

# EPower™

MODEL

## Ideal for

- Glass furnaces
- Melt heat treatment
- Food processing
- Multi-channel heaters
- High temperature furnaces
- Induction heating
- Vacuum furnace
- Large extruders

## Features

- Fully software configurable
- Predictive Load Management
- Current 100A to 400A (nominal load 16A to 400A)
- Operation up to 50°C
- Voltage up to 690V ac
- All types of firing modes
- Better than 1% measurement accuracy
- Large, four row display
- Multi-channel unit
- Log file
- Optional I/O
- Modbus
- Profibus
- DeviceNet® communication
- Ethernet
- Voltage, current and power control
- Complete diagnostics



## Advanced Power Controller Specification Sheet

EPower™ is the Eurotherm® series of advanced power control units. Combining the advantages of the latest technologies and innovations to produce a truly impressive performance for your process.

### Ratings

The EPower current ratings cover the range from 100 amps up to 400 amps (nominal 16 Amps to 400 Amps). Ratings are designed at 40°C, but operation can be defined up to 50°C with associated deratings.

The voltage rating can go up to a maximum of 690 volts.

### Predictive Load management (patent pending)

You can reduce your energy costs across your plant by utilising the Predictive Load Management functionality within EPower. This innovative feature provides a better distribution of energy across different loads in your installation by managing the priority and if necessary, load shedding.

Many more features are available (Log file management, advanced alarm strategy, optional I/O...) to provide you with the best of the technology for your process.

### Multi channel unit

EPower includes seven different power configurations within one unit, depending on the number of power modules fitted. From single phase configuration to two times two phase control, the unit is perfectly modular and configurable to your process and requirements. Multiple zones can be controlled with one unit.

### Display

The large 4 lines x 10 characters display provides a clear and unambiguous indication of the process values. The four-line message centre provides custom or standard views of information that is important to you.

### Communication

Eurotherm has an approach to open communications, offering standard fieldbus networks such as Profibus DP and DeviceNet® communications. The use of Ethernet and (Modbus TCP) also make integration into PLCs and other supervisory systems easy to accomplish and for legacy applications Modbus RTU.

### Configuration

“Quick Start” HMI menus provide an easy and friendly way to quickly configure the unit. With the more complex configurations using the iTools software package.



Invensys®  
EUROTHERM®

# SPECIFICATION

## General Standards

The product is designed and produced to comply with BS EN60947-4-3 (Low voltage switch gear and control gear). Other applicable standards are cited where appropriate.

## Installation Categories

General installation category details for the driver and power units are summarised in the table below.

|  | Installation Category          | Rated impulse withstand voltage (Uimp) | Rated insulation voltage |
|--|--------------------------------|--|--------------------------|
|  | Communications II              | 0.5kV                                  | 50V                      |
|  | Standard I/O II                | 0.5kV                                  | 50V                      |
|  | Driver module power II         | 2.5kV                                  | 230V                     |
|  | Relays III                     | 4kV                                    | 230V                     |
|  | Power Modules (up to 600V) III | 6kV                                    | 600V                     |
|  | Power Modules (690V) II        | 6kV                                    | 690V                     |
|  | Auxiliary (fan) supply II      | 2.5kV                                  | 230V                     |

## Power (at 40°C)

### Caution

Although the driver module supply voltage range is 85 to 265V ac, the fans (if any) fitted to the power (thyristor) modules are specified for use at one of 115V ac or 230V ac as specified at time of order. Before plugging the fan harness into the driver module, ensure that the utility supply voltage is suitable for the fan(s). Otherwise, fan life may be shortened or the cooling effect may not be sufficient, either case presenting a possible hazard to the equipment or to the operator.

### Driver module

Voltage range: 85 to 265V ac  
 Frequency range: 47 to 63Hz  
 Power requirement: 60W + Power Module fans (15W each for 400A power modules; 10W each for 160A/250A modules)

### Power module

Number of modules: Up to four identical units per driver unit  
 Voltage range: 100 to 600V ac (+10% - 15%) or 100 to 690V ac (+10% - 15%) as specified at time of order  
 Frequency range: 47 to 63Hz  
 Nominal current: 16 to 400A 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  
 Fan supply voltage: 115 or 230V ac, as specified at time of order (see 'Caution' above)  
 Fan power requirement: 10VA for 160A/250A modules; 15VA for 400A modules

### Protection

Thyristor drive: RC circuits and high-speed fuses (Type 1)

### Pollution degree:

Pollution degree 2 (EN60947-1)

### Rated short circuit

conditional current: 92kA

### Utilisation categories

AC51: non inductive of slightly inductive loads, resistance furnaces  
 AC56a: switching of transformers

### Duty cycle:

Uninterrupted duty/continuous operation

### Form designation:

Form 4

### Short circuit protection

co-ordination type: Type1

### 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)

## Physical

### Dimensions and fixing centres

See Fixing Details

### Weight:

(including 2kg for driver module)

| Current | 1 phase | 2 phases | 3 phases | 4 phases |
|---------|---------|----------|----------|----------|
| 100A    | 6.5kg   | 11.0kg   | 15.5kg   | 20.0kg   |
| 160A    | 6.9kg   | 11.8kg   | 16.7kg   | 21.6kg   |
| 250A    | 7.8kg   | 13.6kg   | 19.4kg   | 25.2kg   |
| 400A    | 11.8kg  | 21.6kg   | 31.4kg   | 41.2kg   |

