GEFRAN

GRC

ADVANCED POWER CONTROLLER

Main features

- *Single/two/three-phase, 25 A to 150 A*
- *Operating voltages 480 Vac, 600 Vac*
- *Firing mode configurable to “Zero crossing” (Fixed Cycle, Burst Firing, Half Single Cycle) and “Phase angle”*
- *2 analog control inputs configurable in volts, mA, potentiometer.*
- *1 configurable analog retransmission output*
- *1 PNP digital output + 1 Dry contact output*
- *Softstart and RMS and peak current limits*
- *V, V^2, I, I^2 and P feedback*
- *Total and partial interrupted load alarms*
- *Integrated WEB Server*
- *Modbus TCP always present*

- *Built-in fuses*
- *Temperature sensors on power terminals and cooling air inlet*
- *Optional Fieldbus: PROFINET, Modbus RTU, Ethernet IP, EtherCAT*
- *Integrated display*
- *PC configuration tool with setup wizard (SMART)*
- *CE, UL 508, certifications*

PROFILE

The Advanced Power Controllers of the GRC series are self-contained units with the capability of controlling high electrical power levels for various types of single-phase, two-phase and three-phase heating elements.
The controllers allow great flexibility of use in all current and voltage ratings, from 40 A to 150 A and at nominal voltages of 480 Vac, 600 Vac.
They are ideal for accurate, stable temperature control in industrial heating systems.
Their advanced load control functions allow the management of linear resistors with a low thermal coefficient, non-linear resistors with a high thermal coefficient, infrared lamps, and single-phase and three-phase symmetrical and asymmetrical transformers.
Compact mechanics, together with ease of wiring with plug-in connectors and easy configuration methods ensure considerable savings in terms of panel space and installation time, without sacrificing robustness and a notable diagnostic capacity.

CONTROL FUNCTIONS

All GRC models can be operated in different modes to adapt to the various control solutions and architectures found in the field.
The two analogue inputs are highly configurable, so that both two-phase and three-phase devices can be controlled with a single command, and up to 2 modules can be controlled individually and independently.
GRCs can also be operated with digital ON/OFF controls or in PWM mode, through potentiometers, using one of the various Fieldbuses that complete the options of this range.

Flexibility in the control of electrical loads, even very different from each other, is guaranteed by a vast choice of trigger types, freely configurable on all models.
There is a choice of “Zero Crossing” (ZC) mode with fixed cycle times or “Burst Firing” (BF) mode with optimised cycle times, for linear loads and systems with high thermal inertia.
There is also the option of faster firing modes, such as “Half Single Cycle” (HSC), which is ideal for handling mid-wave IR lamps, and of “phase angle” (PA) control, for SWIR lamps, non-linear heating elements such as silicon carbide, silicon molybdenum and both single and three-phase transformer primaries.
Whichever control configuration is chosen, GRC models are able to deliver the desired electrical power, from 0% to 100%, with precision.

The following functions complete the control:
- *softstart at power-on, current limits settable on both peak values and RMS values,*
- *closed-loop feedback algorithms for voltage, current and power, which guarantee supply stability even in the presence of variations and disturbances in rated values.*

Some functions of the GRC range are designed for specific applications and problems:
- *For systems with three-phase transformers, any breakages of three-phase load branches are managed by the controller, which provides an immediate alarm signal while continuing to supply energy to the two intact phases, allowing the process to remain in a holding condition.*
- *In heat treatments with non-linear resistors, such as silicon carbide, heating elements can be brought up to temperature with “phase angle” control and active current limits, with automatic switching to “zero crossing” control when the elements are at temperature and there are no more current peaks, returning to “phase angle” control automatically only if further peaks reoccur.*
- *Three-phase transformers are very often used in industrial furnaces, with symmetrical or asymmetrical primary/secondary connections. GRC controllers can manage both types indiscriminately without any impact on performance.*
- *In the case of several loads managed by different controllers, there is a need to rationalise and synchronise the power outputs of the individual controllers so as to reduce peaks of current/energy supplied instantly or, in some cases, limit the total value to a settable maximum. These functions are performed by the integrated GSLM, a system that allows devices to communicate with each other and balance or limit consumption over time.*

- *Higher accuracy in current, voltage, and power measurements, combined with the ability to maintain constant power output. This combination makes it the ideal choice for optimal performance even in the most delicate applications, such as those in the semiconductor industry.*
- *The availability of phase angle (PA) control (the only control method that completely eliminates flickering in IR lamps), combined with current limit and current, voltage or load power feedback functions, means that "critical" applications such as Super-Kanthal™ special heating elements, silicon carbide resistors or single and three phase transformer primaries can be resolved with confidence.*

DIAGNOSTICS, PREVENTIVE MAINTENANCE AND ALARMS

Great care has been taken in the development of diagnostic, preventive maintenance and alarm functions that can be associated with current, voltage and power values and operating temperatures. The process and power controller are continuously monitored.

For current values:
- *Total or partial interrupted load alarm with alarm threshold teach-in.*
- *SCR short circuit alarm.*
- *Short circuit or surge load alarm.*
- *Internal fuse breakage alarm.*

For voltage values:
- *No line voltage alarm.*
- *Unbalanced three-phase line alarm.*
- *Indication of incorrect phase rotation in three-phase systems (without interruption of controller operation)*

For temperature values:
- *Continuous monitoring of the internal temperature of the power module with automatic disconnection and an alarm signal in the event of over-temperature.*
- *Fan output temperature measurement for electrical panel cooling system efficiency diagnostics.*

The GF_eXpress configuration software also offers an extensive list of additional diagnostic conditions, such as alarm status storage, for immediate and easy analysis in the event of a fault.

MONITORING

GRC controllers can be equipped with an integrated display for monitoring key electrical parameters, alarms, general information, and basic configuration.
The device integrates a web server accessible via browser for monitoring key electrical parameters, alarms, general information, and basic configuration.

CONFIGURATION

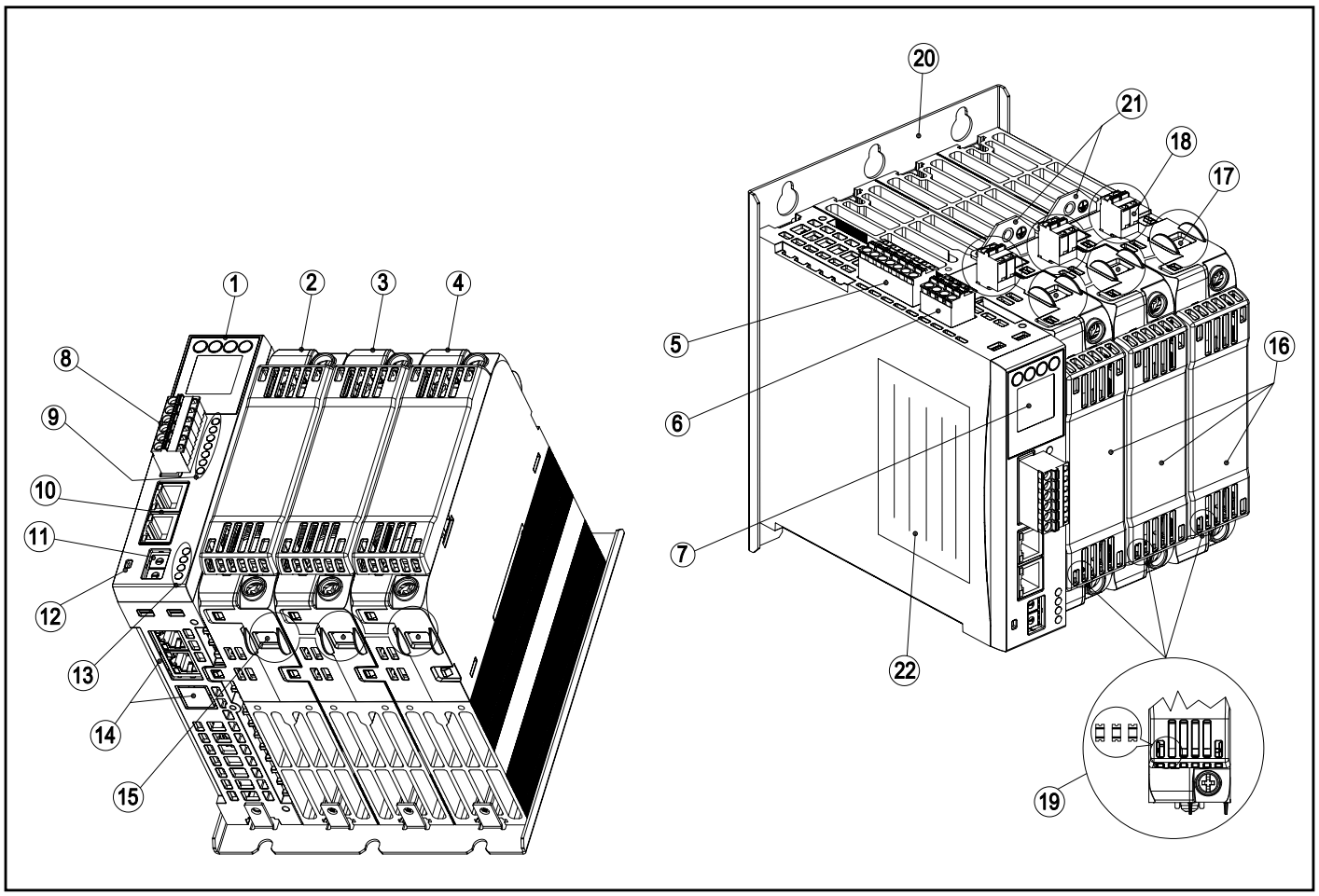
The GRC controllers have been designed with various configuration levels to make initial start-up operations as simple and intuitive as possible.
The GF_eXpress configuration software (freely downloadable from the Gefran site www.gefran.com) has a "Smart Configuration" procedure to configure the controller through a few targeted questions, with limited need for knowledge of the parameters and their meanings. At the end of the procedure (average duration 5 minutes) the controller is ready to pilot the load.
Another section of the software contains the "Wizard" pages, showing the main parameters divided into topics, with a part of the parameter monitoring always active.

