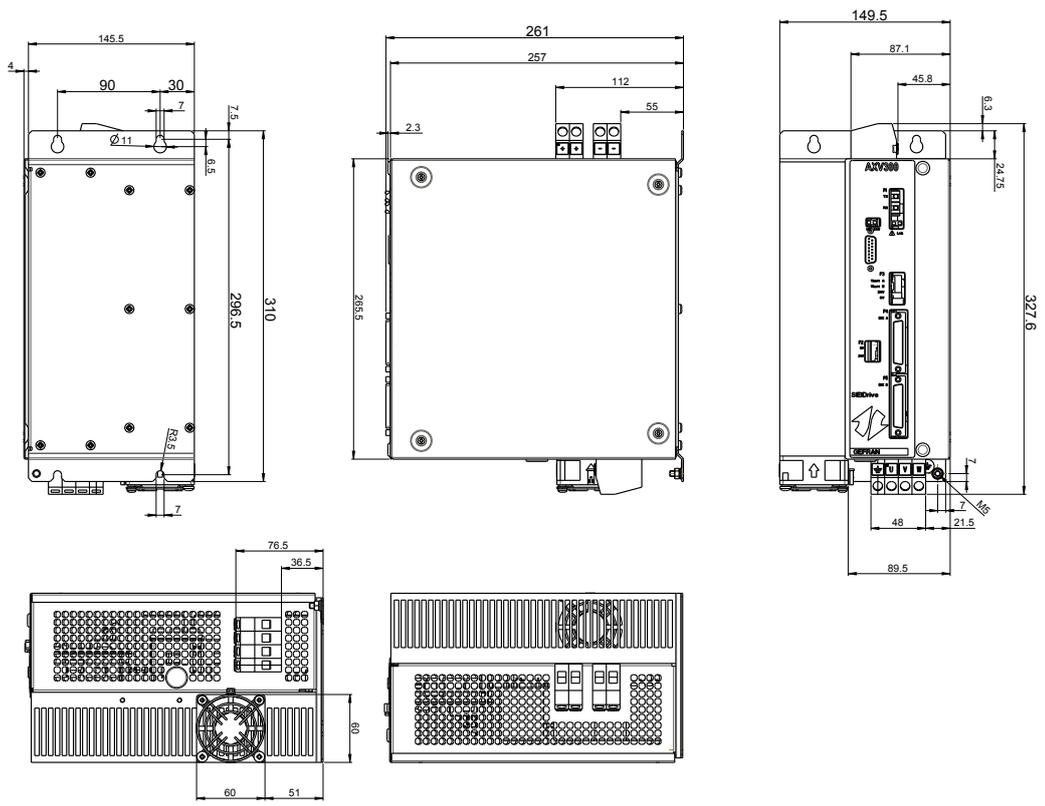
AXV300 CU

PROGRAM.

APPENDICE

Size 3

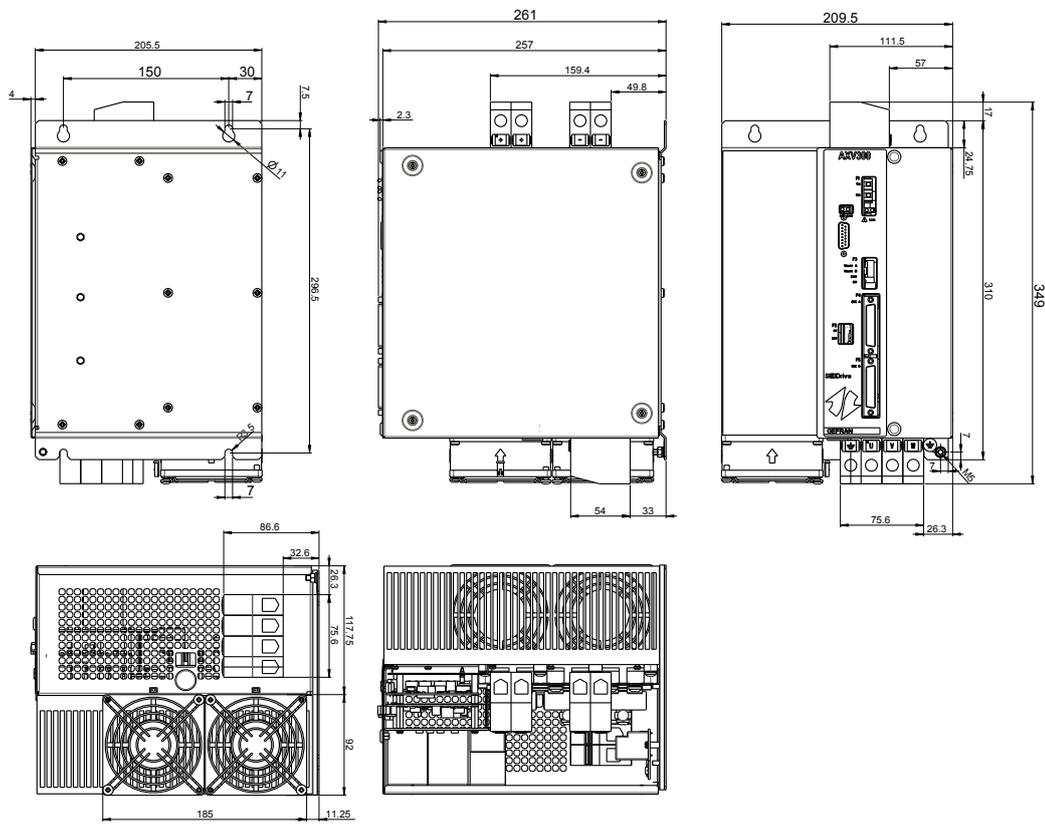
mm (inches)



Sizes	Dimensions: Width x Height x Depth		Weight	
	mm	inches	kg	lbs
AXV300 33570 AXV300 350100	149.5 x 327.6 x 261	5.9 x 12.9 x 10.3	9	19.8

Size 4

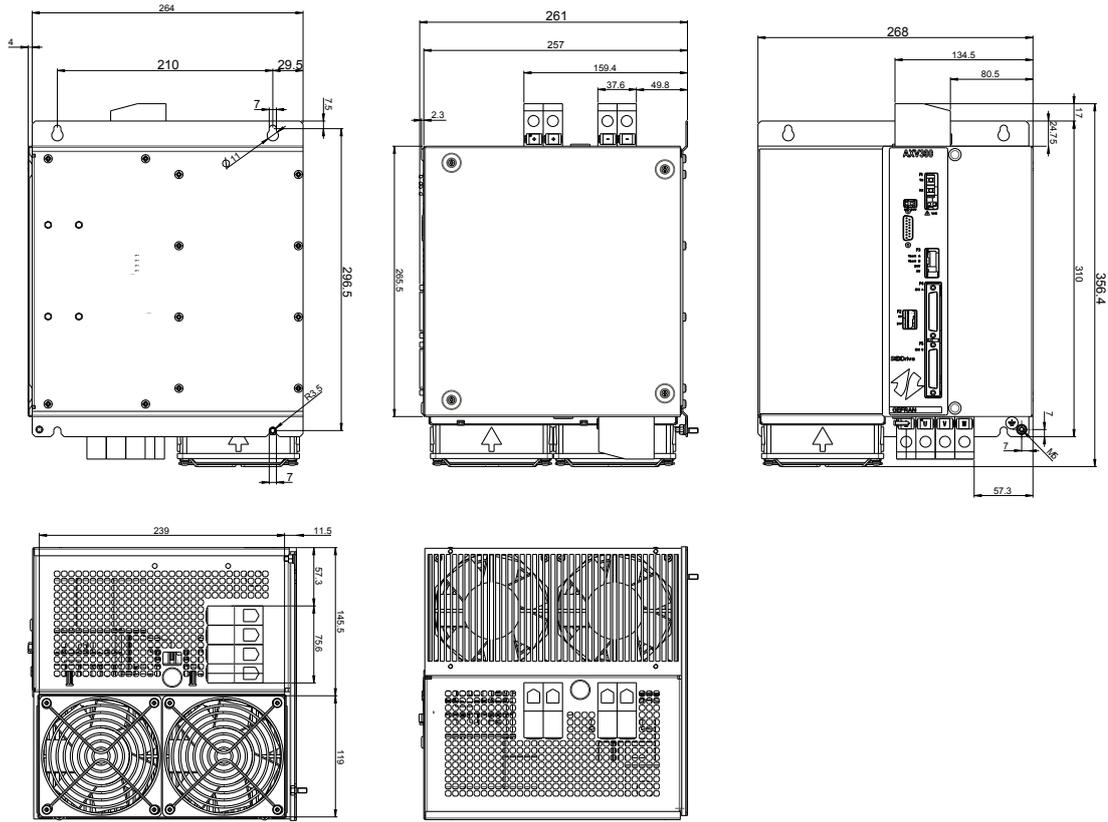
mm (inches)



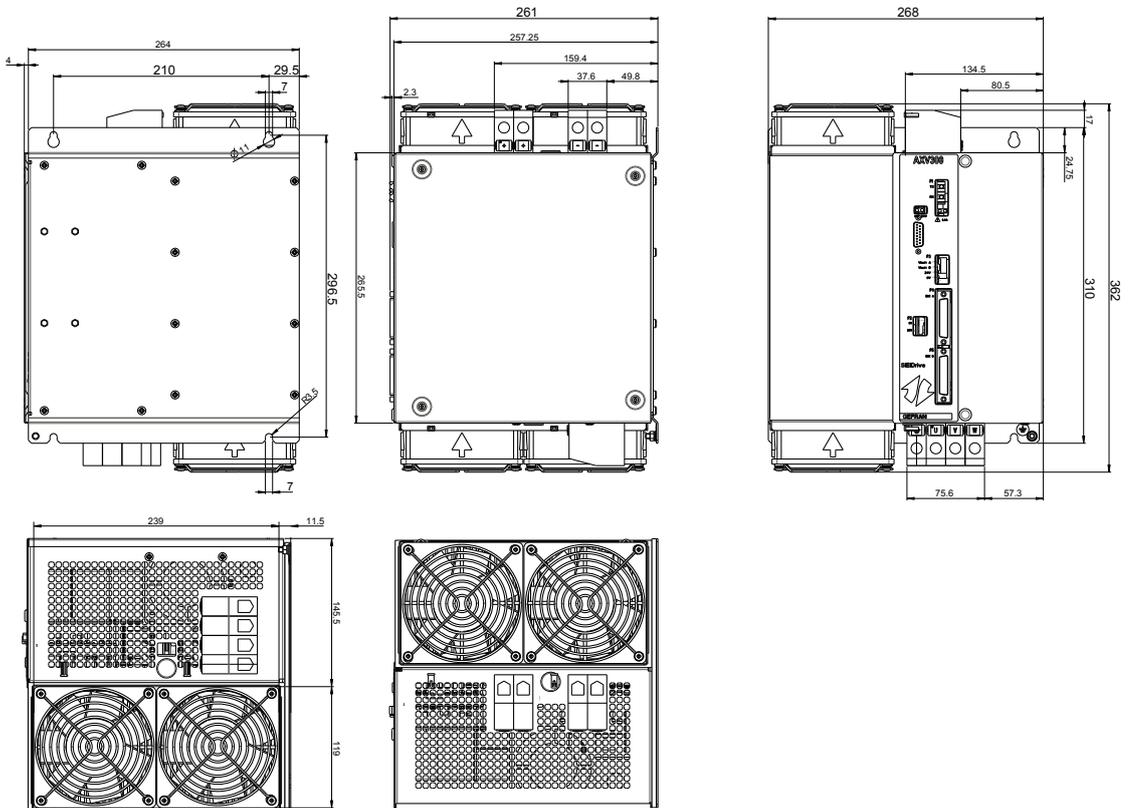
Size	Dimensions: Width x Height x Depth		Weight	
	mm	inches	kg	lbs
AXV300 480160	209.5 x 349 x 261	8.2 13.7 x 10.3	13	28.6

Size 5

mm (inches)



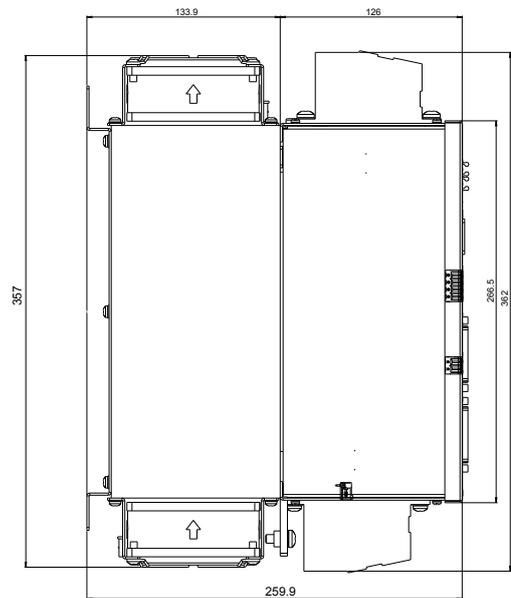
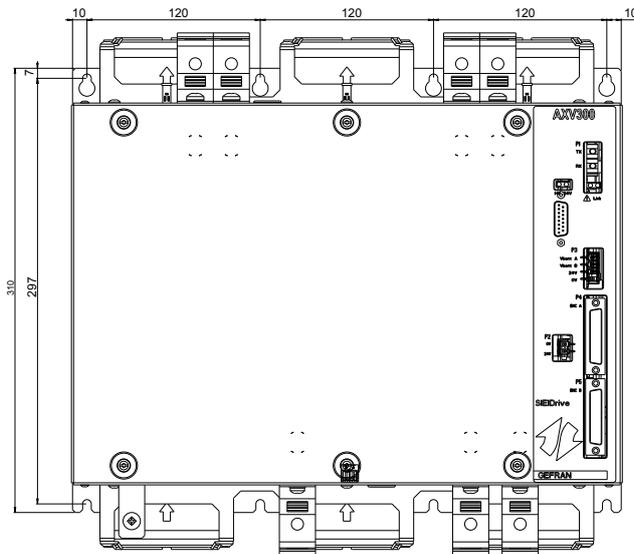
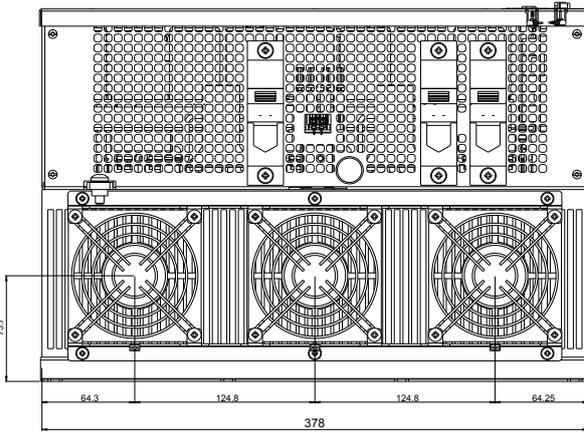
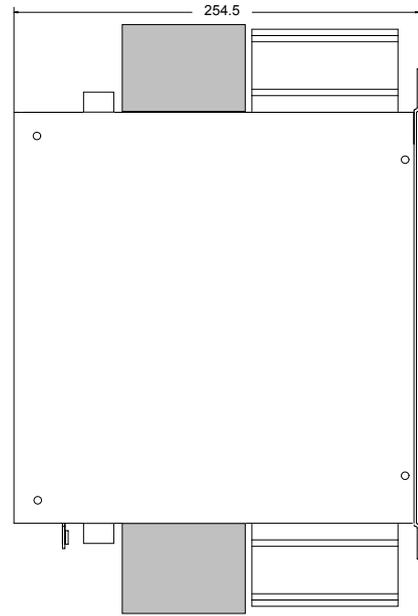
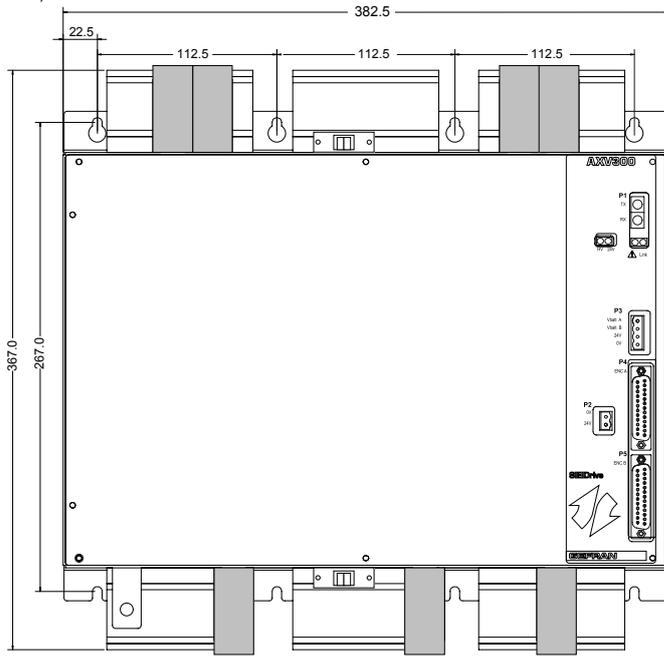
Size	Dimensions: Width x Height x Depth		Weight	
	mm	inches	kg	lbs
AXV300 5100200	268 x 356.4 x 261	10.5 x 14 x 10.3	16	35.3



Size	Dimensions: Width x Height x Depth		Weight	
	mm	inches	kg	lbs
AXV300 5140210	268 x 362 x 261	10.5 x 14.2 x 10.3	20	44.1

Size 6

mm (inches)



Size	Dimensions: Width x Height x Depth		Weight	
	mm	inches	kg	lbs
AXV300 6200250	382.5 x 367 x 254.5	15.06 x 14.45 x 10.02	27	59.5
AXV300 6200320	378 x 357 x 259.9	14.88 x 14.05 x 10.23	25	55.1

1.4 Product identification

Axis module for Synchronous motors:

AXV300 - X XXX XXX -X	
Modular Servodrive System AXV300 series:	AXV300 = Synchronous motors
Mechanical dimensions of the module:	1 = Size 1 2 = Size 2 3 = Size 3 4 = Size 4 5 = Size 5 6 = Size 6
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
Maximum 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
Software:	X = Standard

Example:

AXV300 - 1 04 13 -X	
Modular Servodrive System AXV300 series:	AXV300 = Synchronous motors
Mechanical dimensions of the module:	1 = Size 1
Rated current,:	04 = 4 Arms
Maximum output current:	13 = 13 Arms
Software:	X = Standard

Axis module for Asynchronous motors (currently being developed, preliminary data):

AXV300A - X XXXX -X	
Modular Servodrive System AXV300 series:	AXV300A= Asynchronous motors
Mechanical dimensions of the module:	1 = Size 1 2 = Size 2 3 = Size 3 4 = Size 4 5 = Size 5 6 = Size 6
Power x 10:	20 = 2 kW 60 = 6 kW 120 = 12 kW 0210 = 21 kW 0300 = 30 kW 0480 = 48 kW 0600 = 60 kW 0840 = 84 kW 1200 = 120 kW
Software:	X = Standard

1.5 Order codes

AXV300 • Axis module for Synchronous motors

CODE	TYPE	CONFIGURATION
S3SRV01	AXV300-10413-X	Axis module size 1, In = 4,5 Arms, Ipeak = 13,5 Arms.
S3SRV02	AXV300-21020-X	Axis module size 2, In = 10 Arms, Ipeak = 20 Arms.
S3SRV03	AXV300-22040-X	Axis module size 2, In = 20 Arms, Ipeak = 40 Arms.
S3SRV04	AXV300-33570-X	Axis module size 3, In = 35 Arms, Ipeak = 70 Arms.
S3SRV05	AXV300-350100-X	Axis module size 3, In = 50 Arms, Ipeak = 100 Arms.
S3SRV06	AXV300-480160-X	Axis module size 4, In = 80 Arms, Ipeak = 160 Arms.
S3SRV07	AXV300-5100200-X	Axis module size 5, In = 100 Arms, Ipeak = 200 Arms.
S3SRV08	AXV300-5140210-X	Axis module size 5, In = 140 Arms, Ipeak = 210 Arms.
S3SRV09	AXV300-6200250-X	Axis module size 6, In = 200 Arms, Ipeak = 250 Arms.
S3SRV10	AXV300-6200320-X	Axis module size 6, In = 200 Arms, Ipeak = 320 Arms.

