

Chapter 11 EMC and the CE Mark

'CE' EMC RESPONSIBILITY

The subject of CE marking and EMC is explored in more detail in a separate Eurotherm Application manual entitled 'EMC Installation Guidelines for modules and systems', part number HA388879, available from your local Eurotherm Drives office. The following sections are the minimum necessary for installation and basic understanding.

Eurotherm Drives are adhering to the CEMEP recommendations on 'CE' marking for EMC.

According to SI No. 2372, implementing the EMC directive into UK law, the requirement to CE mark for EMC, applies only to **relevant apparatus** that has '**intrinsic function**' to the **end user** and which is placed on the market (**supplied**). The majority of drive modules/systems sold by Eurotherm Drives will be incorporated into a higher system/apparatus or machine which includes (at least) the motor, cable and a driven load before providing intrinsic function to the end user. As such the majority of Eurotherm Drives products are categorised as **components** (CEMEP validity field 2) and it would be incorrect for Eurotherm Drives to apply the CE mark or produce an EC Declaration of Conformity in respect of EMC. It is the manufacturer/supplier/installer of the relevant apparatus (with the intrinsic function to the end user) who must demonstrate conformance to the EMC directive

However, in a minority of cases, single drives may have intrinsic function to the end user. An example is that of '**add on**' intrinsic function, where an existing fixed speed motor application (such as a fan or a pump) is converted to variable speed with an **add on** drive module (CEMEP validity field 1). In this application Eurotherm Drives CE mark its drive module and issue an EC declaration of conformity. Because the validity of the 'CE' mark for EMC is not known when the product is manufactured, the 'CE' mark will be applied via the product manual, and will not be on the product label. From 1997, when the 'CE' mark for the Low Voltage Directive becomes mandatory, the CE mark will appear on the product label, but its validity for EMC can only be identified from the product manual.

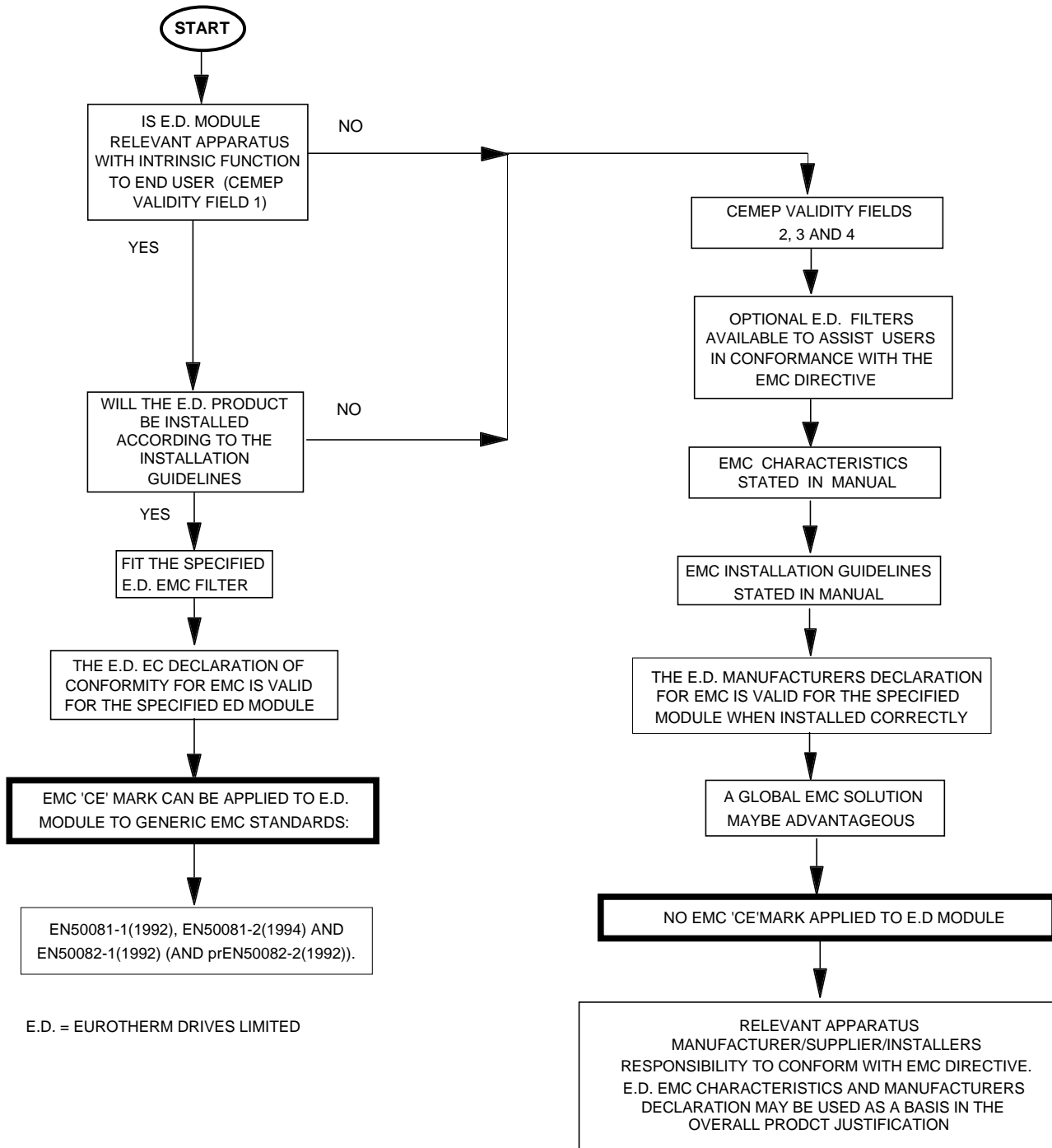
The validity of the 'CE' mark can be identified from the flowchart in figure A, refer to SI No. 2372 for clarification of relevant apparatus.