With GF_eXpress, you can create and save entire parameter recipes and easily duplicate them on other devices. Parameters can also be monitored and displayed graphically with the oscilloscope function.

FIELDBUS

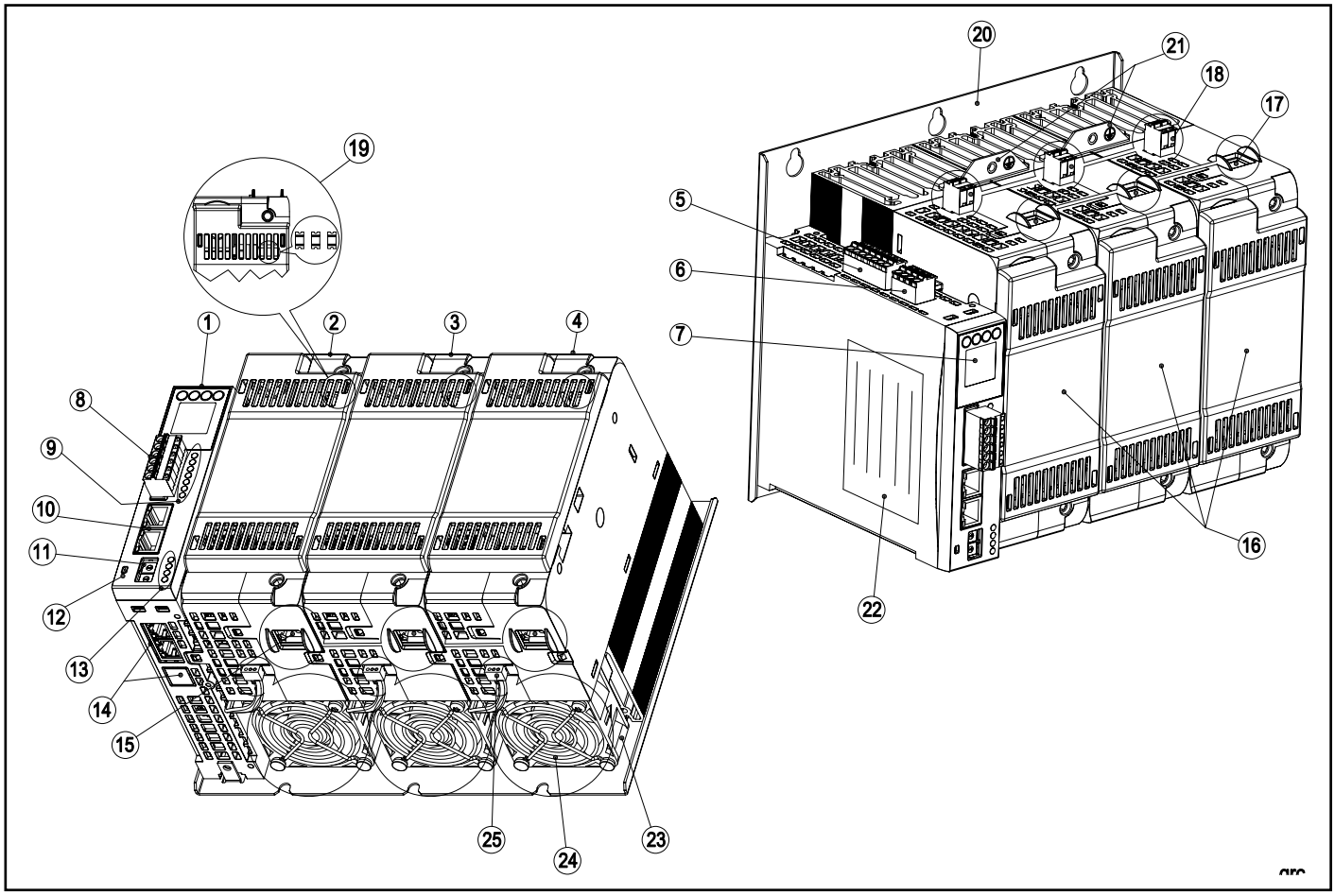
A Modbus TCP port is always available for connections with the configuration tool or with HMI or PLC devices equipped with Modbus Master communication.
An extensive range of certified Fieldbus options lets you add GRC controllers to control architectures with the most popular PLC brands, allowing you to access any device variable with standardised configuration files.

MAIN ELEMENTS OF THE GRC 25A ... 40A



1) CPU module
2) L1 module
3) L2 module (present in 2 PH configuration)
4) L3 module (present in 3 PH configuration)
5) J1 connector 24Vdc power supply and basic I/O
6) J2 connector auxiliary outputs (optional)
7) Display and buttons (optional)
8) J3 connector analog inputs (optional)
9) Device status LEDs
10) RJ45 Ethernet ports ETH0/ETH1 (PORT1)
11) Rotary selectors x1 and x10 (optional)
12) Physical PRG button
13) Fieldbus status LED (optional)
14) Fieldbus access (PORT2, if Modbus RTU connector J5+line terminator, EtherCAT 2 RJ45 IN/OUT ports, Profinet /EthernetIP 2 RJ45 P1/P2 ports) (optional)
15) Load terminal
16) Internal fuse protection cover
17) Line terminal
18) RF1, RF2, RF3 connectors for line reference signal
19) Power module LED and inspection slot
20) Wall mounting plate
21) Grounding plate
22) Product features (serial number, order code, MAC address, default IP, product web page QR code)

MAIN ELEMENTS OF THE 60A ... 150A



1) CPU module
2) L1 module
3) L2 module (present in 2 PH configuration)
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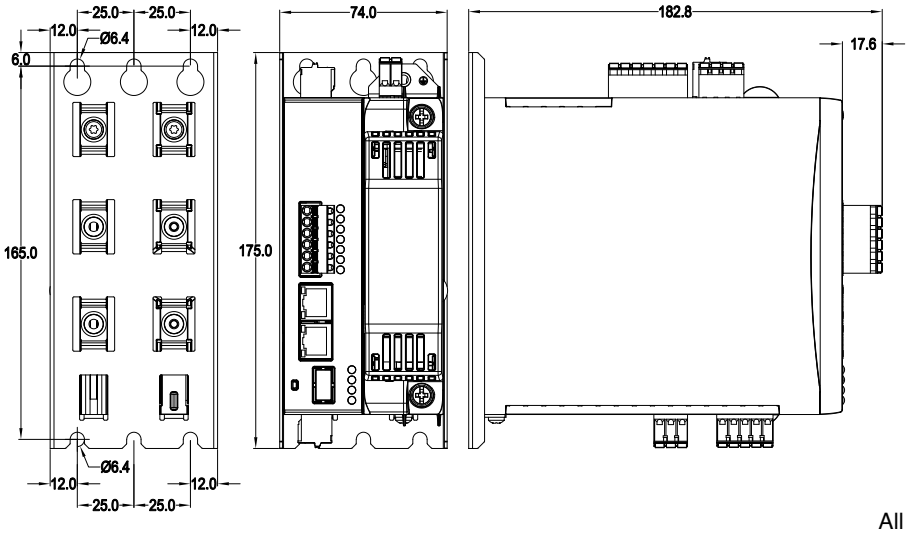
15) Load terminal
16) Internal fuse protection cover
17) Line terminal
18) RF1, RF2, RF3 connectors for line reference signal
19) Power module LED and inspection slot
20) Wall mounting plate
21) Grounding plate
22) Product features (serial number, order code, MAC address, default IP, product web page QR code)
23) Cooling fans (for size 75A and above)
24) Fan protection grilles
25) Integrated fan power supply

