Product Data Sheet Characteristics

EPower™ Controller Power Controller 1-2-3-4 phases

Range name: **Power Controller**

Document number: **HA033671 Issue 1**

Published: **November 2022**

Eurotherm

The EPower™ Advanced SCR Power Controller is a modular multi-channel SCR power controller unit. The EPower current ratings cover ranges from 50 Amps up to 630 Amps (compact variants) and from 800 Amps to 4000 Amps (MC EPower with HPower variants). The voltage rating can go up to a maximum of 690 volts depending on current variants.

Its single-driver module can support up to four independent control loops. The driver module offers a wide choice of options boards with the support of 7 Fieldbus protocols over Ethernet and serial industrial communications, flexible I/O, and Predictive Load Management (PLM).

Eurotherm iTools PC-based configuration software is used for commissioning and advanced programming, this is available free of charge from the Eurotherm website.

Environmental sustainability (50A - 630A)

UKCA/EU RoHS directive	UKCA/EU RoHS declaration
Mercury free	Yes
RoHS exemption information	Yes
China RoHS regulation	China RoHS declaration
Environmental disclosure	Product environmental profile
Circularity profile	End of Life information

Note: Refer to the EPower™ Controller product information page on the Eurotherm website for details (www.eurotherm.com).

Installation categories (all range)

	Installation Category	Rated impulse withstand voltage (Uimp)	Rated insulation voltage (Ui)	Maximum value of rated operational voltage to earth
Communications	II	0.5kV	50V	50V
Standard and optional IO	II	0.5kV	50V	50V
Driver module power supply & auxiliary (fan) supply	II	2.5kV	230V	300V
Relays	III	4kV	230V	300V
Power modules (up to 600V)	III	6kV	600V	600V
Power modules (up to 690V)	II	6kV	690V	600V

Driver (all range)

Driver module power supply & auxiliary (fan) Supply	
Rated control supply voltage (Us)	100 to 240V ac (+10% - 15%)
Frequency range	47 to 63Hz
Power requirement	60W + power module fans (15W each for 400/500/630A power modules; 10W each for 160A/250A modules)

EMC (all range)

Standard	EN60947-4-3:2014 This product has been designed for environment A (Industrial). Use of this product in environment B (domestic, commercial, and light industrial) may cause unwanted electromagnetic disturbances in which cases the user may be required to take adequate mitigation measures.

Operator interface (all range)

Display	Four lines of up to 10 characters each. Display pages can be used to view process variable values and to view and edit the configuration of the unit. Editing of the configuration is better carried out using configuration software (iTools). In addition to the standard displays, up to four 'custom' pages can be defined which allow bargraph displays, text entry etc.
Character format	Seven high x five wide yellow-green LCD dot matrix array
Push buttons	Four push buttons provide page and item entry and scroll facilities
LED indicators (beacons)	Three indicators (PWR, LOC and ALM) are supplied to indicate that power is applied, that Local Control is selected and that there is one or more active alarm, respectively.

Standard inputs/outputs (SK1) (all range)

All figures are with respect to driver module 0V, unless otherwise stated.

Number of inputs/outputs	
Number of analog inputs	2
Number of analog outputs	1
Number of digital inputs/outputs	2 (each configurable as an input or an output)
10V (Potentiometer) supply	1
Update rate	Twice the mains frequency applied to power module 1. Defaults to 83.2Hz (12ms) if no power applied to power module 1 or if supply frequency lies outside the range 47 to 63Hz.
Termination	Removable 10-way connector (5.08mm pitch)

Analog inputs (all range)

Input types	Each input is configurable as one of: 0 to 10V, 1 to 5V, 2 to 10V, 0 to 5V, 0 to 20mA, 4 to 20mA
Absolute maxima + terminal	±16V or ±40mA
- terminal	±1.5V or ±300mA

Analog outputs (all range)

Output types	Each output is configurable as one of: 0 to 10V, 1 to 5V, 2 to 10V, 0 to 5V, 0 to 20mA, 4 to 20mA
Absolute maxima + terminal	(-0.7V or -300mA) or (+16V or +40mA)
0V terminal	±2A

10V supply (potentiometer supply) (all range)

Output voltage	10.3V ± 0.3V @ 5.5mA
Short circuit o/p current	15mA max
Ambient temperature drift	±0.012%/ °C (typ); ±0.04%/ °C (max)
Absolute maxima Pin 1	(-0.7V or -300mA) or (+16V or +40mA)

Relay specification (all range)

Contact life resistive loads	100,000 operations (de-rate with inductive loads as per figure)
High power use current	<2A (resistive loads)
Voltage	<264V RMS (UL: Voltage 250Vac)
Low power use current	>1mA
Voltage	>1V
Contact configuration	Single pole change-over (one set of common, normally open, and normally closed contacts)
Termination relay 1 (standard)	3-way connector on underside of Driver Module (see Electrical Installation in the EPower User Guides - HA179769, HA179891)
Watchdog relay (standard)	3-way connector on underside of Driver Module (see Electrical Installation in the EPower User Guides - HA179769, HA179891)
Relays two to four (option)	12-way option module connector (see Electrical Installation in the EPower User Guides - HA179769, HA179891)
Installation category	Installation category III, assuming that nominal phase to earth voltage is ≤ 300V RMS. Isolation between different relays' contacts is double isolation, in accordance with the installation category and phase to earth voltage specified above.
Absolute maximum switching capability	<2A at 240V RMS (resistive loads)

Note: Normally closed and normally open refer to the relay when the coil is not energized.

Digital I/O (all range)

Hardware response time	100µs
Voltage inputs	
Active level (high)	4.4V<Vin<30V
Non-active level (low)	-30V<Vin<+2.3V
Input impedance	10kΩ
Contact closure inputs	
Source current	10mA min; 15mA max
Open contact (non active) resistance	>500Ω
Closed contact (active) resistance	<150Ω
Current source output	
Source current	9mA<I_{source} <14mA @ 14V 10mA<I_{source} <15mA @ 0V 9mA<I_{source} <14mA @ -15V
Open circuit voltage	<14V
Internal pull-down resistance	10kΩ (to 0V)
Absolute maxima + terminal	±30V or ±25mA
0V terminal	±2A

Notes

- Absolute maximum ratings refer to externally applied signals
- The 10V potentiometer supply is designed to supply two 5kW potentiometers connected in parallel
- The maximum current for any 0V terminal is ±2A
- PLC compatibility: Digital inputs are not 100% compliant with IEC 61131-2 (it is recommended that the user check compatibility before use)

Mains network measurements (all range)

All network measurements are calculated over a full mains cycle, but internally updated every half-cycle. For this reason, power control, current limits and alarms all run at the mains half-cycle rate. The calculations are based on waveform samples taken at a rate of 20kHz. Measurements on each phase are synchronized to its own phase and if the line voltage cannot be detected, the measurements stop for that phase. It should be noted that, depending on the configuration, the phase voltage referred to is one of:

1. the line voltage referenced to neutral in four star,
2. the line voltage referenced to neutral or another phase for single phase, or
3. the line voltage referenced to the phase applied to the next adjacent power module for three phase star or delta configurations

The parameters below are directly derived from measurements for each phase:

Accuracy 20 to 25°C (68 to 77°F)	
Line frequency (F)	±0.02Hz
Line RMS voltage (Vline)	±0.5% of nominal Vline
Load RMS voltage (V)	±0.5% of nominal V for voltage readings >1% of nominal V. Unspecified for readings lower than 1%Vnom
Thyristor RMS current (I_{RMS})	±0.5% of nominal I_{RMS} for current readings > 3.3% of nominal I_{RMS}. Unspecified for readings = 3.3% nominal I_{RMS} (see note below)
Load RMS voltage squared (Vsq)	±1% of (nominal V)^2
Thyristor RMS current squared (Isq)	±1% of (nominal I)^2
True load power (P)	±1% of (nominal V) × (nominal I)
Frequency resolution	0.1Hz
Measurement resolution	11 bits of nominal value (noise free)
Measurement drift with ambient temp	<0.02% of reading / °C

Further parameters (S, PF, Q, Z, Iavg, IsqBurst, IsqMax, Vavg, Vsq Burst, VsqMax and PBurst) are derived from the above, for each network (if relevant). See EPower MC Controller User Guide, HA179891 (Meas submenu), for further details.

Note: For external current feedback, the above specification does not include errors associated with external current transformers.

External current transformer (all range)

Ratio	Chosen such that the full-scale output from the current transformer is 5 Amps

Optional input/output modules (SK3, SK4, SK5) (all range)

Up to three input/output modules can be fitted, each containing the inputs and outputs detailed below. Unless otherwise stated below, the specification for the optional I/O (including relays) is as given above for the standard I/O.

Termination	Removable 12-way (5.08mm pitch) connector per module
Number of modules	Up to three
Number of inputs	One analog input and two digital inputs per module
Number of outputs	One analog output per module
Number of relays	1 set of common, normally open, and normally closed contacts per module
10V potentiometer supply o/p voltage	10.0V ±0.3V at 5.5mA

Communications (all range)

CC-Link protocol	CC-Link version 1.1
Connector	5 way
Indicators	RUN and ERR

DeviceNet protocol	DeviceNet
Connector	Five way
Indicators	Network status and module status

Modbus/TCP type	10baseT (IEEE801)
Protocol	Modbus TCP
Connector	RJ45 single port and dual port
Indicators	Tx activity (green) and communications activity (yellow)

EtherNet/IP protocol	EtherNet/IP
Connector	RJ45 single port and dual port
Indicators	NS (network status), MS (module status) and LINK (link status)

Modbus RTU protocol	Modbus RTU slave
Transmission standard	Three-wire EIA485
Connector	Twin, parallel-wired RJ45
Indicators	Tx activity (green) and Rx activity (yellow)
Isolation (EN60947-4-3)	Installation category II, pollution degree 2
Terminals to ground	50V RMS or dc to ground (double isolation)

Profibus protocol	Profibus DPV1
Connector	9 way D-type
Indicators	Mode and status

Profinet protocol	Profinet I/O
Connector	RJ45 single port and dual port
Indicators	Link, network status and module status

Power module

50A - 630A

Number of modules	Up to four identical units per driver module
Rated operational voltages (Ue)	100 to 600V ac (+10% - 15%) (CE and UL units) or 100 to 690V ac (+10% - 15%) (CE units only), as specified at time of order
Frequency range	47 to 63Hz
Rated operational currents (Ie)	16 to 630A depending on power module
Power dissipation	1.3W per Amp, per phase
Cooling	
Up to and including 100A	Natural convection
Above 100A	Fan cooling. Fans are connected in parallel to driver module connector.

50A - 630A

Fan supply voltage		115 or 230V ac, as specified at time of order
Fan power requirement		10W for 160A/250A modules; 15W for 400A, 500 and 630A modules
Utilization categories		AC51: Non-inductive or slightly inductive loads, resistance furnaces
		AC56a: Switching of transformers
Overload conditions		AC51: 1 x Ie continuous
		AC56a: 1 x Ie continuous
Rated duty		Uninterrupted duty / continuous operation
Form designation		Form 4 (semiconductor controller)
Rated conditional short-circuit current	CE	92kA all modules except: 98kA for 500A modules; 105kA for 630A modules 690 Volts Maximum; coordination type 1
	UL	UL SCCR Rated: 100kA RMS symmetrical amperes, 600 Volts ac Maximum coordination type 1 EPower units do not incorporate branch-circuit protection. It is the user's responsibility to incorporate branch-circuit protection upstream of the EPower unit. The installation must comply in its entirety with all applicable local safety and emissions regulations. The above branch-circuit protection is necessary in order to meet NEC requirements.
Load types		Single or multiphase control of resistive loads (low/high temperature coefficient and non-aging/ aging types) and transformer primaries. Load voltage/current feedback either internal (standard) or external (option for use with transformer secondaries for example).