To assist manufacturers/suppliers/installers of relevant apparatus, Eurotherms 582, 583 and 5831 drive modules are EMC compliant to EN50081-1 (1992), EN50082-1 (1992), EN50081-2 (1994) and prEN50082-2 (1992), when fitted with the specified filter and installed according to these instructions, as confirmed by the manufacturers EMC Declaration to be found at the end of this chapter.

Manufacturers/suppliers/installers of relevant apparatus (CEMEP validity fields 3 & 4) may use this compliance as a basis for their own justification of overall compliance with the EMC Directive.

It must be clearly understood by the customer before installation commences who is legally responsible for conformance with the EMC Directive. Misappropriation of the CE mark is a criminal offence.

Figure A Eurotherm EMC 'CE' Mark Validity Chart



FILTER SELECTION

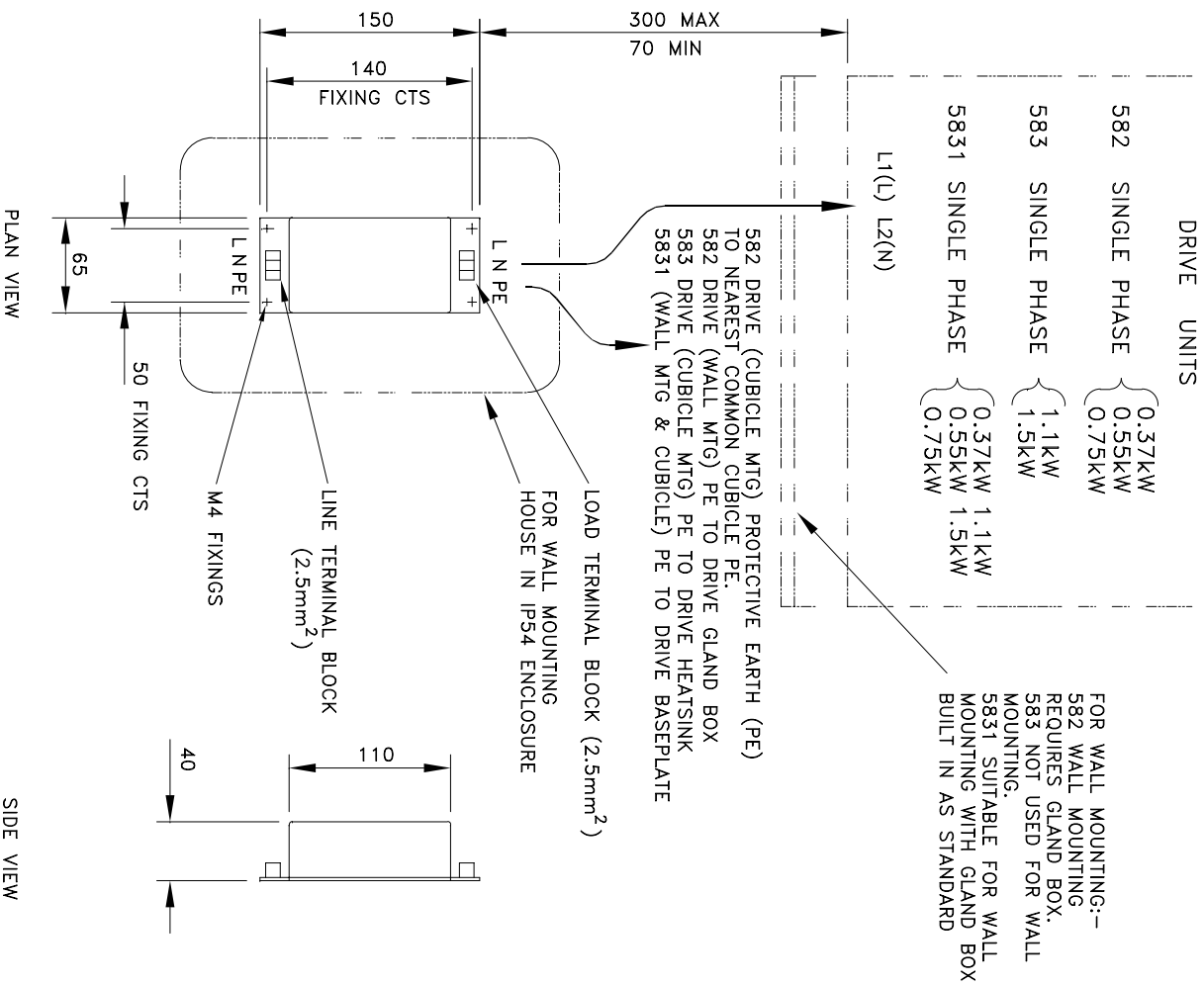
The following AC supply filters are available to comply with the mains terminal limits of EN55011 (1991) Class B. For the Eurotherm Drives EMC 'CE' mark to be valid the fitment of the specified AC supply filter is **mandatory**.

Eurotherm Product	Rating	Eurotherm Filter Part Number
582	single phase 0.55kW & 0.75kW	CO389108
5831	single phase 0.75kW & 1.5kW	CO389108
583	single phase 1.5kW	CO389108
583	single phase 2.2kW	CO389110