DIMENSIONS

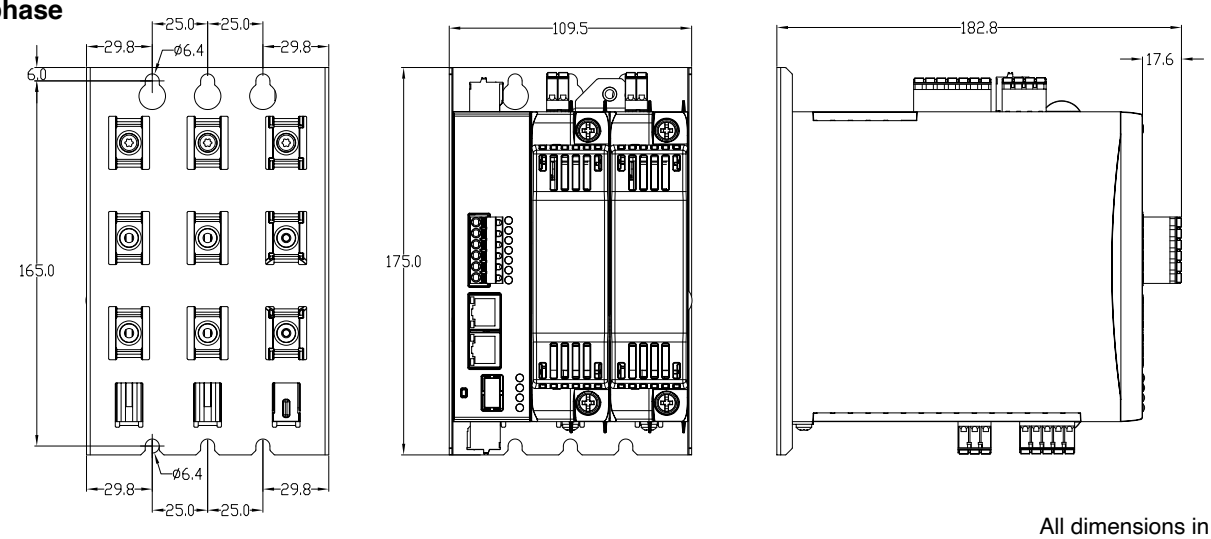
DIMENSIONS OF GRC, 25 A ... 40 A MODELS

Single-phase



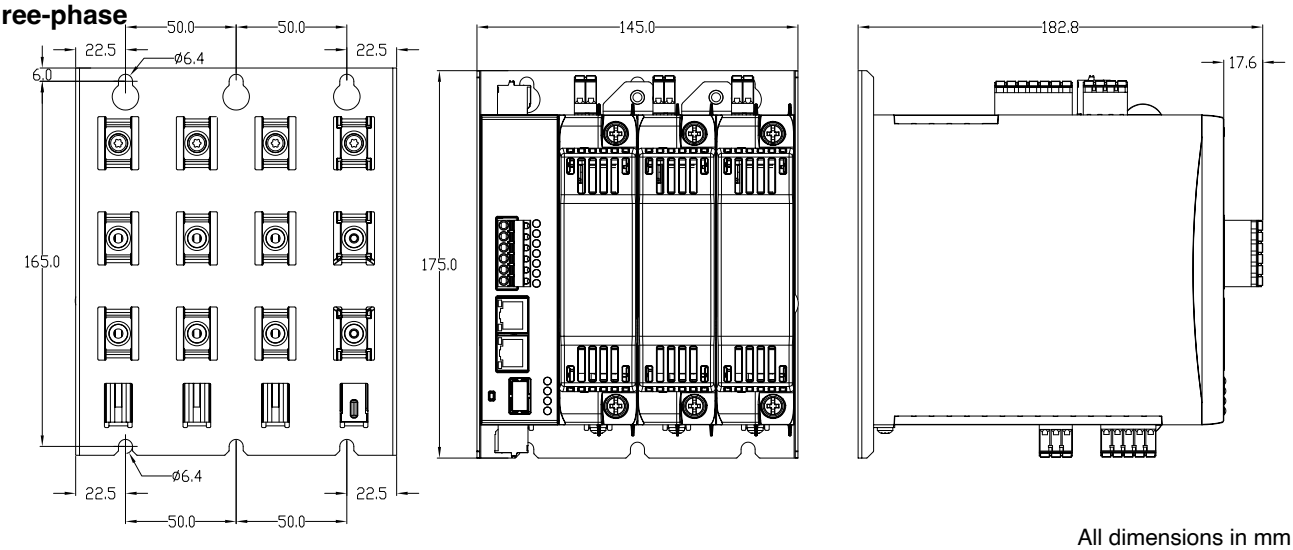
All dimensions in mm

Two-phase



All dimensions in mm

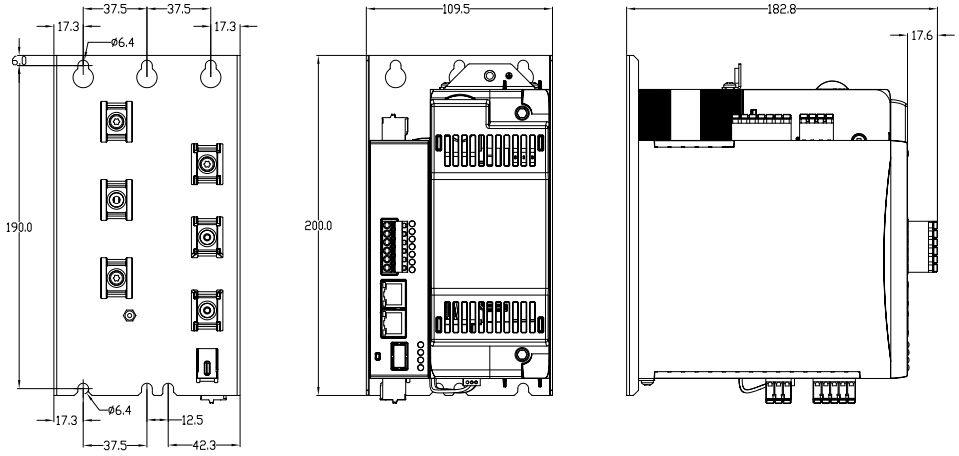
Three-phase



All dimensions in mm

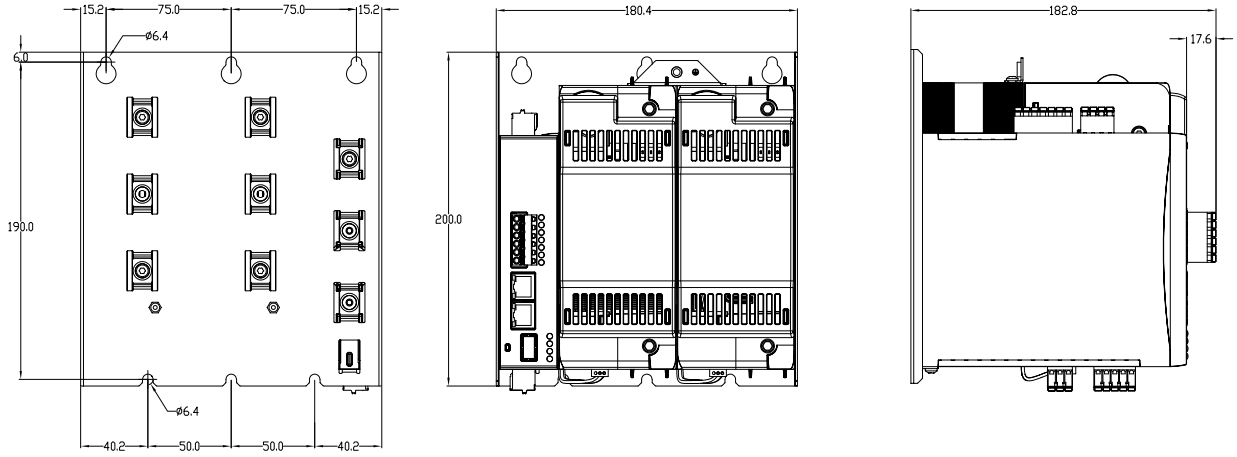