AXV300 • Axis module for Asynchronous motors

CODE	TYPE	CONFIGURATION
-	AXV300A-10027-X	Axis module size 1, Pn = 2,7 kW
-	AXV300A-20060-X	Axis module size 2, Pn = 6 kW
-	AXV300A-20120-X	Axis module size 2, Pn = 12 kW
-	AXV300A-30210-X	Axis module size 3, Pn = 21 kW
-	AXV300A-30300-X	Axis module size 3, Pn = 30 kW
-	AXV300A-40480-X	Axis module size 4, Pn = 48 kW
-	AXV300A-50600-X	Axis module size 5, Pn = 60 kW
-	AXV300A-50840-X	Axis module size 5, Pn = 84 kW
-	AXV300A-61200-X	Axis module size 6, Pn = 120 kW

2. AXV300 SM • Power Supply Module



AXV300 SM-12040



AXV300 SM-24080



AXV300 SM-380140

In non-regenerative systems, the **AXV300 SM** power supply module is connected to the three-phase electrical power supply and delivers the voltage and current required to operate the **AXV300** axis modules.

When the **AXV300** axis modules generate current after a motor braking action, that current is redirected to the braking resistor connected to the power supply module.

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

Thermal protection.

The **AXV300 SM** power supply modules have a maximum internal temperature measured on the power module and referred to as thermal protection.

The thermal protection is set to 110 °C. When the temperature inside the power supply module rises to almost the thermal protection level, a pre-alarm signal is activated on connector P2.

The pre-alarm signal can be monitored and used for a controlled system shutdown in case of overtemperature.

2.1 Input & Output data

Module code AXV300 SM -		12040	24080	380140
Average dissipated power (*)	[W]	53	89	192
INPUT AC				
Input voltage	[V _{ac}]	400 V _{ac} ±10%		
Input frequency	[Hz]	50/60		
Rated input current (**)	[A _{rms}]	18	37	80
Max input current (**)	[A _{rms}]	37	72	127
External power supply (connectors P2 - P3)				
• Rated voltage	[V _{dc}]	24V		
• Average module absorption	[A]	0.5 A + power contactor absorption		
OUTPUT DC				
Output voltage	[V _{dc}]	565		
Rated current, I _N	[A]	20	40	80
Rated power, P _N	[kW]	11	22	44
Peak current, I _{PEAK}	[A]	40	80	140
Peak power P _{PEAK}	[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
Cooling				
Fans with internal supply	[n.]	-	-	-
Fans with external supply 24V	[n.]	-	-	2
Average fan absorption with separate 24 V power supply	[A]	-	-	0.5
Fan capacity	[m ³ /h]	-	-	150

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

(*) At nominal condition.

(**) with input choke.

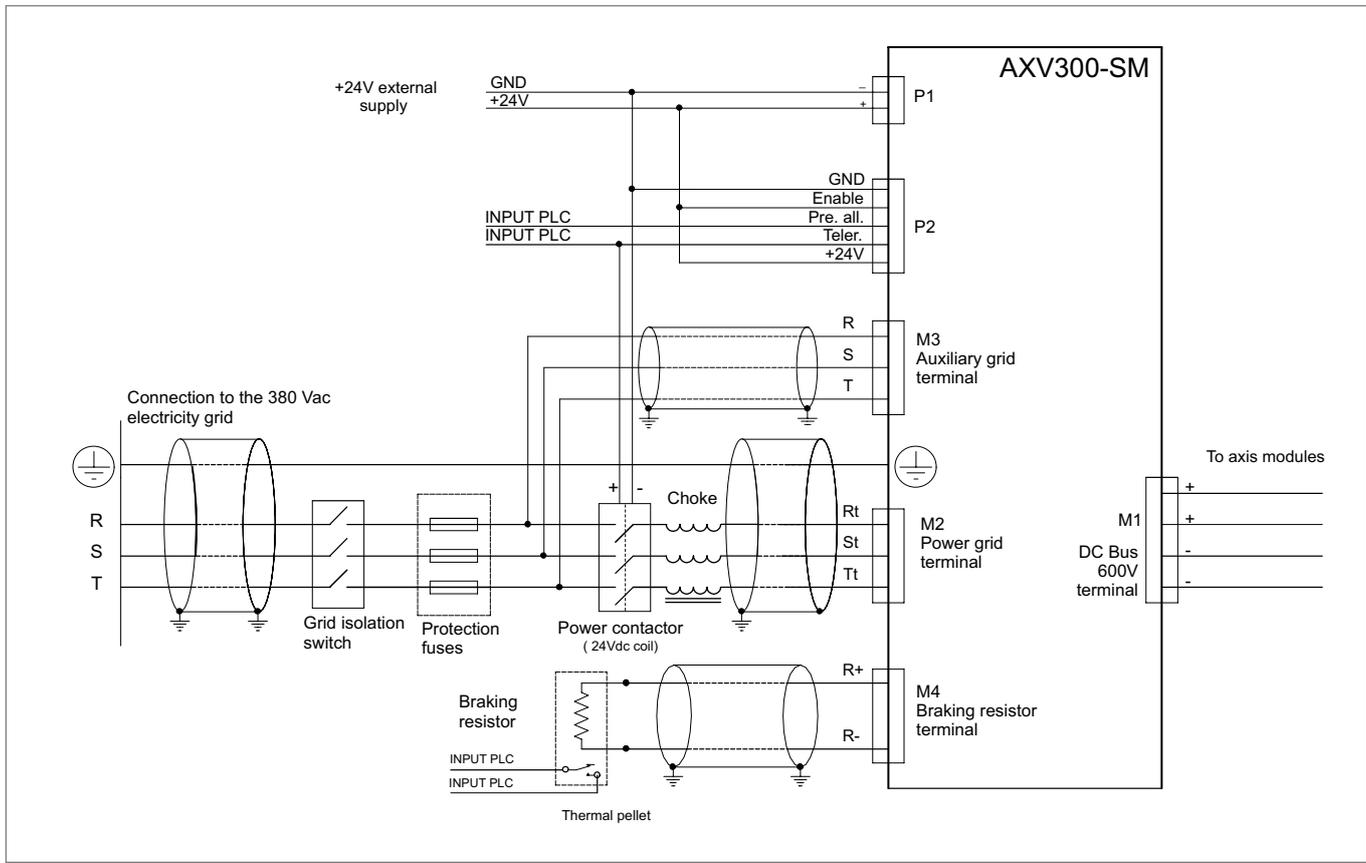
The input choke is **mandatory** on AXV300 SM modules if the output current exceeds the maximum values (I_{limit}) shown in the table below.

We recommend the use of chokes upstream of the non-regenerative power supply unit to limit the maximum current.

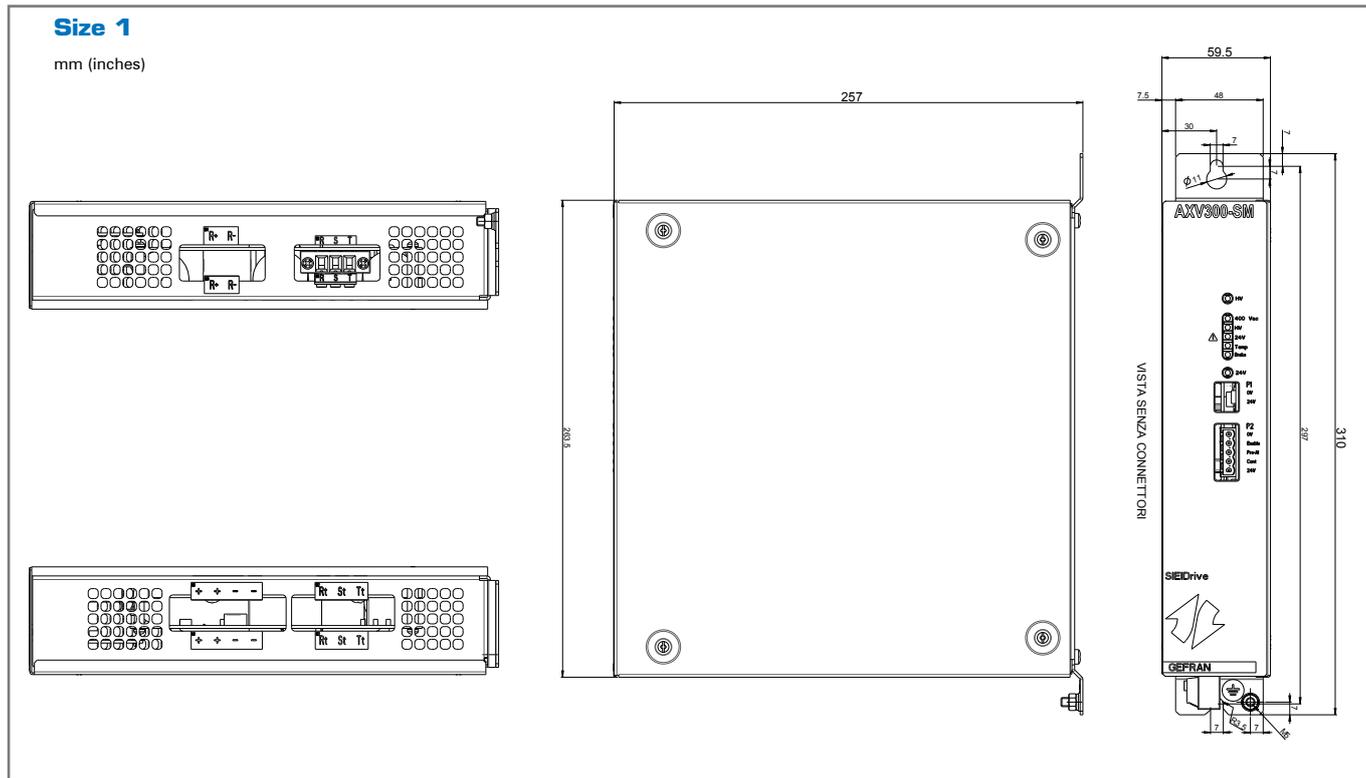
Recommended choke characteristics for the various AXV300 SM modules are shown in the appendix.

AXV300 SM -		12040	24080	380140
I _{dc nom}	[A]	20	40	80
I _{dc max}	[A]	40	80	140
T _{ovld}	[sec]	30	30	30
I _{nmax}	[A]	36	72	129
I _{limit}	[A]	14 (70% NOM)	40 (I _{nom})	80 (I _{nom})

Connection diagram of an AXV300 SM power supply module



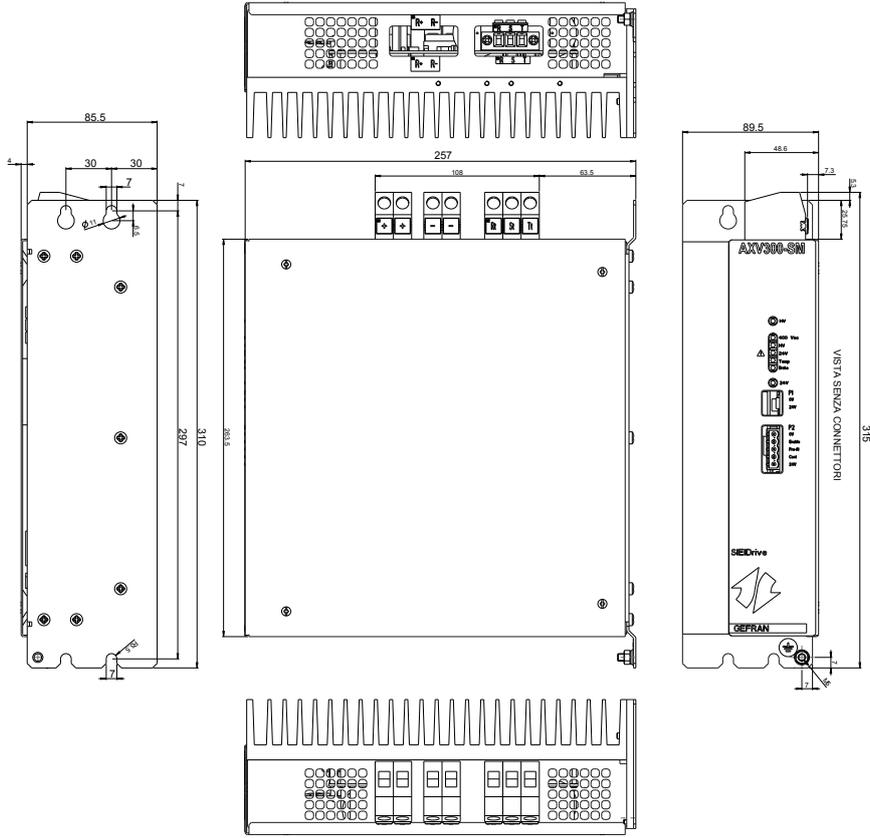
2.2 Weights and dimensions



Size	Dimensions: Width x Height x Depth		Weight	
	mm	inches	kg	lbs
AXV300 SM-12040	59.5 X 310 X 257	2.34 x 12.2 x 10.1	2	4.4

Size 2

mm (inches)



Size	Dimensions: Width x Height x Depth		Weight	
	mm	inches	kg	lbs
AXV300 SM-24080	89.5 X 310 X 257	3.5 x 12.2 x 10.1	4	8.8

AXV300

AXV300 SM

AXV300 AFE-SR

AXV300 SR

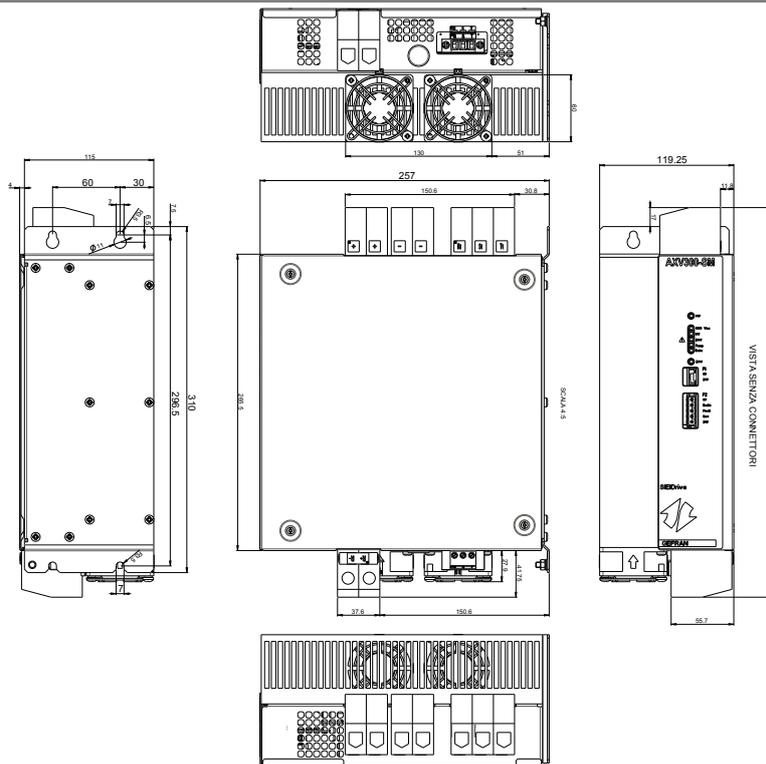
AXV300 CU

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Size 3

mm (inches)



Size	Dimensions: Width x Height x Depth		Weight	
	mm	inches	kg	lbs
AXV300 SM-380140	119.25 X 310 X 257	4.7 x 12.2 x 10.1	9	19.8

2.3 Product identification

	AXV300	SM	-X	XX	XX	-B	X
Modular Servodrive System AXV300 series							
Module:	SM = Power supply						
Mechanical dimensions of the module:	1 = Size 1 2 = Size 2 3 = Size 3						
Rated current.:	20 = 20 Arms 40 = 40 Arms 80 = 80 Arms						
Peak current:	40 = 40 Arms 80 = 80 Arms 140 = 140 Arms						
Braking unit:	B = Included						
Configuration:	X = Standard						

Example:

	AXV300	SM	-2	40	80	-B	X
Modular Servodrive System AXV300 series							
Module:	SM = Power supply						
Mechanical dimensions of the module:	2 = Size 2						
Rated current.:	40 = 40 Arms						
Peak current:	80 = 80 Arms						
Braking unit:	B = Included						
Configuration:	X = Standard						

2.4 Order codes

AXV300 SM • Power Supply Module

- 24 V_{DC} power supply voltage (to power the regulation card/internal logic and fans)
- Mains supply 400 V_{AC} ±10%

CODE	TYPE	CONFIGURATION
S3SRV11	AXV300 SM-12040-BX	Braking unit included, P _n =11 kW, P _{peak} = 22 kW.
S3SRV12	AXV300 SM-24080-BX	Braking unit included, P _n =22 kW, P _{peak} = 44 kW.
S3SRV13	AXV300 SM-380140-BX	Braking unit included, P _n =44 kW, P _{peak} = 80 kW.