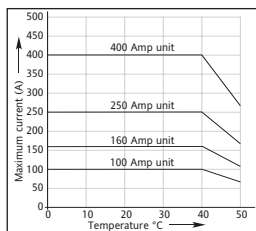
## Environment

### Temperature limits

Operating: 0°C to 50°C

(derate above 40°C as per accompanying curves)

Storage: -25°C to 70°C



### Atmosphere:

Non-explosive, non-corrosive and non-conductive

### Humidity limits:

5% to 95% RH (non-condensing)

### Altitude (maximum):

2000 metres

### Protection:

IP10 (EN60529)

### External wiring:

Must comply with IEC 364

### Shock (EN60068-2-29):

10g Pk; 6mS duration; 10 bumps

### Vibration (EN60068-2-6):

67-150Hz at 1g

## EMC

### Standard:

EN60947-4-3 Emissions class A

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.

### Immunity criteria:

Immunity criterion 1 (criterion 3 for voltage dips and short-time interruptions)

## Operator Interface

### Display:

4 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:

7 high x 5 wide yellow-green LCD dot matrix array

### Push buttons:

4 push buttons provide page and item entry and scroll facilities

### LED indicators (beacons):

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

### Number of inputs/outputs

No of analogue inputs: 2

No of analogue outputs: 1

No 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 41.6Hz (24mS) if no power applied to power module1 or if the frequency lies outside the range 47 to 63Hz)

### Termination:

Removable 10-way connector. (5.08 mm. pitch)

## ANALOGUE INPUTS

Performance: See Tables 1 and 2

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 20 mA

### Absolute maxima

+ terminal: ±16V or ±40mA

- terminal: ±1.5V or ±300mA

### Analogue input: Voltage input performance

| Parameter                                   | Typical | Max/Min          |
|---|---------|------------------|
| Total voltage working input span (note 1)   |         | -0.25V to +12.5V |
| Resolution (noise free) (note 2)            | 13 bits |                  |
| Calibration error (notes 3, 4)              | <0.25%  | <0.5%            |
| Linearity error (note 3)                    |         | ±0.1%            |
| Ambient temperature error (note 3)          |         | <0.01%/°C        |
| Input resistance (+ve terminal)             |         | >140kΩ           |
| Input resistance (-ve terminal)             | 150Ω    |                  |
| Allowable voltage (-ve terminal to 0V)      |         | ±1V              |
| Series mode rejection of mains interference | 46dB    | >30dB            |
| Common mode dc rejection                    | 46dB    | >40dB            |
| Hardware response time                      | 5ms     |                  |

Note 1: w.r.t. to the relevant -ve input

Note 2: w.r.t. total working span

Note 3: % of effective range (0 to 5V, 0 to 10V)

Note 4: After warm up. Ambient = 25°C

Table 1 Analogue input specification table (voltage inputs)

### Analogue input: Current input performance

| Parameter                                   | Typical | Max/Min       |
|---|---------|---------------|
| Total current working input span            |         | -1mA to +25mA |
| Resolution (noise free) (note 1)            | 12 bits |               |
| Calibration error (notes 2, 3)              | <0.25%  | <0.5%         |
| Linearity error (note 2)                    |         | ±0.1%         |
| Ambient temperature error (note 2)          |         | <0.01%/°C     |
| Input resistance (+ve to -ve terminal)      | 235Ω    |               |
| Input resistance (-ve terminal)             | 150Ω    |               |
| Allowable voltage (-ve terminal to 0V)      |         | <±1V          |
| Series mode rejection of mains interference | 46dB    | >30dB         |
| Common mode dc rejection                    | 46dB    | >40dB         |
| Hardware response time                      | 5ms     |               |

Note 1: w.r.t. total working span

Note 2: % of effective range (0 to 20mA)

Note 3: After warm up. Ambient =25°C

Table 2 Analogue input specification table (current inputs)

**ANALOGUE OUTPUTS**

Performance: See Tables 3 and 4  
 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 20 mA  
 Absolute maxima + terminal: (-0.7V or -300mA) or (+16V or +40mA)  
 0V terminal: ±2A

| Analogue output: Voltage output performance                   |           |                 |
|---|-----------|-----------------|
| Parameter   | Typical   | Max/Min         |
| Total voltage working span (within ±20mA (typ.) current span) |           | -0.5V to +12.5V |
| Short circuit current   |           | <24mA           |
| Resolution (noise free) (note 1)                              | 12.5 bits |                 |
| Calibration error (note 2, note 3)                            | <0.25%    | <0.5%           |
| Linearity error (note 2)                                      |           | <±0.1%/°C       |
| Ambient temperature error (note 2)                            |           | <±0.01%/°C      |
| Minimum load resistance                                       |           | >800Ω           |
| DC output impedance   |           | <2Ω             |
| Hardware response time (10% to 90%)                           | 20ms      | <25ms           |
| <b>Note 1:</b> w.r.t. total working span                      |           |                 |
| <b>Note 2:</b> % of effective range (0 to 5V, 0 to 10V)       |           |                 |
| <b>Note 3:</b> After warm up. Ambient = 25°C                  |           |                 |