DIMENSIONS OF 60 A ... 150 A MODELS

Single-phase



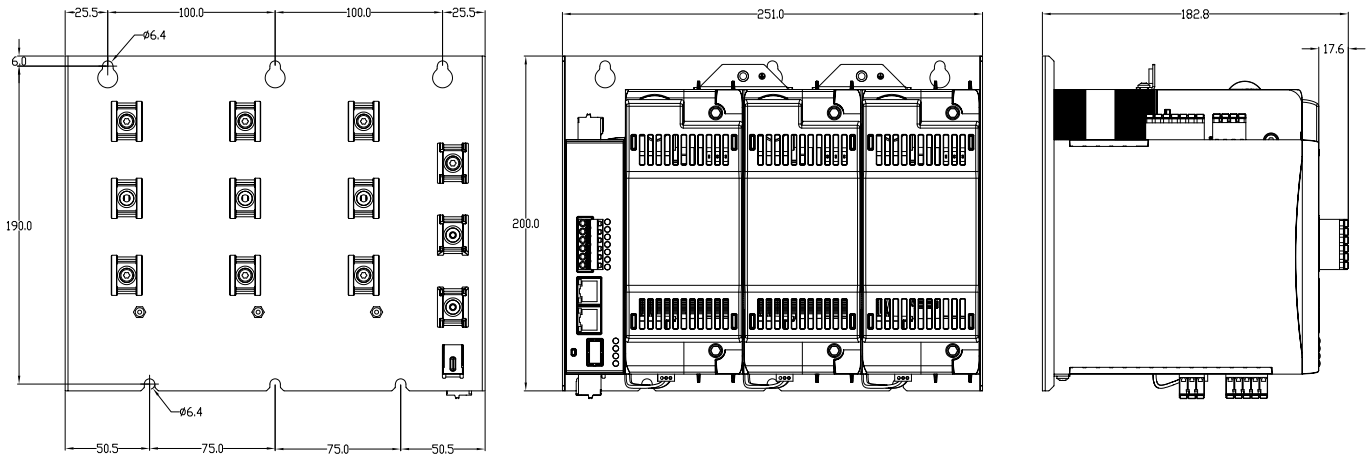
All dimensions in mm

Two-phase



All dimensions in mm

Three-phase

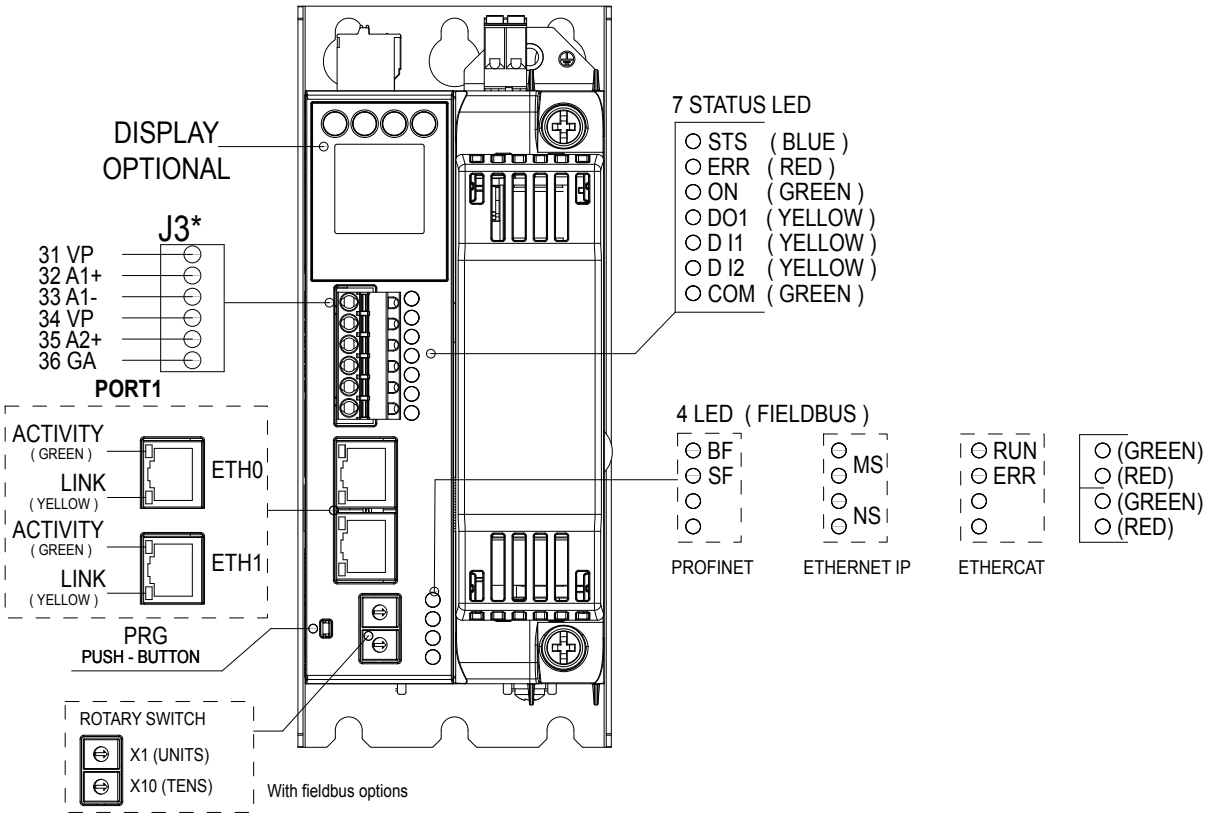


All dimensions in mm

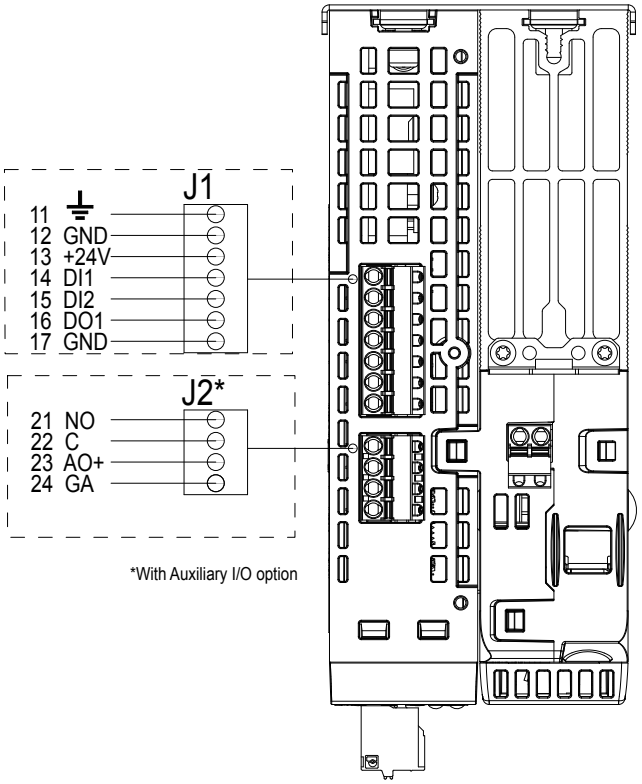
DESCRIPTION OF THE CONNECTIONS

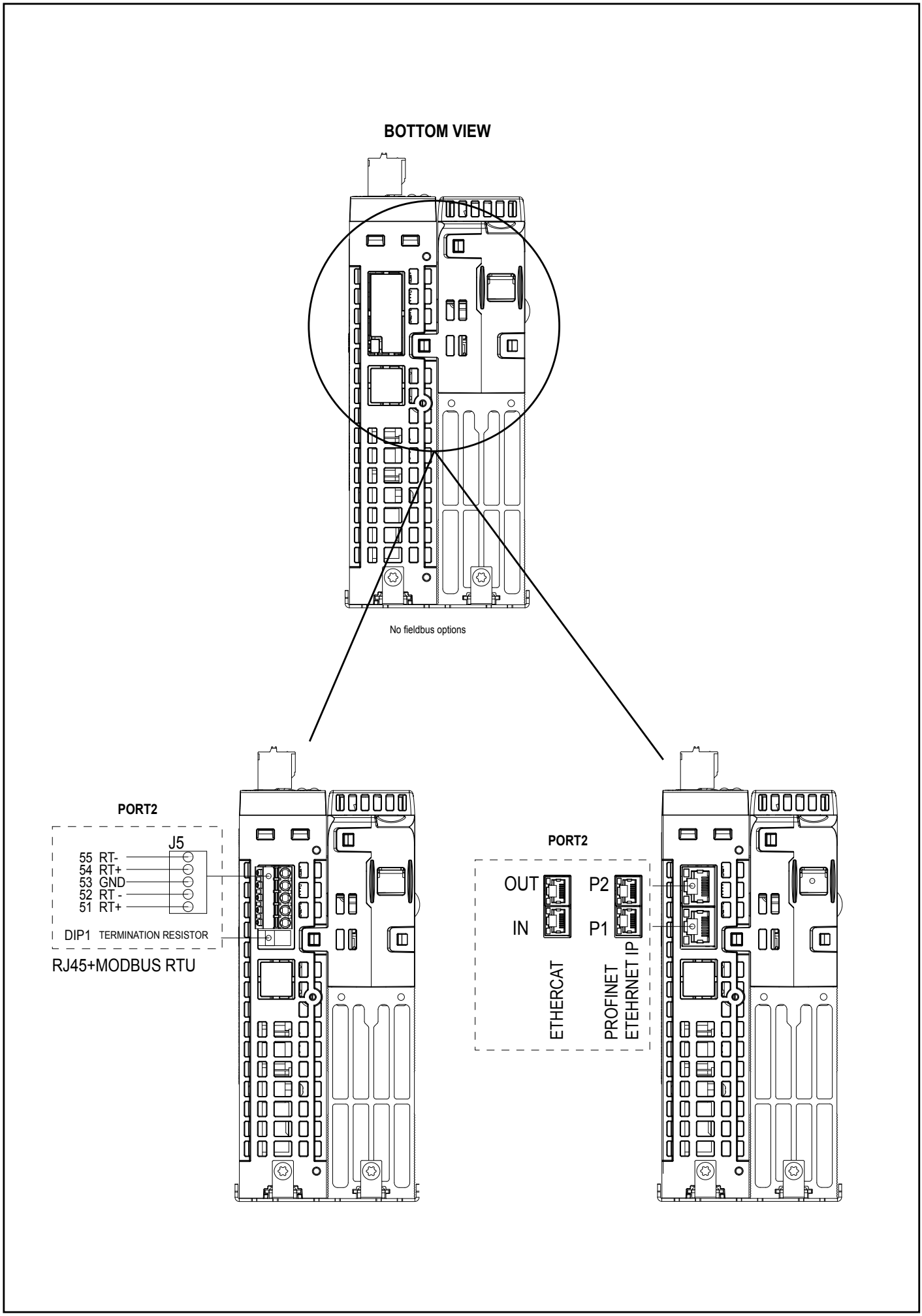