AXV300

AXV300 SM

AXV300 AFE-SR

AXV300 SR

AXV300 CU

PROGRAM.

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3. AXV300 AFE-SR • Regenerative power supply control module



AXV300 AFE-SR is the regenerative power supply control module.

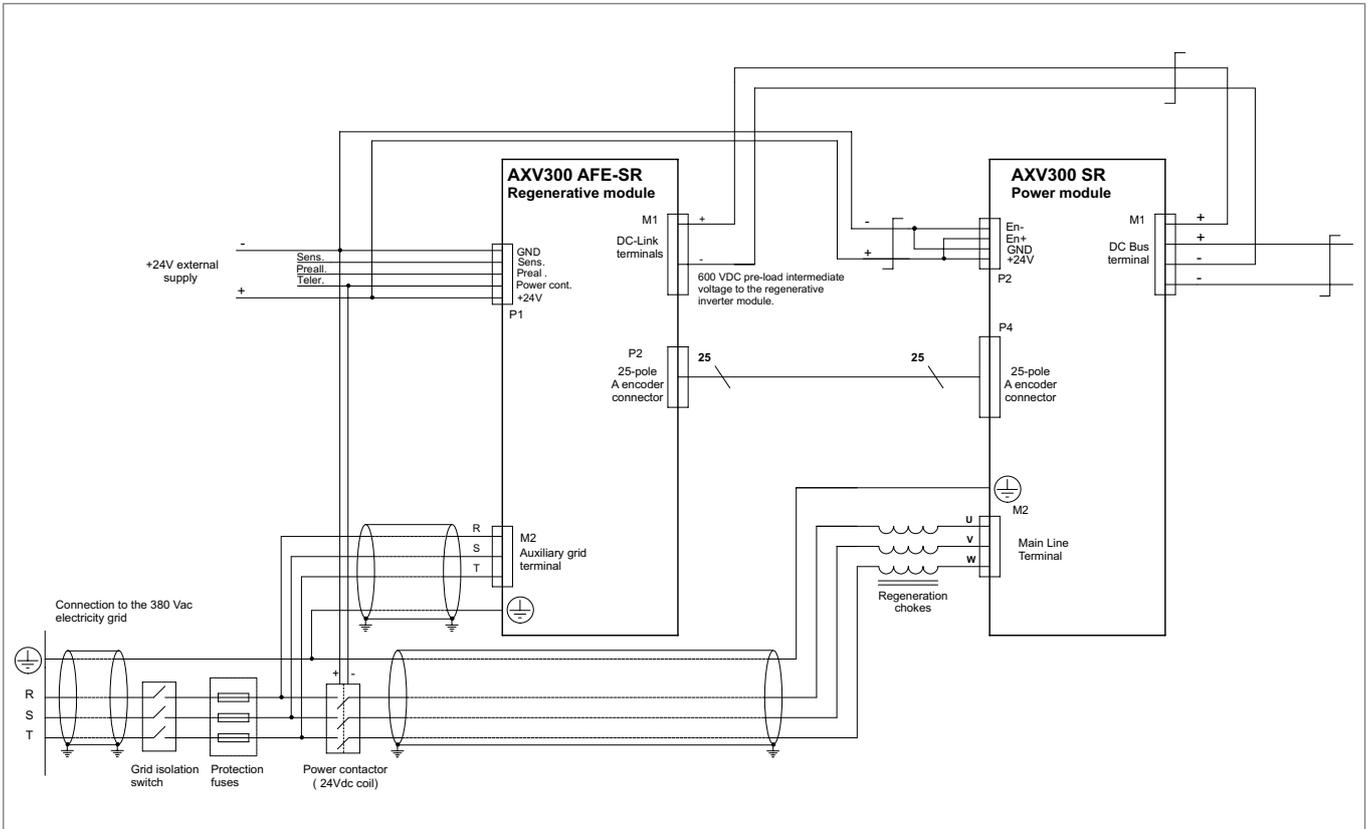
Used with the **AXV300 SR** power module it is the system's regenerative power supply unit

3.1 Input & Output data

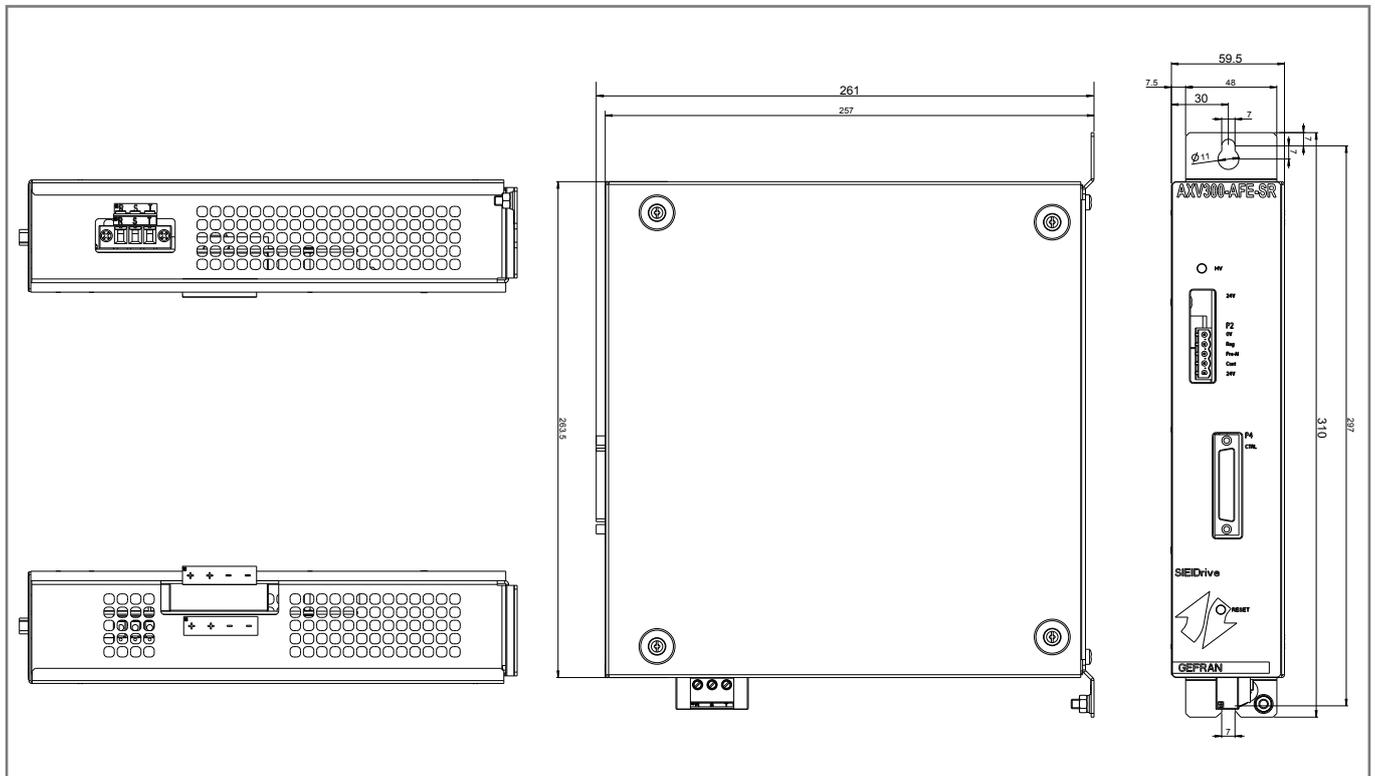
Module code		AXV300 AFE-SR-1
Average dissipated power (*)	[W]	17
INPUT		
Input voltage	[Vac]	400 Vac \pm 10%
Input frequency	[Hz]	50/60
Rated input current	[Arms]	0.8
Max input current	[Arms]	6
External power supply (connectors P2 - P3)		
• Rated voltage	[Vdc]	24V
• Average module absorption	[A]	0.5 A + power contactor absorption
OUTPUT		
Output voltage	[Vdc]	625
Rated current, I _N	[A]	1
Peak current, I _{PEAK}	[A]	3
Cooling		
Fans with internal supply	[n.]	-
Fans with external supply 24V	[n.]	-
Average fan absorption with separate 24 V power supply	[A]	-
Fan capacity	[m ³ /h]	-

(*) At nominal condition.

AXV300 SR and AXV300 AFE-SR module connection diagram



3.2 Weights and dimensions



Size	Dimensions: Width x Height x Depth		Weight	
	mm	inches	kg	lbs
AXV300 AFE-SR-1	59,5 x 310 x 261	2,3 x 12,2 x 10,3	2	4,4

AXV300

AXV300 SM

AXV300 AFE-SR

AXV300 SR

AXV300 CU

PROGRAM.

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3.3 Product identification

		AXV300	AFE-SR	-X
Modular Servodrive System AXV300 series				
Module:	AFE-SR = Regenerative power supply control module			
Software:	X = Standard			

3.4 Order codes

AXV300 AFE-SR • Regenerative power supply control module

CODE	TYPE	CONFIGURATION
S3SRV37	AXV300 AFE-SR-X	

4. AXV300 SR • Regenerative Power Supply module

AXV300 SR • Regenerative Power supply module



AXV300 SR-10413



AXV300 SR-21020



AXV300 SR-22040



AXV300 SR-33570



AXV300 SR-350100



AXV300 SR-480160



AXV300 SR-5100200



AXV300 SR-5140210



AXV300 SR-6200250



AXV300 SR-6200320

AXV300 SR modules come in a wide range of current ratings, making them the ideal choice for building regenerative power module.

4.1 Input & Output data

Module code - AXV300 SR		10413	21020	22040	33570	350100	480160	5100200	5140210	6200250	6200320
Average dissipated power (*)	[W]	30	75	140	240	360	550	780	1120	1850	1850
INPUT (AC side)											
Input voltage	[V _{AC}]	400 V _{AC} ±10%									
Input frequency	[Hz]	50/60									
Rated current	[A _{rms}]	4.1	9.1	18.3	32	46	73	91.5	128	183.5	183.5
Max current	[A _{rms}]	12.2	18.3	36.3	64	91.5	147	183	185	tbd	367
OUTPUT (DC side)											
V _{DC} bus	[V _{DC}]	625									
Rated current, I _N	[A]	4.5	10	20	35	50	80	100	140	200	200
Peak current, I _{PEAK}	[A]	13.5	20	40	70	100	160	200	210	250	320
Rated power, P _N	[kW]	2.8	6.3	12.5	21.9	31.3	50	62.5	87.5	125	125
Peak power P _{PEAK}	[kW]	8.4	12.5	25	43.8	62.5	100	125	131.3	156.3	200
Cooling											
Fans with internal supply	[n.]	-	-	1	1	2	-	-	-	-	-
Fans with external supply 24V	[n.]	-	-	-	-	-	2	2	4	7	7
Average fan absorption with separate 24 V power supply	[A]	-	-	-	-	-	1	1.6	3.2	3.2	3.2
Fan capacity	[m ³ /h]	-	-	20	60	120	400	600	1200	1300	1300

(*) At nominal condition.

AXV300

AXV300 SM

AXV300 AFE-SR

AXV300 SR

AXV300 CU

PROGRAM.

APPENDICE

I^2xT 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% I_n for 60 sec);
- Fast overload (typically 200% I_n 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% I_n .

Module code - 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 ovl 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%I_n	[s]	395	395	395	395	395	395	395	178	66	218
Idc ovl 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%I_n	[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:

$$f_{\text{slow}} \% = \frac{\int (I_{dc}^2 - I_n^2) \cdot dt}{(I_{\text{slow}}^2 - I_n^2) \cdot T_{\text{slow}}} \cdot 100$$

Fast overload is calculated according to the formula:

$$f_{\text{fast}} \% = \frac{\int (I_{dc}^2 - I_{\text{slow}}^2)^2 \cdot dt}{(I_{\text{fast}}^2 - I_{\text{slow}}^2) \cdot T_{\text{fast}}} \cdot 100$$

Current limit management

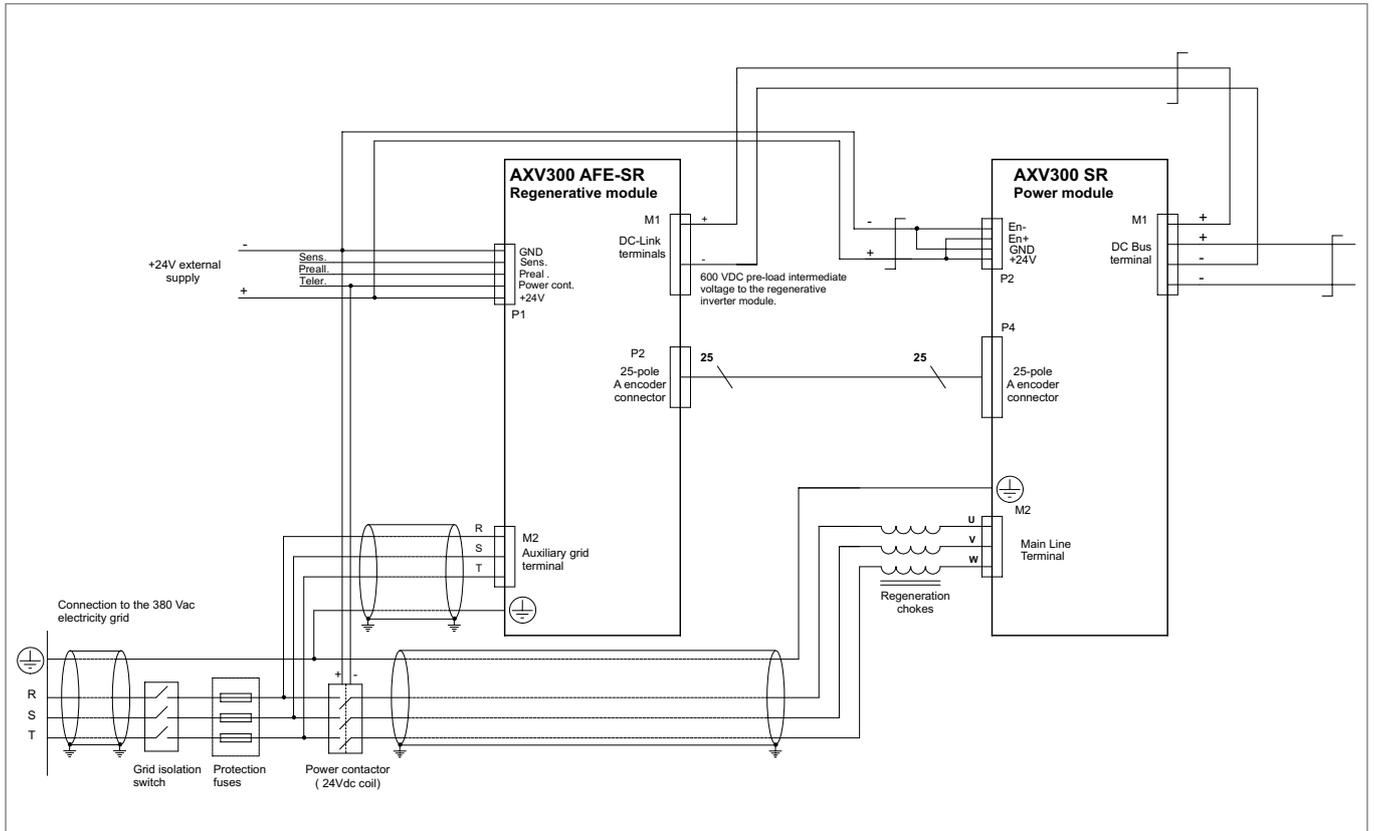
When the current supplied by the supplier exceeds the I_n value, **fslow%** increases to 100%.

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

fslow% reaches 100% in 60 sec if the current supplied by the drive is equal to I_{slow} .

The regen supplier can also supply a maximum current equal to I_{fast} . In this case, when the output current exceeds the I_{slow} threshold, the **fslow%** value is increased to 100% in 0.5 sec, after which the maximum current is limited to the **I_{slow}** value.