Table 3 Analogue output specification table (voltage outputs)

| Analogue output: Current output performance                      |           |                |
|--|-----------|----------------|
| Parameter  | Typical   | Max/Min        |
| Total current working span (within -0.3V to +12.5V voltage span) |           | -24mA to +24mA |
| Open circuit voltage   |           | <16V           |
| Resolution (noise free) (note 1)                                 | 12.5 bits |                |
| Calibration error (note 2, note 3)                               | <0.25%    | <0.5%          |
| Linearity error (note 2)   |           | <±0.1%/°C      |
| Ambient temperature error (note 2)                               |           | <±0.01%/°C     |
| Maximum load resistance  |           | <550Ω          |
| DC Output conductance  |           | <1µA/V         |
| Hardware response time (10% to 90%)                              | 20ms      | <25ms          |
| <b>Note 1:</b> w.r.t. total working span                         |           |                |
| <b>Note 2:</b> % of effective range (0 to 20mA)                  |           |                |
| <b>Note 3:</b> After warm up. Ambient = 25°C                     |           |                |

Table 4 Analogue output specification table (current outputs)

**10V SUPPLY (POTENTIOMETER SUPPLY)**

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)

**DIGITAL I/O**

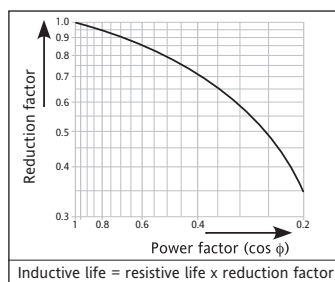
Hardware response time: 100µs  
**Voltage inputs**  
 Active level (high): 4.4V<Vin<30V  
 Non-active level (low): -30V<Vin<+2.3V  
 Input impedance: 10kΩ  
**Contact closure input**  
 Source current: 10mA min; 15mA max  
 Open contact (non active) resistance: >500Ω  
 Closed contact (active) resistance: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

**Notes:**

1. Absolute maximum ratings refer to externally applied signals
2. The 10V potentiometer supply is designed to supply two 5kΩ potentiometers connected in parallel with one another.
3. The maximum current for any 0V terminal is ±2A.

**Relay Specification**

The relays associated with this product have gold plated contacts applicable to 'dry circuit' (low current) use.



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  
 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 unit  
 Watchdog relay (standard): 3-way connector on underside of driver unit  
 Relays two to four (option): 12-way option module connector  
 Absolute max switching capability: <2A at 240V RMS (resistive loads)

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

**Optional Input/Output Modules (SK3, SK4, SK5)**

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 3  
 Number of inputs: 1 analogue input and 2 digital inputs per module  
 Number of outputs: 1 analogue output per module  
 Number of relays: 1 set of common, normally open and normally closed contacts per module  
 10V potentiometer supply output voltage: 10.0V ±0.3V at 5.5mA

**Mains Network Measurements**

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 network waveform samples, taken at a rate of 20kHz. Measurements on each network phase are synchronised to its own phase and if the line voltage cannot be detected, the measurements will stop for that phase. It should be noted that, depending on the network configuration, the phase voltage referred to is one of:

- a. the line voltage referenced to neutral in four star,
- b. the line voltage referenced to neutral or another phase for single phase networks or
- c. the line voltage referenced to the phase applied to the next adjacent power module for three phase star or delta networks.

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

Accuracy (20 to 25°C)  
 Line frequency (F): ±0.02Hz  
 Line RMS voltage (Vline): ±0.5% of Nominal Vline  
 Load RMS voltage (V): ±0.5% of Nominal V  
 Thyristor RMS current (I): ±0.5% of Nominal I  
 Load RMS voltage squared (Vs<sup>2</sup>): ±1% of (Nominal V)<sup>2</sup>  
 Thyristor RMS current squared (Is<sup>2</sup>): ±1% of (Nominal I)<sup>2</sup>  
 True load power (P): ±1% of (Nominal V) x (Nominal I)  
 Frequency resolution: 0.01Hz  
 Measurement resolution: 11 bits of Nominal value (noise free)  
 Meas. drift with ambient temp: <0.02% of reading /°C

Further parameters (S, PF, Q, Z, Iavg, IsqBurst, IsqMax, Vavg, Vs<sup>2</sup>Burst, Vs<sup>2</sup>Max and PBurst) are derived from the above, for each network (if relevant). See EPower User Guide Section 6.19.1 (Meas submenu) for further details.

**Communications**

**Ethernet**  
 Type: 10baseT (IEEE801)  
 Protocol: Modbus TCP  
 Connector: RJ45 with indicators (Green = Tx activity; Yellow = Network activity)  
**Modbus RTU**  
 Protocol: Modbus RTU slave  
 Transmission standard: 3-wire EIA485  
 Connector: Twin, parallel-wired RJ45, with indicators (Green = Tx activity; Yellow = Rx activity)  
 Isolation (EN60947-4-3): Installation category II, Pollution degree 2  
 Terminals to ground: 50V RMS or dc to ground (double isolation)

# ELECTRICAL INSTALLATION

## Drive Unit Connectors

**Configuration Port (EIA232)**

**Beacons** Power Local Alarm

**Pushbuttons** Return Scroll down Scroll up Enter

**SK1 Standard I/O**

|    |                   |
|----|-------------------|
| 1  | +10 Volts out     |
| 2  | Analogue i/p 1+   |
| 3  | Analogue i/p 1-   |
| 4  | Analogue i/p 2+   |
| 5  | Analogue i/p 2-   |
| 6  | Analogue o/p 1    |
| 7  | Analogue o/p 1 0V |
| 8  | Digital i/o 1+    |
| 9  | Digital i/o 2+    |
| 10 | Digital i/o 0V    |