FILTER INSTALLATION

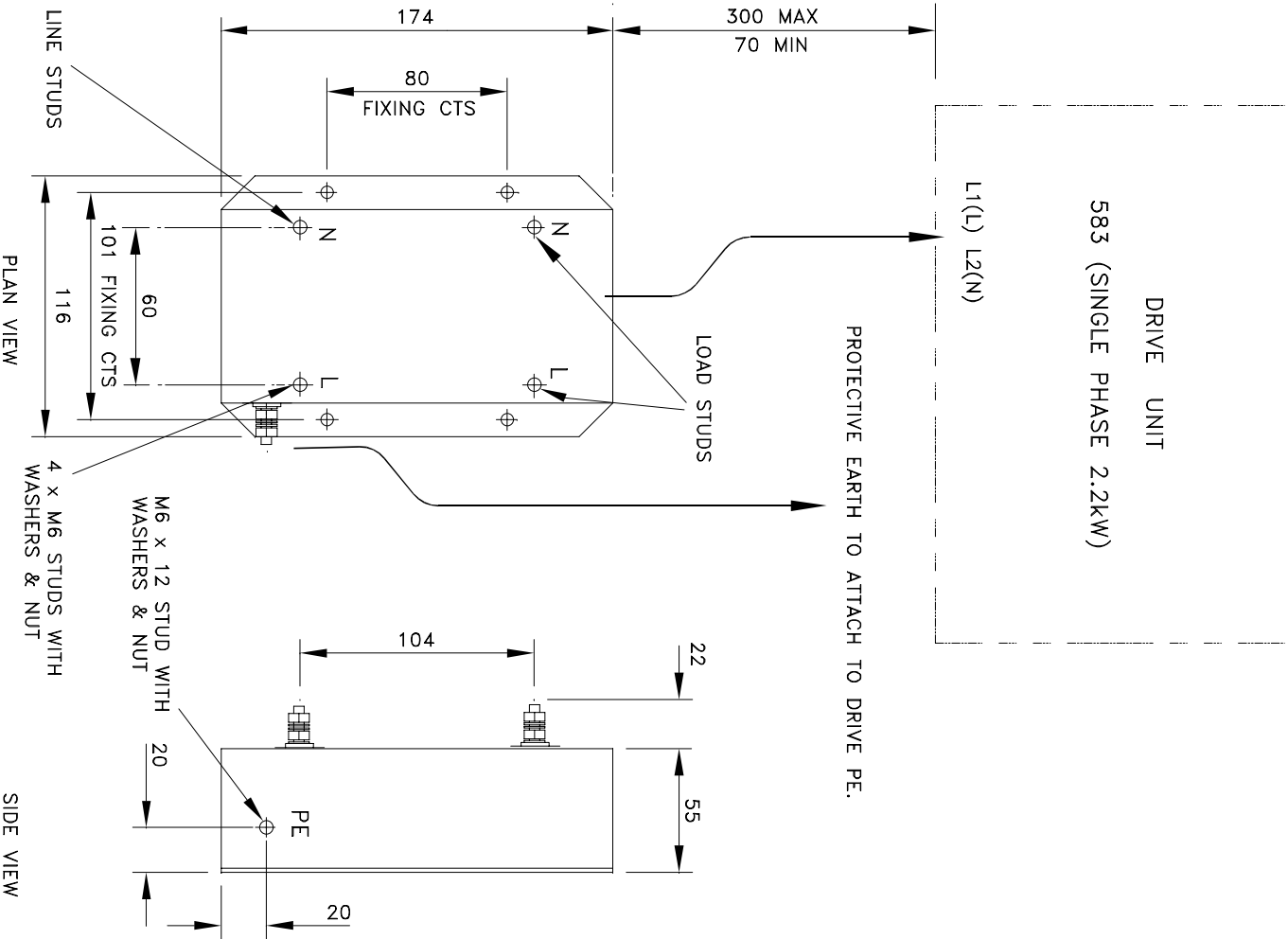
Filter mechanical mounting details are shown in figures B and C.

Figure B Mounting Details for Filter Part Number CO389108



FILTER MOUNTING DETAILS
 Part No CO389108
 FOR DRIVE UNITS 582,583 & 5831

Figure C Mounting Details for Filter Part Number CO389110



FILTER MOUNTING DETAILS

Part No CO389110

FOR DRIVE UNIT 583 (SINGLE PHASE 2.2kW)

For both AC and DC drives the conducted emissions increase with motor cable length. EMC conformance to the stringent limits applied by Eurotherm Drives is only guaranteed up to a maximum cable length of 5m, but can be increased dependent on reduced limits being applied. This length can be still further increased by the use of output filters and chokes. Refer to the separate Eurotherm Application manual entitled 'EMC Installation Guidelines for modules and systems', part number HA388879 for more information



WARNING 1: The AC supply filters produce earth leakage currents in excess of 3.5mA.



WARNING 2: The AC supply filters contain capacitors phase to phase and phase to earth. Discharge resistors are fitted, but the filters or cabling should **not be touched** for a period of 1 minute after the removal of the AC supply.



WARNING 3: The AC supply filter must only be used with a **permanent earth** connection. Permanent earthing can be achieved by either a) using a copper protective earth conductor of at least 10mm² or b) installing a second conductor in parallel connection with the protective conductor to a separate protective earth terminal. The conductor shall on its own meet the requirements for a protective earth conductor.



WARNING 4: Eurotherm Drives **do not recommend** the use of RCDs. Special RCDs (Type B according to the second amendment of IEC755) are required due to the AC and DC components flowing in the earth leakage current. All loads requiring protection with the RCD would be at risk.



WARNING 5: Eurotherm Drives only guarantee the thermal performance of the EMC AC supply filter up to a maximum equivalent cable length of 150m.