Description of the CPU GRC connections

FRONT VIEW

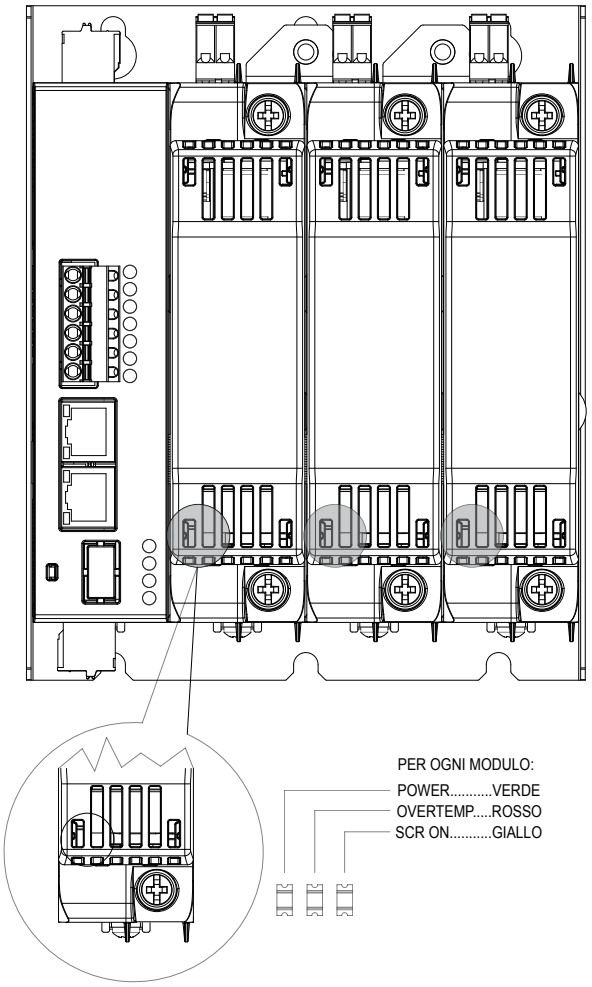


TOP VIEW

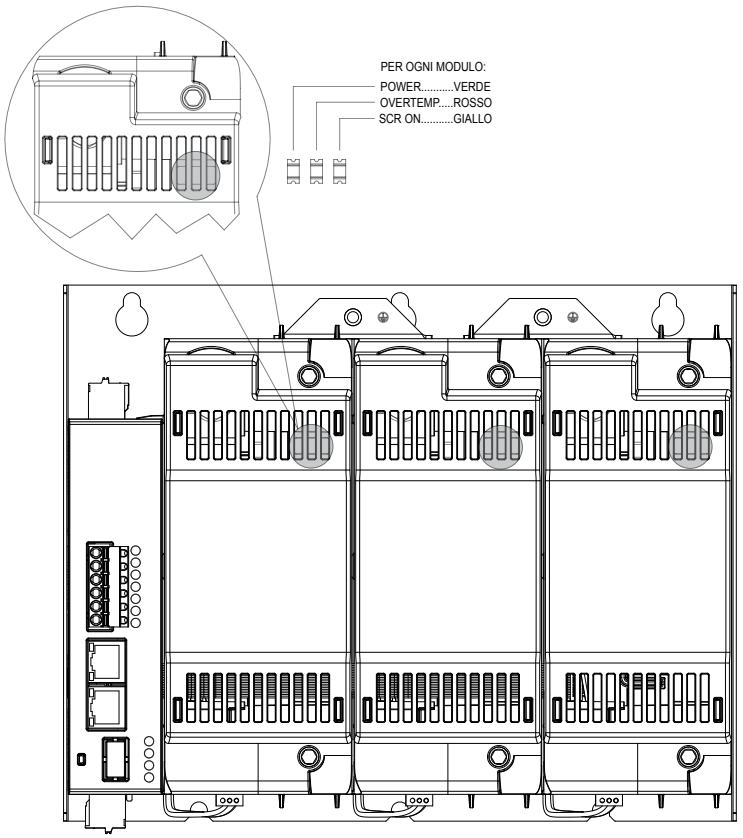



BOTTOM VIEW
No fieldbus options
PORT2
J5
55 RT-
54 RT+
53 GND
52 RT -
51 RT+
DIP1 TERMINATION RESISTOR
RJ45+MODBUS RTU
PORT2
OUT
IN
P2
P1
ETHERCAT
PROFINET
ETEHRNET IP