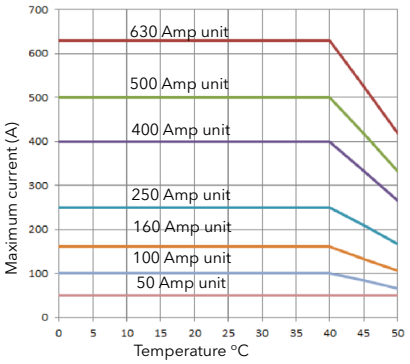
HPower 800A - 4000A

Number of stacks		Up to four identical units per driver module
Voltage range (air cooled units)		100 to 690V ac (+10% - 15%)
Voltage range (water cooled units)		100 to 600V ac (+10% - 15%)
Frequency range		47 to 63Hz
Nominal current		800 to 4000 Amps according to model
Power dissipation		1.3W per Amp, per phase
Short circuit protection		
Rated short-circuit conditional current		CE Rated 100kA (not a UL508A test)
Co-ordination type		Type 1 (fuses)
Cooling (remote thyristor stacks)		Forced air (fan) or water, according to model
Fan supply voltage		115 or 230V ac, as specified at time of order (+10% -15%) see derating curve
Fan power requirement:		105W maximum per Hpower air-cooled unit
Incoming water temperature (max)		40˚C (104˚F)
Water temperature rise per unit		Lower than 10°C (50˚F)
Water flow rate (min)		10 l/min (2.65 U.S gallons/min) (2.21 imperial gallons/min)
Pressure loss per unit		200Pa
Water pipe		
	Internal diameter	½ in (12.7mm)
Outside diameter (typical)		19.1mm (0.75in)
Max operating temp		80˚C (176˚F)
Working pressure (max)		1.6MPa (232psi)
Recommended material		Polyurethane
Protection	Thyristor drive	High-speed fuses and RC circuits
Pollution degree		Pollution degree 2 (EN60947-1)
Installation category	Power network	Installation category II or category III
Auxiliary (fan) supply		Installation category II assuming nominal phase voltage with respect to earth is ≤ 300V rms
Utilization categories		AC51: Non-inductive or slightly inductive loads, resistance furnaces
		AC56a: Switching of transformers
Duty cycle		Uninterrupted duty / continuous operation
Overload current profile		AC51 1 x Ie continuous
Form designation		Form 4 (semiconductor controller)
Load types		Single or multiphase control of resistive loads (low/high temperature coefficient and non-aging/ aging types) and transformer primaries

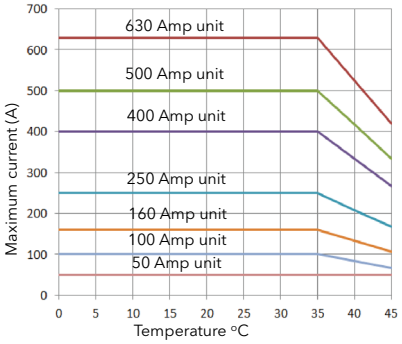
Environment

50A - 630A

Temperature limits Operating		0°C to 40°C (32°F to 104°F) maximum at 1000m 0°C to 35°C (32°F to 95°F) maximum at 2000m (Refer to de-rating curve for upper temperature)
Storage		-25°C to +70°C (-13°F to +158°F)
Altitude (maximum)		1000 metres at 40°C (104°F) 2000 metres at 35°C (95°F) (Refer to de-rating curve for upper temperature)
Humidity limits		5% to 95% RH (non-condensing)
Pollution degree		Pollution degree 2
Atmosphere		Non-explosive, non-corrosive and non-conductive
Protection	CE	(according to EN60529) IP10 With internal lug terminals (see Line/Load termination details in the EPower User Guide, HA179769) IP00 with power connection adapter (see Power connection adapter termination details in the EPower User Guide, HA179769)
	UL	Open type
External wiring	CE	Must comply with IEC60364-1 and IEC60364-5-54 and all applicable local regulations Cross sections must comply with Table 9 & 10 of IEC60947-1
	UL	Wiring must comply with NEC and all applicable local regulations Used cables must be rated 75°C (167°F) stranded copper only Connection must be made by using listed lugs
Shock (EN60068-2-29)		10g peak; 6ms duration; 100 bumps
Vibration (EN60068-2-6)		67 to 150Hz at 1g
Product certifications		China RoHS, EAC, UL/cUL, RCM, CE, UKCA



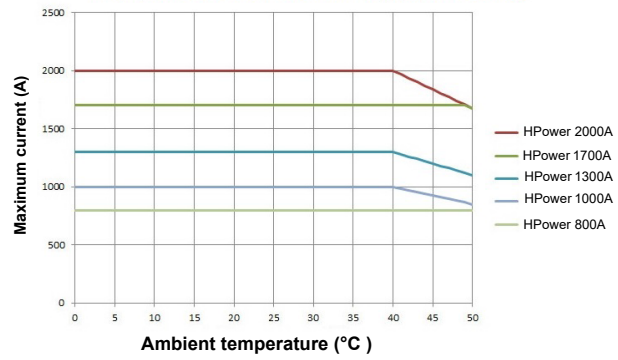
Derating curve at 2000m altitude



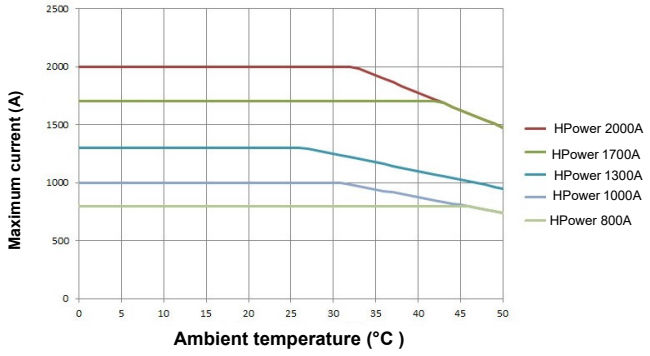
HPower 800A - 4000A

Temperature limits	Operating	Air cooled: 40˚C (104˚F) at 1000m at rated current. Up to 50˚C (122°F) and 2000m Water cooled: 50˚C (122°F) for EPowerMC (control unit)
	Storage	-25°C to +70°C (-13˚F to +158˚F)
Humidity limits		5% to 95% RH (non-condensing)
Altitude (maximum)		Air cooled - 1000 metres (3280 ft.) at 40˚C (104˚F) at rated current. Up to 2000m and 50˚C (122˚F) Water cooled - 2000 metres (6560 ft)
Protection	Control units	IP10 (EN60529)
Thyristor stacks		IP00 (EN60529)
Atmosphere		Non-explosive, non-corrosive and non-conductive
External wiring		Must comply with IEC60364-1 and IEC60364-5-54 and all applicable local regulations
Air cooled		
Shock (EN60068-2-29)		10g peak; 6ms duration; 10 bumps
Vibration (EN60068-2-6)		10-67Hz at 0.07mm displacement - 67Hz at 1g
		67-150Hz at 1g constant
Water cooled		
Shock (EN60068-2-29)		15g peak; 11ms duration; 10 bumps
Vibration (EN60068-2-6)		5Hz to 8.42Hz at 1.75mm displacement
		8.42Hz to 150Hz at 0.5g acceleration
Product certifications		China RoHS, EAC, RCM, CE

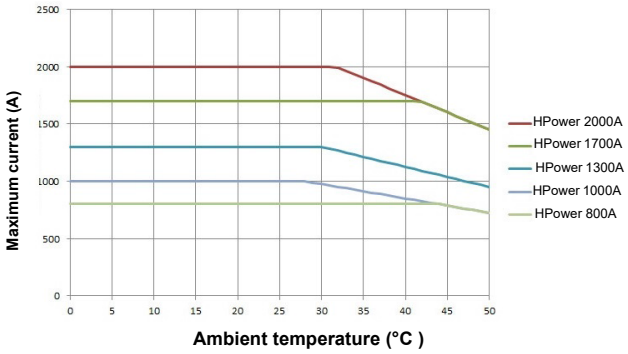
Derating curve at 1000m altitude with fan supply at nominal voltage



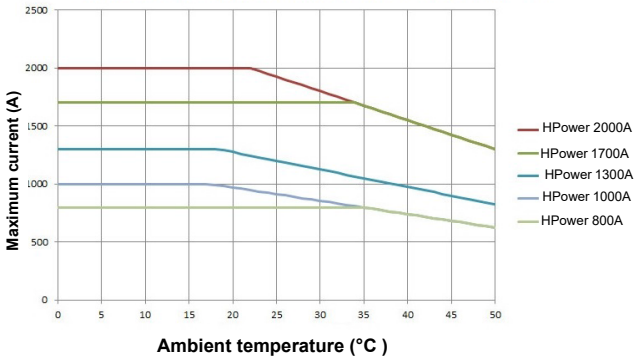
Derating curve at 1000m altitude with fan supply at nominal voltage -15%



Derating curve at 2000m altitude with fan supply at nominal voltage



Derating curve at 2000m altitude with fan supply at nominal voltage -15%



Physical and fixing details (50A - 630A)

Unit weights									
Current	Weight (including 2kg (4.4lb) for driver module)								
	1 phase		**2 phases**		**3 phases**		**4 phases**		
	kg	lb	kg	lb	kg	lb	kg	lb	
50/100A	6.5	14.3	11.0	24.3	15.5	34.2	20.0	44.1	
160A	6.9	15.2	11.8	26.0	16.7	36.8	21.6	47.6	Weights ± 50g (2oz)
250A	7.8	17.2	13.6	30.0	19.4	42.8	25.2	55.6	
400A	11.8	26.0	21.6	47.6	31.4	69.2	41.2	90.8	
500A	14.0	30.9	26.0	57.3	38.0	83.8	50.0	110.2	
630A	14.5	32.0	27.0	59.5	39.5	87.1	52.0	114.6	

