7300A Advanced Controllers

7300A

Three-phase thyristor units (≤ 40 A version)

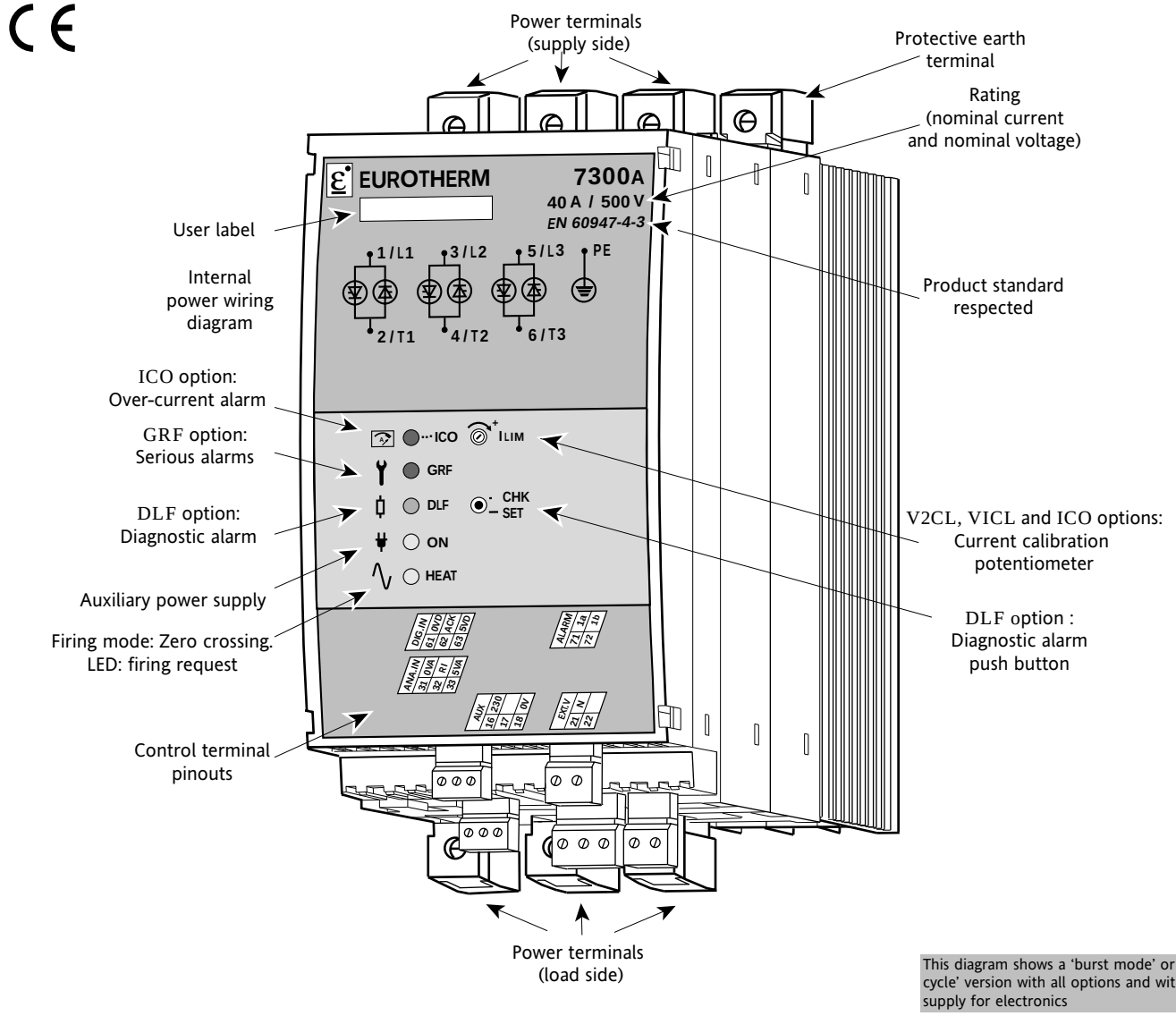
GENERAL PRESENTATION

EUROTHERM AUTOMATION

IDENTIFICATION

The 7300A series of power thyristor units can control all types of three-phase electric load using 'Phase angle' mode or zero-crossing firing ('Burst mode' or 'Single-cycle' mode).
These units comprise three thristor-controlled channels.