Wall Mount (582/5831)

For wall mount applications filters CO389108, CO389110 will require mounting in a separate suitable enclosure, and all connections made with conduit. In addition the optional 582 gland box must be used. Ensure the filter to drive cable is passed through conduit mounted between the filter and the drive gland box. This cable must be as short as possible (0.3m maximum) and segregated from all other cables.

Cubicle Mount (582/583)

Ideally the filter will be mounted onto a metallic back panel in the cubicle to which the drive is mounted too. The RF connection between the drive and filter will be usefully enhanced by scraping away any paint/insulation between the filter and drive mounting points on the panel. Liberally apply petroleum jelly over the mounting points and securing threads to prevent corrosion.

SCREENING

All Eurotherm Drives modules comply with the radiated emission limits of EN55011 (1991) Class A when installed in free air (Wall Mounted) according to these instructions, using an AC supply filter and screened motor cable, but using unscreened control and signal cabling. Products which meet the limits of Class A can be made to meet the more stringent limits of Class B by simply mounting inside an enclosure with 10dB attenuation between 30 and 100MHz (which

would typically be the attenuation provided by a standard metal cubicle) and screening any control and signal cabling outside of the cubicle (including any optional tacho, encoders or communications connections etc.).

On AC drives, in addition to screening the motor cable, any connections to the DC link must also be screened/armoured, with the screen connected at both ends (e.g. to the protective earth of the dynamic brake resistor).

Safety earthing always takes precedence over EMC earthing.

Screen to earth connections via 360° bonding is 75% more effective than earthing via pigtails. The integrity of the screen should be maintained over the entire length of the cable. If the cable is broken to insert contactors, chokes, fuses etc., then the screen must be connected over the shortest possible distance. Note some hazardous area installations may preclude direct earthing at both ends of the screen, in this case earth the other end via a 1µF, 50VAC capacitor.

If a shielded cable is not available, lay unshielded motor cables in a metal conduit which will act as a shield. The conduit must be continuous with a direct electrical contact at both ends. If links are necessary use braid with a minimum cross sectional area of 10mm².

Wall Mount (582/5831)

The cable between the wall mount drive module and the motor must be screened or armoured. The screen/armour must be earthed at both ends by connecting it to both the motor frame and the drive in 360° termination's. Ideally these will be via the glanded cable entry to the motor and drive.

Screening of all the control and signal cables is required to comply with the most stringent radiated emission limits of EN55011 Class B (including any optional tacho, encoders or communications connections etc.). The screen integrity should be continuous right back to the drive. Always minimise the length of screen stripped back to make this connection. **The screen should only be connected at the drive end.** If high frequency noise is still a problem, earth at the non drive end via a 0.1µF capacitor.

Cubicle Mount (582/583)

The cable between the cubicle and the motor must be screened or armoured. The screen/armour must be earthed at both ends by connecting it to both the motor frame and the entrance to the cubicle, ideally in 360° termination's via cable glands. Often the screens are terminated on a power screen rail at the entrance to the cubicle using 'U' clips to achieve a near 360° screen bond.