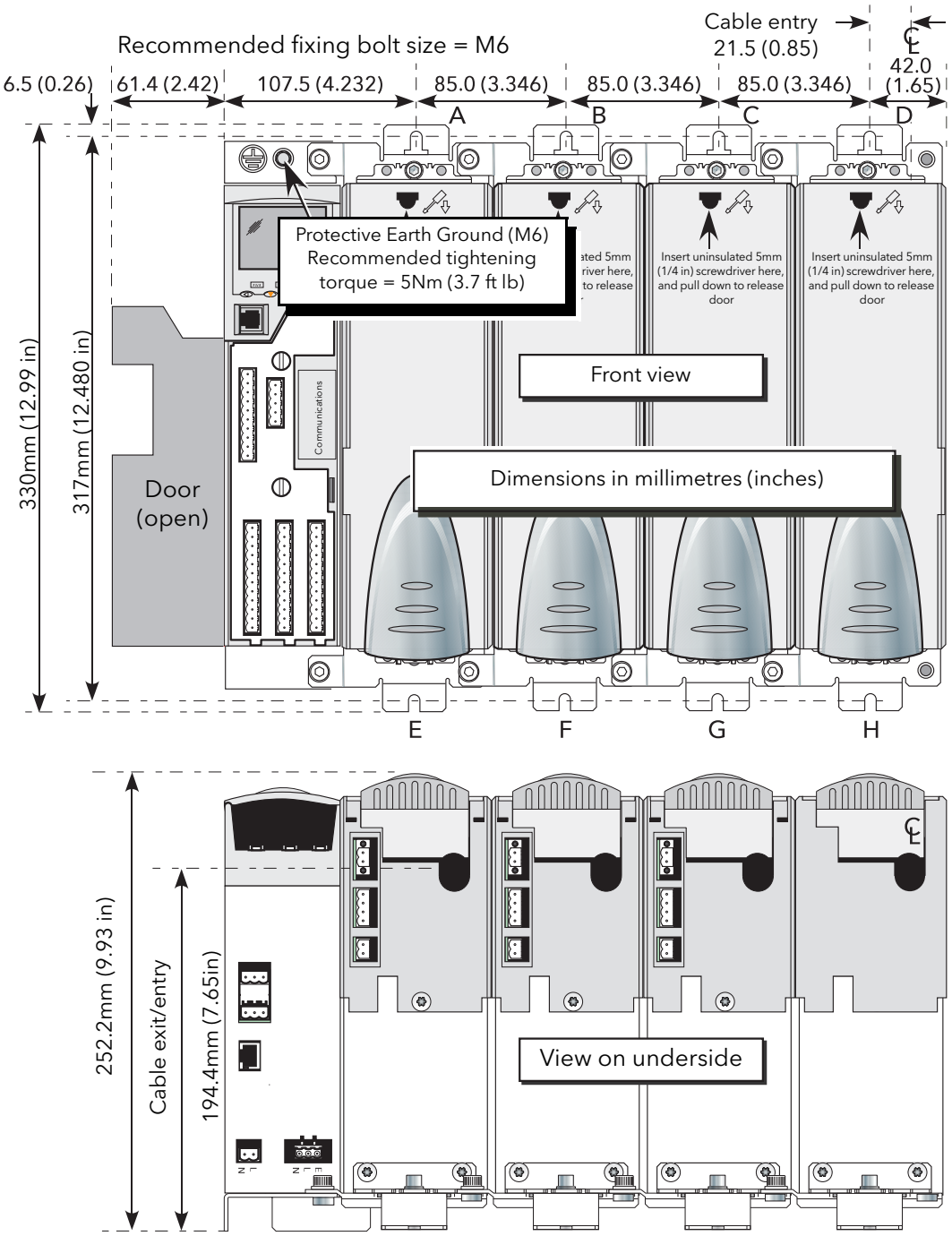


Figure 1) 50A/100A units

Overall widths				
No of phases	1	2	3	4
Door closed	149.5mm (5.89in)	234.5mm (9.23in)	319.5mm (12.58in)	404.5mm (15.93in)
Door open	211.0mm (8.31in)	296.0mm (11.65in)	381.0mm (15.00in)	466.0 mm (18.35in)

	Upper bracket	Lower bracket
2-phase	Use A and B	Use E and F
3-phase	Use A, B and C	Use E and G
4-phase	Use A, B, C and D	Use E, F, G and H

Note: Units are shown with individual mounting brackets. Multi-phase units come supplied with two, three or four phase brackets as appropriate.

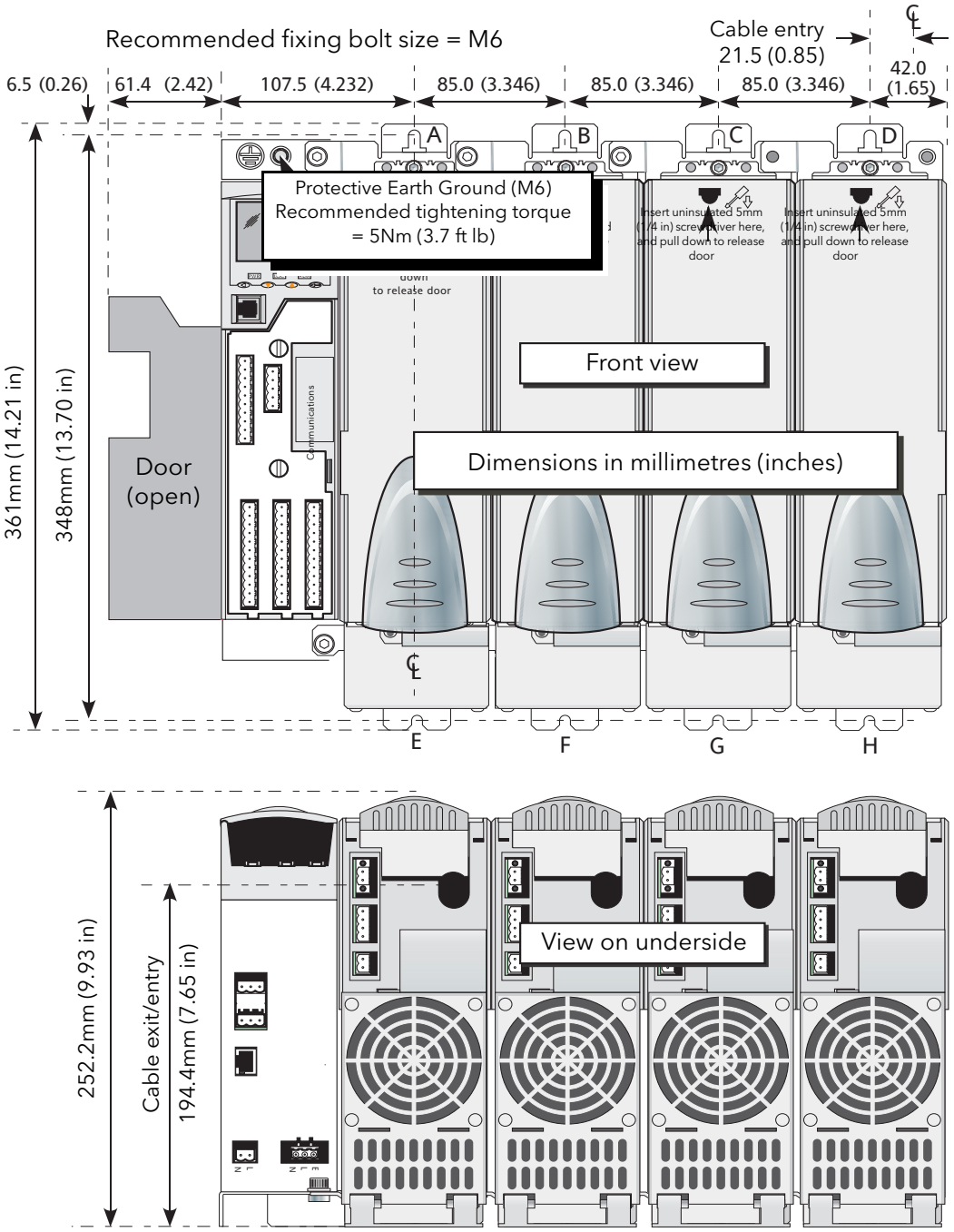


Figure 2) 160A unit

Overall widths				
No of phases	1	2	3	4
Door closed	149.5mm (5.89in)	234.5mm (9.23in)	319.5mm (12.58in)	404.5mm (15.93in)
Door open	211.0mm (8.31in)	296.0mm (11.65in)	381.0mm (15.00in)	466.0 mm (18.35in)

	Upper bracket	Lower bracket
2-phase	Use A and B	Use E and F
3-phase	Use A, B and C	Use E and G
4-phase	Use A, B, C and D	Use E, F, G and H

Note: Units are shown with individual mounting brackets. Multi-phase units come supplied with two, three or four phase brackets as appropriate.

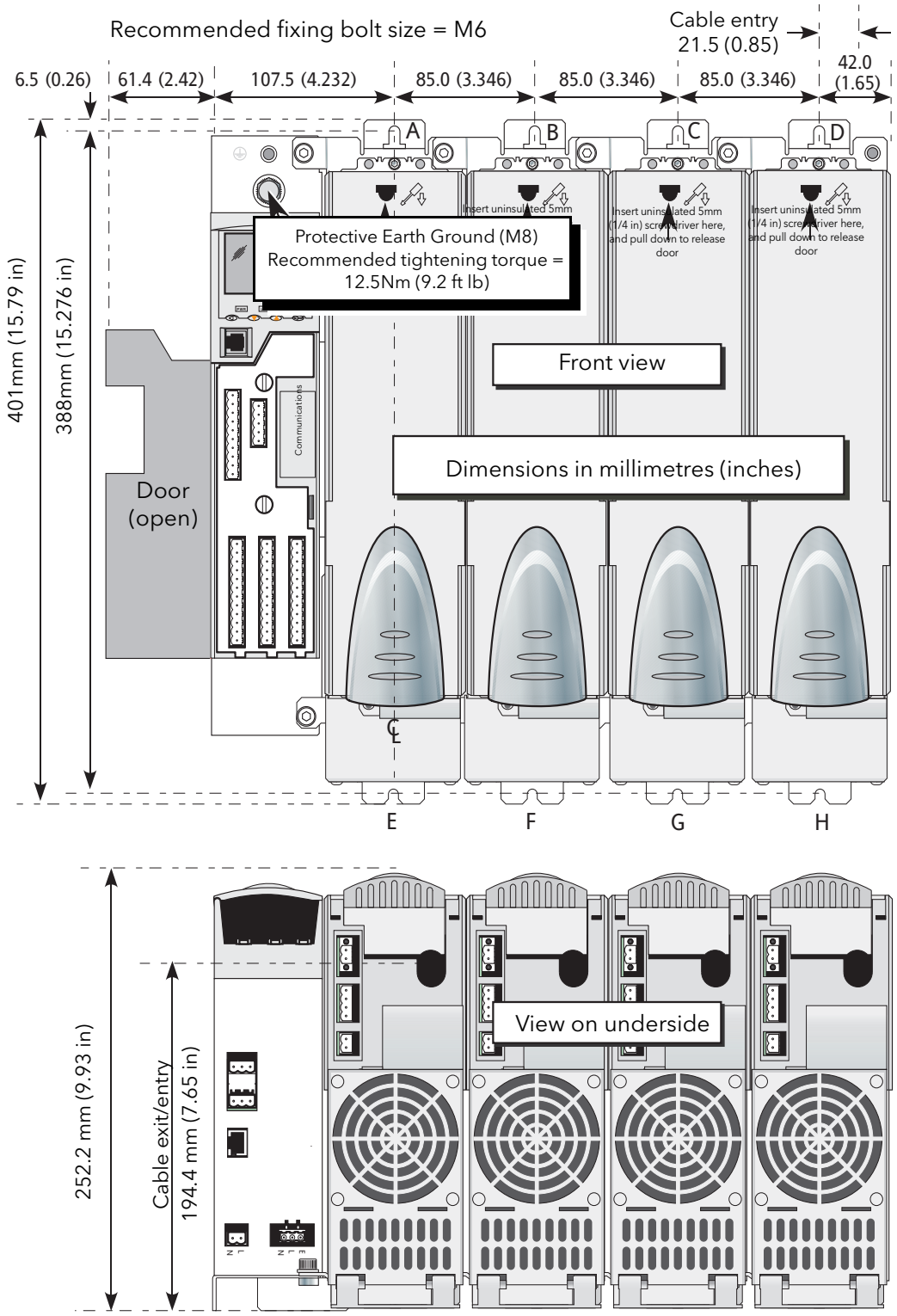


Figure 3) 250A unit

Overall widths				
No of phases	1	2	3	4
Door closed	149.5mm (5.89in)	234.5mm (9.23in)	319.5mm (12.58in)	404.5mm (15.93in)
Door open	211.0mm (8.31in)	296.0mm (11.65in)	381.0mm (15.00in)	466.0 mm (18.35in)

	Upper bracket	Lower bracket
2-phase	Use A and B	Use E and F
3-phase	Use A, B and C	Use E and G
4-phase	Use A, B, C and D	Use E, F, G and H

Note: Units are shown with individual mounting brackets. Multi-phase units come supplied with two, three or four phase brackets as appropriate.