**SK2 Predictive Load Management Option**

|   |              |
|---|--------------|
| 1 | Terminator A |
| 2 | Low          |
| 3 | Shield       |
| 4 | High         |
| 5 | Terminator B |

**SK3 Optional I/O 1**

|    |                   |
|----|-------------------|
| 1  | +10 Volts out     |
| 2  | Analogue i/p 3+   |
| 3  | Analogue i/p 3-   |
| 4  | Analogue o/p 2+   |
| 5  | Analogue o/p 2 0V |
| 6  | Digital i/p 3-    |
| 7  | Digital i/p 4+    |
| 8  | Digital 0V        |
| 9  | Not used          |
| 10 | Relay 2 NO (24)   |
| 11 | Relay 2 Com (21)  |
| 12 | Relay 2 NC (22)   |

**SK4 Optional I/O 2**

|    |                   |
|----|-------------------|
| 1  | +10 Volts out     |
| 2  | Analogue i/p 4+   |
| 3  | Analogue i/p 4-   |
| 4  | Analogue o/p 3+   |
| 5  | Analogue o/p 3 0V |
| 6  | Digital i/p 5+    |
| 7  | Digital i/p 6+    |
| 8  | Digital 0V        |
| 9  | Not used          |
| 10 | Relay 3 NO (34)   |
| 11 | Relay 3 Com (31)  |
| 12 | Relay 3 NC (32)   |

**SK5 Optional I/O 3**

|    |                   |
|----|-------------------|
| 1  | +10 Volts out     |
| 2  | Analogue i/p 5+   |
| 3  | Analogue i/p 5-   |
| 4  | Analogue o/p 4+   |
| 5  | Analogue o/p 4 0V |
| 6  | Digital i/p 7+    |
| 7  | Digital i/p 8+    |
| 8  | Digital 0V        |
| 9  | Not used          |
| 10 | Relay 4 NO (44)   |
| 11 | Relay 4 Com (41)  |
| 12 | Relay 4 NC (42)   |

**Relay 1 (De-energised)**

**Watchdog Relay (De-energised)**

NO = Normally open  
NC = Normally closed  
Com = Common

**Remote display (isolated EIA485)**

**Supply in** N L

**Supply output for power module fan(s)** N L E

## Power Unit Connectors

**External feedback connections (optional)**

**Load current** I1 I2

**Load Voltage** V1 V2

**Neutral/phase reference (either pin)**

**Load cable exit**

**View on underside of Drive unit**

**View on underside of Power unit**

## FIXING DETAILS

### 100Amps

**Front view**

Recommended fixing bolt size = M6 Cable entry 21.5mm

Dimensions: 61.4mm, 107.5mm, 85.0mm, 85.0mm, 85.0mm, 42.0mm

Labels: A, B, C, D, E, F, G, H

Labels: Safety earth (M6), Door (Open), Communications, Insert 5mm screwdriver here, and pull down to release door

**View on underside**

Dimensions: 252.2mm, 194.4mm

**Note:** Units are shown with individual mounting brackets. Multi-phase units come supplied with 2, 3 or 4 phase brackets as appropriate. See table below for details.

| No of phases | Overall Widths |       |       |       |
|--------------|----------------|-------|-------|-------|
|              | 1              | 2     | 3     | 4     |
| Door closed  | 149.5          | 234.5 | 319.5 | 404.5 |
| Door open    | 211.0          | 296.0 | 381.0 | 466.0 |

| Bracket         | Upper           |                 | Lower        |         |
|-----------------|-----------------|-----------------|--------------|---------|
|                 | 2-phase         | 3-phase         | 2-phase      | 3-phase |
| Use A & B       | Use A, B & C    | Use E & F       | Use E, F & G |         |
| Use A, B, C & D | Use A, B, C & D | Use E, F, G & H |              |         |

### 160Amps

**Front view**

Recommended fixing bolt size = M6 Cable entry 21.5mm

Dimensions: 61.4mm, 107.5mm, 85.0mm, 85.0mm, 85.0mm, 42.0mm

Labels: A, B, C, D, E, F, G, H

Labels: Safety earth (M6), Door (Open), Communications, Insert 5mm screwdriver here, and pull down to release door

**View on underside**

Dimensions: 252.2mm, 194.4mm

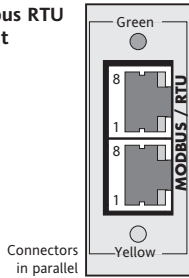
**Note:** Units are shown with individual mounting brackets. Multi-phase units come supplied with 2, 3 or 4 phase brackets as appropriate. See table below for details.

| No of phases | Overall Widths |       |       |       |
|--------------|----------------|-------|-------|-------|
|              | 1              | 2     | 3     | 4     |
| Door closed  | 149.5          | 234.5 | 319.5 | 404.5 |
| Door open    | 211.0          | 296.0 | 381.0 | 466.0 |

| Bracket         | Upper           |                 | Lower        |         |
|-----------------|-----------------|-----------------|--------------|---------|
|                 | 2-phase         | 3-phase         | 2-phase      | 3-phase |
| Use A & B       | Use A, B & C    | Use E & F       | Use E, F & G |         |
| Use A, B, C & D | Use A, B, C & D | Use E, F, G & H |              |         |

## Communications

### Modbus RTU pinout



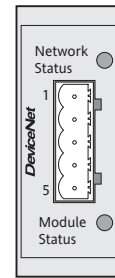
| Pin | 3-wire      |
|-----|-------------|
| 8   | Reserved    |
| 7   | Reserved    |
| 6   | N/C         |
| 5   | N/C         |
| 4   | N/C         |
| 3   | Isolated 0V |
| 2   | A           |
| 1   | B           |