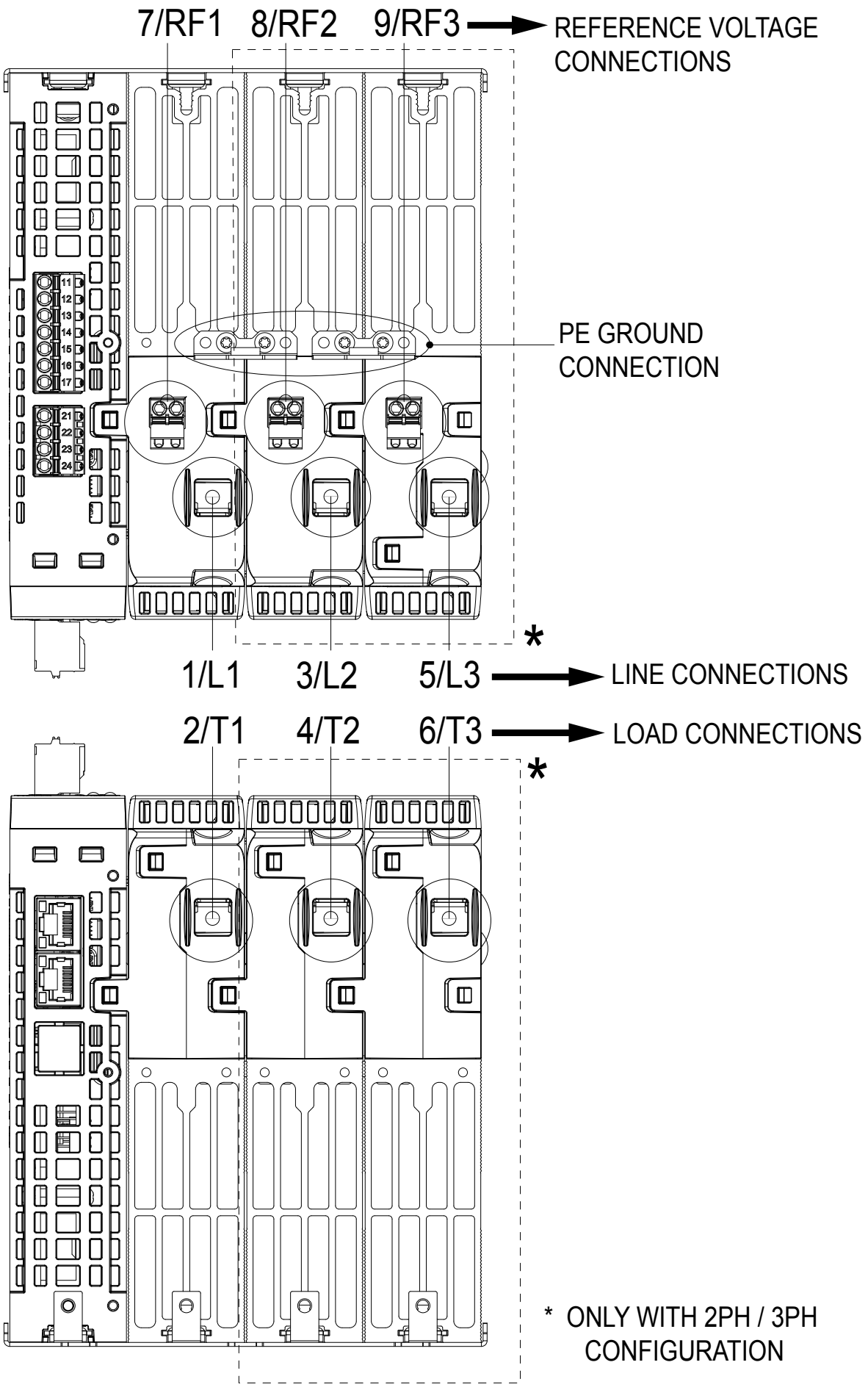
Power Modules LEDs 25-40A



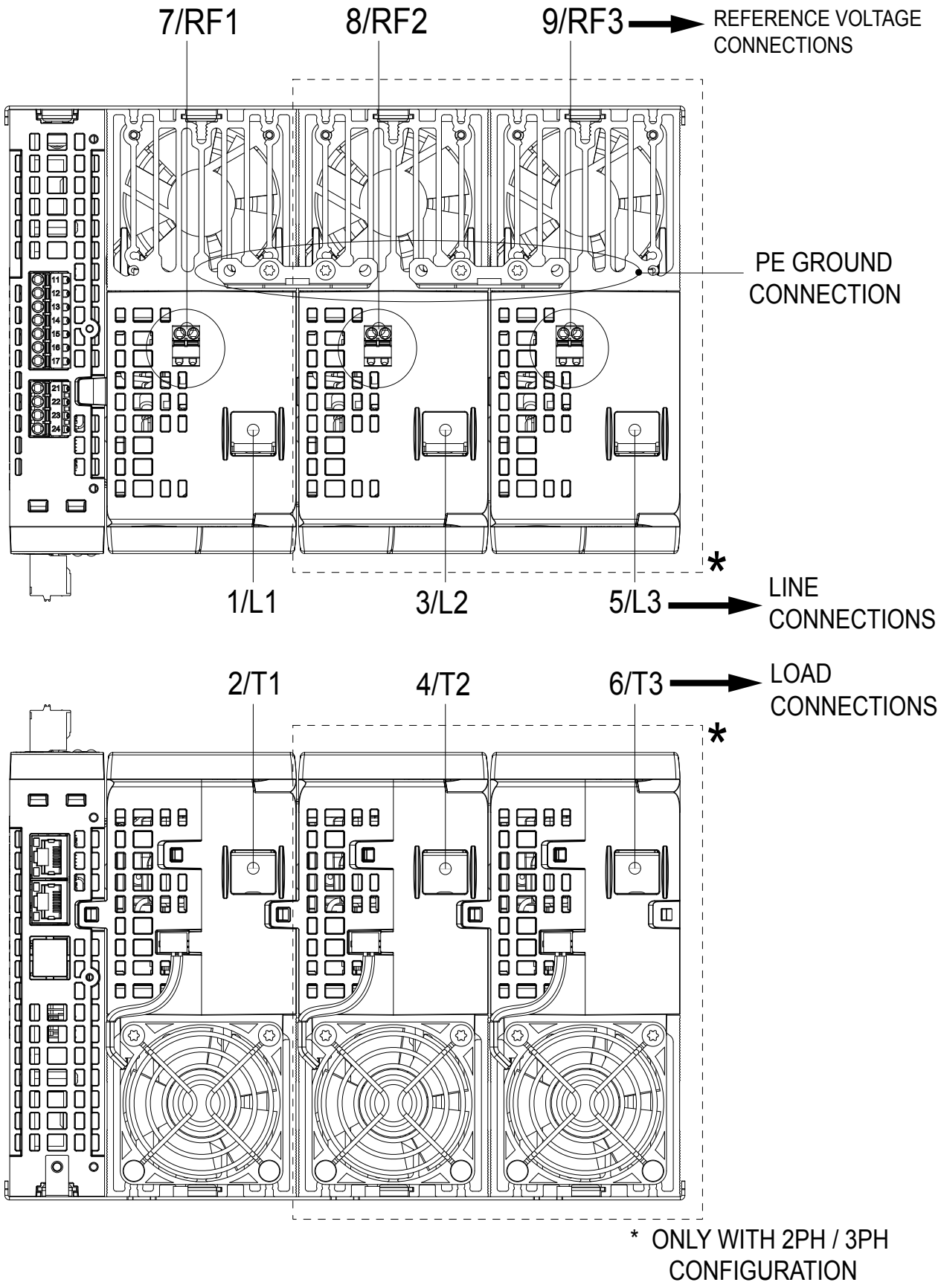
Power Modules LEDs 60-150A



DESCRIPTION OF GRC 25 .. 40A POWER CONNECTIONS

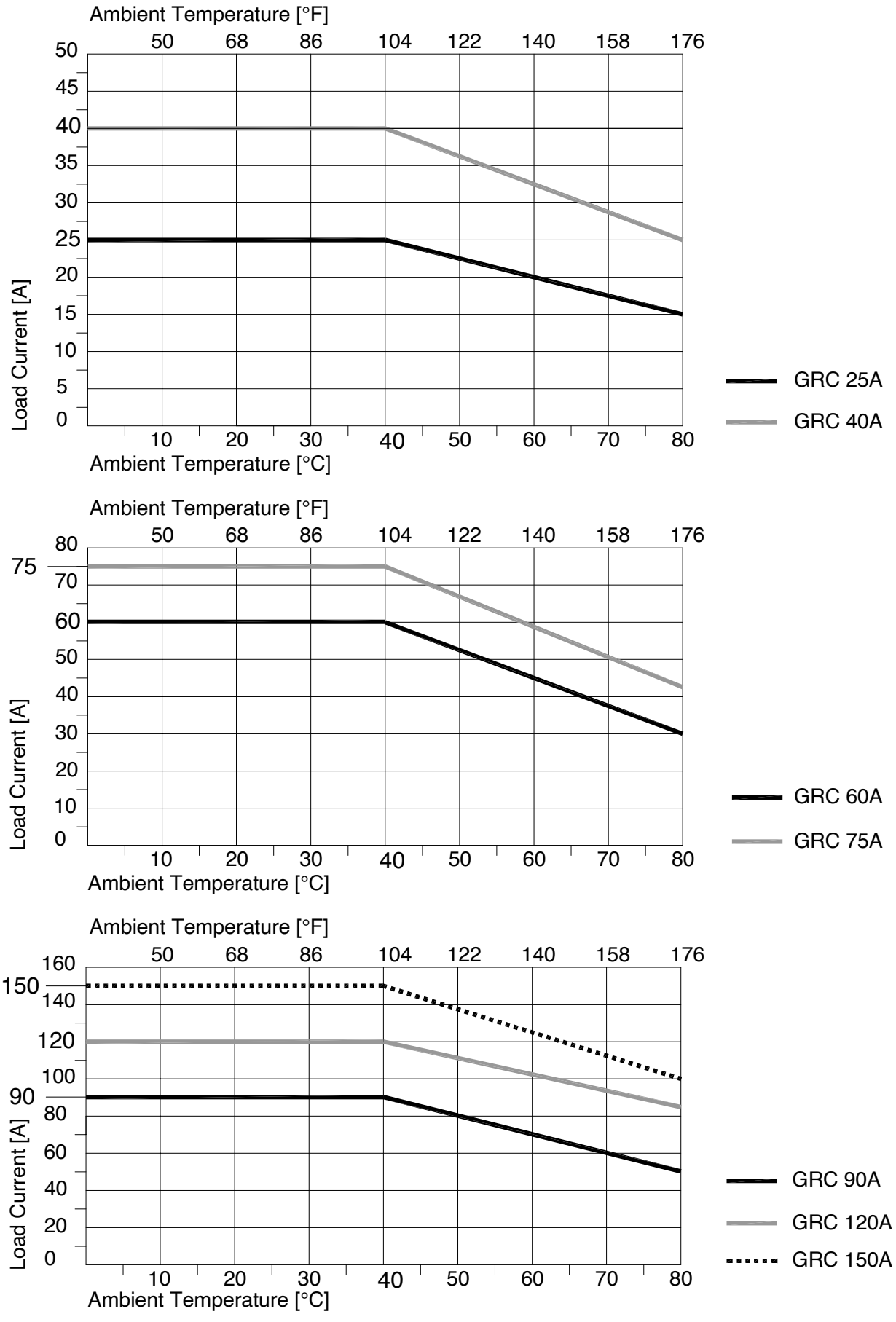


DESCRIPTION OF GRC 60 .. 150A POWER CONNECTIONS



* ONLY WITH 2PH / 3PH CONFIGURATION

DERATING CURVES



Nota: Le curve del GRC 75/90/120/150A si riferiscono al dispositivo completo di ventola di serie funzionante.