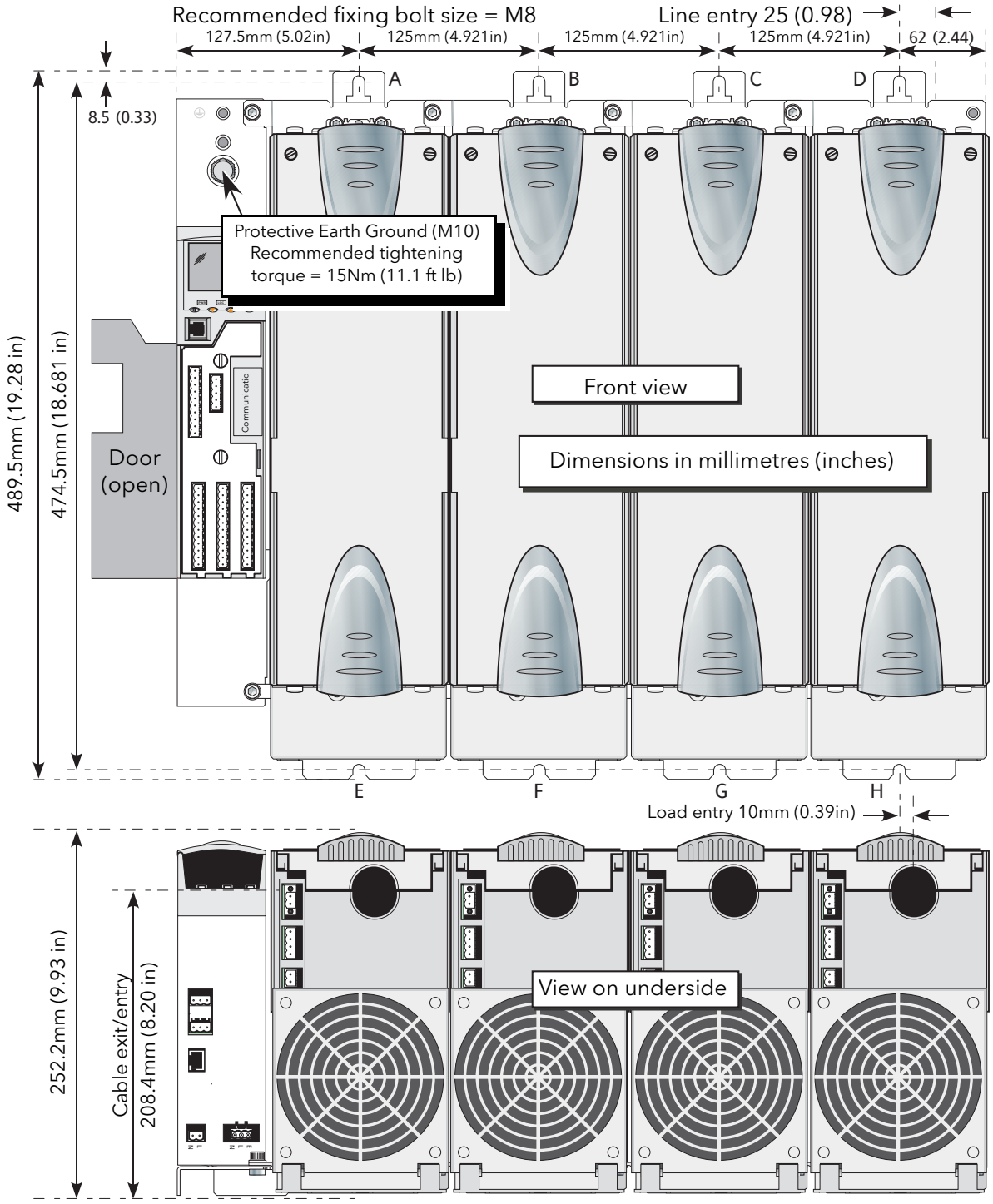


Figure 4) 400A unit

Overall widths				
No of phases	1	2	3	4
Door closed	189.5mm (7.46in)	314.5mm (12.38in)	439.5mm (17.30in)	564.5mm (22.22in)
Door open	251.0mm (9.88in)	376.0mm (14.80in)	501.0mm (19.72in)	626.0 mm (24.65in)

	Upper bracket	Lower bracket
2-phase	Use A and B	Use E and F
3-phase	Use A, B and C	Use E and G
4-phase	Use A, B, C and D	Use E, F, G and H

Note: Units are shown with individual mounting brackets. Multi-phase units come supplied with two, three or four phase brackets as appropriate.

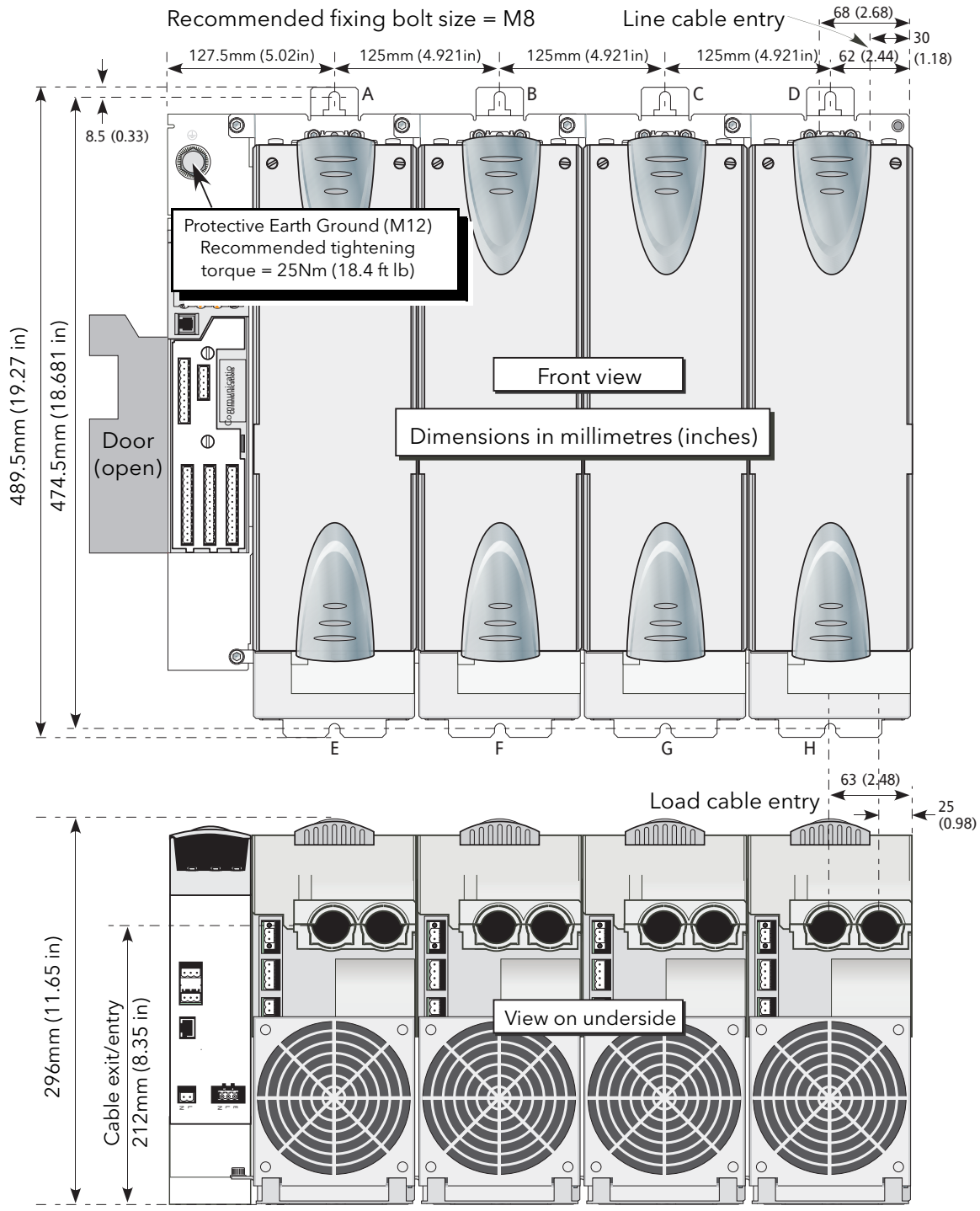


Figure 5) 500A/630A units

Overall widths				
No of phases	1	2	3	4
Door closed	189.5mm (7.46in)	314.5mm (12.38in)	439.5mm (17.30in)	564.5mm (22.22in)
Door open	251.0mm (9.88in)	376.0mm (14.80in)	501.0mm (19.72in)	626.0 mm (24.65in)

	Upper bracket	Lower bracket
2-phase	Use A and B	Use E and F
3-phase	Use A, B and C	Use E and G
4-phase	Use A, B, C and D	Use E, F, G and H

Note: Units are shown with individual mounting brackets. Multi-phase units come supplied with two, three or four phase brackets as appropriate.

Physical and fixing details (HPower)

MC unit weights			
Weight (including 2 kg (4.4 lb) for driver module)			
1 phase	**2 phases**	**3 phases**	**4 phases**
4.0kg	6.5kg	9kg	11.5kg
(8lb 13oz)	(14lb 5oz)	(19lb 13oz)	(25lb 6oz)

Thyristor stack weights							
Nominal stack current	Weight						
	1 phase		**2 phases**		**3 phases**		
	kg	lb	kg	lb	kg	lb	
800/1000A	25	55.2	40	88.2	50	101.2	Weights ± 50g (2oz)
1300A	25	55.2	40	88.2	90	198.4	
1700/2000A (air cooled)	70	154.3	113	249.1	163	359.4	
2000A (water cooled)	18	40	Water-cooled units are available as single phase only				
3000A/4000A	23	51					