AXV300 SR and AXV300 AFE-SR module connection diagram

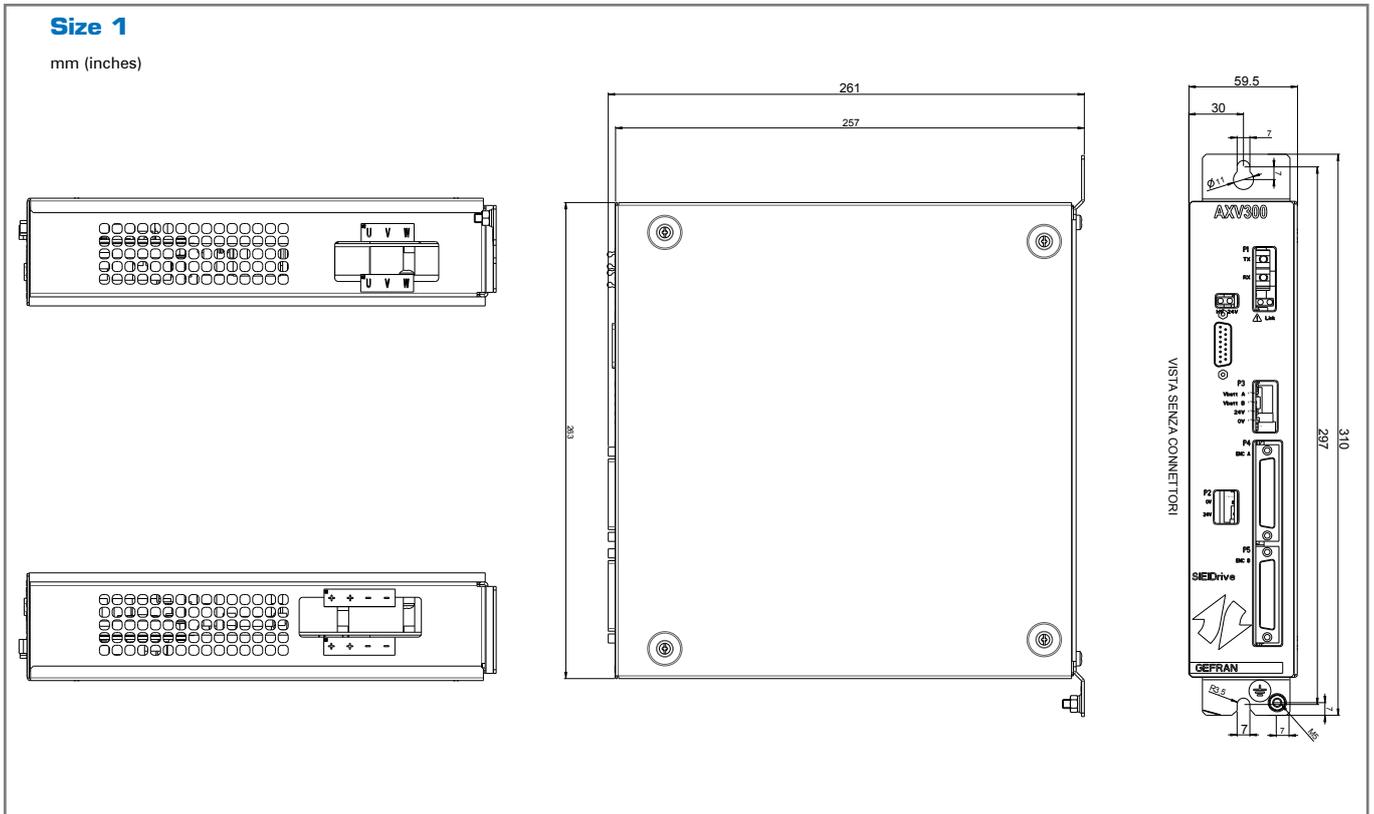


AXV300

AXV300 SM

AXV300 AFE-SR

4.2 Weights and dimensions



AXV300 SR

AXV300 CU

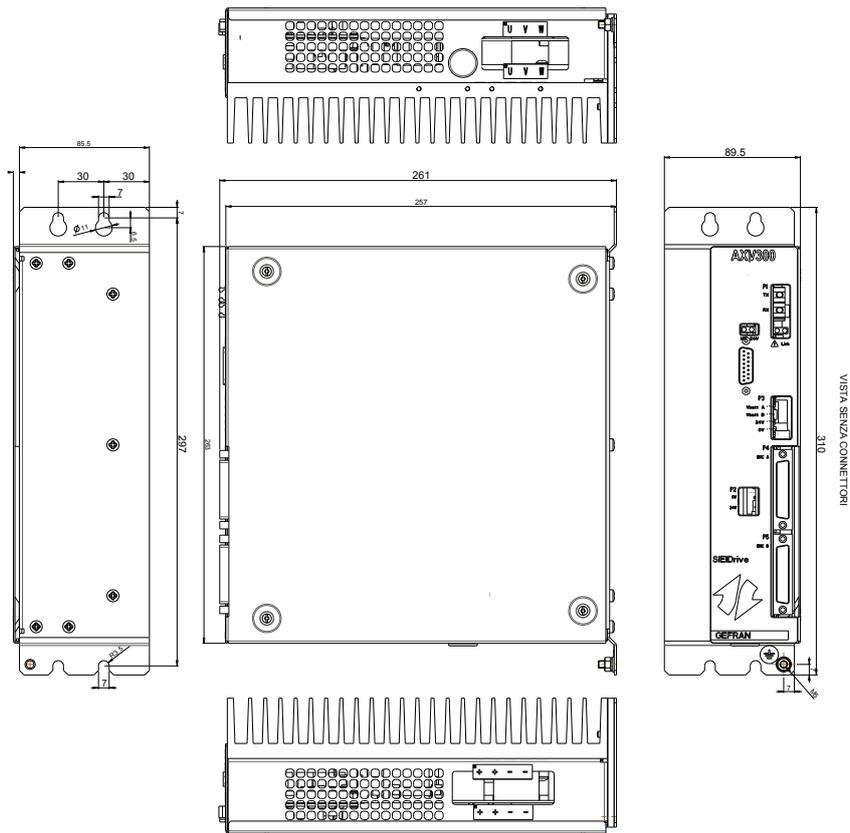
PROGRAM.

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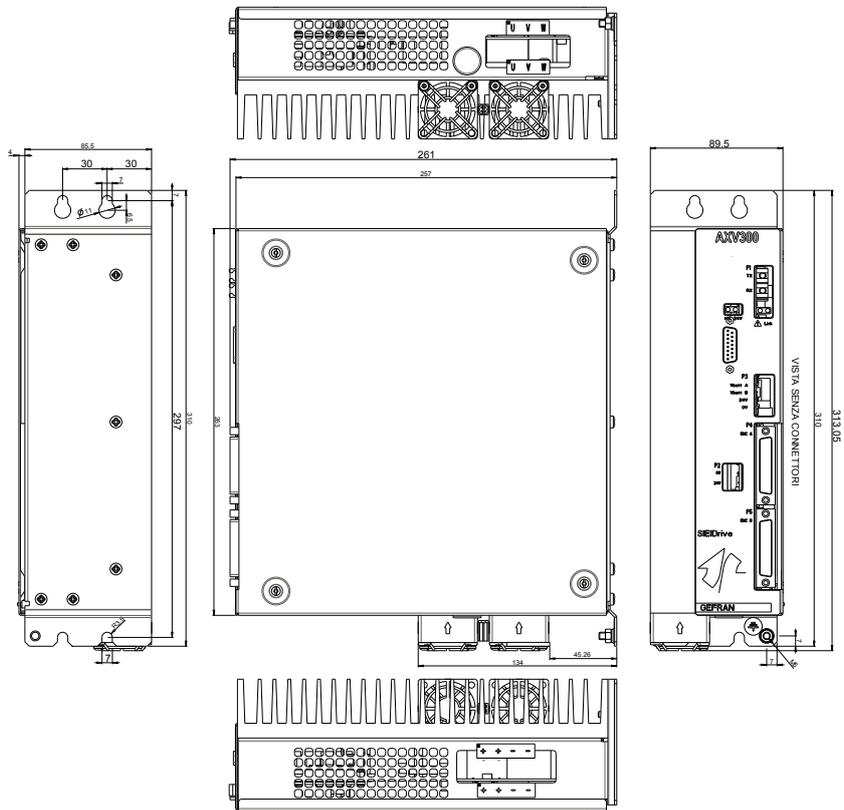
Size	Dimensions: Width x Height x Depth		Weight	
	mm	inches	kg	lbs
AXV300 SR-10413	59,5 x 310 x 261	2,34 x 12,2 x 10,3	3	6,6

Size 2

mm (inches)



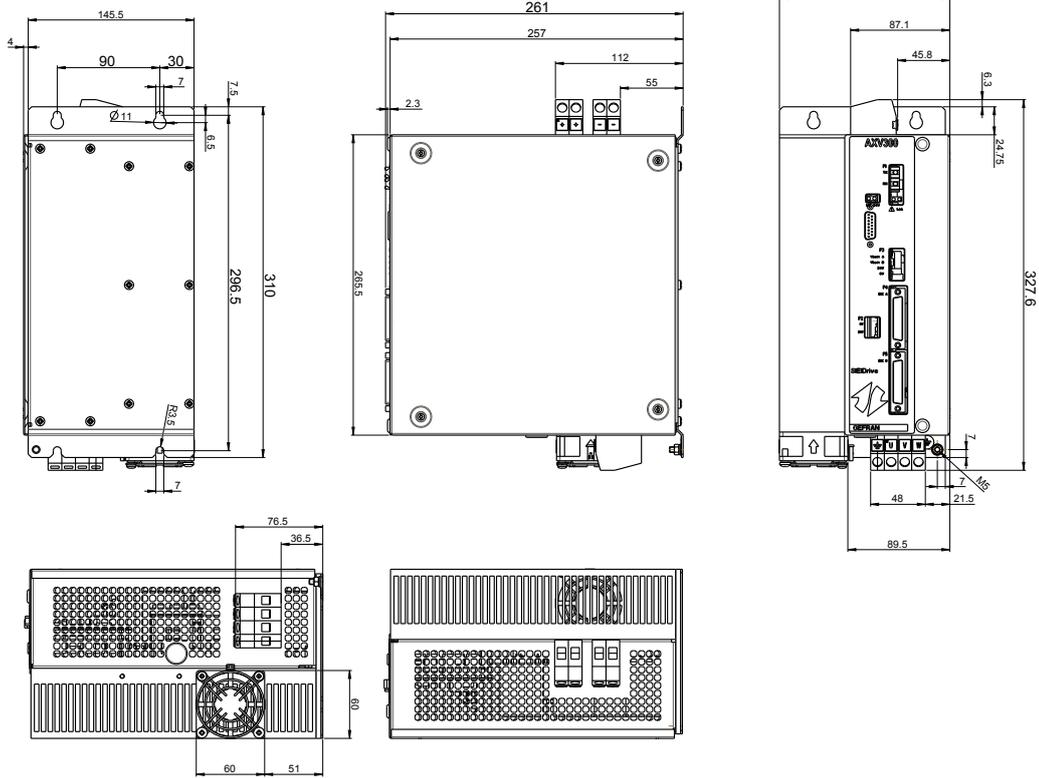
Size	Dimensions: Width x Height x Depth		Weight	
	mm	inches	kg	lbs
AXV300 SR-21020	89,5 x 310 x 261	3,52 x 12,2 x 10,3	5	11



Size	Dimensions: Width x Height x Depth		Weight	
	mm	inches	kg	lbs
AXV300 SR-22040	89,5 x 313 x 261	3,52 x 12,3 x 10,3	5	11

Size 3

mm (inches)



Sizes

Dimensions: Width x Height x Depth

Weight

**AXV300 SR-33570
AXV300 SR-350100**

149,5 x 327,6 x 261

5,9 x 12,9 x 10,3

kg

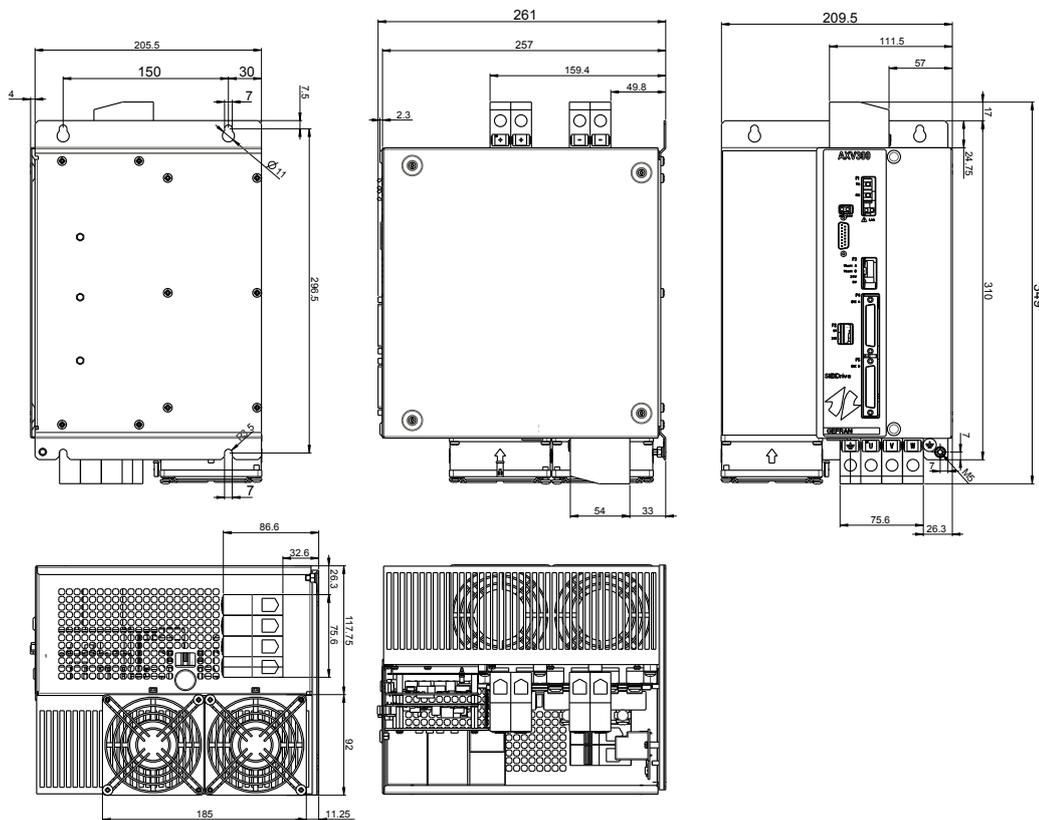
9

lbs

19,8

Size 4

mm (inches)



Size

Dimensions: Width x Height x Depth

Weight

AXV300 SR-480160

209,5 x 349 x 261

8,2 13,7 x 10,3

kg

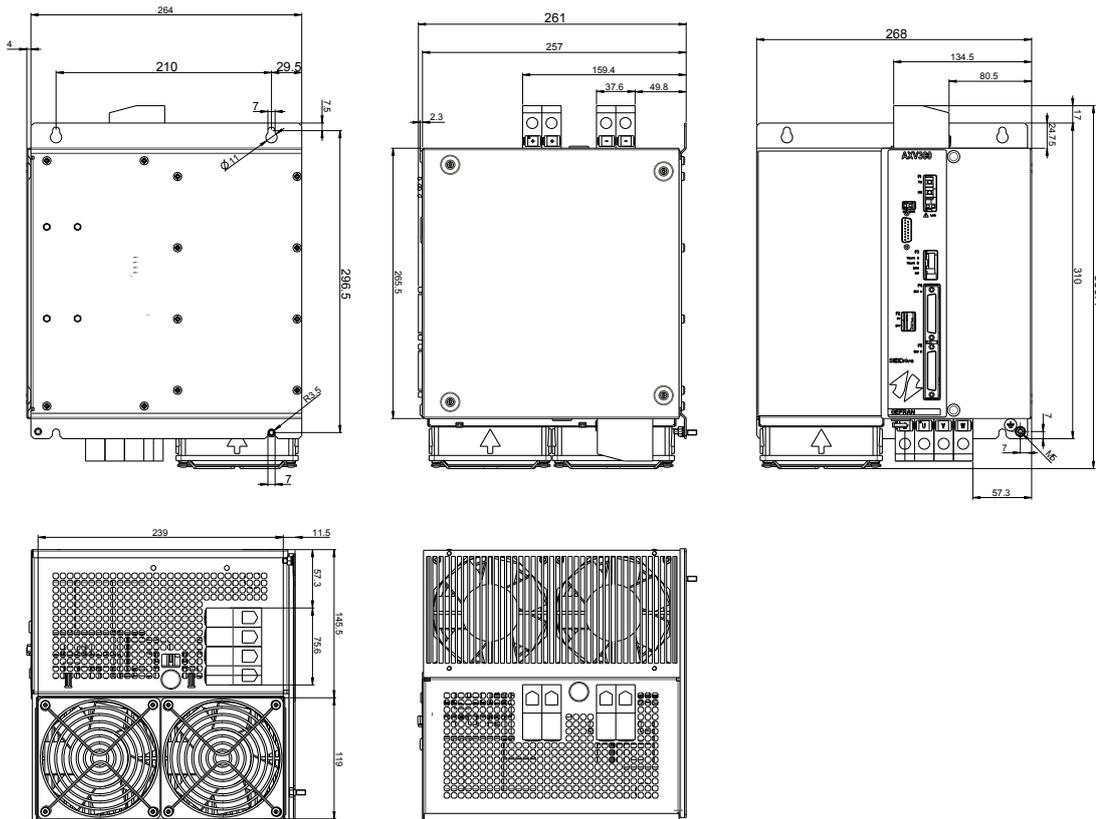
13

lbs

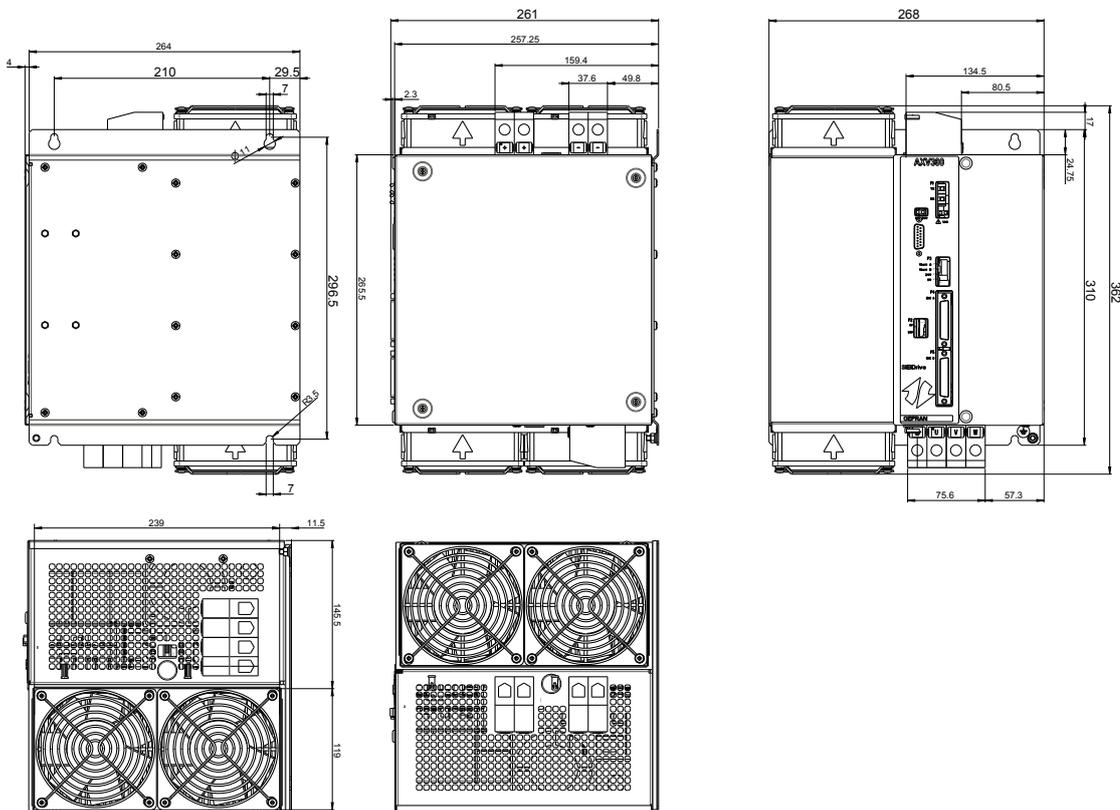
28,6

Size 5

mm (inches)