7300A units are available with an extensive choice of current rating, supply type (including self-powered directly from the supply network) and firing type as well as numerous options to match all user requirements. The options include selection of the control mode, current limiting as well as alarms to diagnose and signal the condition of the thyristors and the load as well as over-temperature and over-current.



This diagram shows a 'burst mode' or 'single-cycle' version with all options and with 230 V supply for electronics

OPTIONS

The following options are available on 7300A series power thyristor units:
- current limiting, power calibration and various control modes,
- transient limiting by delaying the first thyristor firing and by using a safety ramp.

7300A series power thyristor units can optionally signal the following alarms:
- serious alarms (thyristor short circuit, total load failure)
- load fault diagnosis and monitoring
- over-temperature (for fan-cooled units with current rating ≥ 80 A)
- over-current (for 'burst mode' or 'single cycle' operation)

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TECHNICAL SPECIFICATIONS

Power

Nominal current	16A to 630A per phase at 45°C, see order code
Nominal voltage	200 V to 690 V, see order code.
Frequency	Use from 47 to 63 Hz
Dissipated power	1.3 W (approx.) per amp and per phase.
Cooling	Rating ≤ 63 A: Natural convection Rating ≥ 80 A: Fan-cooled 115 V or 230 V fan; consumption 10 VA
Load	Three-phase industrial load.
Use category	• AC-51 Resistive load with low temperature coefficient. • AC-55b Short wave infrared elements • AC-56a Transformer primary and Resistive load with high temperature coefficient.

Control

Supply	Self-powered from supply network, or external (115 V or 230 V +10%; -15%) Consumption: 10 VA.
Control type	Analogue (optional digital communication) • Remote analogue setpoint: 0-5 V or 0-10 V (100 kΩ ≈ input), 0-20 mA or 4-20 mA (250 Ω input) • Potentiometer for manual setpoint (5 V supply available).

Firing mode

Firing at zero crossings	• 'Burst mode' base time: 16 or 64 cycles • 'Single cycle': base time 1 cycle • 'Advanced single-cycle': base firing time 1 cycle; non firing by half-cycles.
Firing angle variation	• Phase angle

Control

Control parameter	• Standard: - load voltage squared (V^2) • Option: - - apparent power (V × I) - - load current squared (I^2) - - open loop.
Linearity and Stability	Better than ±2% of full scale (balanced supply and load).
Current limit	Option, depending on firing mode: • 'Phase angle': Automatic control transfer - from V^2 to I^2 or - from V × I to I^2 with current recalibration set by potentiometer on front panel. • Burst mode, 16 cycle base: Current limited by threshold set using potentiometer on front panel.
Calibration	A control signal is available in V × I for power and current calibration and maintenance.
Transient current limit	Option for transformer primary control in 'burst mode' firing: • Transformer magnetisation firing angle ramp at first switch on. • First firing delay adjustable using potentiometer on front panel.

Signalling Electronics supply present: green 'ON' LED.
Thyristor firing request: green 'HEAT' LED.

Type 1 alarms (Options)

Serious alarms (*GRF option*)	Total load failure and thyristor short circuit detection. Signalled by red 'GRF' LED and alarm relay contact.
Diagnostic alarm (*DLF option*)	Partial load failure detection. Signalled by orange 'DLF' LED and alarm relay contact. Settings: Monitoring diagnosis, alarm adjustment and resetting using push button on front panel. Sensitivity: Detects the failure of at least one heating element for six identical elements connected in parallel. The DLF option includes serious alarm monitoring (GRF).
Over-temperature alarm	For all fan-cooled units (≥ 80 A) operation stops if the temperature threshold is exceeded. Signalled by red 'T°' LED and alarm relay (if GRF or DLF option selected).

Type 2 alarm (Option)

Over-current alarm (*ICO option*)	Operation stopped if current threshold exceeded. Only available with *zero crossing* firing and *DLF* option (except for *short wave infrared* elements, *transformers* and codes *VICL* and *V2CL).* Alarm threshold adjustable from 20 to 100% using potentiometer on front panel. Signalled by red 'ICO' LED and alarm relay contact.
Alarm relay	Available with alarm options. The relay contact (0.25 A/230 Vac; 32 Vdc) is either open on alarm or closed on alarm depending on the product code.
Communication	Available later.