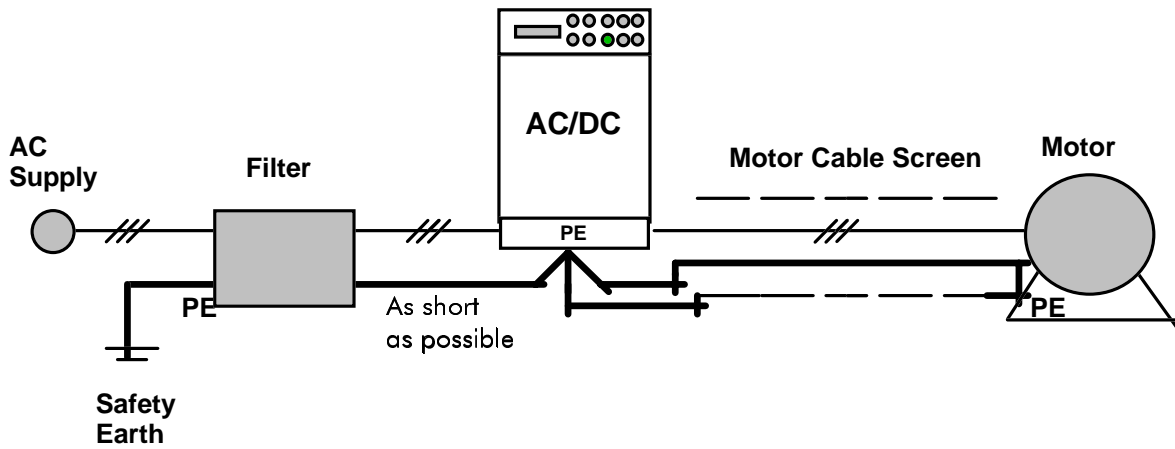
EARTHING

Wall Mount (582/5831)

A single point earthing policy is to be followed as shown in figure D. The motor protective earth (PE) connection must run inside the screened cable between the drive and motor. This must be connected at one end to the motor protective earth terminal and at the other to the drive protective earth terminal in the cable gland box (Note, only one protective earth conductor is permitted at each earth terminal contacting point). The filter should be **permanently earthed**. Local regulations may dictate the motor protective earth connection is connected locally. This should be in addition to the protective earth connection made back to the drive module. The RF impedance of the local motor earth connection will be significantly greater than that via the screen/armour and will not introduce RF problems.

Safety earthing always takes precedence over EMC earthing.

Figure D EMC and Safety Earthing Policy



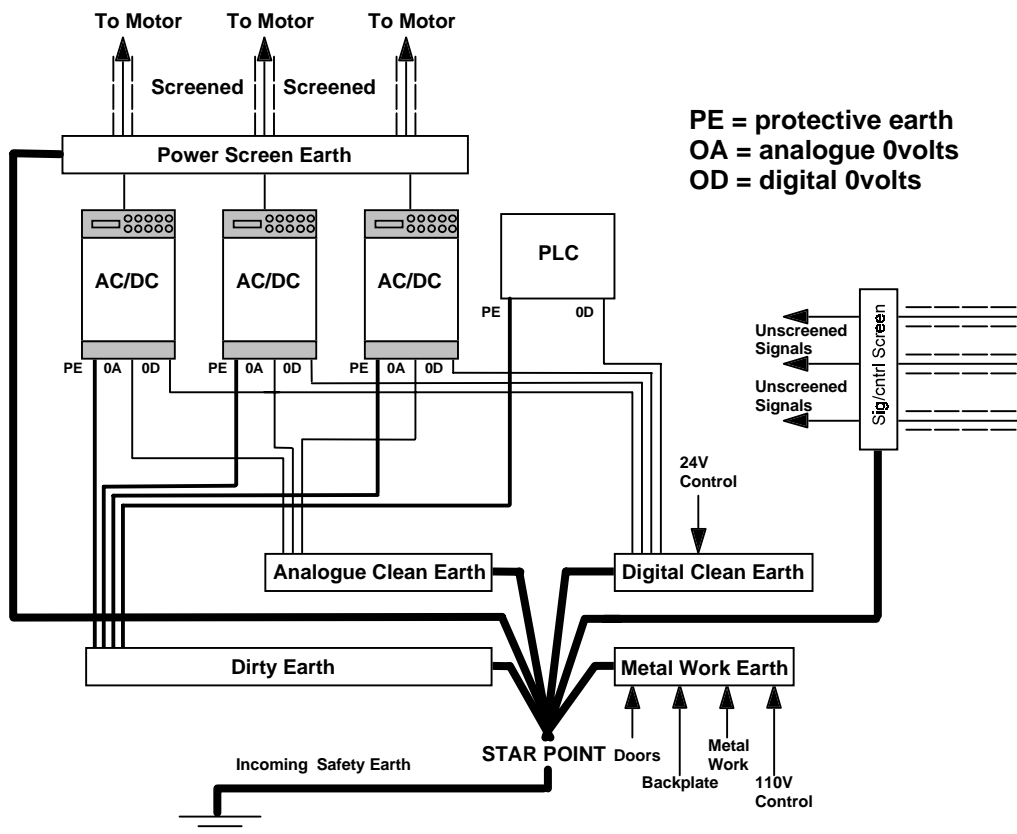
Cubicle Mount (582/583)

Reference should be made to EN60204 regarding earthing for cubicles. In addition, when more than one electrical product is fitted inside a cubicle care must be taken to ensure that noise flowing in the earth connection does not couple into other equipment. A star point earthing policy is strongly recommended separating noisy from quiet earths. Six earths can be identified as shown in figure E. The screens are terminated on the separate screen rails at the entrance to the cubicle using ‘U’ clips to achieve a near 360° screen bond.