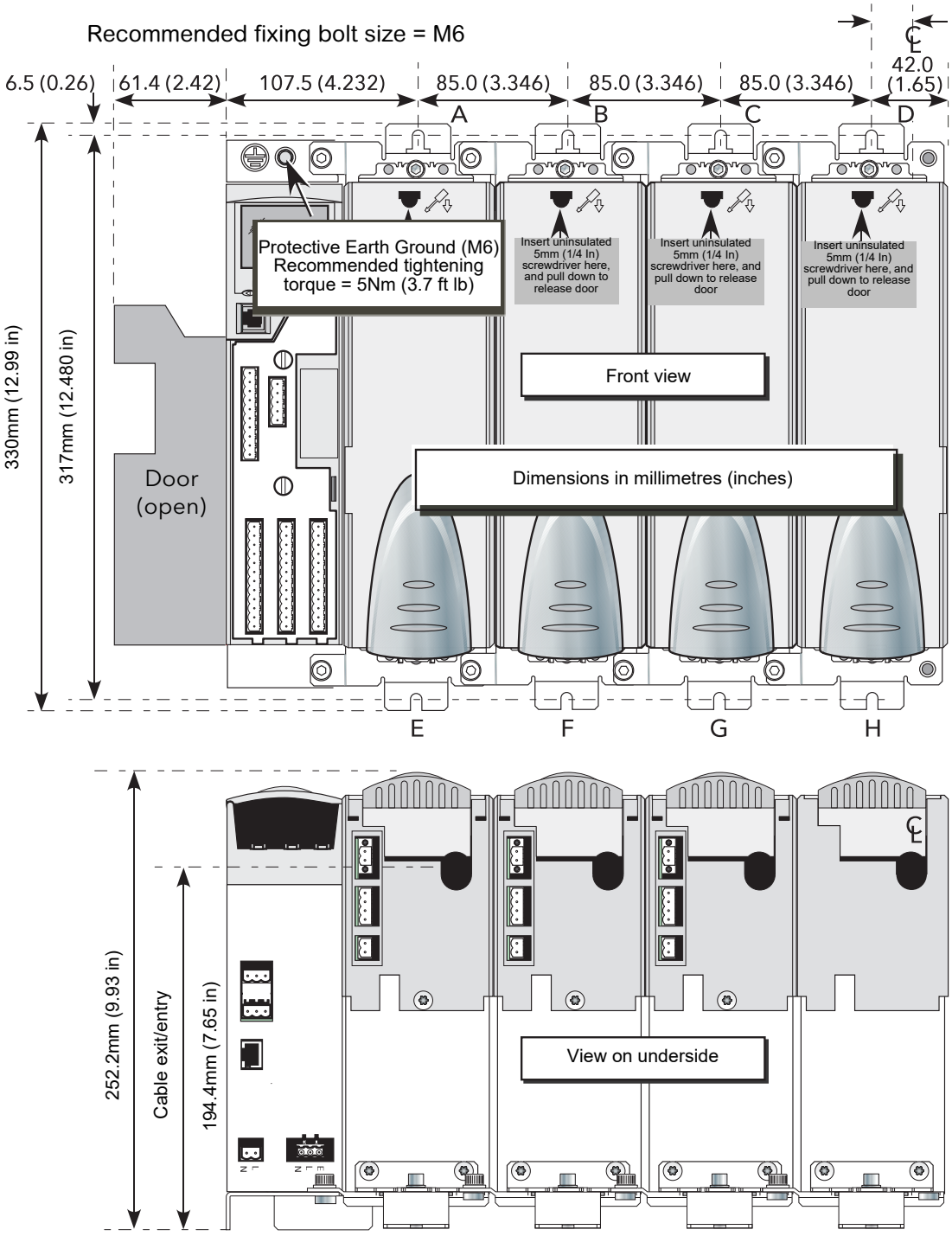


Figure 6) Fixing details (EPower MC units)

Overall widths				
No of phases	1	2	3	4
Door closed	149.5mm (5.89in)	234.5mm (9.23in)	319.5mm (12.58in)	404.5mm (15.93in)
Door open	211.0mm (8.31in)	296.0mm (11.65in)	381.0mm (15.00in)	466.0 mm (18.35in)

	Upper bracket	Lower bracket
2-phase	Use A and B	Use E and F
3-phase	Use A, B and C	Use E and G
4-phase	Use A, B, C and D	Use E, F, G and H

Note: Units are shown with individual mounting brackets. Multi-phase units come supplied with two, three or four phase brackets as appropriate.