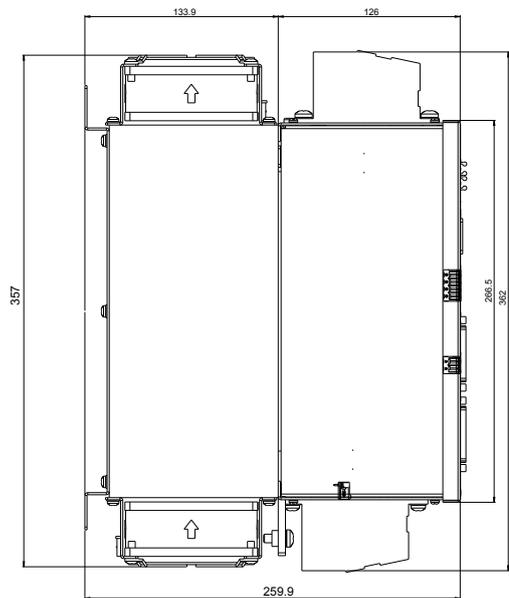
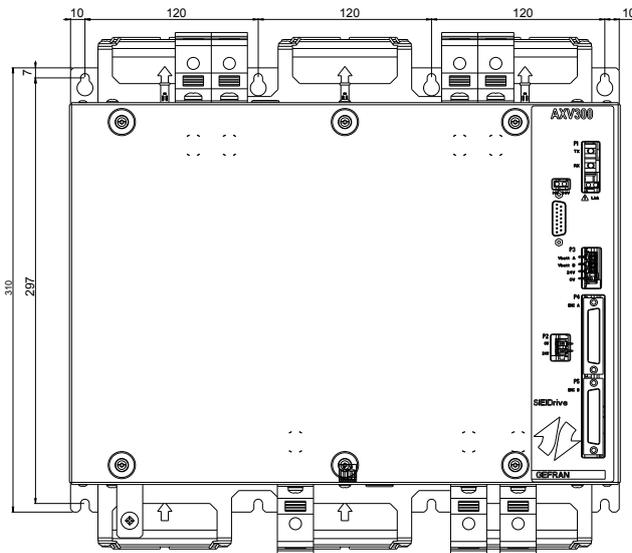
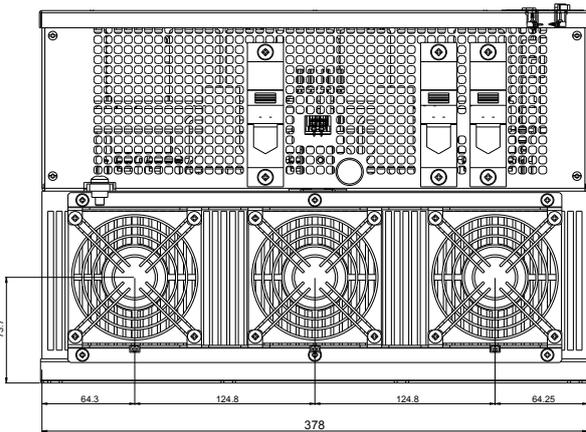
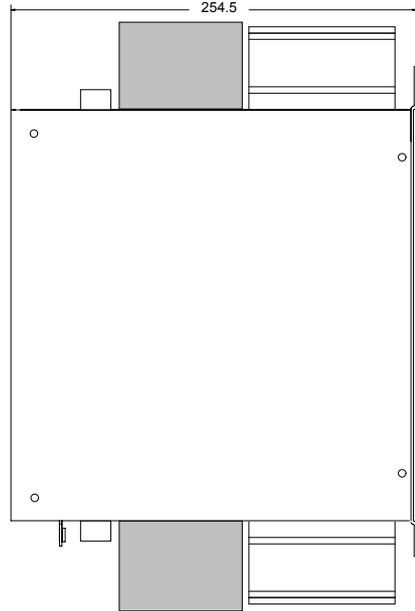
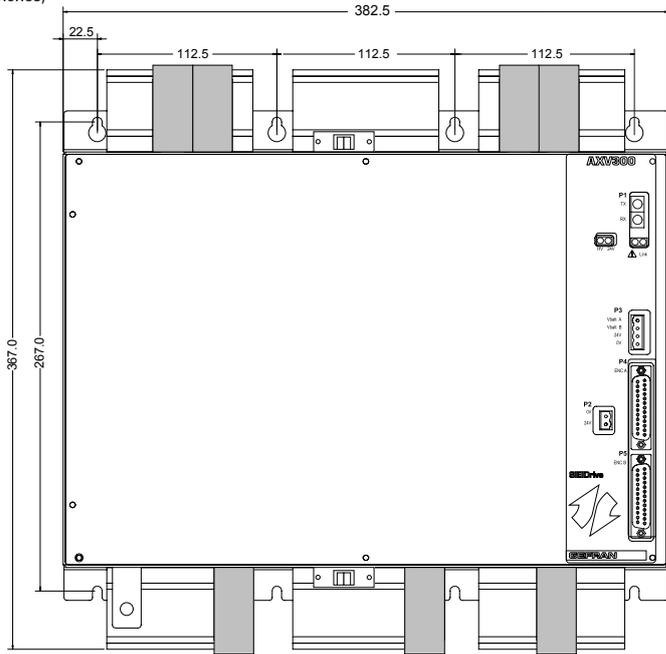
Size	Dimensions: Width x Height x Depth		Weight	
	mm	inches	kg	lbs
AXV300 SR-5100200	268 x 356,4 x 261	10,5 x 14 x 10,3	16	35,3



Size	Dimensions: Width x Height x Depth		Weight	
	mm	inches	kg	lbs
AXV300 SR-5140210	268 x 362 x 261	10,5 x 14,2 x 10,3	20	44,1

Size 6

mm (inches)



Size	Dimensions: Width x Height x Depth		Weight	
	mm	inches	kg	lbs
AXV300 6200250	382.5 x 367 x 254.5	15.06 x 14.45 x 10.02	27	59.5
AXV300 6200320	378 x 357 x 259.9	14.88 x 14.05 x 10.23	25	55.1

AXV300

AXV300 SM

AXV300 AFE-SR

AXV300 SR

AXV300 CU

PROGRAM.

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4.3 Product identification

AXV300 SR -X XX XX -X

Modular Servodrive System AXV300 series	
Module:	SR = Power supply module
Mechanical dimensions of the module:	1 = Size 1 2 = Size 2 3 = Size 3 4 = Size 4 5 = Size 5 6 = Size 6
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
Maximum 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
Software:	X = Standard

Example:

AXV300 SR -3 50 100 -X

Modular Servodrive System AXV300 series	
Module:	SR = Power supply module
Mechanical dimensions of the module:	3 = Size 3
Rated current,:	50 = 50 Arms
Maximum output current:	100 = 100 Arms
Software:	X = Standard

4.4 Order codes

AXV300 SR • Power supply module

CODE	TYPE	CONFIGURATION
S3SRV21	AXV300 SR-10413-X	Axis module size 1, Pn dc = 2,7 kW, Ppeak dc = 8,1 kW.
S3SRV22	AXV300 SR-21020-X	Axis module size 2, Pn dc = 6 kW, Ppeak dc = 12 kW.
S3SRV23	AXV300 SR-22040-X	Axis module size 2, Pn dc = 12 kW, Ppeak dc = 24 kW.
S3SRV24	AXV300 SR-33570-X	Axis module size 3, Pn dc = 21 kW, Ppeak dc = 42 kW.
S3SRV25	AXV300 SR-350100-X	Axis module size 3, Pn dc = 30 kW, Ppeak dc = 60 kW.
S3SRV26	AXV300 SR-480160-X	Axis module size 4, Pn dc = 48 kW, Ppeak dc = 96 kW.
S3SRV27	AXV300 SR-5100200-X	Axis module size 5, Pn dc = 60 kW, Ppeak dc = 120 kW.
S3SRV28	AXV300 SR-5140210-X	Axis module size 5, Pn dc = 84 kW, Ppeak dc = 126 kW.
S3SRV29	AXV300 SR-6200250-X	Axis module size 6, Pn dc = 120 kW, Ppeak dc = 150 kW.
S3SRV36	AXV300 SR-6200320-X	Axis module size 6, Pn dc = 120 kW, Ppeak dc = 192 kW.

AXV300

AXV300 SM

AXV300 AFE-SR

AXV300 SR

AXV300 CU

PROGRAM.

APPENDICE

5. AXV300 CU • Control Unit Module



The **AXV300 CU** module, based on an embedded platform with 32 bit floating point processor, coordinates the entire multi-axis system.

The **AXV300 CU** processes data in order to generate paths and coordinate simultaneous movements of up to 8 axes, calculating positions or interpolation values.

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, ...).

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

5.1 Features

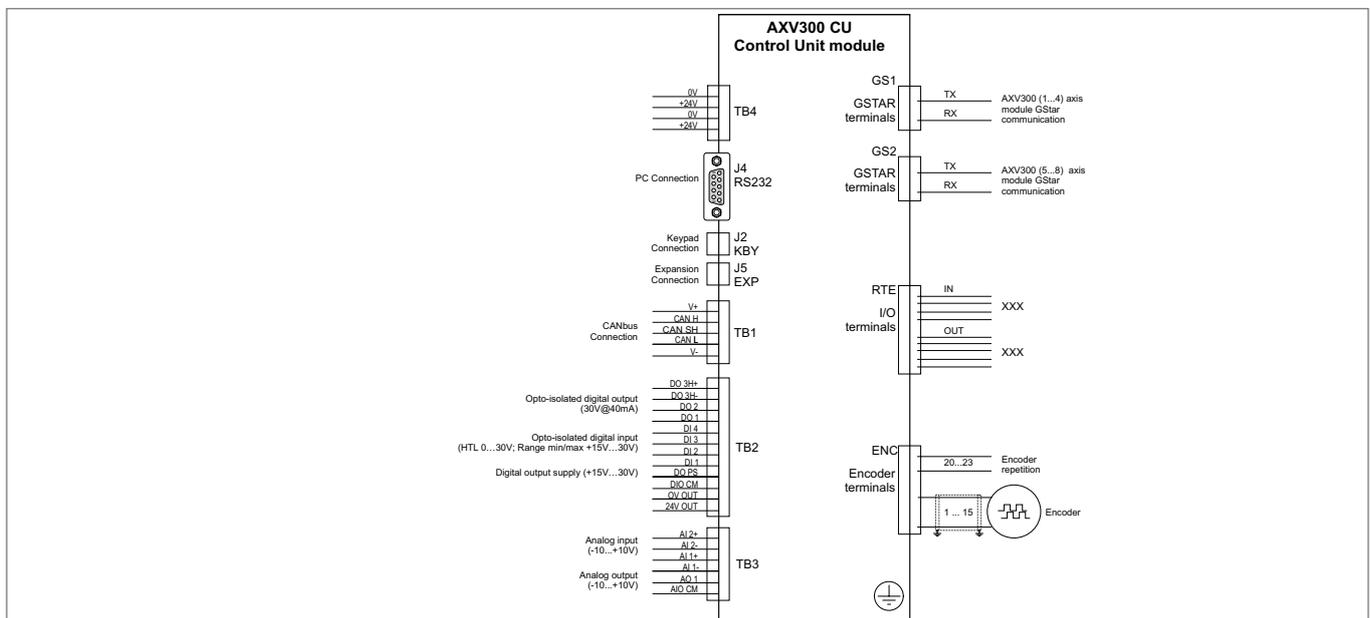
- System initialisation;
- System alarm management;
- Software updates;
- Master control unit communication via fieldbus (with additional module);
- Fast data exchange with all axes;
- Set-point calculation/transmission;
- Reading of significant values;
- Execution of application (e.g. Injection press);
- Fieldbus communication (CANopen port);
- Encoder management (with additional module):
 - Digital Encoder;
 - Sinusoidal Encoder;
 - SinCos and 5-traces Encoder;
 - 2 poles Resolver;
 - Absolute Encoder with EN-DAT 2.1 / EN-DAT 2.2 protocols;
 - Absolute Encoder with SSI/BiSS protocol.
- Modbus RTU RS232 connection;
- Serial port for connection to auxiliary programming keypad (currently being developed);
- 2-way synchronous communication with axes via optical fibre (GStar);
- SD-card for storing configurations and downloading system data;
- All AXV300 modules need a 24 VDC supply voltage to power the regulation card/internal logic and fans.

5.2 Input & Output data

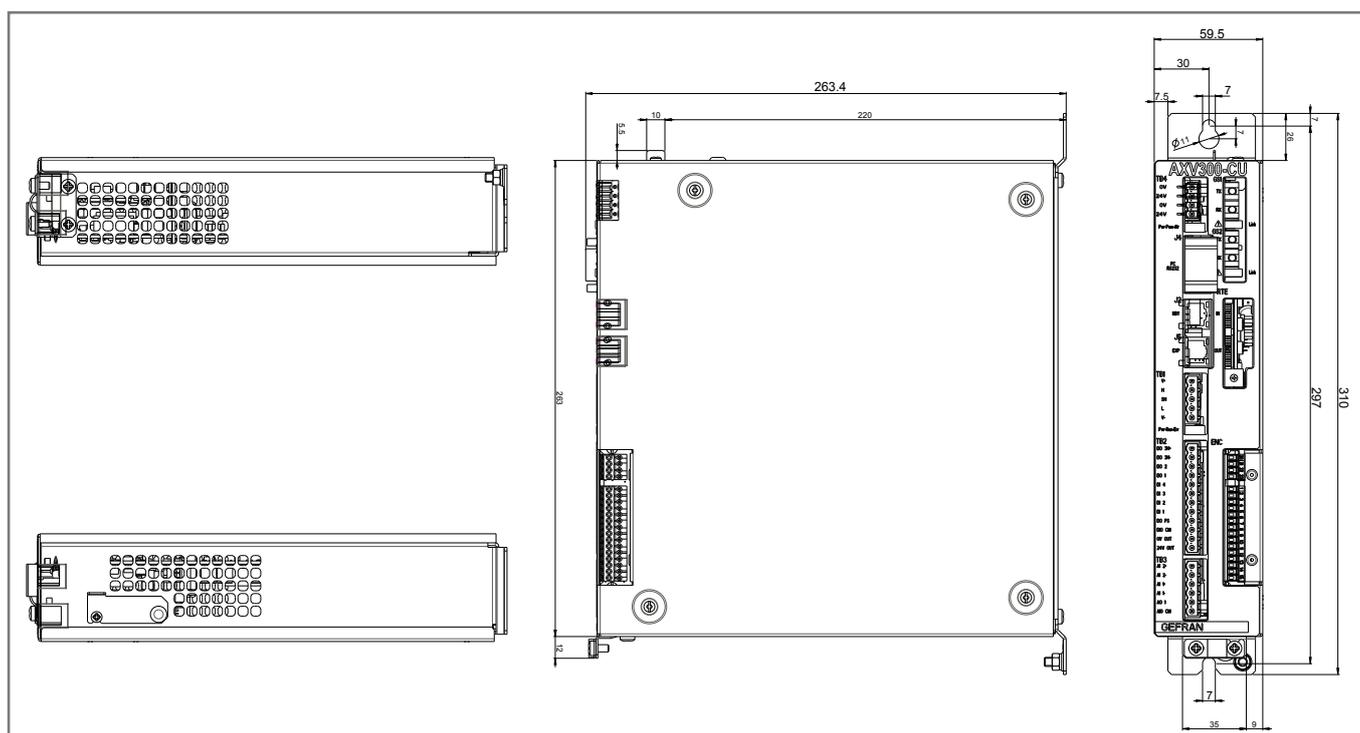
Module code	AXV300 CU	
Average dissipated power (*)	[W]	20W (refers to the standard version), 24W (refers to the version with RTE)
Mains supply, Vdc	[Vdc]	24V
Standard IO		<ul style="list-style-type: none"> • 2 analog inputs -10V...+10V • 1 analog output -10V...+10V @ 5mA • 4 opto-isolated digital inputs HTL 0...30V
Additional Real-Time Ethernet module		<ul style="list-style-type: none"> • 2 opto-isolated digital input 30V@40mA • 1 opto-isolated digital output 30V @ 500mA • Modbus TCP-IP
I/O expansion		(currently being developed)
Additional encoder module		<ul style="list-style-type: none"> • Digital; • Sinusoidal; • SinCos and 5-traces; • 2 poles Resolver (currently being developed); • Absolute EN-DAT 2.1 / EN-DAT 2.2; • Absolute SSI/BiSS (currently being developed).

(*) At nominal condition.