Safety earthing always takes precedence over EMC earthing.

Refer to the separate Eurotherm Application manual entitled ‘EMC Installation Guidelines for modules and systems’, part number HA388879 for more information

Figure E: Cubicle Earthing Policy



EMC TECHNICAL SPECIFICATION

Table H Minimum EMC Immunity Performance when installed as recommended

Port	Phenomenon	Test Standard	Level	Criterion	Generic Standard
Enclosure Port	ESD RF Field(Q1/96)	IEC 801-2* IEC 801-3	8kV AD 10V/m,1kHz AM	Self Recovery No Change	EN50082-1 (1992), Draft prEN50082-2 (1992)
Power Ports	Fast Transient Burst	IEC 801-4	2kV	Self Recovery	
Signal & Control	Fast Transient Burst	IEC 801-4	2kV	Self Recovery	
Power Interfaces	Fast Transient Burst	IEC 801-4	2kV	Self Recovery	

* Only for wall mount product

Table I Maximum Emission Performance for 'CE' marked product with specified filters installed as recommended

Port	Phenomenon	Test Standard	Level	Generic Standard
Enclosure Port	Radiated	EN55011	Class B	EN50081-1 (1992)
Power Port	Conducted	EN55011	Class B*	EN50081-2 (1994)

* Achieved with up to 5m of motor cable.

The AC supply filters may be flash tested in circuit upto 2000V DC for 1 minute. Ensure all AC/DC drives and other equipment that may be damaged by such flash testing has been suitably isolated/removed/short circuited as applicable. Due to the internal capacitors between phase and earth, the DC voltage should be wound up slowly, to prevent excessive earth current. For similar reasons AC flash testing cannot be performed due to the excessive earth leakage current. Repeated flash testing on such units is not recommended as it may degrade the insulation.

EC Declaration of Conformity for EMC**EC DECLARATION OF CONFORMITY**

In accordance with the EEC Directive 89/336/EEC,
Article 10 and Annex 1, (EMC DIRECTIVE)

We Eurotherm Drives Ltd, address as below, declare under our sole responsibility that the
following electronic products

582, 583 & 5831

when installed, used and CE marked in accordance with the instructions in the product manual
(provided with each piece of equipment) using the specified EMC filters to which this
declaration refers is in conformity with the following standards:-

BSEN50081-1 (1992), BS EN50081-2 (1994)

BSEN50082-1 (1992) & draft prEN50082-2* (1992)

Following provisions of EEC-Directive
89/336/EEC with amendments 92/31/EEC and 93/68/EEC

8th December 1995

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Dr Martin Payn,
Conformance Officer
Eurotherm Drives Ltd

.....
Dr Dan Slattery,
Technical Director
Eurotherm Drives Ltd

.....
Date

* For information only

EUROTHERM DRIVES LIMITED

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Registered number: 1159876 England. Registered Office: Leonardslee, Lower Beeding, Horsham, West Sussex RH13 6PP

Manufacturers EMC Declaration



MANUFACTURERS EMC DECLARATION

In accordance with the EEC Directive 89/336/EEC,
Article 10 and Annex 1, (EMC DIRECTIVE)
We Eurotherm Drives Ltd, address as below, declare under our sole responsibility that the
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582, 583 & 5831

when installed and used in accordance with the instructions in the
product manual (provided with each piece of equipment) and using the
specified EMC filters to which this declaration refers is in conformity
with the following standards:-

BSEN50081-1 (1992), BSEN50081-2 (1994)
BSEN50082-1# (1992) & draft prEN50082-2# (1992)

29th April 1996

.....
Dr Martin Payn,
Conformance Officer
Eurotherm Drives Ltd

.....
Dr Dan Slattery,
Technical Director
Eurotherm Drives Ltd

.....
Date

Compliant with these immunity standards without specified EMC filters

EUROTHERM DRIVES LIMITED

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