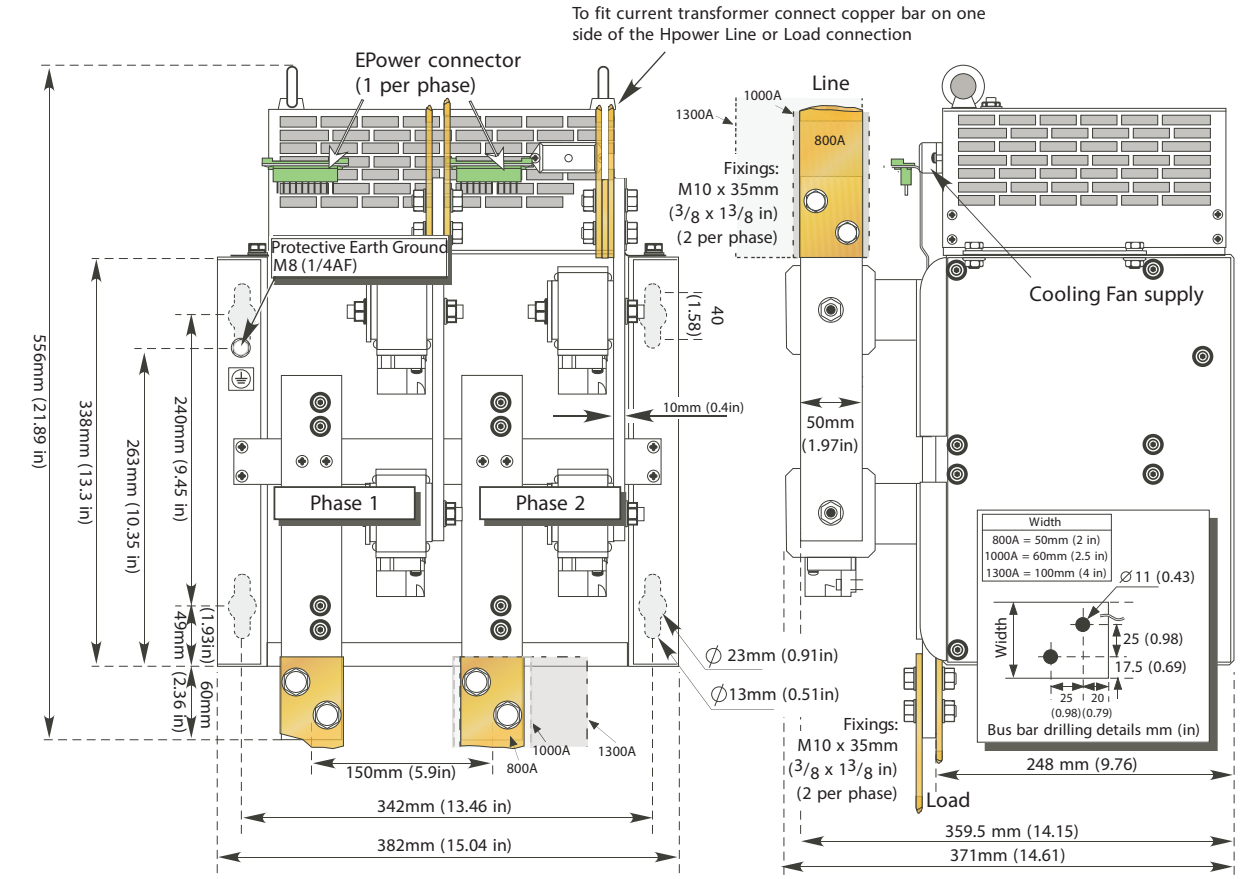


Figure 7) Thyristor stack - 800A/1000A/1300A, 1 or 2 phase units

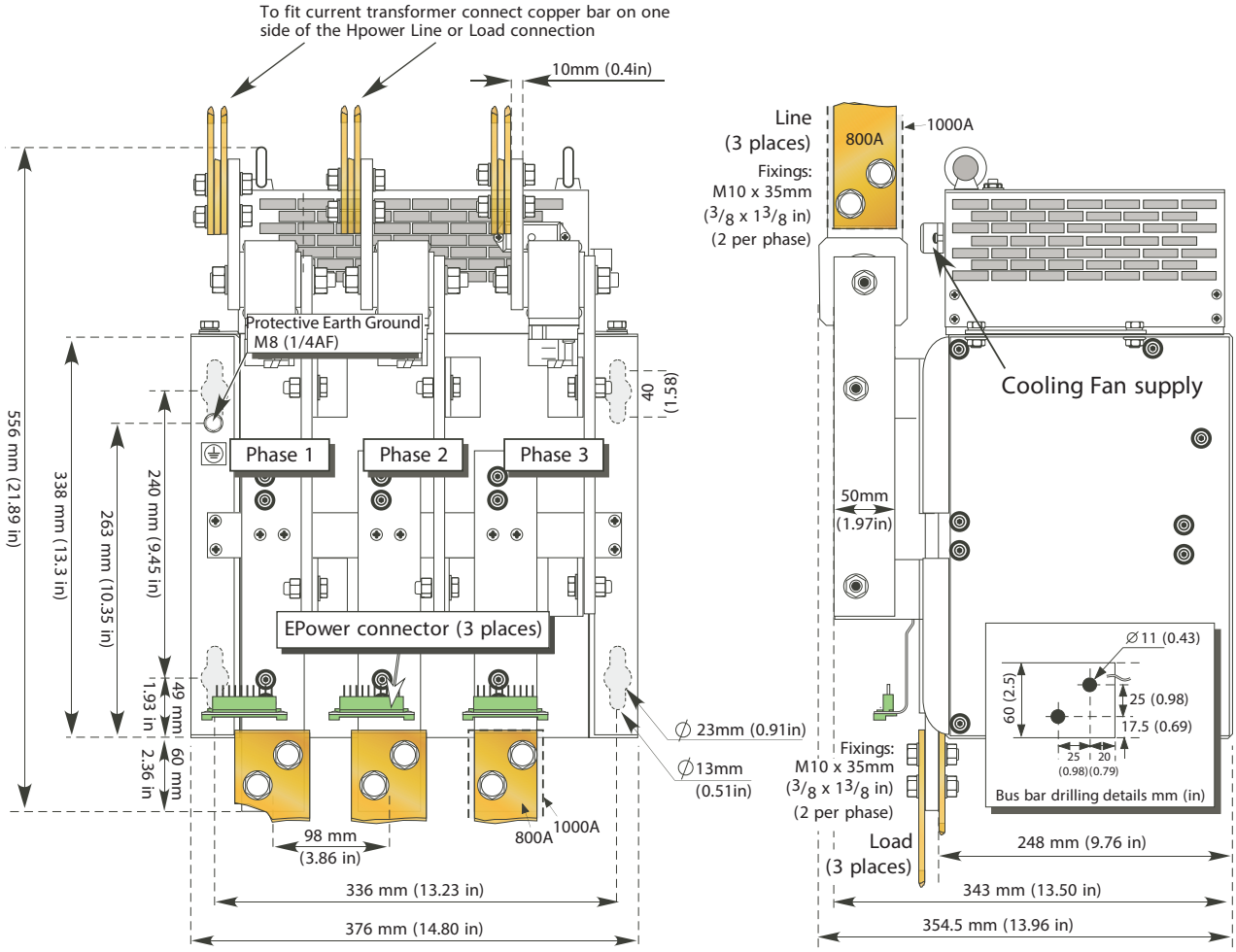


Figure 8) Thyristor stack - 800A/1000A, 3 phase units

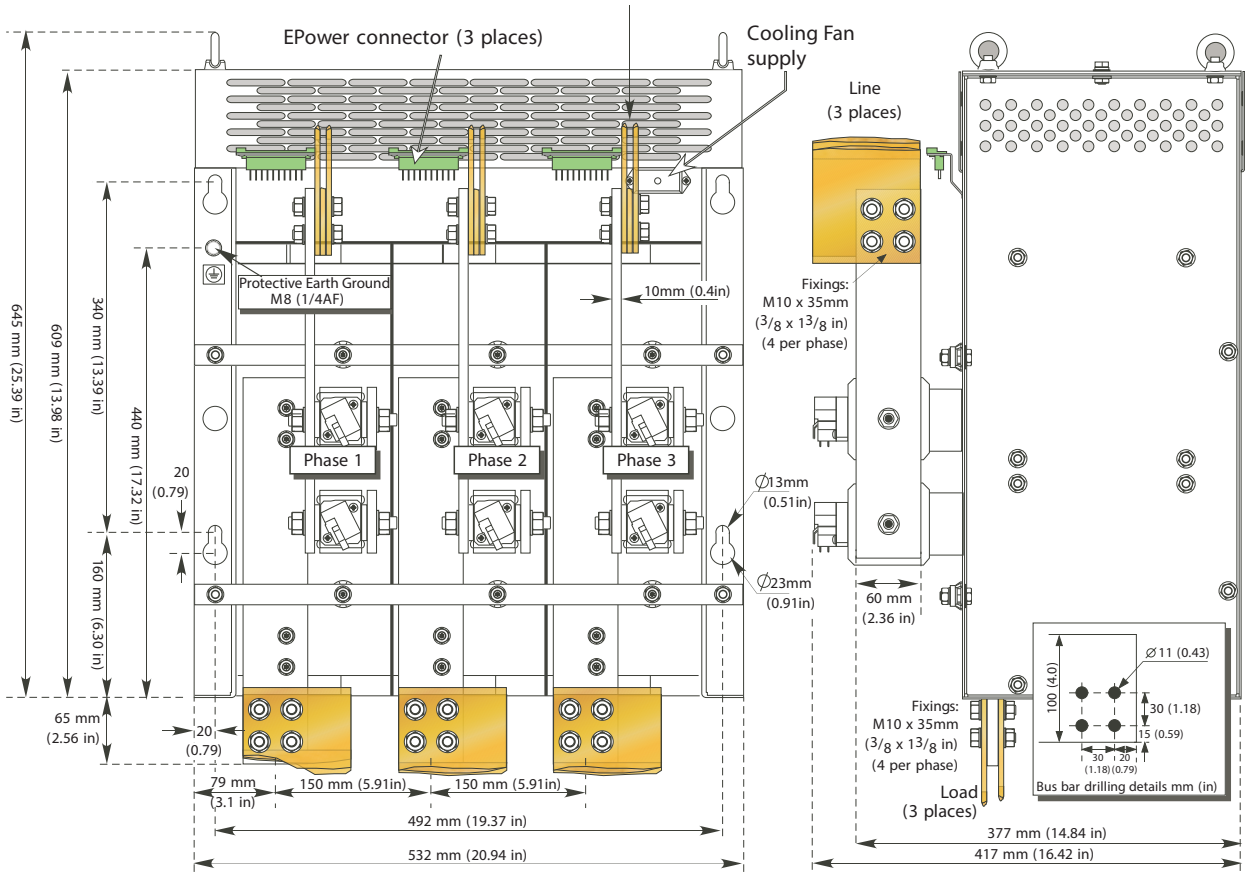


Figure 9) Thyristor stack - 1300A 3 phase units

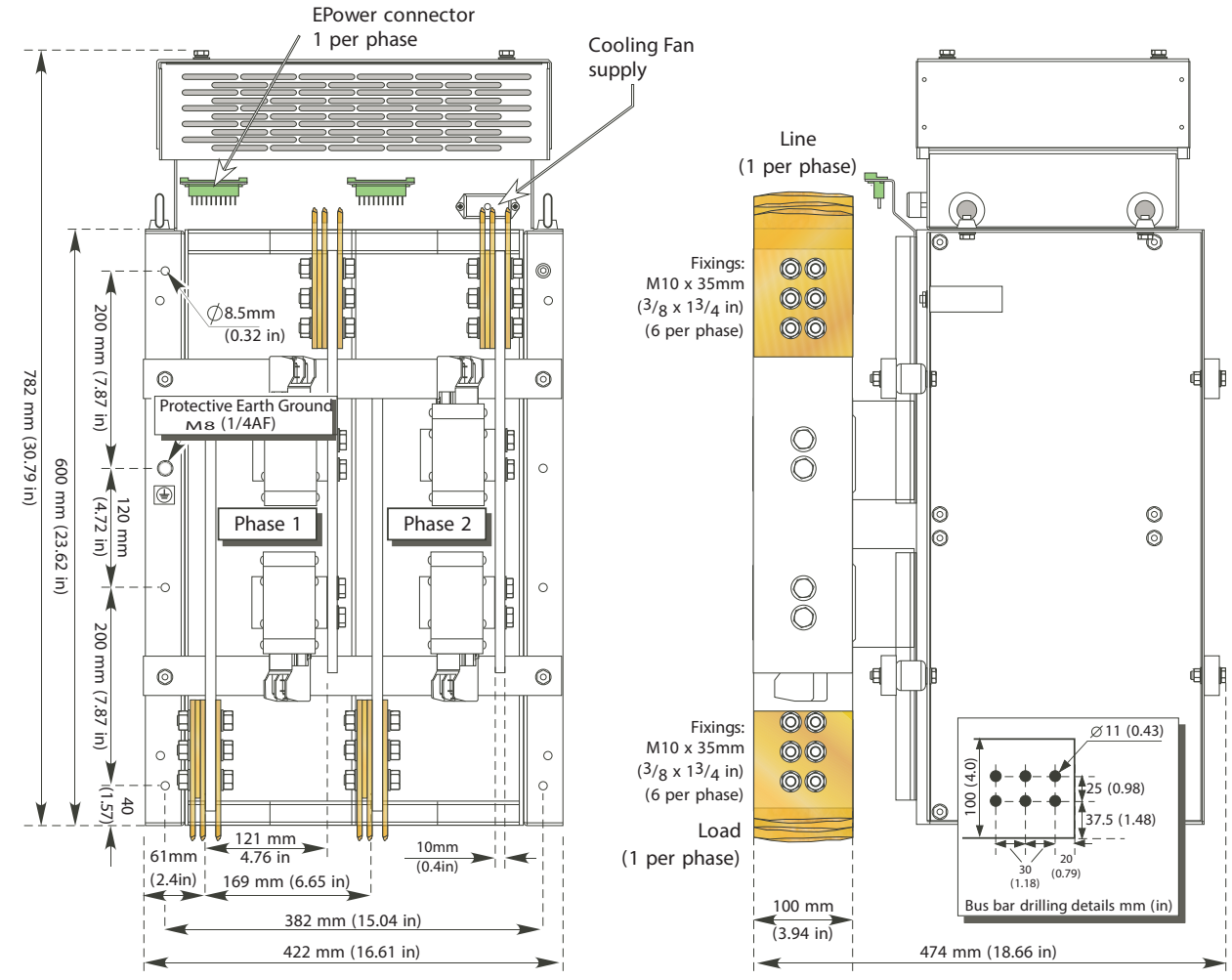


Figure 10) Thyristor stack - 1700A/2000A air cooled 1 or 2 phase units

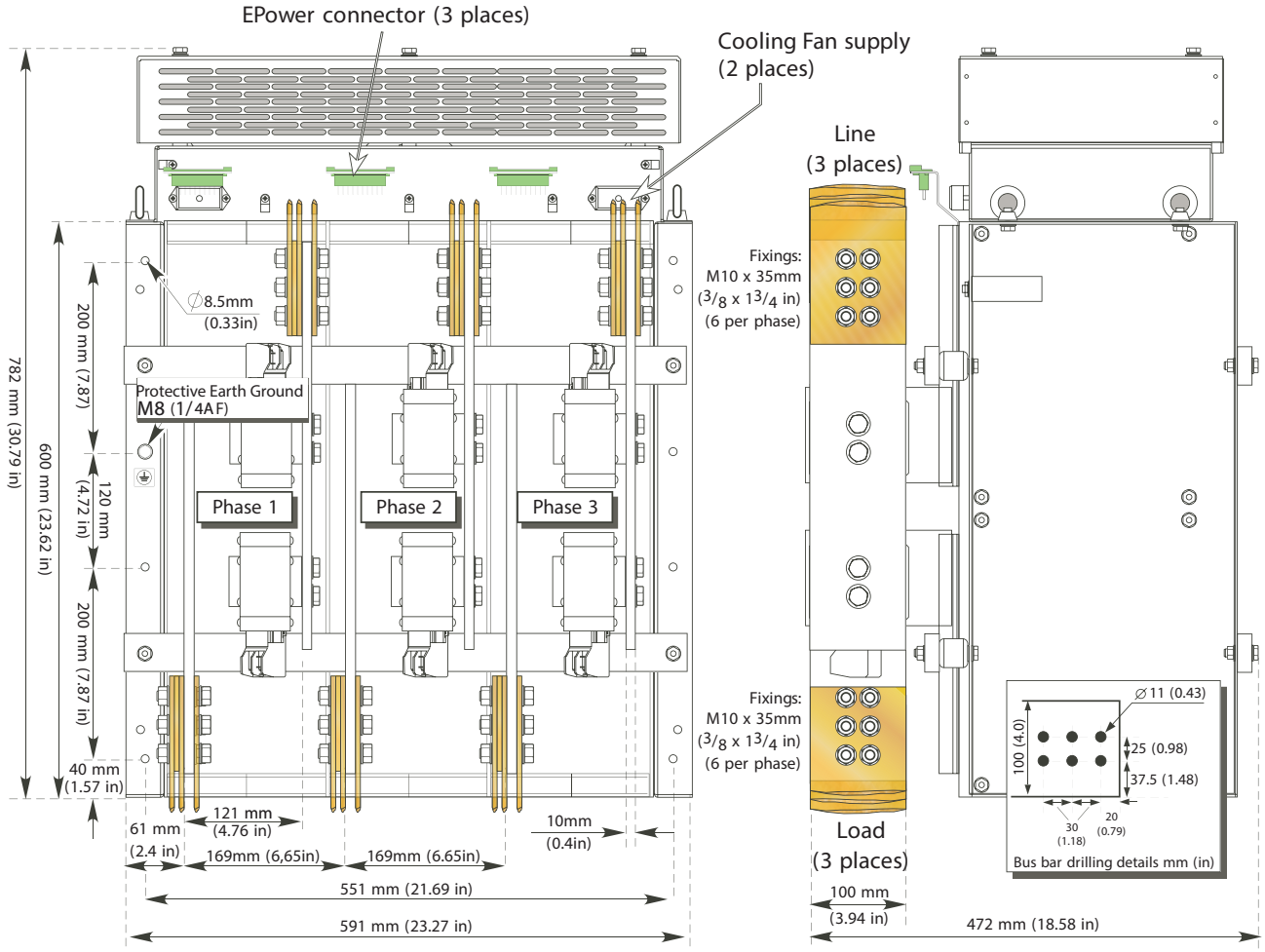


Figure 11) 1700A/2000A air cooled 3 phase units

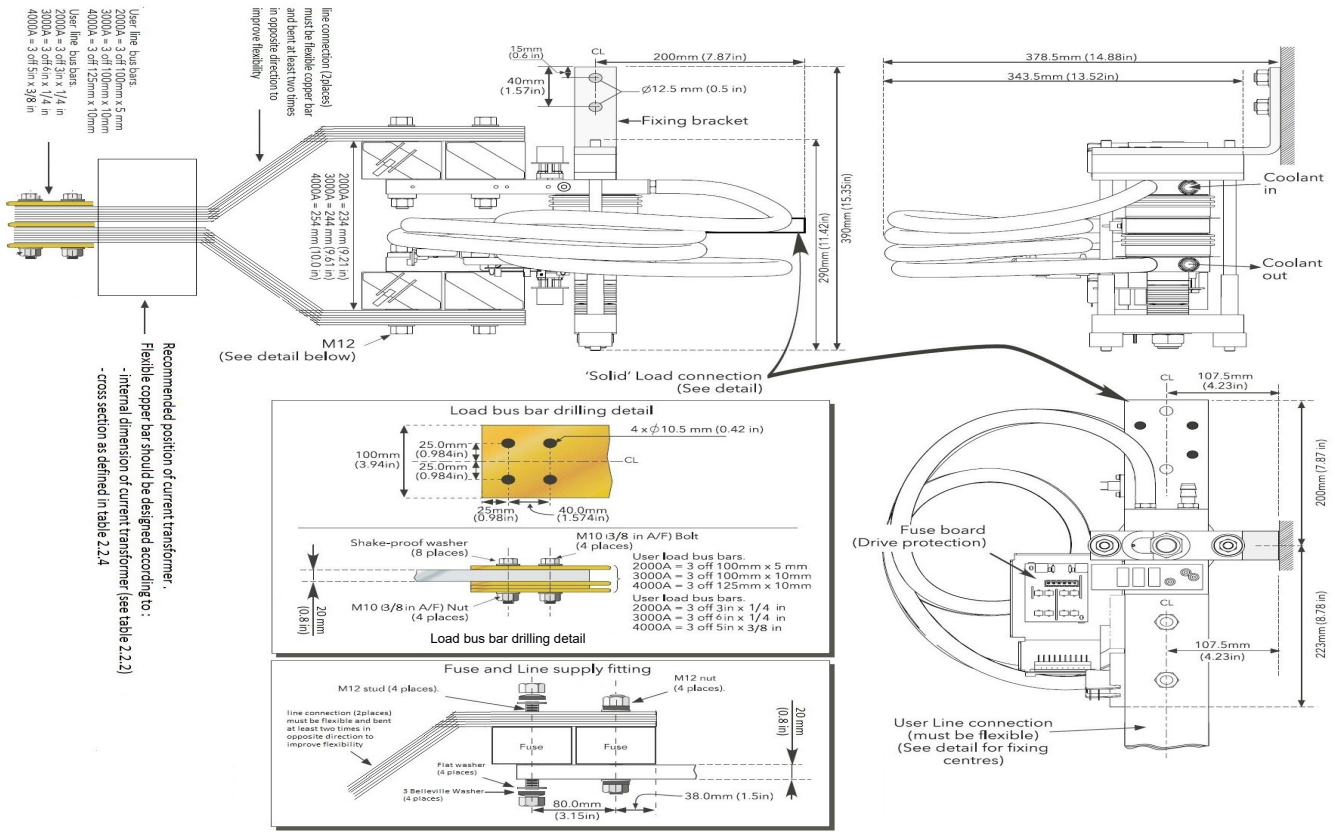


Figure 12) 2000A/3000A/4000A water cooled units

Note: Water cooled units are supplied only as single-phase units. For two or three phase working, two or three units will be supplied.

32h8e remote display unit for the EPower unit

This instrument is a horizontal 1/8 DIN indicator and alarm unit that performs the dual function of remote display and independent 'policeman' (to disconnect power should an over temperature or other excess process condition occur). The unit is intended for indoor use in a permanent installation, enclosed in an electrical panel. To ensure IP65 and NEMA 4 front sealing against dust and water, the panel should have a non-textured surface.

Communications between the unit and EPower are via RJ45 'Panel comms port' located on the underside of the controller module. The communications standard is 3-wire EIA485, and it uses Modbus protocol.

Supply voltage range

100 to 240Vac, -15%, +10%, 48 to 62Hz

Ambient temperature range

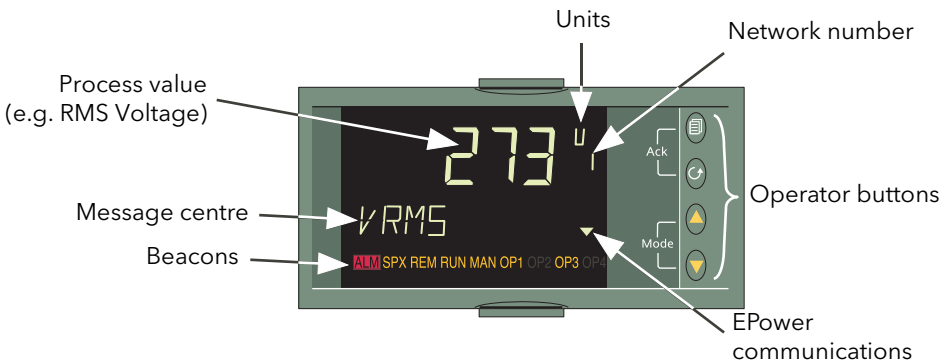
Range is 0 to 55°C (32 to 131°F)

Process parameters

ENERGY	Energy. Shows the global energy counter in the EPower instrument. This is only available if the Energy Counter feature is enabled in the connected EPower instrument.
HIGH	Peak High. Shows the highest reading that the indicator has recorded since switch on or since reset (Level 2)
LOW	Peak Low. Shows the lowest reading that the indicator has recorded since switch on or since reset (Level 2)
A1 (*Type*)	Alarm 1 type and setpoint. Indicates the threshold value for alarm 1. 'Type' = 'Hi', 'Lo' or 'ROC' according to configuration (Set 2). This parameter does not appear if it is 'Unconfigured' in Set 2.
An (*Type*)	('n' = 2, 3 or 4) Further alarm types and threshold values, as configured in level 3 configuration

EPower network summary parameters

IRMS	The RMS value of load current (Amps), for this network
VRMS	The RMS value of load voltage (Volts) for this network
POWER	Either P or PBurst according to network type. Watts or kilowatts
ENRGY	Energy. Shows the energy for this network. This is only available if the Energy Counter feature is enabled in the connected EPower instrument.
WSP	Working setpoint. WSP is the working setpoint currently being used by the EPower unit and is either the Local setpoint, or the remote setpoint (from an analog input or via a communications link)
SP	Target setpoint (% or engineering units) for the network in use. It may be edited via the remote panel either directly setting the Control Setpoint (if EPower's SetProv function block is not enabled) or setting the local setpoint of the SetProv function block (if it is enabled and its SPSelect parameter is set to 'Local'). If the value is greater than 99999, the displayed value is divided by 1000 and shown with suffix 'K' in the format 'nnnn.nK' ('K' = kilo). (E.G. a value of 1000000 would be displayed as '1000.0K'.
SP.SEL	Setpoint Select. Available only in level 2 and if the associated SetProv function block in EPower is enabled, allowing the user to select between local (LSP) and remote setpoints (rSP)
E.RST	Energy Reset. Available only in level 2 and if the Energy Counter is enabled in EPower. User Energy total can be reset
IRMS1 (2) (3)	RMS Load current for phase 1 (2) (3). (3-phase networks only)
VRMS1 (2) (3)	RMS Load voltage for phase 1 (2) (3). (3-phase networks only)
IAVG	Average load current (3-phase networks only)
VAVG	Average load voltage (3-phase networks only)



Order codes (all range)

The order code is divided into three sections:

1. Hardware which defines the type, number and size of the unit and/or the modules (Fields 1 to 6)
2. Optional hardware and software functions (Fields 7 to 18)