Internal connections :  
Pin 1 to 5V via 100kΩ  
Pin 2 to 0V via 100kΩ

LEDs:  
Green = Tx activity  
Yellow = Rx activity

| Network Status LED Indication |                                 |
|-------------------------------|---------------------------------|
| LED state                     | Interpretation                  |
| Off                           | Off-line or no power            |
| Steady green                  | On-line to one or more units    |
| Flashing green                | On-line - no connections        |
| Steady red                    | Critical link failure           |
| Flashing red                  | 1 or more connections timed out |

| Network Status LED Indication |                                     |
|-------------------------------|-------------------------------------|
| LED state                     | Interpretation                      |
| Off                           | Power                               |
| Steady green                  | Operating normally                  |
| Flashing green                | Missing or incomplete configuration |
| Steady red                    | Unrecoverable fault(s)              |
| Flashing red                  | Recoverable fault(s)                |

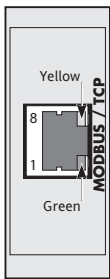


### DeviceNet connector pinout

| Pin | Function                         |
|-----|----------------------------------|
| 1   | V- (negative bus supply voltage) |
| 2   | CAN_L                            |
| 3   | Cable shield                     |
| 4   | CAN_H                            |
| 5   | V+ (positive bus supply voltage) |

- Notes:**
- See DeviceNet specification for power supply specification
  - During startup, an LED test is performed, satisfying the DeviceNet standard.

### Modbus TCP (Ethernet 10baseT) pinout

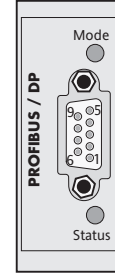


| Pin | Function |
|-----|----------|
| 8   | N/C      |
| 7   | N/C      |
| 6   | Rx-      |
| 5   | N/C      |
| 4   | N/C      |
| 3   | Rx+      |
| 2   | Tx-      |
| 1   | Tx       |

LEDs:  
Green = Tx activity  
Yellow = Network activity

| Operation Mode LED Indication |                              |
|-------------------------------|------------------------------|
| LED state                     | Interpretation               |
| Off                           | Off-line or no power         |
| Steady green                  | On-line, data exchange       |
| Flashing green                | On-line, clear               |
| Red single flash              | Parametrisation error        |
| Red double flash              | Profibus configuration error |

| Status LED Indication |                             |
|-----------------------|-----------------------------|
| LED state             | Interpretation              |
| Off                   | No power or not initialised |
| Steady green          | Initialised                 |
| Flashing green        | Diagnostic event present    |
| Steady red            | Exception error             |

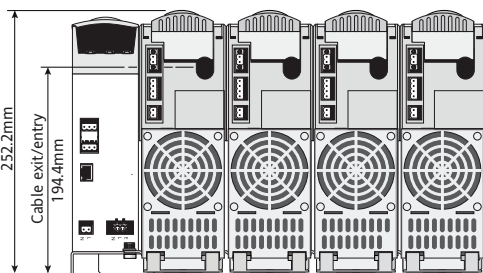
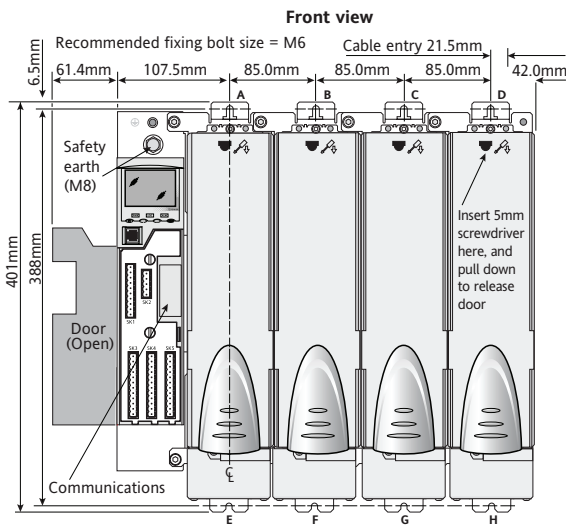


### Profibus connector pinout

| Pin | Function          | Pin | Function        |
|-----|-------------------|-----|-----------------|
| 9   | N/C               | 5   | Isolated ground |
| 8   | A (RxD -/TxD -)   | 4   | RTS             |
| 7   | N/C               | 3   | B (RxD+ / TxD+) |
| 6   | +5 V (See note 1) | 2   | N/C             |
|     |                   | 1   | N/C             |

- Notes:**
- Isolated 5 Volts for termination purposes. Any current drawn from this terminal affects the total power consumption.
  - The cable screen should be terminated to the connector housing.