Protection

Thyristor protection	Varistor and RC snubber. Short circuit Coordination type : Type 1. High speed fuses : • rating ≤ 100 A: external (optional) • rating ≥ 125 A: internal. No fuse for short wave infrared elements in firing at zero crossings or in phase angle firing mode without current limit.
Electrical protection	IP20 without adding additional protection. Overvoltage category 3 (defined by IEC 664).
Product standard	The 7300A products comply with the terms of product standard **EN 60947-4-3** 'Contactors and motor-starters - AC semiconductor controllers and contactors for non-motor loads'.
CE labelling	Complies with the essential requirements of the European Low Voltage Directive 73/23 EEC dated 19 February 1973, modified by 93/68/EEC dated 22 July 1993 and the Electromagnetic Compatibility Directive 89/336/EEC dated 3 May 1989 modified by 92/31/EEC dated 28 April 1992 and 93/68/EEC dated 22/07/93.

Environment

Use	0 to 45°C with nominal current, at max. altitude of 2000 m.
Storage	-10°C to 70°C.
Pollution	Degree 2 acceptable (defined by CEI 664).
Humidity	RH 5% to 95% non-condensing.
Dimensions	Rating 16 A to 40 A:
H × W × D (overall)	Basic version: 220 × 96 × 215 mm Options: 220 × 96 × 243 mm.
Weight	Maximum 2.5 kg.

	Ratings	Basic selection	Options
Coding: 7300A	**1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 / 11 / 12 / 13 / 14 / 15 / 16 / 17 / 18 / 19 / 20**		

Ratings

1. Nominal current per phase	Code
16 amps	**16A**
25 amps	**25A**
40 amps	**40A**
63 amps	**63A***
80 amps	**80A***
100 amps	**100A***
125 amps	**125A***
160 amps	**160A***
200 amps	**200A***
250 amps	**250A***
315 amps	**315A***
400 amps	**400A***
500 amps	**500A***
630 amps	**630A***

2. Nominal voltage between phases	Code
200 volts	**200V**
230 volts	**230V**
277 volts	**277V**
400 volts	**400V**
460 volts	**460V**
480 volts	**480V**
500 volts	**500V**
690 volts	**690V***

3. Power supply for electronics	Code
Self-powered (except 690 V)	**SELF**
External 110 V supply	**115V**
External 230 V supply	**230V**

4. Fan power supply	Code
≤ 63 A: No fan	**XXXX**
≥ 80 A:	
- 115 V fan with 115 V or SELF electronics	**115V**
- 230 V fan with 230 V or SELF electronics	**230V**

5. Load coupling	Code
Star without neutral	**3S**
Star with neutral	**4S**
Closed delta	**3D**
Open delta	**6D**

Basic selection

5. Thyristor fuse	Code
Fuse without fuse blown microswitch	**FUSE**
Fuse with fuse blown microswitch	**MSFU**
No fuse (*short wave infrared elements*)	**NONE**

6. Firing mode	Code
Phase angle	**PA**
Burst mode:	
base time 16 cycles	**C16**
base time 64 cycles	**C64**
Single-cycle: 1 base cycle	**FC1**
Advanced single-cycle: 1 base cycle non-firing by half cycles in 4S or 6D coupling only	**ASC**

7. Internal EMC filter	Code
Phase angle **or** ratings ≥ 125 A: no filter	**XXXX**
Burst mode or single-cycle 16 A to 100 A:	
- with filter	**FILT**
- no filter	**NONE**

8. Input	Code
Analogue signal:	
current from 0 mA to 20 mA	**0mA20**
current from 4 mA to 20 mA	**4mA20**
voltage from 0 V to 5 V	**0V5**
voltage from 0 V to 10 V	**0V10**

9. Manual language	Code
French	**FRA**
English	**ENG**
German *	**GER**

11. Selected options	Code
No options, V^2 control and ***End of code***	**NONE**
Version with Options: Selection of options	**YES**

Options for Phase Angle firing

12. Control options	Code
Voltage control (V^2)	**V2**
Current control (I^2)	**I2**
Current limit by control transfer (V^2 to I^2)	**V2I2**
Current limit by control transfer (V×I to I^2)	**VII2**
Open loop	**OL**

13. Delay on first firing	Code
No delay on first firing	**XXXX**

14. Type 1 alarms	Code
Serious Alarms: thyristor short-circuit, total load failure, over-temperature for ratings ≥ 80 A	**GRF**
Partial load failure and Serious Alarms	**DLF**
No alarms	**NONE**