3. QuickStart which is intend to configure the unit for maximum 60% to 80% of the application (single unit in 1, 2 or 3 legs configuration) (Fields 19 to 37)

The code can then be either short (includes only the main hardware fields), or medium (combines the hardware + the optional fields), or long (includes additional quick start code at the end).

EPower™ Controller

1. Phase / Amps				**2. Voltage**	
1PH-50A	1 Phase unit 50A	1PH-800A-AC	1 Phase unit 800 Amps air cooled version	600V	100 to 600V (water cooled HPower are only for 600V)
1PH-100A	1 Phase unit 100A	1PH-1000A-AC	1 Phase unit 1000 Amps air cooled version	690V	100 to 690V (air cooled HPower are only for 690V)
1PH-160A	1 Phase unit 160A	1PH-1300A-AC	1 Phase unit 1300 Amps air cooled version	XXX	For Driver mod only
1PH-250A	1 Phase unit 250A	1PH-1700A-AC	1 Phase unit 1700 Amps air cooled version		
1PH-400A	1 Phase unit 400A	1PH-2000A-AC	1 Phase unit 2000 Amps air cooled version	**3. Fan supply**	
1PH-500A	1 Phase unit 500A	1PH-2000A-WC	1 Phase unit 2000 Amps water cooled version	230V	230V ac >= 160A
1PH-630A	1 Phase unit 630A	1PH-3000A-WC	1 Phase unit 3000 Amps water cooled version	115V	115V ac >= 160A
		1PH-4000A-WC	1 Phase unit 4000 Amps water cooled version	XXX	No fan <= 100A
2PH-50A	2 Phase unit 50A	2PH-800A-AC	2 Phase unit 800 Amps air cooled version	**4. Warranty**	
2PH-100A	2 Phase unit 100A	2PH-1000A-AC	2 Phase unit 1000 Amps air cooled version	XXX	Standard
2PH-160A	2 Phase unit 160A	2PH-1300A-AC	2 Phase unit 1300 Amps air cooled version	WL005	5 Year
2PH-250A	2 Phase unit 250A	2PH-1700A-AC	2 Phase unit 1700 Amps air cooled version	USWL3	US Extended
2PH-400A	2 Phase unit 400A	2PH-2000A-AC	2 Phase unit 2000 Amps air cooled version		
2PH-500A	2 Phase unit 500A	2PH-2000A-WC	2 Phase unit 2000 Amps water cooled version	**5. Internal use**	
2PH-630A	2 Phase unit 630A	2PH-3000A-WC	2 Phase unit 3000 Amps water cooled version	XXX	None
		2PH-4000A-WC	2 Phase unit 4000 Amps water cooled version		
				6. Internal use	
3PH-50A	3 Phase unit 50A	3PH-800A-AC	3 Phase unit 800 Amps air cooled version	XXX	None
3PH-100A	3 Phase unit 100A	3PH-1000A-AC	3 Phase unit 1000 Amps air cooled version		
3PH-160A	3 Phase unit 160A	3PH-1300A-AC	3 Phase unit 1300 Amps air cooled version	**7. Option**	
3PH-250A	3 Phase unit 250A	3PH-1700A-AC	3 Phase unit 1700 Amps air cooled version	XX	None - end of code
3PH-400A	3 Phase unit 400A	3PH-2000A-AC	3 Phase unit 2000 Amps air cooled version	00	Unit with options and/or quick start definition
3PH-2500A	3 Phase unit 250A	3PH-2000A-WC	3 Phase unit 2000 Amps water cooled version		
3PH-630A	3 Phase unit 630A	3PH-3000A-WC	3 Phase unit 3000 Amps water cooled version	**8. Communications protocol**	
		3PH-4000A-WC	3 Phase unit 4000 Amps water cooled version	XX	No optional fieldbus communication
				Y2	2-wire 485 modbus (RJ45 connector)
4PH-50A	4 Phase unit 50A	4PH-800A-AC	4 Phase unit 800 Amps air cooled version	PB	PROFIBUS DPV1 (with D type connector)
4PH-100A	4 Phase unit 100A	4PH-1000A-AC	4 Phase unit 1000 Amps air cooled version	ET	Modbus TCP
4PH-160A	4 Phase unit 160A	4PH-1300A-AC	4 Phase unit 1300 Amps air cooled version	DN	DeviceNet
4PH-250A	4 Phase unit 250A	4PH-1700A-AC	4 Phase unit 1700 Amps air cooled version	IP	EtherNet/IP
4PH-400A	4 Phase unit 400A	4PH-2000A-AC	4 Phase unit 2000 Amps air cooled version	CC	CC-Link
4PH-500A	4 Phase unit 500A	4PH-2000A-WC	4 Phase unit 2000 Amps water cooled version	PN	PROFINET IO
4PH-630A	4 Phase unit 630A	4PH-3000A-WC	4 Phase unit 3000 Amps water cooled version	2E	Modbus TCP dual port
		4PH-4000A-WC	4 Phase unit 4000 Amps water cooled version	2P	PROFINET dual port
				2I	EtherNet/IP dual port
PWR-50A	50A Power module	PWR-800A-AC	Power module for stack 800 A air cooled version (Note 1)		
PWR-100A	100A Power module	PWR-1000A-AC	Power module for stack 1000 A air cooled version (Note 1)		
PWR-160A	160A Power module	PWR-1300A-AC	Power module for stack 1300 A air cooled version (Note 1)	**9. Module 1**	
PWR-250A	250A Power module	PWR-1700A-AC	Power module for stack 1700 A air cooled version (Note 1)	XX	None
PWR-400A	400A Power module	PWR-2000A-AC	Power module for stack 2000 A air cooled version (Note 1)	IO	IO optional board