AXV300 CU module connection diagram



5.3 Weights and dimensions



Size	Dimensions: Width x Height x Depth		Weight	
	mm	inches	kg	lbs
AXV300 CU	59,5 x 310 x 263,5	2,34 x 12,2 x 10,4	2	4.4

5.4 Product identification

AXV300 CU-XX-X-X-XX

Modular Servodrive System AXV300 series

Module:	CU = Control Unit Module
Optional Real-Time Ethernet module:	XX = not included ET = EtherCAT module GD = GD-Net module EP = EtherNet IP module
Optional encoder input module:	X = not included A = Absolute Encoder with SSI protocol D = Digital Encoder B = Absolute Encoder with SSI/BiSS protocol R = 2 poles Resolver S = SinCos and 5-traces Encoder U = Absolute Encoder with EN-DAT 2.1 / 2.2 protocols
Software:	X = Standard
Special versions:	16 = 16bits analog inputs XX = standard version

Example:

AXV300 CU ET D -X-XX

Modular Servodrive System AXV300 series

Module:	CU = Control Unit Module
Optional Real-Time Ethernet module:	ET = Real Time Ethernet module
Optional encoder input module:	D = Digital Encoder
Software:	X = Standard
Special versions:	XX = standard version

5.5 Order codes

AXV300 CU - Control Unit Module

CODE	TYPE	CONFIGURATION
S3SRV30	AXV300 CU-XX-X-X-XX	Basic module.
S3SRV34	AXV300 CU-ET-X-X-XX	Ethercat module included.
S3SRV31	AXV300 CU-GD-X-X-XX	GD-Net module included.
-	AXV300 CU-XX-A-X-XX	Absolute encoder input module with SSI protocol included.
-	AXV300 CU-ET-A-X-XX	Ethercat module and absolute encoder input module with SSI protocol included.
-	AXV300 CU-GD-A-X-XX	GD-Net module and absolute encoder input module with SSI protocol included.
S3SRV32	AXV300 CU-XX-D-X-XX	Digital encoder input module included.
S3SRV35	AXV300 CU-ET-D-X-XX	Ethercat module and digital encoder input module included.
S3SRV33	AXV300 CU-GD-D-X-XX	GD-Net module and digital encoder input module included.
-	AXV300 CU-XX-B-X-XX	Absolute encoder input module with BiSS digital protocol included.
-	AXV300 CU-ET-B-X-XX	Ethercat module and absolute encoder input module with BiSS digital protocol included.
-	AXV300 CU-GD-B-X-XX	GD-Net module and absolute encoder input module with BiSS digital protocol included.
-	AXV300 CU-XX-R-X-XX	2-pole resolver input module included.
-	AXV300 CU-ET-R-X-XX	Ethercat module and 2-pole resolver input module included.
-	AXV300 CU-GD-R-X-XX	GD-Net module and 2-pole resolver input module included.
-	AXV300 CU-XX-S-X-XX	5-track SinCos encoder input module included.
-	AXV300 CU-ET-S-X-XX	Ethercat module and 5-track SinCos encoder input module included.
-	AXV300 CU-GD-S-X-XX	GD-Net module and 5-track SinCos encoder input module included.
-	AXV300 CU-XX-U-X-XX	Encoder input module with EN-DAT 2.1/EN-DAT 2.2 protocol included.
-	AXV300 CU-ET-U-X-XX	Ethernet module and encoder input module with EN-DAT 2.1/EN-DAT 2.2 protocol included.
-	AXV300 CU-GD-U-X-XX	GD-Net module and encoder input module with EN-DAT 2.1/EN-DAT 2.2 protocol included.

AXV300

AXV300 SM

AXV300 AFE-SR

AXV300 SR

AXV300 CU

PROGRAM.

APPENDICE

6. Programming

6.1 "GF_eXpress" PC Configuration Tool

Applications

- Parameter configuration of Gefran devices (Instruments, Drives, Sensors)
- Tuning of control parameters with on-line tests and trends
- Management of parameter archive for multiple configuration

Features

- Guided product selection
- Simplified settings
- Multiple languages
- Parameter printout
- Creation and storing of recipes
- Network autoscan



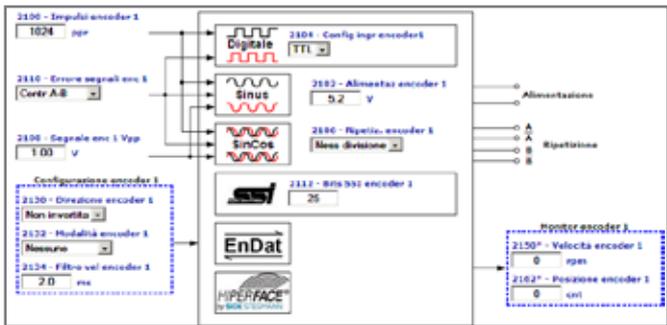
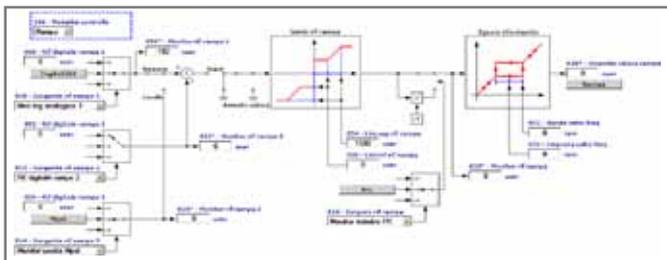
GF_eXpress is the software used to configure the parameters of the automation components, drives and sensors in the Gefran catalogue.

The procedures for selecting and configuring parameters are easy and intuitive, thanks to the graphic interface and devices are grouped according to product type and functions.

Product searches are performed by means of a context search and a visual selection from among actual images of the products.

This makes it possible to have a single library of devices for all Gefran products.

All details for configuration of each single device are set out in XML format to facilitate expansion of the catalogue and parameters.



The selected product can be configured as follows:

- using a sub-set of predefined parameters
- using a guided graphic interface with context menus

The creation of custom parameter menus with a limited sub-set of data is envisaged, to enable better and more effective device configuration.

GF_eXpress is based on HTML technology. The graphic layout and content are intuitive and easy to use.

The interface and descriptions of the configuration parameters are available in multi-language format.

The use and support of UNICODE format, for multi-language management, enables the inclusion of languages that use special characters (Chinese, Korean, Russian, etc.).

GF_eXpress also offers the following functions:

• Autoscan

Device connection parameters can be configured manually or using the Autoscan function.

The Autoscan function automatically searches for the device connected to the development PC, sending serial commands to identify the type and parameters of communication.

• Monitor Window

When the device is connected, the configuration pages display the value of the single parameter in real-time.

Besides displaying the value the Monitor Window also enables parameters to be modified in real-time.

• Recipes

Saving and archiving a list of parameters. This function is used to manage same configurations on different devices or the transfer of configurations between different users.

• Oscilloscope

Simultaneous monitoring of up to 8 curves. The reference value for the curve being displayed can be selected from among all the variables that are available for the selected device.

• Print

Prints the variables that are displayed or selected. The Print function also includes the preview.

• Technical data

Operating systems:

- Windows ® 2000, XP, Vista.

Minimum PC requirements:

- Pentium class CPU
- 512 MB of RAM
- Free space of > 200MB
- Graphic card min. VGA (1024x768)
- 1 RS232 or USB serial port
- 1 Ethernet port (for other Gefran devices, e.g. Geflex)
- CD-ROM drive

Communication protocols supported:

- Serial communication with the device (Modbus).

6.2 GF_Softscope

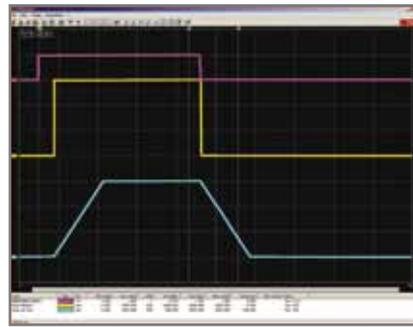
GF_Softscope is a software oscilloscope with synchronous sampling (buffered with a minimum sampling time of 1ms). Using SoftScope the user can easily display in a fast way some specific variables, for example commissioning variables, variables to test performance levels achieved or to tune the control loops.

SoftScope allows the definition of the following parameters:

- Trigger conditions (e.g. climbing leading edge of a specific signal)
- Recording quality (a multiple of the basic clock at 1ms)
- Recording duration period
- System sizes to be recorded.

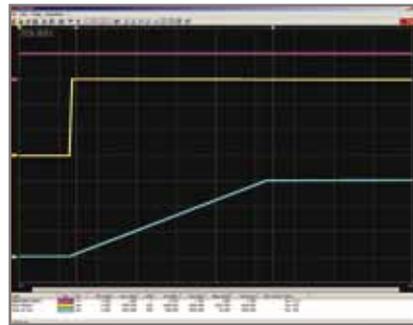
The curves can be displayed with different colours and they can be enabled/disabled. The zoom function allows enlargement of the details. The cursor allows detection of the signal peaks and duration.

The recorded data are displayed as time-based curves and therefore can be analysed. The displayed curves can be printed and stored in ASCII format and can be used with the most common data processing tools (for example Excel, Matlab).



Speed cycle
Start, ramp reference 1500 rpm, ramp output reaches 1500 rpm, Stop, ramp reference 0 rpm, ramp output reaches 0 rpm.

- 1) start command
- 2) ramp input speed reference
- 3) ramp output



Zoom
Ramp output phase from 0 rpm to 1500 rpm of the previous cycle.

- 1) start command
- 2) ramp input speed reference
- 3) ramp output

6.3 "MDPlc" advanced development environment

The Motion Drive Programmable logic controller (MDPlc) development environment is a tool for the development of industrial applications based on the SIEIDrive ADV200, XVy-EV and AXV300 series of drives.

It is an integrated tool that allows simple writing, compiling, downloading and debugging of specific applications.

MDPlc allows complete personalisation of the drives according to the application requirements using a "friendly" and powerful graphic interface. The importance of the MDPlc's performance is particularly evident when defining advanced applications.

The primary feature of MDPlc is its ability to create an application code for the drives in assembly language, by compiling the application written in the MDPlc environment with PLC languages in compliance with the IEC 61131-3 international standard.

The languages that can be used to program specific custom applications are:

- Instruction List (IL)
- Structured Text (ST)
- Ladder Diagram (LD)
- Function Block Diagram (FBD)
- Sequential Flow Chart (SFC)

These languages can be used simultaneously within the same application so that the most suitable language is used for each application process.

The application can be structured on different levels, according to the block hierarchy and sequence. The user can also use basic library blocks or create custom blocks to be incorporated into personalised libraries.

The MDPlc editor is very efficient due to specific functions such as syntax, colouring and automatic insertion, together with the ability to include comments thereby making the program easier to be used.



The MDPlc development environment is structured on 5 "tasks" performed with different cycle times:

- Task "Boot": application boot (initialisation)
- Task "Fast": cycle at 250us (high priority)
- Task "Slow": cycle at 1 to 8ms
- Task "Background": asynchronous execution (low priority)
- Task "Parameter": asynchronous if a parameter is modified

The user can program each task with a high degree of precision in one or more of the IEC 61131 - 3 standard languages, including those with floating-point arithmetic. Depending on the application and in order to obtain the desired performance and accuracy levels, the user can organise the program to take best advantage of the system capacities in terms of languages and calculation times. The user can also access all drive variables and parameters, including the system (processor) and DSP ones (for example, instant voltage and currents, encoder variables and parameters).

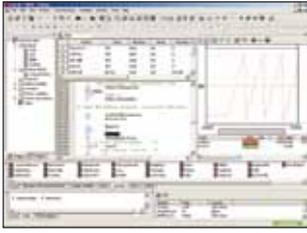
Inside the MDPlc application the user can define different variables (floating, integers, etc.) and parameters. Again, depending on the application, the user can also define some personalised drive parameter menus that can be used and modified by the GF_eXpress configurator of the drive.

The application can perform a direct data exchange using the available buses (DeviceNet, CanOpen®, Profibus-DP, Fast Link, etc.) both via the supervision PC/Plc and via the I/O remote modules. Typical situations where MDPlc applications have been developed are packaging, automatic warehouse systems, the plastic and glass industry, the textile sector and other applications requiring high reliability, accuracy, programming flexibility and short development times.



CD-ROM GF_eXpress + MDPlc for AXV300
code 1S3SR01

• Debug tools



MDPIc integrates a series of diagnostic tools supporting the application debug, its setting and optimisation. MDPIc allows the display, both numerically and graphically, and in suitable windows of all drive and application variables which have been con-

figured via the drag-and drop mode. The graphic curves are displayed with different colours for clarity; the different colours can be connected to configurable events and conditions (trigger). Because the synchronous acquisitions are buffered at 1ms, the variables are used with high accuracy so as to give a precise analysis of their condition.

During the application development and testing, it is possible to insert some triggers into pre-defined code points, which can be configured via a suitable window. The variables, which are read in a synchronous way with each trigger, can be displayed as numbers, as diagrams or tables. The MDPIc environment supports the application debug by highlighting any programming errors, which are then displayed in a suitable window during the compiling process. The highlighted error is displayed together with its position and error cause showing a direct link to the program section to be analysed.

• Instruction List (IL)



Instruction List is a low-level language, with a structure similar to a simple machine assembler language. It is ideal for solving small straightforward problems where there are few decision points and a limited number of changes in the program execution flow.

IL can be used when the execution time is critical, for example in the MDPIc Fast Task at 1ms.

• Structured Text (ST)



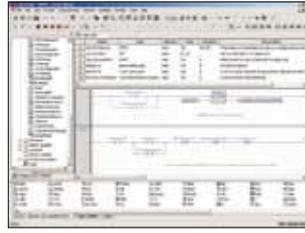
Structured text is a high-level language. It has a syntax that on first appearance is very similar to Pascal language. An ST program is usually organised as continuous text. This is divided and structured into paragraphs, which represent the logic units of

the ST program.

The wide range of basic commands satisfies the needs of the data management, computation functions, complex arithmetic calculations and control structure. ST has a comprehensive range of constructs to assign values to variables, to call functions and function blocks, to create expressions, to evaluate conditions (IF, CASE) and to implement iterations and loops (WHILE, REPEAT UNTIL).

ST is recommended in the MDPIc Fast Task at 1 ms, where the execution time is critical.

• Ladder Diagram (LD)



The representation of logical sequences in the form of the ladder diagram originates from the area of electrical plant engineering.

LD is based on the methods used to design relay logic. This form of representation is particularly suitable for implementing relay switching operations in PLC programs.

• Function Block Diagram (FBD)



The basic idea behind PLC programming with the function block diagram is that the program is structured in function-oriented logical sequence cascades (networks). FBD derives from the graphic representation of flow diagrams, hence its ease of use.

FBD is based on viewing a system in terms of the flow of signals, represented in the form of electronic circuit diagrams. Within one network, the execution direction is always from left to right. All input values must always be computed and available before the execution of a function block. The execution and evaluation of a network is not completed until the output values of all elements have been calculated.

• Sequential Flow Chart (SFC)



Sequential Function Chart is a powerful graphical language for the description of the sequential behaviour of a program in terms of states and transitions

SFC describes the sequential aspects of a program and it can be used to divide a control problem

so that only relevant aspects to a specific phase are considered.

SFC can be useful for the development of programs with a well-defined "top-down" or "bottom-up" structure. Usually SFC can include functions, function blocks and programs, and also actions and transitions written with languages such as FBD, IL, LD or ST, which are more suitable for descriptions of specific parts of the program and not of the sequential flow, implemented with the SFC program.

A1. Sizing

• General criteria for drive/brushless motor sets

Given the high-level performance that can be achieved by the drive/brushless motor set, the dynamic performance of the entire system is strongly influenced by the mechanical design of the system being operated.

The following considerations are particularly important:

- the degree of precision depends on the sensor, not on the motor;
- the speed of response depends on transmission rigidity (mechanical pass-band);
- system noise levels, which are sometimes high, do not depend on the motor or on the drive, but on a mechanical design that is not suitable for the required performance level;
- motor noise is due to continuous acceleration and braking. Motor overheating may occur in such conditions but not be due to the use of a motor that is too small;
- the pass-band controlling the drive depends on the mechanical design, as the device cannot be stabilised in less than a period equal to 3 times the time required to dampen the mechanical oscillations.

The mechanical transmission must therefore be chosen according to the type of application. In mandrel applications, which involve significant power transmission and marginal dynamic performance, ordinary geared transmissions are used. These are the best choice in this case, in terms of cost.

For axis applications, where dynamic performance is essential, the required torque is usually equal to the sum of the motor and load inertial torques.

The use of a reduction ratio in the transmission reduces the load inertia effect but at the same time increases that of the motor. Direct coupling is therefore normally used in such applications. With direct coupling, system dynamics are influenced by the torsional rigidity of the shaft and relative resonance frequency.

The drive and motor can have a bigger pass-band width than the mechanical part.

After choosing the motor and transmission, the next step is to check the application.

For applications with a load and speed that are practically constant or which vary over longer periods of time than the motor time constant, it is sufficient to check that the maximum load is within the capacity limits as stated for the motor and the drive.

Otherwise, for applications where the load varies according to the speed of the cycle, proceed as follows:

- trace a cycle speed/time diagram, bearing in mind that a settling period equal to 3 times the system pass-band period is required to reach an exact position or speed value, in addition to the time set by the system maximum accelerations;
- refer the system inertia and loads back to the motor axis;
- calculate the acceleration cycle and the cycle of the relative inertia torques;
- define the torque/time diagram by adding the inertial torques to the loads;
- from the torque/time diagram calculate the cycle effective torque. If the cycle is made up of n duration segments t_1, t_2, \dots, t_n , and of their corresponding torques C_1, C_2, \dots, C_n , the cycle effective torque is given by:

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

- using the same equation, calculate the average quadratic speed;
- calculate the cycle average torque;
- calculate the maximum duration of the cycle maximum torque;
- calculate the torque required at the maximum cycle speed.
- calculate the cycle maximum torque.

The motor and the drive must be checked on the basis of the data obtained.

• Motor check

The motor check involves the following steps:

- checking the peak torque,
- thermal sizing,
- electrical sizing.

Demagnetisation current check

This check involves a direct comparison of the maximum peak current value, obtained using the formula shown below, with the motor demagnetisation current.

$$I_{PK} = \sqrt{2} \frac{C_{PK}}{K_T}$$

Where:

C_{PK} cycle peak torque
 K_T motor torque constant

Thermal sizing check

First check that the C_{EFF} , ω_{EFF} point is within the area of the motor's continuous operating range.

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

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

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.