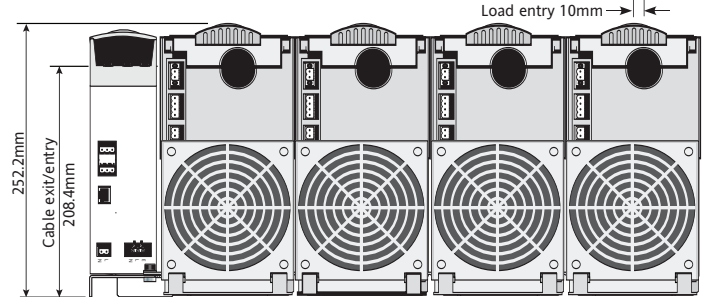
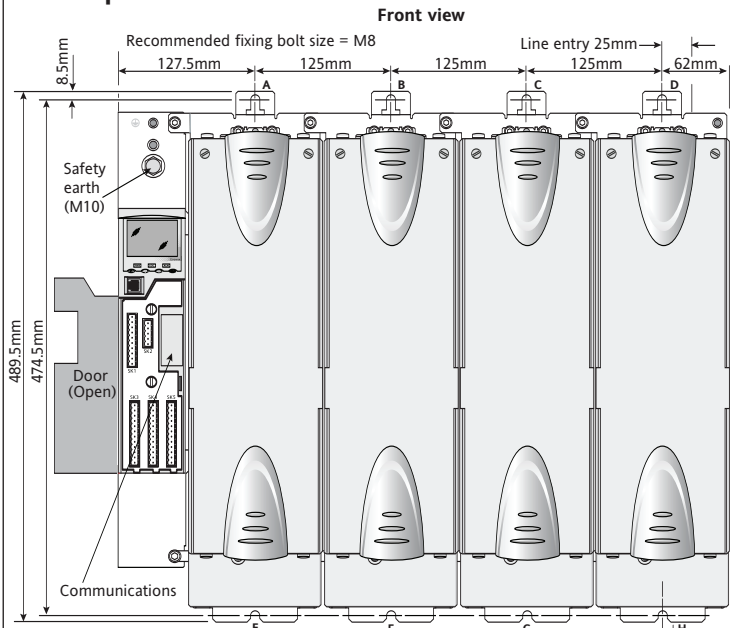
## 250Amps



**Note:** Units are shown with individual mounting brackets. Multi-phase units come supplied with 2, 3 or 4 phase brackets as appropriate. See table below for details.

| No of phases | Overall Widths |       |       |       | Bracket | Upper           | Lower           |
|--------------|----------------|-------|-------|-------|---------|-----------------|-----------------|
|              | 1              | 2     | 3     | 4     |         |                 |                 |
| Door closed  | 149.5          | 234.5 | 319.5 | 404.5 | 2-phase | Use A & B       | Use E & F       |
| Door open    | 211.0          | 296.0 | 381.0 | 466.0 | 3-phase | Use A, B & C    | Use E, F & G    |
|              |                |       |       |       | 4-phase | Use A, B, C & D | Use E, F, G & H |

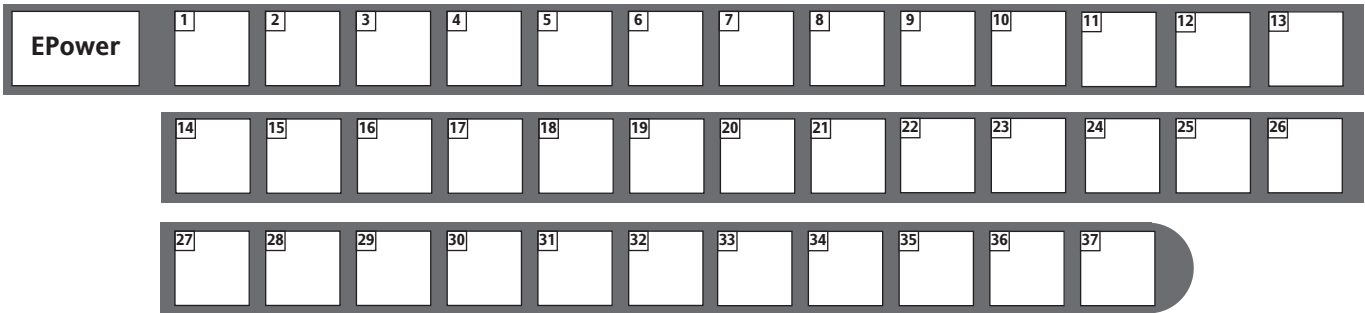
## 400Amps



**Note:** Units are shown with individual mounting brackets. Multi-phase units come supplied with 2, 3 or 4 phase brackets as appropriate. See table below for details.

| No of phases | Overall Widths |       |       |       | Bracket | Upper           | Lower           |
|--------------|----------------|-------|-------|-------|---------|-----------------|-----------------|
|              | 1              | 2     | 3     | 4     |         |                 |                 |
| Door closed  | 189.5          | 314.5 | 439.5 | 564.5 | 2-phase | Use A & B       | Use E & F       |
| Door open    | 251.0          | 376.0 | 501.0 | 626.0 | 3-phase | Use A, B & C    | Use E, F & G    |
|              |                |       |       |       | 4-phase | Use A, B, C & D | Use E, F, G & H |

# ORDER CODES



The code is divided in three sections:

- 1 Hardware, which defines the type, number and size of the unit and/or the modules.
- 2 Optional hardware and software functions.
- 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)

The code can then be either “Short” and include only the main hardware fields or “medium” and combine the hardware + the optional fields, or finally “Long” with the additional quick start code at the end.