PWR-500A	500A Power module
PWR-630A	630A Power module

PWR-2000A-WC	Power module for stack 2000 A water cooled version (Note 1)
PWR-3000A-WC	Power module for stack 3000 A water cooled version (Note 1)
PWR-4000A-WC	Power module for stack 4000 A water cooled version (Note 1)

DRV-XXX	Driver module only

10. Module 2

XX	None
IO	IO optional board

11. Module 3

XX	None
IO	IO optional board

12. Predictive load management

XXX	None
PLM	predictive load management

13. External feedback

XF	External feedback (Factory option)

14. Remote panel

XX	None
32ENG	32h8e English
32FRA	32h8e French
32GER	32h8e German
32ITA	32h8e Italian
32SPA	32h8e Spanish

15. Software option 1

XXX	None
EMS	Energy Measurement (Counter)
LTC	Load Tap Changer

16. Software option 2

XXX	None
EMS	Energy measurement (counter)
LTC	Load tap changer

17. Not used

XXX	Default

18. Quick start

XXX	None - End of code
QS	Quick start config

19. Language

ENG	English
FRA	French
GER	German
ITA	Italian
SPA	Spanish

20. Load current (nominal)

16A	16 Amps (Note 2)
25A	25 Amps (Note 2)
40A	40 Amps (Note 2)
50A	50 Amps (Note 2)
63A	63 Amps (Note 2)
80A	80 Amps (Note 2)
100A	100 Amps (Note 2)
125A	125 Amps (Note 2)
160A	160 Amps (Note 2)
200A	200 Amps (Note 2)
250A	250 Amps (Note 2)
315A	315 Amps (Note 2)
400A	400 Amps (Note 2)
500A	500 Amps (Note 2)
630A	630 Amps (Note 2)
800A	800 Amps (Note 2)
900A	900 Amps (Note 2)
1000A	1000 Amps (Note 2)
1150A	1150 Amps (Note 2)
1300A	1300 Amps (Note 2)
1500A	1500 Amps (Note 2)
1700A	1700 Amps (Note 2)
1850A	1850 Amps (Note 2)
2000A	2000 Amps (Note 2)
3000A	3000 Amps (Note 2)
4000A	4000 Amps (Note 2)

21. Load voltage (nominal)

100V	100 Volts
110V	110 Volts
115V	115 Volts
120V	120 Volts
127V	127 Volts
200V	200 Volts
208V	208 Volts
220V	220 Volts
230V	230 Volts
240V	240 Volts
277V	277 Volts
380V	380 Volts
400V	400 Volts
415V	415 Volts
440V	440 Volts
460V	460 Volts
480V	480 Volts
500V	500 Volts
575V	575 Volts
600V	600 Volts
660V	660 Volts (Note 3)
690V	690 Volts (Note 3)

22. Control type (note 4)

1P	Single phase control
2P	Two phase control
3P	Three phase

23. Load configuration (note 5)

1P	Single phase
3S	Star
3D	Delta
4S	Star with neutral
6D	Open delta

24. Load type

XX	Resistive
TR	Transformer primary

25. Firing mode (note 6)

PA	Phase angle
HC	Half cycle
BF	Burst firing (default 16 cycles)
FX	Fix modulation period (default 2 seconds)
LG	Logic mode

26. Feedback

V2	RMS load voltage squared
12	RMS load current squared
TP	True power
VR	RMS load voltage
IR	RMS load current
OL	Open loop

27. Current transfer mode (linear current limit) (note 7)

XX	Off
I2	RMS load current squared transfer
IR	RMS load current transfer

28. Analog input 1 function (note 7)

XX	None
SP	Setpoint
HR	Setpoint limit
IL	Current limit
VL	Voltage limit
PL	Power limit
TS	Current transfer span

29. Analog input 1 type

XX	None
1V	1-5 Volt
2V	2-10 Volt
5V	0-5 Volt
0A	0-20 mA
4A	4-20 mA

30. Analog input 2 function (note 7)

XX	None
SP	Setpoint
HR	Setpoint limit
IL	Current limit
VL	Voltage limit
PL	Power limit

31. Analog input 2 type

XX	None
0V	0-10 Volt
1V	1-5 Volt
2V	2-10 Volt
5V	0-5 Volt
0A	0-20 mA

32. Analog output function

X	None
V	Voltage
I	Current
P	Power
R	Impedance

33. Analog output type

XX	None
0V	0-10 Volt
1V	1-5 Volt
2V	2-10 Volt
5V	0-5 Volt
0A	0-20 mA

TS	Current transfer span	4A	4-20 mA	4A	4-20 mA

34. Digital input 2 function		35. Alarm relay configuration		36. Load management configuration		37. Predictive load management address	
XX	None	XX	None	XX	None – load management disabled	XX	Predictive load management address (00 to 63) Default address 00
AK	Alarm acknowledgement	AA	Any alarm	SH	Sharing		
RS	Remote setpoint selection	PA	Process alarms	I1	Incremental type 1		
		FB	Fuse blown	I2	Incremental type 2		
				RI	Rotating incremental		
				DC	Distributed control		
				DI	Distributed control and incremental control		
				RD	Rotating distributed control and incremental control		

Notes

1. Stack not included
2. The maximum nominal current selectable is the current rating selected in Field 1
3. Only available if 690V selected in Field 2
4. Selection dependent on number of phases selected in Field 1
   1PH = 1P only
   2PH = 1P or 2P only
   3PH = 1P or 3P only
   4PH = 1P or 2P only
5. Selection dependent on number of phases selected in Field 1
   1PH = 1P only
   2PH = 1P, 3S or 3D only
   3PH = Any
   4PH = 1P, 3S or 3D only
   If 1P selected in Field 22 only option is 1P
6. PA not selectable if 2P selected in Field 22
   HC not selectable if TR selected in Field 24
7. Except XX the selection in Fields 28 and 30 cannot be the same

Protection fuse details

Power module current ratings	Eurotherm spare part reference
50A, 100A & 160A	SUBEPWR/FUSE160A
250A	SUBEPWR/FUSE250A
400A	SUBEPWR/FUSE400A
500A	SUBEPWR/FUSE500A
630A	SUBEPWR/FUSE630A

Order codes - external thyristor stack (HPower)

1. Phase / Amps			
1PH-800A-AC	1 Phase unit 800 Amps air cooled version	3PH-800A-AC	3 Phase unit 800 Amps air cooled version
1PH-1000A-AC	1 Phase unit 1000 Amps air cooled version	3PH-1000A-AC	3 Phase unit 1000 Amps air cooled version
1PH-1300A-AC	1 Phase unit 1300 Amps air cooled version	3PH-1300A-AC	3 Phase unit 1300 Amps air cooled version
1PH-1700A-AC	1 Phase unit 1700 Amps air cooled version	3PH-1700A-AC	3 Phase unit 1700 Amps air cooled version
1PH-2000A-AC	1 Phase unit 2000 Amps air cooled version	3PH-2000A-AC	3 Phase unit 2000 Amps air cooled version
1PH-2000A-WC	1 Phase unit 2000 Amps water cooled version	3PH-2000A-WC	3 Phase unit 2000 Amps water cooled version
1PH-3000A-WC	1 Phase unit 3000 Amps water cooled version	3PH-3000A-WC	3 Phase unit 3000 Amps water cooled version
1PH-4000A-WC	1 Phase unit 4000 Amps water cooled version	3PH-4000A-WC	3 Phase unit 4000 Amps water cooled version

2PH-800A-AC	2 Phase unit 800 Amps air cooled version	4PH-800A-AC	4 Phase unit 800 Amps air cooled version
2PH-1000A-AC	2 Phase unit 1000 Amps air cooled version	4PH-1000A-AC	4 Phase unit 1000 Amps air cooled version
2PH-1300A-AC	2 Phase unit 1300 Amps air cooled version	4PH-1300A-AC	4 Phase unit 1300 Amps air cooled version
2PH-1700A-AC	2 Phase unit 1700 Amps air cooled version	4PH-1700A-AC	4 Phase unit 1700 Amps air cooled version
2PH-2000A-AC	2 Phase unit 2000 Amps air cooled version	4PH-2000A-AC	4 Phase unit 2000 Amps air cooled version
2PH-2000A-WC	2 Phase unit 2000 Amps water cooled version	4PH-2000A-WC	4 Phase unit 2000 Amps water cooled version
2PH-3000A-WC	2 Phase unit 3000 Amps water cooled version	4PH-3000A-WC	4 Phase unit 3000 Amps water cooled version
2PH-4000A-WC	2 Phase unit 4000 Amps water cooled version	4PH-4000A-WC	4 Phase unit 4000 Amps water cooled version

PWR-800A-AC	Power module for stack 800 A air cooled version (note 1)	**2. Fan Supply**	
PWR-1000A-AC	Power module for stack 1000 A air cooled version (note 1)	115V	115V ac
PWR-1300A-AC	Power module for stack 1300 A air cooled version (note 1)	230V	230V ac
PWR-1700A-AC	Power module for stack 1700 A air cooled version (note 1)	000	No fan. For water cooled stacks
PWR-2000A-AC	Power module for stack 2000 A air cooled version (note 1)		
PWR-2000A-WC	Power module for stack 2000 A water cooled version (note 1)		
PWR-3000A-WC	Power module for stack 3000 A water cooled version (note 1)		
PWR-4000A-WC	Power module for stack 4000 A water cooled version (note 1)		

Note:

1. Stack not included

Protection fuse details

Stack current ratings	Eurotherm spare part reference			
	(1 Phase)	(2 Phase)	(3 Phase)	(4 Phase)
800A	SUBHPWR/1PH-800A-AC/FUSE	SUBHPWR/2PH-800A-AC/FUSE	SUBHPWR/3PH-800A-AC/FUSE	SUBHPWR/4PH-800A-AC/FUSE
1000A	SUBHPWR/1PH-1000A-AC/FUSE	SUBHPWR/2PH-1000A-AC/FUSE	SUBHPWR/3PH-1000A-AC/FUSE	SUBHPWR/4PH-1000A-AC/FUSE
1300A	SUBHPWR/1PH-1300A-AC/FUSE	SUBHPWR/2PH-1300A-AC/FUSE	SUBHPWR/3PH-1300A-AC/FUSE	SUBHPWR/4PH-1300A-AC/FUSE
1700A	SUBHPWR/1PH-1700A-AC/FUSE	SUBHPWR/2PH-1700A-AC/FUSE	SUBHPWR/3PH-1700A-AC/FUSE	SUBHPWR/4PH-1700A-AC/FUSE
2000A (air)	SUBHPWR/1PH-2000A-AC/FUSE	SUBHPWR/2PH-2000A-AC/FUSE	SUBHPWR/3PH-2000A-AC/FUSE	SUBHPWR/4PH-2000A-AC/FUSE
2000A (water)	SUBHPWR/1PH-2000A-WC/FUSE	SUBHPWR/2PH-2000A-WC/FUSE	SUBHPWR/3PH-2000A-WC/FUSE	SUBHPWR/4PH-2000A-WC/FUSE
3000A	SUBHPWR/1PH-3000A-WC/FUSE	SUBHPWR/2PH-3000A-WC/FUSE	SUBHPWR/3PH-3000A-WC/FUSE	SUBHPWR/4PH-3000A-WC/FUSE
4000A	SUBHPWR/1PH-4000A-WC/FUSE	SUBHPWR/2PH-4000A-WC/FUSE	SUBHPWR/3PH-4000A-WC/FUSE	SUBHPWR/4PH-4000A-WC/FUSE

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