Electrical sizing check

Check whether at maximum speed the voltage required by the motor is lower or equal to that supplied by the drive with the minimum power supply voltage envisaged. The following ratio must be true:

$$V_{MAX} = \sqrt{\left(\frac{C_{PK}}{K_T} \right)^2 + \left(\frac{C_{PK} P_N}{K_T 2} \right)^2} \leq E_{MIN}$$

where:

E_{MIN} minimum voltage supplied by the drive
 K_E motor electric 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 number of motor poles
 L_W motor terminal to terminal inductance

If this condition is not met, select a motor with a winding suitable for higher speeds; in this case a higher current will be needed.

• Checking the axis size

The drive size must be chosen according to the torque to be supplied to the motor with a specific winding, on which the necessary current is calculated.

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

$$I_{MAX} = \frac{C_{PK}}{K_T} \quad I_{med} = \frac{C_{AVE}}{K_T}$$

where:

C_{PK} cycle maximum torque
 C_{AVE} cycle average torque
 K_T motor torque constant

The drive must be in a position to deliver continuous and peak currents higher than the calculated values, bearing in mind that the drive maximum current must only be compared with I_{max} if the relative time is less than 2 seconds; otherwise the drive must have a rated current of more than I_{max} .

Sizing of braking resistor for AXV300 SM power 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.

Minimum ohmic value

The use of lower resistor values could damage the supply module and is strictly forbidden.

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:

- PMFR = Peak power [W]
- TFR = Braking time [s]
- Tc = Repeat time [s]
- EFR = Braking energy [J]
- PNFR = Braking power [W]

Ratios:

$$PNFR = 0.5 * PMFR * \frac{TFR}{Tc} = [W]$$

or

$$PNFR = \frac{EFR}{Tc} = [W]$$

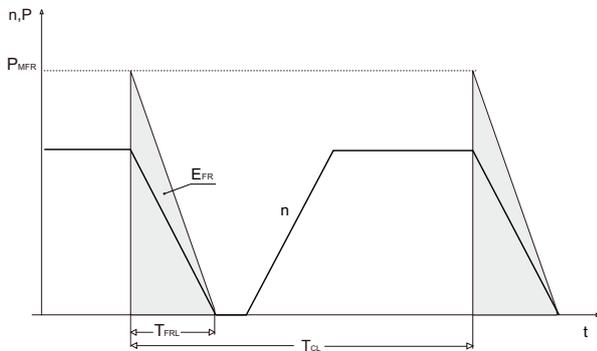


Figure 1: Limit braking cycle with typical triangular profile

Checking the resistor:

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

- power rating $PNFR < PNBR$
- maximum power that can be absorbed $EFR < EBR$

Example of how to select the braking resistor

"Table 1: Braking resistors and combinations " on page 53 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:

PMFR	= 10 kW
TFR	= 3 s
Tc	= 15 s

Use these to calculate the braking energy value:

$$EFR = 0.5 * PMFR * TFR = 15 [kJ]$$

AXV300 SM 12040 supply module data

Rmin = 33 Ohm -> Rmin20% = 39 Ohm

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

EBR1	= 20 kJ
EBR2	= 82 kJ
PNBR	= 2 kW

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

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

This must be greater than PPFR.

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

Cycle (1)

Maximum possible braking time:

$$TBRL1 = 2 * \frac{EBR1}{PPSM} = 3.4 [s]$$

Cycle (2)

Maximum possible braking time:

$$TBRL2 = 2 * \frac{EBR2}{PPSM} = 14.0 [s]$$

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

$$TFR = 3 [s] < TBRL1 \text{ or } TBRL2.$$

If not, select a braking resistor with a higher energy absorption capacity (EBR).

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

$$PNFR = 0.5 * PMFR * \frac{TFR}{Tc} = \frac{EFR}{Tc} = [W]$$

Cycle (1)

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

Cycle (2)

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

In that case the tests are the same where the equivalent resistor data are shown in table 1.

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 that shown in table 2.

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.

Table 1: Braking resistors and combinations

Type	Code	PNBR [W]	RBR [Ohm]	EBR (1) [kJ]	EBR (2) [kJ]	PPSM [kW]	TBRL1 [s]	TBRL2 [s]	AXV300 SM-		
									12040	24080	380160
BR T2KO-28R	S8T00F	2000	28	20	82	17.5	2.3	9.4		•	•
BR T2KO-42R	S8T00M	2000	42	20	82	11.7	3.4	14.1	•	•	•
BR T4KO-11R6	S8T00H	4000	11.6	40	150	42.2	1.9	7.1		•	•
BR T4KO-15R4	S8T00G	4000	15.4	40	150	31.8	2.5	9.4		•	•
BR T4KO-18R	S8T00O	4000	18	40	150	27.2	2.9	11.0		•	•
BR T8KO-23R	S8T00N	8000	23	40	150	21.3	3.8	14.1		•	•
BR T8KO-11R6	S8T00R	8000	11.6	80	220	42.2	3.8	10.4		•	•
BR T8KO-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	S8S23	750	68	7.5	28	7.2	2.1	7.8	•	•	•
RFPR 750 D 80R	S8S20	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	S8S24	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	S8S22	1900	25	19	75	19.6	1.9	7.7		•	•
RFPR 1900 D 28R	S8S25	1900	28	19	75	17.5	2.2	8.6		•	•

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

Table 2

		RBR	PPSM	PNBR	EBR
R series R		2	1/2	2	2
R parallel R		1/2	2	2	2
2R parallel 2R		1	1	4	4

A2. Accessories

External mains side fuses

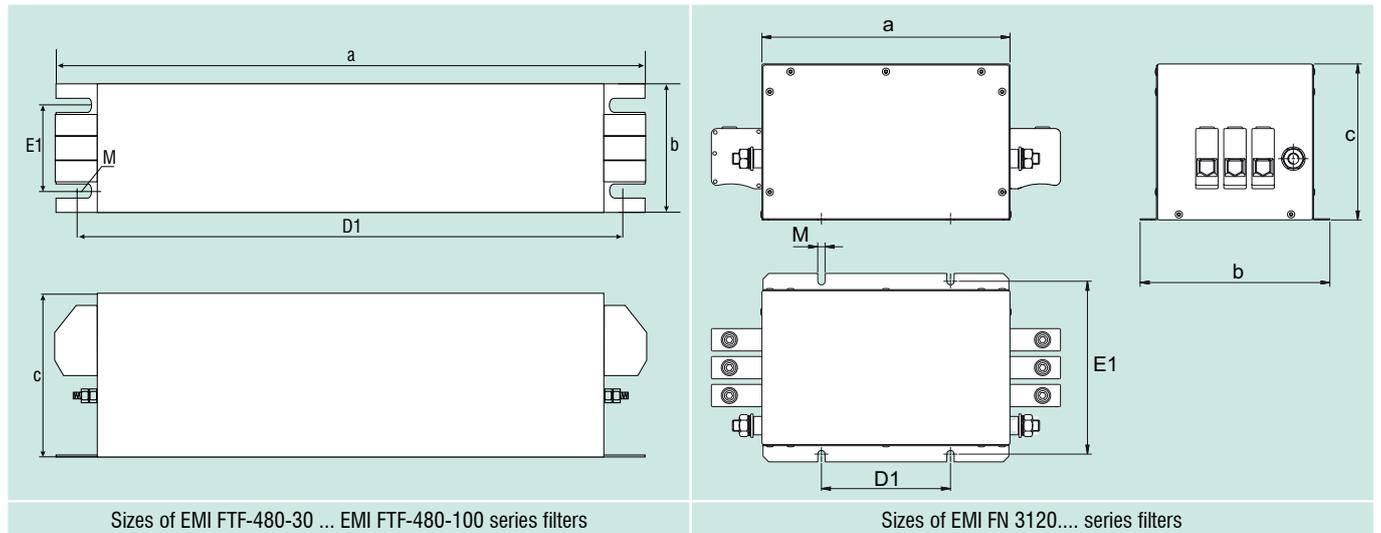
Module type	Type	Code	Note
AXV300 SM			
12040	Z14gR40 A70QS40-14F	F4M13	14 x 51 - UL Recognized - 40A/600V
24080	A70QS80-22 FWP-80A22Fa	F4M19	22 x 58- UL Recognized - 80A/600V
380140	CP URQ 27x60/160	S85D4	27 x 60.3 - UL Recognized - 160A/690V
AXV300 SR			
10413	Z14gR16 A70QS16-14F (*)	F4M05	14 x 51- UL Recognized (*) - 16A/600V
21020	Z14gR20 A70QS20-14F (*)	F4M07	14 x 51- UL Recognized (*) - 20A/600V
22040	Z14gR40 A70QS40-14F (*)	F4M13	14 x 51- UL Recognized (*) - 40A/600V
33570	A70QS80-22 FWP-80A22Fa	F4M19	22 x 58- UL Recognized - 80A/600V
350100	A70QS100-22F FWP-100A22Fa	F4M21	22 x 58- UL Recognized - 100A/600V
480160	CP URQ 27x60/160	S85D4	27 x 60.3 - UL Recognized - 160A/690V
5100200	S00üF1/80/200A/660V	F4G23	200A/660V
5140210			
6200250	S1üF1/110/315A/660V	F4G30	315A/660V
6200320			

Technical data for fuses, including dimensions, weights, dissipated power, fuse blocks, etc. can be found in the manufacturers' catalogues:
 A70..., CP... : Ferraz; FWP... : Bussmann; S..., Z14 ... = Jean Mueller.

External EMC filters

Module type	Type	Code	EN 61800-3 : Category / Environment / Length of motor cables	Note
AXV300 SM				
12040	EMI FTF 480-30	S7GHP	C3/2°/100m	
24080	EMI FTF 480-42	S7GOA	C3/2°/100m	
380140	EMI FTF 480-75	S7GOC	C3/2°/100m	For lower loads
	EMI FTF 480-100	S7GOD	C3/2°/100m	For other loads
AXV300 SR				
10413	EMI-FN3120H-480V-25A	S7GHE	C3/2°/100m	
21020	EMI-FN3120H-480V-25A	S7GHE	C3/2°/100m	
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
33570	EMI FN 3120-480-50	S7DGV	C3/2°/100m	
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
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
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
5140210	EMI FN 3120-480-150	S7EMI18	C3/2°/100m	
6200250	EMI FN 3120-480-230	S74EE	C3/2°/100m	
6200320	EMI FN 3120-480-230	S74EE	C3/2°/100m	

Dimensions:



Filers 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.

Input choke

AXV300 SM

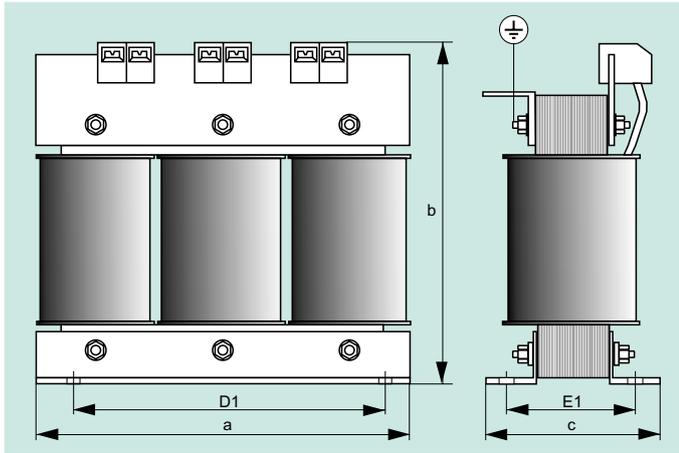
The input choke is mandatory if the output current exceeds the maximum "Ilimit" values shown in the table in the paragraph "2.1 Input & Output data" on page 23".

AXV300 SR

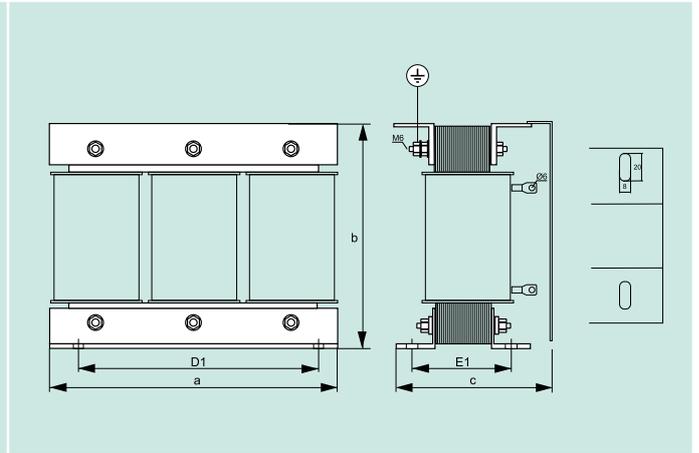
The input choke is mandatory.

Module type	Type	Code	Choke rating [mH]	Current rating [A]	Current saturation [A]
AXV300 SM					
12040	LR3y-2075	S7AB6	0.89	17.7	36.5
24080	LR3-022	S7FF4	0.35	43	86
380140	LR3-037	S7FF2	0.18	71	145
AXV300 SR					
10413	LR3 AXV-04-R	S7AD3	1,5-3,5	5	13
21020	LR3 AXV-10-R	S7AC7	1,5-3,5	10	20
22040	LR3 AXV-20-R	S778DD	2,7	20	40
33570	LR3 AXV-35-R	S7AL01	1,2	60	100
350100	LR3 AXV-80-R	S7LR02	0,6	60	
480160	LR3 AXV-80-R	S7LR02	0,6	60	
5100200	LR3 AXV-140-R	S7LR03	0,25	140	
5140210	LR3 AXV-140-R	S7LR03	0,25	140	
6200250	LR3 AXV-200-R	S7LR04	0,25	200	
6200320	LR3 AXV-200-R	S7LR04	0,25	200	

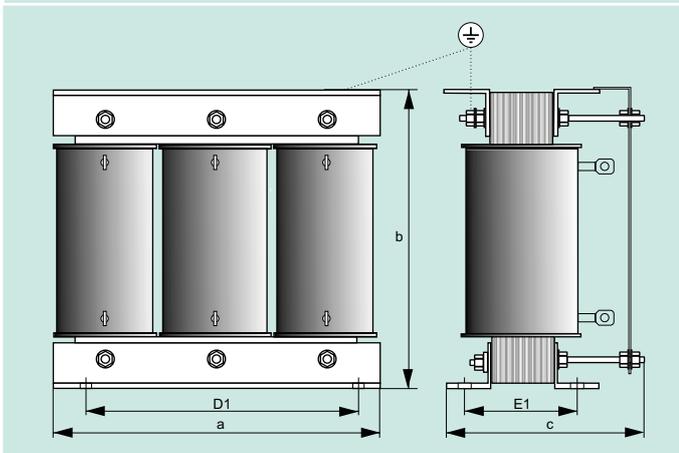
Dimensions:



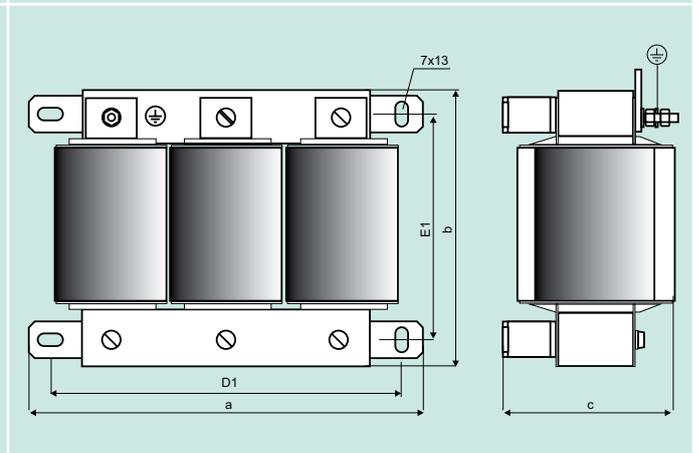
LR3y-..., LR3-022, LR3-AXV-04-R, LR3-AXV-10-R



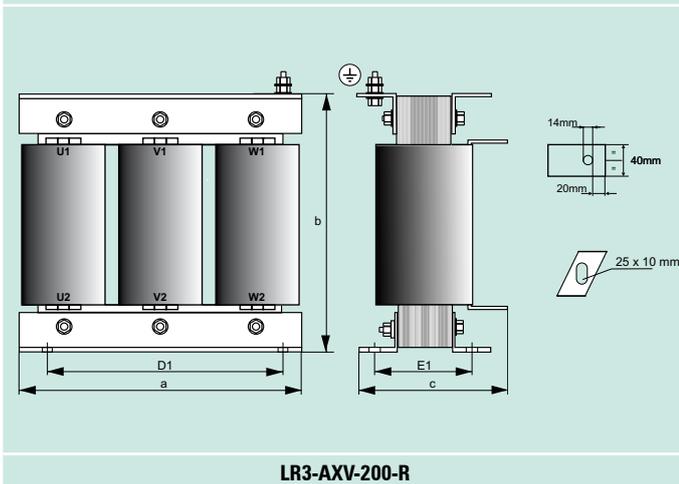
LR3-AXV-35-R, LR3-AXV-80-R, LR3-AXV-140-R



LR3-037



LR3 AXV-20-R



LR3-AXV-200-R

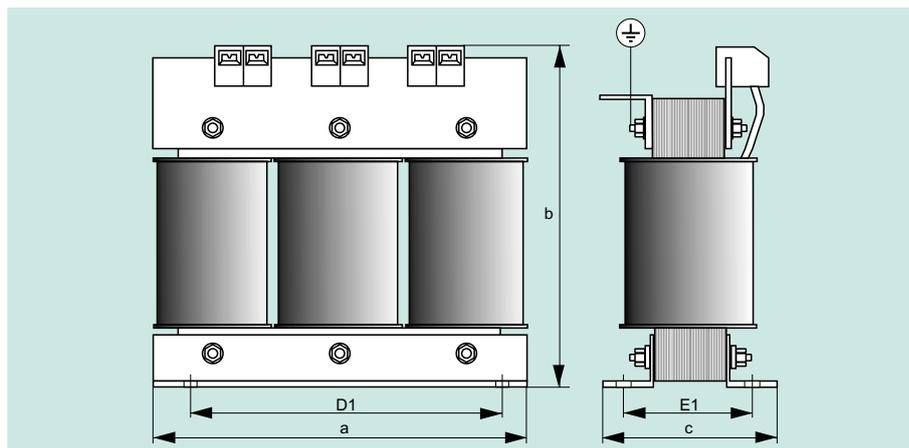
Choke type	Code	a mm [inch]	b mm [inch]	c mm [inch]	D1 mm [inch]	E1 mm [inch]	Weight kg [lbs]
LR3y-2075	S7AB6	150 [5.9]	155 [6.1]	79 [3.1]	90 [3.5]	54 [2.1]	4.9 [10.8]
LR3-022	S7FF4	180 [7.1]	182 [7.2]	130 [5.1]	150 [5.9]	74 [2.9]	7.8 [17.2]
LR3-037	S7FF2	180 [7.1]	160 [6.3]	180 [7.1]	150 [5.9]	80 [3.1]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

Output choke

The output choke is recommended with long connections (motor cables that are more than 30 metres long).