POWER CONNECTIONS

Recommended cable cross-section

POWER TERMINALS							
Corrente Nominale del carico	**25A**	**40A**	**60A**	**75A**	**90A**	**120A**	**150A**
Contact area (WxD)	10 x 11 mm		15 x 14 mm				
Stripping length	15 mm		20 mm				
1 Conductor section **2 Conductors section** *(minimum section)*	"1 x 6 mm^2 / 2 x 4 mm^2"	"1 x 10 mm^2 / 2 x 6 mm^2"	"1 x 25 mm^2 / 2 x 16 mm^2 "		35 mm^2	" 1 x 50 mm^2 / 2 x 25mm^2"	" 1 x 50 mm^2 / 2 x 25mm^2"
	"1 x 10 AWG / 2 x 12 AWG"	"1 x 8 AWG / 2 x 10 AWG"	"1 x 4 AWG / 2 x 6 AWG"	"1 x 3 AWG / 2 x 6 AWG"	2 AWG	"1 x 1/0 AWG / 2 x 3 AWG"	"1 x 1/0 AWG / 2 x 3 AWG"
Maximum allowed section	"1 x 50 mm2 / 2 x 25 mm2 1 x 1/0 AWG / 2 x 3 AWG"		"1 x 70 mm2 / 2 x 35 mm2 1 x 2/0 AWG / 2 x 2 AWG"				
Tightening torque	"5 Nm (44,25 lb-in)"		"10 Nm (88,51 lb-in)"				
Note: Use 75°C (167°F) copper (CU), multi-stranded conductors							

GROUND TERMINAL	
Contact area **models 25/40 A**	275 mm^2
Contact area **models 60/75/90/120/150 A**	472 mm^2
Screw type	M5
Tightening torque	"1,5 - 2,5 Nm (13,3 - 22 lb-in)"

VLINE TERMINAL	
1 Conductor section **2 Conductors section**	1 x 0.2 - 2.5 mm^2 / 2 x 0.5 - 1.5 mm^2
	1 x 24 – 12 AWG 2 x 20 - 16 AWG
Stripping length	10 mm

CONNESSIONI DI POTENZA

INPUT	
AIN1, AIN2 – Control analog input (optional)	
Function	Proportional power control signal reference
Accuracy	1% f.s. ± 1 digit at ambient temperature of 25°C/ 77°F
Thermal drift	< 100 ppm/°C of f.s.
Sampling time	10 ms
Range 0-10V	Input impedance > 500 KΩ
Range 0-5V	Input impedance > 500 KΩ
range 0-20mA or 4-20mA	Externa Shunt resistance: 250 Ω
Potentiometer input	Potentiometer resistance: da 1 KΩ a 47 KΩ Potentiometer power supply: +5V (from GRC, max 10mA)
Input range	0 …. 100.0 %
DIN1, DIN2 – Digital Input (CPU insulation)	
Function	Configurable
Type	Digital Input TYPE 1/3 CEI EN 61131-2
Max voltage	32Vdc
Corrente Tipica a 24V	5mA
Voltage value with “0” condition	< 10,5 V
Voltage value with “1” condition	>12 V
Line voltage value	
Function	Line voltage measure
Voltage reading range (f.s.)	40...530Vac with 480 Vac working voltage model 40...660Vac with 600 Vac working voltage model
Voltage RMS reading value accuracy	+/-0.2% f.s. at ambient temperature of 25°C / 77°F Therma drift: < 200 ppm/°C
Line frequency	50 / 60 Hz
Load current value	
Function	Load current reading True RMS
Current reading range (f.s.)	0 ... 1,1 * model nominal current value
Current RMS reading value accuracy	+/-0.5% f.s. at ambient temperature of 25°C / 77°F Thermal drift: < 200 ppm/°C **Firing FCT-BF/HSC** In the case of power delivery with wave/half-wave On/Off packet modulation, accuracy refers to the current reading during the ON phase, available in the Ion variables. The rms value published in variable I is then recalculated based on the % power delivered Ou.P. **Firing PA** In the case of power delivery with phase angle modulation, accuracy refers to the RMS current value, provided in the I variable. Accuracy is guaranteed with RMS current delivered >=2% of f.s.

OUTPUT	
DO1 Digital output	
Function	Configurable alarm output (default): Partial load break, line fault, thermal alarm.
Type	Output Type Digital output normally off (configurable as normally active). PNP type, output voltage: 0 V…(18 to 32 Vdc) depending on the product's power supply value , Iout max = 20 mA (not protected against short circuit)
C-NO Dry contact (output) (optional)	
Function	Configurable alarm output (default): Partial load break, line fault, thermal alarm..
Type	Voltage free contact (solid state N.O.) max characteristics: 30Vdc/ac max 100mA conduction resistance: ≤ 16 Ω
AO + Analog output (optional)	
Function	Configurable
Type	0…10 V, max 20 mA 2…10 V, max 20 mA 0…20 mA, max resistance 500 Ω 4…20 mA, max resistance 500 Ω
Resolution	12 bit

COMMUNICATION PORT		
PORT 1 (default)		
Function	Ethernet Modbus TCP	
Port	Connection number	2
	Connector type	RJ45
	Type	Ethernet
	Baudrate	10/100 Mbit/s
PORT 2 (option)		
Function	Fieldbus communication	
Type of fieldbus	Profinet	
	Ethercat	
	Modbus RTU	
Profinet option	Connection number	2
	Connector type	RJ45
	Type	Ethernet
Ethercat option	Connection number	2
	Connector type	RJ45
	Type	Ethernet
	Baudrate	100 Mbit/s
Modbus RTU	Connection number	2
	Connector type	PUSH-IN
	Type	RS-485
	Baudrate	1200...115 000 kbit/s
	Line termination	DIP switch (product bottom side accessibility)
	Rotary	2

POWER MODULE									
Category of use (Tab. 2 EN60947-4-3)	AC 51: resistive or low-inductance loads AC 55b: infrared lamps AC56a transformers, resistive loads with high temperature coefficient								
Trigger modes	**FCT- Fixed Cycle Time** - Zero Crossing with constant cycle time (settable in the range 1...200 sec). **BF - Burst Firing** - Optimized minimum variable cycle time (Zero crossing firing). **HSC – Half Single Cycle** - Corresponds to a Burst Firing which handles half on/off cycles (Zero crossing firing). **PA – Phase Angle** - Load management by adjusting the power-on phase angle. It is useful for reducing flickers with short-wave infrared loads								
Feedback and Limits (optional) (Re-calibrating is required each time the Feedback Mode is changed.)	**V, V2**: Voltage feedback, proportional to the true RMS value of the voltage on the load to compensate for possible variations in line voltage. **I, I2**: Current feedback, proportional to the true RMS value of the current in the load to compensate for possible line voltage variations and/or load impedance variations. **P**: Power feedback, proportional to the actual power value on the load to compensate for line voltage variations and/or load impedance variation								
Nominal voltage	480 Vac / 600 Vac base of selected model								
Working voltage range	Model 480 Vac: 40…530 Vac Model 600 Vac: 40…660 Vac								
Non-repetitive voltage (Surge protection level)	Model 480 Vac: 1200 Vp Model 600 Vac: 1600 Vp								
Nominal frequency	50/60Hz with auto-determination								
Nominal current @ 40 °C	Model GRC								
	25	25I	40	40I	60	75	90	120	150
	25A	25A	40A	40A	60A	75A	90A	120A	150A
Non-repetitive current (t=20msec)	620A	1600A	620A	1600A	1600A	1600A	1500A	1500A	2150A
I2t for fuse melting (t=1…10msec) A2s	1800	12800	1800	12800	12800	12800	11250	11250	32000
Critical dv/dt with power output disable	1000 V/µs								
Rated impulse withstand voltage	4kV								
Rated current in short circuit condition	5kA								
Voltage drops over rated current	= < 1,2Vrms								
Dissipated power	Thermal power dissipation is related to load current: Pdissipation = 1,3 W × I_load For models with built-in fuse also consider the power dissipation of the fuse at rated current								
Nominal current AC 56A	Trigger mode allowed	ZC, BF con DT (Delay Triggering), PA with soft start							
	Derating	20% of current nominal value							

OPTION	
Display	- Process variable visualization
Integrate fuses	- Embedded extra rapid fuses, replacement with access under the front cover - Size 1 (25 to 40A) : cylindrical 14 x 51 mm - Size 2 (60 to 150A) : Size 000 DIN80

FEATURES		
Type of load connection and load control	GRC-1PH model	Nr. 1 Mono phase load
	GRC 2PH model	Nr. 2 Mono phase loads Only with ZC and BF trigger mode: Nr. 1 Three phase load, connection closed delta and two legs control Nr. 1 Three phase load, connection star without neutral and two legs control
	GRC 3PH model	Nr. 3 Mono phase loads Nr. 3 Mono phase independent loads open delta connection Nr. 1 Three phase load open delta Nr. 1 Three phase load closed delta Nr. 1 Three phase load star without neutral Nr. 1 Three phase load star with neutral
Control	General	• Power-on soft start time ramp, with or without current peak control • Power-on soft start ramp for Infrared lamps. • Power-off ramp time. • RMC load current limitation • Delay-Triggering 0-90° for inductive load power on with ZC and BF trigger mode control • Calibration by automatic procedure of the HB alarm threshold from the current value in the load.
Diagnostics	Alarms	• SCR short circuit alarm (current presence with control command OFF). • No current due to SCR open / Load break alarm • High temperature alarm. • Total or partial heater break alarm. • Short circuit or overcurrent alarm • No line voltage alarm • Three phase line unbalanced alarm • Three phase load configuration - phase rotation alarm
Energy	Counter	Load energy supplied totalization
	Visualization	Embedded display (option) or remote via fieldbus communication
	Counter reset feature	yes