15. Load type (information for DLF)	Code
*With **DLF** option*: Short wave infrared elements	**SWIR**
Low temperature coefficient load	**LTCL**
*Without **DLF** option or* High temperature coefficient load	**XXXX**

16. Type 2 alarm	Code
No over-current alarm	**XXXX**

17. Alarm relay contact	Code
With alarm option: Contact closed on alarm	**NC**
Contact open on alarm	**NO**
Without alarm option	**XX**

Options for Burst / Single-Cycle firing

12. Control options	Code
Voltage control (V^2)	**V2**
Burst firing C16 only:	
Voltage control (V^2) and current limit	**V2CL**
Power control (V×I) and current limit	**VICL**

13. Delay on first firing	Code
Burst firing C16 or C64: Transformer primary	**XFMR**
Other configurations	**NONE**
Single-cycle (FC1/ASC)	**XXXX**

14. Type 1 alarms	Code
Serious Alarms: thyristor short-circuit, total load failure, over-temperature for ratings ≥ 80 A	**GRF**
Partial load failure and Serious Alarms	**DLF**
No alarms	**NONE**

15. Load type	Code
*With **DLF** option*: Short wave infrared elements	**SWIR**
Low temperature coefficient load	**LTCL**
*Without **DLF** option or* High temperature coefficient load	**XXXX**

16. Type 2 alarm	Code
Over-current alarm (*for DLF option*) *except* codes: SWIR, XFMR, VICL and V2CL	**ICO**
No over-current alarm	**NONE**

17. Alarm relay contact	Code
With alarm option: Contact closed on alarm	**NC**
Contact open on alarm	**NO**
Without alarm option	**XX**

Communication and Certification options

18 / 19. Communication options*	Code
Available later	**NONE**

20. Certification option	Code
No certificate of 'Compliance with Order'	**NONE**
Certificate of 'Compliance with Order'	**CFMC**

*** Available later**

SAFETY DURING USE

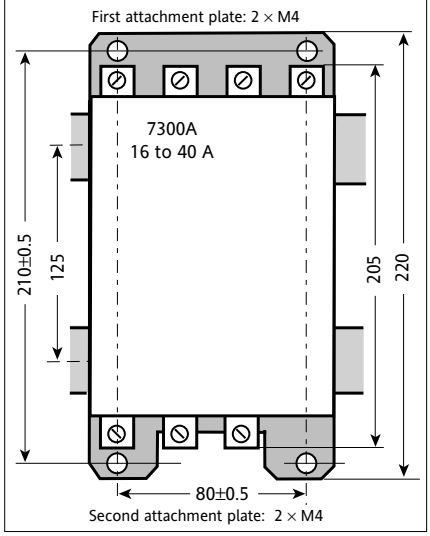
- Eurotherm Limited shall not be held responsible for any damage, injury, losses or expenses caused by inappropriate use of the product or failure to comply with this manual.
- The protective earth must be connected before any other connections are made and should be the last cable to be disconnected.
- The high speed fuses merely protect the thyristors. A suitable device must be fitted to protect the installation and separate it from the supply, in accordance with applicable standards.
- The user must not attempt to access internal parts. Disconnect the unit before disassembling.
- Avoid touching the heatsink when the unit is operating and for 15 minutes after shutting down.

MOUNTING

Mounting mechanism
Two horizontal attachment plates (4 M4 screws) mounted on the unit.

Mounting type
Rating from 16 A to 40 A :
Two symmetric EN50022 DIN rails or Bulkhead mounting.
Rating > 40 A:
Bulkhead mounting only.

Layout:
Leave a horizontal gap of at least 10 mm between adjacent units.
Vertical gap: Units must be mounted with the heatsink vertical, with no obstructions above or below the unit which might reduce or impede air flow.
Maximum ambient temperature above the unit: 45°C.



WIRING

Only use copper conductors rated up to at least 75 °C.