Module type	Type	Code	Choke rating [mH]	Current rating [A]	Current saturation [A]
AXV300 Axis Module					
10413	LU3-003	S7FG2	1.4	9.5	20
21020	LU3-005	S7FG3	0.87	16	34
22040	LU3-011	S7FG4	0.51	27	57
33570	LU3-022	S7FH3	0.33	42	72
350100	LU3-037	S7FH5	0.18	76	130
480160	LU3-055	S7FH6	0.12	110	192
5100200	LU3-090	S7F10	0.07	180	310
5140210	LU3-090	S7F10	0.07	180	310
6200250	LU3-160	S7FH8	0.041	310	540
6200320	LU3-160	S7FH8	0.041	310	540

Dimensions:



Choke type	Code	a mm [inch]	b mm [inch]	c mm [inch]	D1 mm [inch]	E1 mm [inch]	Weight 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]

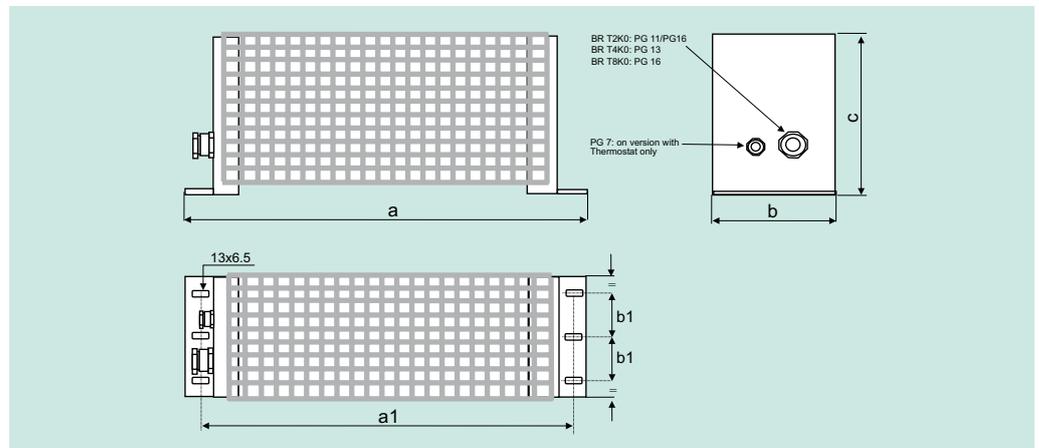
Braking resistors

Suggested braking resistors for use with an internal braking unit.

Module type	Rbr minimum [ohm]	Braking resistance		RBR suggested [ohm]	Continuative Power [kW]	EBR 1 (1) [kJ]	EBR 2 (2) [kJ]
		Type	Code				
AXV300 SM -							
12040	33	BRT2k0-42R	S8T00M	42	2	20	82
24080	9	BRT4k0-15R4	S8T00G	15.4	4	40	150
380140	6	BRT8k0-9R2	S8T00Q	9.2	8	82	220

(1) Overload max: 1" - duty-cycle 10%.
 (2) Overload max: 30" - duty-cycle 25%.

Dimensions:



Resistor type	Code	a mm [inch]	b mm [inch]	c mm [inch]	a1 mm [inch]	b1 mm [inch]	Weight kg (lbs)
BRT2k0-42R	S8T00M	625 [24.6]	100 [3.9]	250 [9.8]	605 [23.8]	40 [1.6]	6.2 [13.7]
BRT4k0-15R4	S8T00G	625 [24.6]	100 [3.9]	250 [9.8]	605 [23.8]	40 [1.6]	7.0 [15.43]
BRT8k0-9R2	S8T00Q	625 [24.6]	200 [7.8]	250 [9.8]	605 [23.8]	80 [2.4]	11.5 [25.35]

A3. Options

I/O expansion

CODE	Option	Description
------	--------	-------------

-	EXP-AXV300-IO	Optional external card (currently being developed). Connect the card to the AXV300 CU module using connector RJ45 (J5-EXP).
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Connection via serial line



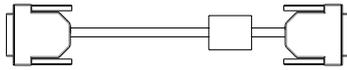
S573L	PC-OPT-ADL	Optoisolator for RS232 for Multidrop connections
8S8F59	5-meter keypad cable	Shielded cable with connectors to connect the RS232 to the PC, length 5 metres.
8S874C	10-meter keypad cable	Shielded cable with connectors to connect the RS232 to the PC, length 10 metres.
S5A20	USB-RS232 CONVERTER	USB - RS232 Serial protocol coverter

Optical fibre connection



6S8V83	HFR4501	HFBR-4501-type connectors. For the optical fibre connection of the P1 terminals on the AXV300 modules.
8S7B25	Single Plastic Optical Fiber (POF) Cable	980/1000 μ m plastic optical fibre (single) cable with polyethylene sheathing and outside diameter of 2.2 mm Spool length 100 m.
S727701	Single Plastic Optical Fiber (POF) Cable with connectors	Cable 8S7B25 + n.2 connectors 6S8V83. Length 40 cm.
S727702	Double Plastic Optical Fiber (POF) Cable with connectors	Cable 8S7B25 + n.2 connectors 6S8V83. Length 2 metres.

Various



CODE	Option	Description
S72769	AFE-SR/SR connecting cable	Connection cable between AXV300-AFE-SR and AXV300-SR. Connection between terminal P2 (25-pin) on the AXV300 AFE-SR module and terminal P4 (25-pin) on the AXV300 SR module. Length=300 mm.
-	KB-XXX	Programming keypad with memory. (currently being developed). Connect to the AXV300 CU module using connector RJ45 (J2-KBY).
S72644	KIT SD-CARD	Adapter for SD card (data loading memory)
1S3SR01	CD-ROM Configurator	<ul style="list-style-type: none"> - GF_eXpress - SpeedTorque Application - MDPIc development environment for AXV300 - AXV300 Instruction manuals

AXV300

AXV300 SM

AXV300 AFE-SR

AXV300 SR

AXV300 CU

PROGRAM.

APPENDICE

➔ We guarantee each customer a high-quality, tailored service backed by a wealth of technical and professional expertise, which makes GEFRAN a reliable, flexible partner capable of providing specialised, global support.

“ You can be assured that your plant will be backed by a wealth of professional expertise ”



Our pre-sales support includes preliminary technical and commercial advice, with recommendations for professional and economically advantageous solutions. Our aim is to provide innovative products and solutions tailored to suit each individual requirement.



Installation and Start-up

Purchasing a GEFRAN product provides access to a global package of exclusive services.

GEFRAN has an international team of engineers who are specialised in the installation and commissioning of proprietary drives and control systems. Customers can always rely on fast, professional service and an efficient telephone support line.



After-sales Service

GEFRAN offers a highly professional after-sales service to customers worldwide.

Customers know they can rely on fast, worldwide support, limiting machine downtimes to a minimum without affecting production capacity.



Calendar of courses and education days

Training addresses internal technical and service personnel of the Gefran Group and system maintenance engineers, machine manufacturers and control system designers

- ➔ “Gefran Drive & Motion” training courses are intended to provide industrial automation sector operators with a basic grounding in SIEIDrive DC, AC and Servo-brushless drives.
- ➔ The courses are structured so that participants are able to acquire a general theoretical grounding in drives and include a detailed description of Gefran products covering theoretical/practical use of the drives.



Venue of courses

The courses are held at the Gefran S.p.A. production facility - Drive & Motion Control Unit in Gerenzano (Varese), Italy.

For foreign branches, training courses can be organised at other times, directly at the branch or Gefran distributors' facilities.

Education days (on demand)

In addition to scheduled courses, problems and specific aspects of SIEIDrive products can be examined during "Education" days.

These courses, dedicated exclusively to individual requirements, are available on request and must be defined directly with sales staff at Gefran S.p.A.

The duration of "Education" days may vary according to the issues that are dealt with.

Levels

Courses are normally based on three levels of difficulty: level 1 (basic); level 2 (high) and level 3 (advanced) mainly addressing MDPIc application developers.

Frequency and number of participants

The courses planned for 2010 envisage a minimum and maximum number of participants.

The frequency of the courses shown may be changed according to demand.

Reservations

To book a place on these courses, please call us on +39 02 967601 / +39 02 96760500. This service is available at the following times: 9.00 – 12.30 / 13.30 – 17.00 or send an e-mail to: marketing@gefran.com.

Gefran S.p.A. - Drive & Motion Control Unit will book overnight hotel accommodation.





After-sales Service

“ High-level performance, from the first day onwards ”

- ➔ Faults must be detected and repaired as soon as possible in order to guarantee continuous operation of industrial production systems.
- ➔ GEFTRAN responds to this important requirement by offering a highly professional after-sales service to cover each step.



Telephone helpline

The Contact Centre helpline is available to deal with your requests and answer your technical queries.

The dedicated helpline operates from 8 am until 8 pm, from Monday to Saturday.

 **+39 02 967 60428**



Online assistance

GEFRAN also operates an online technical service.

We welcome enquiries from end users, installers and project designers. Contact us any time at technoHelp@gefran.com to receive immediate assistance in the form of technical or commercial advice.



ON-SITE assistance

With offices and service centres throughout the world, GEFran guarantees a prompt, reliable service to ensure continuous plant operation.

Repairs are carried out at our works or on-site by skilled technicians.



Warranty

GEFRAN guarantees the quality and functionality of its products when dispatched and will:

- ➔ replace faulty products with an equivalent or similar product
- or:
- ➔ repair, in good time, any parts that are found to be faulty during the warranty period.



WARRANTY terms and conditions

Products to be replaced must be returned in their original packaging or in other adequate or equivalent packaging.

The customer will be responsible for the cost of forwarding the product to GEFRA (Drive & Motion Control Unit - Gerenzano (Varese), Italy, while the latter will bear all costs relating to the materials and transport charges to replace all or part of the product.

In case of assistance provided by our technical staff, work may be performed at the GEFRA facility.

For repairs carried out on-site at the customer's premises, GEFRA guarantees assistance within 48 working hours following receipt of the written request.

Exclusion of WARRANTY

The warranty does not apply in the following cases, in which GEFRA declines all responsibility:

- work, modifications or repairs carried out on the customer's own initiative
- use of the product other than for its intended purpose, incorrect use or installation under conditions other than those described in the user guide
- damage caused by foreign bodies (smoke, corrosive substances, etc.) or damage due to unforeseeable circumstances (lightning, overvoltage, damage caused by water, earthquake, fire, war, riots, etc.)
- damage during transportation or in any case occurring after the transfer of risk and damage resulting from incorrect packaging by the customer
- inadequate ventilation
- out-of-pocket expenses (travel, transport, board and lodging) incurred by technical staff in order to carry out repairs at the customer's premises are excluded.

Solutions

GEFRAN system technology

- ➔ GEFran applies its application experience to the design and development of specific automation systems for a broad range of industrial sectors.
- ➔ Innovative technological solutions based on an extensive range of process control products and 45 years of experience, acquired in working alongside leading sector operators.
- ➔ GEFran offers Drive Cabinet Solutions with the standard "**plug and play**" protocol or, upon request, in the "**clean power energy**" featuring the use of Active Front End regenerative power supply units with IGBT technology.
- ➔ "**Custom-built**" single or multiple-drive control systems to individual specifications and hardware and software system architecture for automation systems to control the very latest machines.



GEFRAN's Power Electronic Drive solutions have always been used with success in the various plastic processing industries.

GEFRAN has acquired a technological know-how in the control of all-electric and hybrid injection presses and of equipment used for blowing, extrusion, film processing, mixing, etc., to consolidate its undisputed leadership in terms of product and sector.



**Metal -
Sheet metal**

GEFRAN's Power Electronic Drive platforms, used in sheet metal, metal wire and metal processing, guarantee system efficiency and offer energy-saving technology for high power industrial machinery.

With its technological products and dedicated application programs, GEFran develops complete control systems based on the highly specialised System Drive platform.



HVAC



**Water
Treatment**

GEFRAN's Power Electronic Drive platforms offer dedicated application solutions for the air-conditioning and water treatment industries. The availability of specific power structures for variable or quadratic loads results in the best possible design in terms of technology and cost-effectiveness.

Clean power technology also guarantees better power control with real energy-saving benefits. Specific SW functions enable control of highly optimised systems.

If you have any suggestions that you think might help us to improve this catalogue, please do not hesitate to contact us at techdoc@gefran.com.

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The data indicated are provided for the sole purpose of describing the product and must not be considered as legally binding characteristics.

All rights reserved



Certificate No. FM 38167

Gefran S.p.A. (Drive & Motion Control Unit - Gerenzano VA), operates a Quality Management System which complies with the requirements of ISO 9001:2008



The company operates a ISO 9001:2008-certified quality system.

Our primary corporate goal is customer satisfaction: it is from this that mutual collaboration, maximum trust in the company and a consolidated long-standing partnership role stem.

Gefran ensures total support through its technical services (from design and start-up right up to onstream assistance), which are more highly specialised than those which large multisector companies are able to offer.

GEFRAN always meets the demands of high-tech users with the certainty of total quality.



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GEFRAN

GEFRAN HEADQUARTER

Via Sebina, 74
25050 PROVAGLIO D'ISEO (BS) ITALY
Ph. +39 03098881
Fax +39 0309839063
info@gefran.com

Drive & Motion Control Unit

Via Carducci, 24
21040 GERENZANO (VA) ITALY
Ph. +39 02967601
Fax +39 029682653
info.motion@gefran.com

Technical Assistance:

technohelp@gefran.com

Customer Service

motioncustomer@gefran.com
Ph. +39 02 96760500
Fax +39 02 96760278

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GEFRAN BENELUX N.V.

ENA 23 Zone 3, nr. 3910
Lammerdries-Zuid 14A
B-2250 OLEN
Ph. +32 (0) 14248181
Fax +32 (0) 14248180
info@gefran.be

GEFRAN DEUTSCHLAND GmbH

Philipp-Reis-Straße 9a
D-63500 Seligenstadt
Ph. +49 (0) 61828090
Fax +49 (0) 6182809222
vertrieb@gefran.de

SIEI AREG - GERMANY

Gottlieb-Daimler Strasse 17/3
D-74385 - Pleidelsheim
Ph. +49 (0) 7144 897360
Fax +49 (0) 7144 8973697
info@sieiareg.de

GEFRAN SUISSE sa

Sandackerstrasse, 30
9245 Oberbüren
Ph. +41 71 9554020
Fax +41 71 9554024
office@gefran.ch

GEFRAN FRANCE sa

4, rue Jean Desparmet - BP 8237
69355 LYON Cedex 08
Ph. +33 (0) 478770300
Fax +33 (0) 478770320
commercial@gefran.fr

GEFRAN UK Ltd

Capital House, Hadley Park East
Telford
TF1 6QJ
Tel +44 (0) 8452 604555
Fax +44 (0) 8452 604556
sales@gefran.co.uk

GEFRAN España

Calle Vic, números 109-111
08160 - MONTMELÓ
(BARCELONA)
Ph. +34 934982643
Fax +34 935721571
comercial.espana@gefran.es

GEFRAN SIEI Drives Technology Co., Ltd

No. 1285, Beihe Road, Jiading
District, Shanghai, China 201807
Ph. +86 21 69169898
Fax +86 21 69169333
info@gefransiei.com.cn

GEFRAN SIEI Electric Pte. Ltd.

No. 1285, Beihe Road, Jiading
District, Shanghai, China 201807
Ph. +86 21 69169898
Fax +86 21 69169333
info@gefransiei.com.cn

GEFRAN SIEI - ASIA

Blk.30 Loyang Way
03-19 Loyang Industrial Estate
508769 Singapore
Ph. +65 6 8418300
Fax +65 6 7428300
info@gefransiei.com.sg

GEFRAN INDIA Head Office: Pune

Survey No: 182/1 KH, Bhukum, Paud road,
Taluka - Mulshi,
Pune - 411 042, MH, INDIA
Phone No.: +91-20-39394400
Fax No.: +91-20-39394401
gefran.india@gefran.in

Branch Office: Mumbai

403, Damodar Nivas,
'B' Cabin Road, Near Railway quarters,
Naupada, Thane (W) - 400 602, MH, India
Phone No.: +91-22-2533 8797
Phone/Fax No.: +91-22-2541 8797
gefran.india@gefran.in

Branch office: Ahmedabad

20-A, Second Floor, Kala Purnam Building,
Near Municipal Market, C. G. Road,
Ahmedabad - 380 019, Gujarat, India
Ph: +91-79-2640 3591
Ph/Fax: +91-79-2640 3592
gefran.india@gefran.in

GEFRAN TAIWAN

Rm. 3, 9F., No.8, Ln. 157, Cihui 3rd St.,
Zhongli City,
Taoyuan County 320, Taiwan (R.O.C.)
Tel/Fax +886-3-4273697
dino.yeh@gefransiei.com.sg

GEFRAN Inc.

8 Lowell Avenue
WINCHESTER - MA 01890
Toll Free 1-888-888-4474
Fax +1 (781) 7291468
info@gefraninc.com

GEFRAN BRASIL ELETROELETRÔNICA

Avenida Dr. Altino Arantes,
377 Vila Clementino
04042-032 SÃO PAULO - SP
Ph. +55 (0) 1155851133
Fax +55 (0) 1132974012
comercial@gefran.com.br

www.gefran.com