| Product        |                       | 8 Communication Protocol      |                                       | 19 Language               |               |
|----------------|-----------------------|-------------------------------|---------------------------------------|---------------------------|---------------|
| EPower         | Power Controller      | XX                            | No optional fieldbus communication    | ENG                       | English       |
|                |                       | Y2                            | 2-wire 485 Modbus (RJ45 connector)    | FRA                       | French        |
|                |                       | PB                            | Profibus-DPV1 (with D type connector) | GER                       | German        |
|                |                       | ET                            | Modbus-TCP                            | ITA                       | Italian       |
|                |                       | DN                            | DeviceNet                             | SPA                       | Spanish       |
| 1 Phase / Amps |                       | 9 Module 1                    |                                       | 20 Load Current (nominal) |               |
| 1PH-100A       | 1 Phase unit 100 amps | XX                            | None                                  | 16A                       | 16 Amps       |
| 1PH-160A       | 1 Phase unit 160 amps | IO                            | IO optional board                     | 25A                       | 25 Amps       |
| 1PH-250A       | 1 Phase unit 250 amps |                               |                                       | 40A                       | 40 Amps       |
| 1PH-400A       | 1 Phase unit 400 amps |                               |                                       | 50A                       | 50 Amps       |
| 2PH-100A       | 2 Phase unit 100 amps | 10 Module 2                   |                                       | 63A                       | 63 Amps       |
| 2PH-160A       | 2 Phase unit 160 amps | XX                            | None                                  | 80A                       | 80 Amps       |
| 2PH-250A       | 2 Phase unit 250 amps | IO                            | IO optional board                     | 100A                      | 100 Amps      |
| 2PH-400A       | 2 Phase unit 400 amps |                               |                                       | 125A                      | 125 Amps (1)  |
| 3PH-100A       | 3 Phase unit 100 amps | 11 Module 3                   |                                       | 160A                      | 160 Amps (1)  |
| 3PH-160A       | 3 Phase unit 160 amps | XX                            | None                                  | 200A                      | 200 Amps (1)  |
| 3PH-250A       | 3 Phase unit 250 amps | IO                            | IO optional board                     | 250A                      | 250 Amps (1)  |
| 3PH-400A       | 3 Phase unit 400 amps |                               |                                       | 315A                      | 315 Amps (1)  |
| 4PH-100A       | 4 Phase unit 100 amps | 12 Predictive Load Management |                                       | 400A                      | 400 Amps (1)  |
| 4PH-160A       | 4 Phase unit 160 amps | XXX                           | None                                  |                           |               |
| 4PH-250A       | 4 Phase unit 250 amps | ELM                           | Predictive Load Management            | 21 Load Voltage (nominal) |               |
| 4PH-400A       | 4 Phase unit 400 amps |                               |                                       | 100V                      | 100 Volts     |
| PWR-100A       | 100A Power module     | 13 Not Used                   |                                       | 110V                      | 110 Volts     |
| PWR-160A       | 160A Power module     | XX                            | None - Standard unit                  | 115V                      | 115 Volts     |
| PWR-250A       | 250A Power module     | 14 Not Used                   |                                       | 120V                      | 120 Volts     |
| PWR-400A       | 400A Power module     | XX                            | None                                  | 127V                      | 127 Volts     |
| DRV-XXX        | Driver module only    | 15 Software Option 1          |                                       | 200V                      | 200 Volts     |
|                |                       | XXX                           | None                                  | 208V                      | 208 Volts     |
|                |                       | 16 Software Option 2          |                                       | 220V                      | 220 Volts     |
|                |                       | XXX                           | None                                  | 230V                      | 230 Volts     |
|                |                       | 17 Not Used                   |                                       | 240V                      | 240 Volts     |
|                |                       | XX                            | Default                               | 277V                      | 277 Volts     |
|                |                       | 18 QuickStart                 |                                       | 380V                      | 380 Volts     |
|                |                       | XX                            | None - End of code                    | 400V                      | 400 Volts     |
|                |                       | QS                            | QuickStart config                     | 415V                      | 415 Volts     |
|                |                       |                               |                                       | 440V                      | 440 Volts     |
|                |                       |                               |                                       | 460V                      | 460 Volts     |
|                |                       |                               |                                       | 480V                      | 480 Volts     |
|                |                       |                               |                                       | 500V                      | 500 Volts     |
|                |                       |                               |                                       | 575V                      | 575 Volts     |
|                |                       |                               |                                       | 600V                      | 600 Volts     |
|                |                       |                               |                                       | 660V                      | 660 Volts (2) |
|                |                       |                               |                                       | 690V                      | 690 Volts (2) |
|                |                       | 22 Control Type (3)           |                                       |                           |               |
|                |                       | 1P                            | Single phase                          |                           |               |
|                |                       | 2P                            | Two phase control                     |                           |               |
|                |                       | 3P                            | Three phase control                   |                           |               |
|                |                       | 23 Load Configuration (4)     |                                       |                           |               |
|                |                       | 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

|    |   |
|----|---|
| PA | Phase angle (5)                           |
| 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 |
| I2 | 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)

|     |                                   |
|-----|-----------------------------------|
| XXX | Off                               |
| I2  | RMS load current squared transfer |
| IR  | RMS load current transfer         |

#### 28 Analog Input 1 Function

|    |                       |
|----|-----------------------|
| 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

|    |           |
|----|-----------|
| 0V | 0-10 Volt |
| 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

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

#### 31 Analog Input 2 Type

|    |           |
|----|-----------|
| 0V | 0-10 Volt |
| 1V | 1-5 Volt  |
| 2V | 2-10 Volt |
| 5V | 0-5 Volt  |
| 0A | 0-20 mA   |
| 4A | 4-20 mA   |

#### 32 Analog Output Function

|   |           |
|---|-----------|
| X | None      |
| V | Voltage   |
| I | Current   |
| P | Power     |
| R | Impedance |