Power terminals (cage terminals):
- supply: **1/L1, 3/L2, 5/L3**
- load : **2/T2, 4/T2, 6/T3**
- protective earth: **PE**

Rating A	Terminal capacity mm² / AWG	Tightening torque Nm
16 to 25	2.5 /13 to 6 / 9	1.2
40	6 / 9 to 16 / 5	1.8

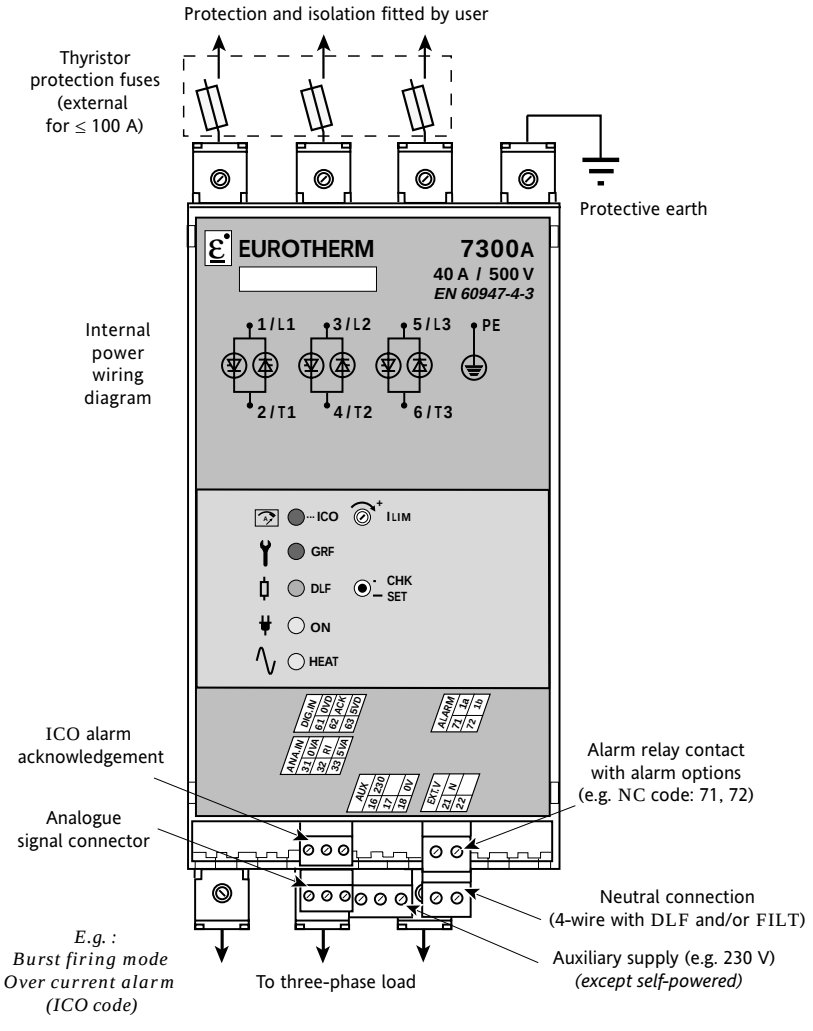
The cross-section of conductors must correspond to the IEC 943 standard.

Control terminals (plug-in terminal blocks)

Capacity of ANA.IN, DIG.IN, ADJ.CAL terminals:
1.5 mm² / 16 AWG; Tightening torque: 0.5 Nm.
Capacity of AUX, ALARM, EXT.V terminals:
2.5 mm² / 14 AWG; Tightening torque: 0.7 Nm

Terminal block	Terminal No.	Label	Purpose	
ANA.IN	31	0VA	0 V analogue signal	Basic or Options
	32	RI	+ analogue signal	
	33	5VA	5 V user supply	
AUX	16	230	Auxiliary 230 V or	
	17	115	115 V supply	
	18	0V	Neutral or 2nd phase	
DIG.IN	61	0VD	0 V logic signal	Over-current alarm
	62	ACK	ICO acknowledgement	
	63	5VD	5 V user supply	
ALARM	71	1a	Alarm relay	Alarms
	72	1b	contact (NC code)	
	73	1a	Alarm relay	
	74	1b	contact (NO code)	
ADJ.CAL	66	0VC	0 V calibration	V × I control
	67	HRC	Calibration control	
EXT.V	21	N	Neutral for 4S	DLF/FILT options
	22		Not connected	

CONNECTION DIAGRAM



Fuse without microswitch (code **FUSE**)

Rating	Fuse	With three-phase fuse-holder	Overall dimensions H × W × D (mm)
16 A	CH260024	FU3038/16A	81 × 52.5 × 68
25 A	CH260034	FU3038/25A	81 × 52.5 × 68
40 A	CH330054	FU3451/40A	97 × 79.5 × 86

Fuse with microswitch (code **MSFU**)