GENERAL CHARACTERISTICS	
Power supply	24 Vdc ± 10% Power consumption: Min. 15W Max 25 W (Fan active and Fieldbus option present)
LED indication	STATUS (RGB): Multifunction ER (red): System error SCR-ON (Yellow): Power active DI-1 (Green): Digital Input 1 status DI-2 (Green): Digital input 2 status DO (Green): Digital output status
Protection rating	IP20
Working temperature	0…60°C (32 ... 140°F) (see derating curves)
Storage temperature	-20°C - +85°C (-4 ... 185°F) average temperature in a period of 24H not higher than 35°C (95°F) (according to EN 60947-4-3 § 7.1.1)
Maximum relative humidity	90% non-condensing
Environmental conditions of use	Indoor use, maximum altitude 2000m. For higher altitudes consider: -Decreasing 1% of rated current for every 100m (328ft) above elevation 2000m (6562ft). -Decreasing of maximum voltage by correction factor: 0.88 from 2000 (6562ft) to 3000m (9842ft) 0.77 from 3001 (9846ft) to 4000m (13123ft) 0.68 from 4001 (13127ft) to 5000m (16404ft) Example for GRC-..25-60.. at 2800 mslm (9186ft) - 25A nominal derated by 1%*8-->23A - 600Vac nominal, maximum voltage 660Vac derated to 660*0.88=580.8Vac
Installation	Panel mount by screw
Installation requirements	Installation category II, pollution degree 2 Maximum air temperature around the device 40°C / 104°F (for Temperature > 40°C / 104°F see derating curves)

ACCESSORIES

Accessories	
F103980	KIT FAN GRC 75-150A (60x60x25)
353177	Connector VLINE (2 pin)
353167	Connector J1 (7 pin)
353898	Connector J2 (4 pin)
353144	Connector J3 (6 pin)
353139	Connector J5 (5 pin)

FUSES

GRC Type	Order Code	Manufacturer Code	Description	Rating current	Rating Voltage	I2t	Power dissipation @In
25, 25I	338416	FWP-40A14F	FUSE 40A 14X51mm aR 690Vac -UL-	40A	690Vac	750 A2s	8W
40, 40I	338417	FWP-50A14F	FUSE 50A 14X51mm aR 690Vac -UL-	50A	690Vac	1800 A2s	9W
60	338934	DN000UB69V125	FUSE 125A/690V 8900 A2s (FUS-125S) *	125A	690Vac	8900 A2s	26W
75	338934	DN000UB69V125	FUSE 125A/690V 8900 A2s (FUS-125S) *	125A	690Vac	8900 A2s	26W
90	338934	DN000UB69V125	FUSE 125A/690V 8900 A2s (FUS-125S) *	125A	690Vac	8900 A2s	26W
120	338930	DN000UB69V200	FUSE 200A/690V 31500 A2s (FUS-200S)*	200A	690Vac	31500 A2s	36W
150	338930	DN000UB69V200	FUSE 200A/690V 31500 A2s (FUS-200S)*	200A	690Vac	31500 A2s	36W

MCB PROTECTION

Protection co-ordination (Type 2) with Siemens Miniature Circuit Breaker (MCB / Thermal-Magnetic) 5SY4 series, curve A, 1P/2P/3P						
Current size model (I^2t)	**1P MCB model (MCB Nominal current in A) at 230Vac ***	**Wire cross sectional area (mm^2)**	**Minimum length ***of copper wire conductor (m)**	**2P/3P MCB model (MCB Nominal current in A) at 400Vac ****	**Wire cross sectional area (mm^2)**	**Minimum length*** of copper wire conductor (m)**
GRC-... -25, 40 (1800 A2s)	5SY4110-5 (10)	1,0	6,0	5SY4210-5 (10) 5SY4310-5 (10)	1,0	6,0
		1,5	9,0		1,5	10,0
		2,5	14,0		2,5	14,0
	5SY4116-5 (16)	1,0	6,0	5SY4216-5 (16) 5SY4316-5 (16)	1,0	6,0
		1,5	9,0		1,5	10,0
		2,5	14,0		2,5	14,0
		4,0	15,0		4,0	25,0
	5SY4120-5 (20)	1,5	9,0	5SY4220-5 (20) 5SY4320-5 (20)	1,5	10,0
		2,5	15,0		2,5	21,0
		4,0	30,0		4,0	30,0
	5SY4125-5 (25)	2,5	18,0	5SY4225-5 (25) 5SY4325-5 (25)	2,5	18,0
		4,0	30,0		4,0	30,0
	5SY4132-5 (32)	2,5	21,0	5SY4232-5 (32) 5SY4332-5 (32)	2,5	36,0
		4,0	35,0		-	-
GRC-... -25I, 40I, 60, 75 (12800 A2s)	For MCBs smaller than those indicated in the lines below, there are no section and length constraints					
	5SY4132-5 (32)	2,5	2,0	5SY4232-5 (32) 5SY4332-5 (32)	2,5	2,0
		4,0	4,0		4,0	4,0
		6,0	7,0		6,0	7,0
	5SY4140-5 (40)	4,0	4,0	5SY4240-5 (40) 5SY4340-5 (40)	4,0	4,0
		6,0	7,0		6,0	7,0
		10,0	10,0		10,0	10,0
	5SY4150-5 (50)	6,0	7,0	5SY4250-5 (50) 5SY43250-5 (50)	6,0	7,0
		10,0	10,0		10,0	10,0
		16,0	18,0		16,0	18,0
	5SY4163-5 (63)	6,0	7,0	5SY4263-5 (63) 5SY4363-5 (63)	6,0	7,0
		10,0	10,0		10,0	10,0
		16,0	18,0		16,0	18,0
GRC-... -90,120 (11250 A2s)	For MCBs smaller than those indicated in the lines below, there are no section and length constraints					
	5SY4132-5 (32)	2,5	2,0	5SY4232-5 (32) 5SY4332-5 (32)	2,5	2,0
		4,0	4,0		4,0	4,0
		6,0	7,0		6,0	7,0
	5SY4140-5 (40)	4,0	4,0	5SY4240-5 (40) 5SY4340-5 (40)	4,0	4,0
		6,0	7,0		6,0	7,0
		10,0	10,0		10,0	10,0
	5SY4150-5 (50)	6,0	7,0	5SY4250-5 (50) 5SY4350-5 (50)	6,0	7,0
		10,0	10,0		10,0	10,0
		16,0	18,0		16,0	18,0
	5SY4163-5 (63)	6,0	7,0	5SY4263-5 (63) 5SY4263-5 (63)	6,0	7,0
		10,0	10,0		10,0	10,0
		16,0	18,0		16,0	18,0

* The sizing is valid for a 230Vac phase-neutral line with an assumed short-circuit current of 2,5KA
** The sizing is valid for a 400Vac phase-to-phase line with an assumed short-circuit current of 5KA
*** Between MCB and Load plus return path which goes back to the lines/neutral

The use of MCBs with a **nominal size smaller** than the smallest ones associated with a specific GRC in the table, is allowed without restrictions on the length and section of the cables.
For example, a 25I size GRC can be coupled to a 5SY4116-5 (16) MCB with any cable length or section.

Example, for a GRC-3PH-40I.., with line voltage of 400Vac, controlled load of 30 A nominal, with a section of 4 mm2 of cable, an MCB 5SY4332-5 (32) the minimum length of the cables is 7m (cable length is intended between MCB and load, including return).

ORDER CODE

Phases	
Monophase	**1PH**
Biphase (2-leg control for 3PH load, or 2x1PH loads)	**2PH**
Triphase (full 3PH load control, or 3x1PH loads)	**3PH**

Current	
Size1	
25 Ampere	**25**
25 Ampere I2t++	**25I**
40 Ampere	**40**
40 Ampere I2t++	**40I**
Size2	
60 Ampere	**60**
75 Ampere	**75**
90 Ampere	**90**
120 Ampere	**120**
150 Ampere	**150**

Voltage	
480 (40…530 Vac)	**48**
600 (40…660 Vac)	**60**

Add-On Functions	
None	**0**

Fieldbus option	
0	No added fieldbus-ModbusTCP always on board
MR	Modbus RTU
PN	Profinet
EC	EtherCAT
EI	Ethernet IP

Fuses	
0	None
F	Integrated high speed fuses

Integrated Display	
0	None
D	Integraed display

Auxiliary I/O	
0	Always onboard I/O (2 DI, 1 DO)
1	2 Analog Input + 1 Analog Output +1 DO +always on board

Control load options	
0	Basic diagnostic (No current reading)
FV	Feedback V,V2
HB	FV + Current reading, HB diagnostic and Current limiter
FB	FV + HB+ Feedback I,I2,P

CERTIFICATIONS

CE	This device conforms to European Union Directive 2014/30/EU and 2014/35/EU as amended with reference to generic standards: EN 61000-6-2 (iammunity in industrial environment) EN 61000-6-4 (emission in industrial environment) - EN 61010-1 (safety regulations).
UL	Conformity C/UL/US file no. **E243386 vol. 1 sez. 12**