#### 33 Analog Output Type

|    |           |
|----|-----------|
| 0V | 0-10 Volt |
| 1V | 1-5 Volt  |
| 2V | 2-10 Volt |
| 5V | 0-5 Volt  |
| 0A | 0-20 mA   |
| 4A | 4-20 mA   |

#### 34 Digital Input 2 Function

|    |                           |
|----|---------------------------|
| XX | None                      |
| AK | Alarm acknowledgement     |
| RS | Remote setpoint selection |

#### 35 Alarm Relay Configuration

|    |                |
|----|----------------|
| XX | None           |
| AA | Any alarm      |
| PA | Process alarms |
| FB | Fuse blown     |

#### 36 Load Management Configuration

|    |  |
|----|--|
| XX | None -- Load Management disabled                     |
| SH | Sharing  |
| I1 | Incremental Type 1                                   |
| I2 | Incremental Type 2                                   |
| RI | Rotating Incremental                                 |
| DC | Distributed Control                                  |
| DI | Distributed Control and Incremental Control          |
| RD | Rotating Distributed Control and Incremental Control |

#### 37 Predictive Load Management Address

|    |  |
|----|--|
| XX | Predictive Load Management address (00 to 63) Default address 00 |
|----|--|

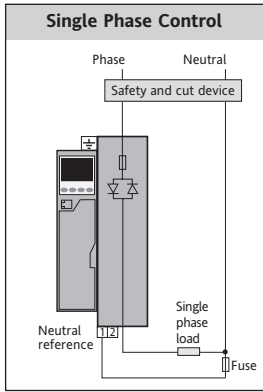
#### Notes

- (1) The maximum nominal current selectable is  $\leq$  the current rating selected in Field 1.
- (2) Only available if 690V selected in Field 2.
- (3) Selection dependent on number of Phases selected in Field 1  
 1PH = IP only  
 2PH = IP or 2P only  
 3PH = IP or 3P only  
 4PH = IP or 2P only
- (4) 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 IP selected in Field 22 only option is IP
- (5) PA not selectable if 2P selected in Field 22

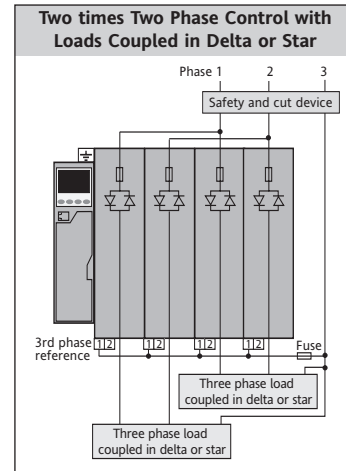
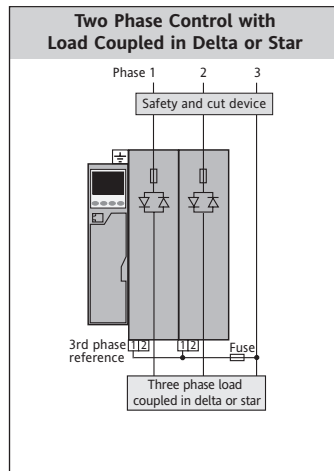
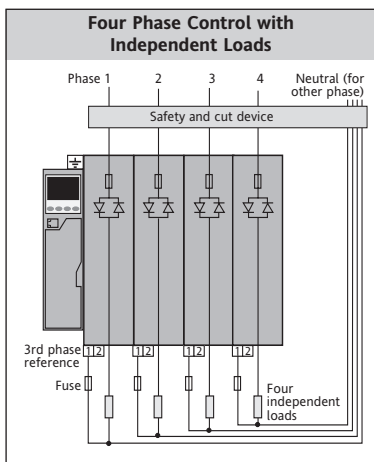
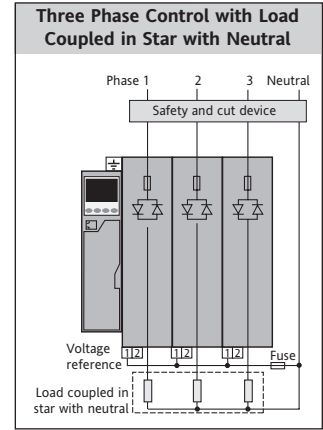
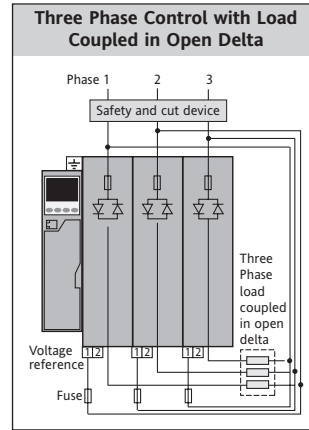
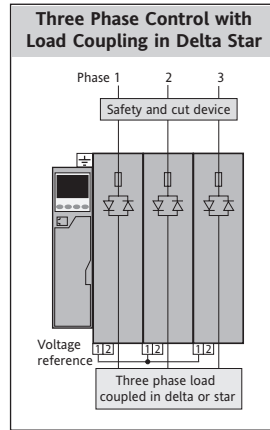
#### Spare fuses for power modules

| Current rating | Fuse reference |
|----------------|----------------|
| 100 Amp        | CS179139U315   |
| 160 Amp        | CS179139U315   |
| 250 Amp        | CS179139U315   |
| 400 Amp        | CS179439U550   |

## GENERAL DIAGRAMS



Single Phase Control up to  
Four Single Phase Control



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