Rating	Fuse	With three-phase fuse-holder	Overall dimensions H × W × D (mm)
16 A	CS176513U020	MSFU3038/16A	110 × 79.5 × 94
25 A	CS176513U032	MSFU3038/25A	110 × 79.5 × 94
40 A	CS176513U050	MSFU3038/40A	110 × 79.5 × 94

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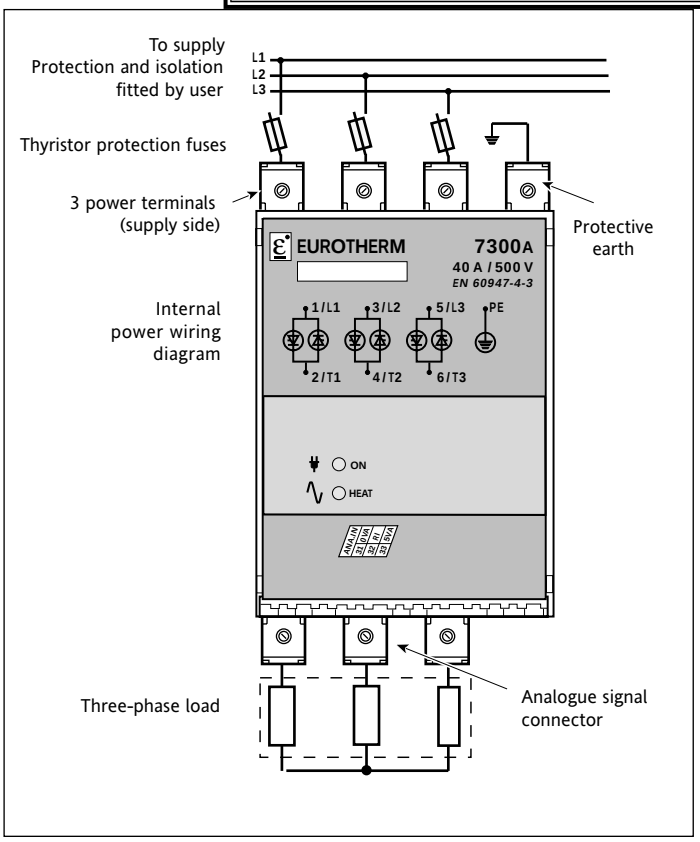
HA176583ENG

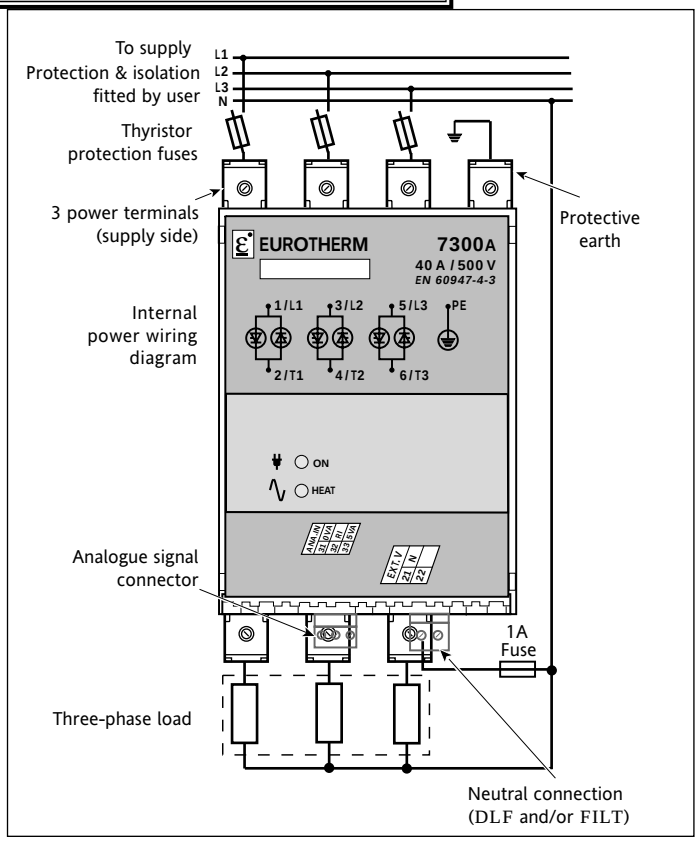
7300A
Three-phase Thyristor units (≤ 40 A version)
Three Load Wiring

(Addendum HA176583ENG001 for the General Presentation HA176583ENG Iss2.0)

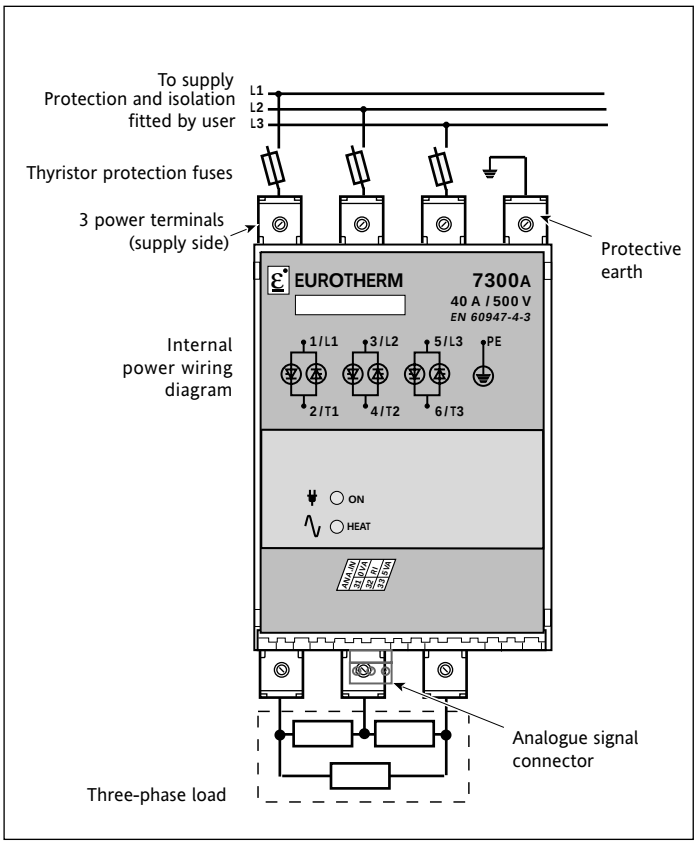
EUROTHERM AUTOMATION



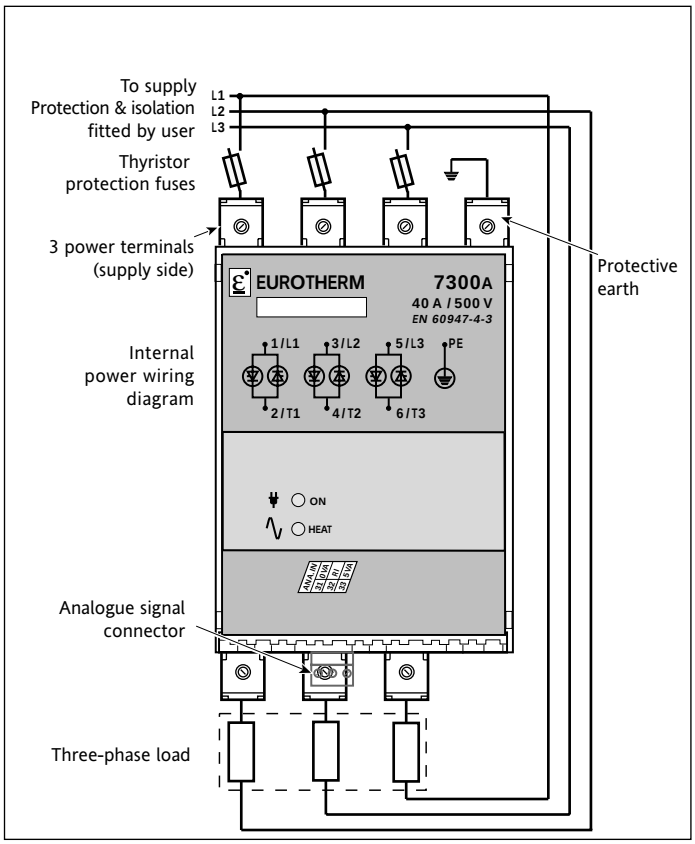
Power wiring diagram for a 3 wires load 'Star without neutral' (code 3S)



Power wiring diagram for a 4 wires load 'Star with neutral' (code 4S)



Power wiring diagram for a 3 wires load 'Closed Delta' (code 3D)



Power wiring diagramfor a 6 wires load 'Open Delta' (code 6D)