Chapter 7

The European Directives and the 'CE' Mark

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Chapter 7 The European Directives and the 'CE' Mark

CEMEP

Until recently each European drives manufacturer and importer has been interpreting the EMC directive and 'CE' marking requirements differently. This has led to considerable confusion and frustration in the market place. To provide a unified approach, the European machines and drives manufactures, via their national trade associations have formed **the 'European Committee of Manufacturers of Electrical Machines and Power Electronics'**, termed CEMEP. This committee has produced a document entitled "Recommendations for Application of Power Drive Systems (PDS), European Council Directives - CE Marking and Technical Standardisation", which will be followed by all major European Drives manufacturer. A copy is available from your local trade association or from your local Eurotherm Drives office.

EMC DIRECTIVE

'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 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.

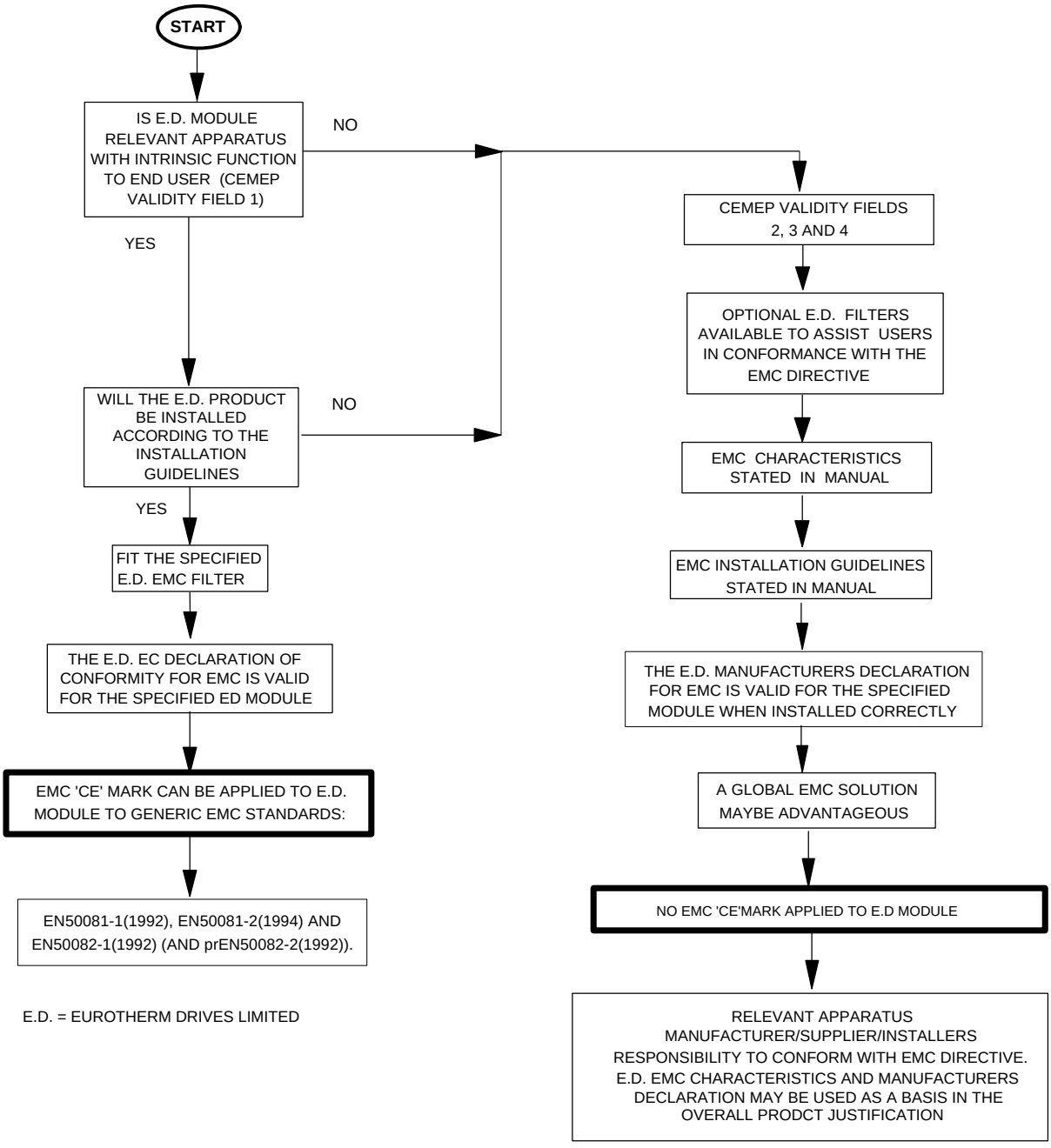
The validity of the 'CE' mark can be identified from the flowchart in figure 7.1, refer to SI No. 2372 for clarification of relevant apparatus.

To assist manufacturers/suppliers/installers of relevant apparatus, Eurotherms 620 Vector 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 and manufacturers EMC declaration 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 7.1 Eurotherm EMC 'CE' Mark Validity Chart



Consideration of EMC Environment

When considering the relevant EMC emission and immunity standards it is important to distinguish between the following classes of EMC environments:

	Residential, supplied directly from public electricity supply 		**Commercial and light industry, supplied directly from public electricity supply** 		**Industrial installation with a separate transformer station** 	
	RF emission	**Immunity**	**RF emission**	**Immunity**	**RF emission**	**Immunity**
Basic and Generic Standards	EN55011 (Class B) or EN50081-1(1992)	EN50082-1(1992) see below for referenced standards	EN55011 (Class B) or EN50081-1(1992)	EN50082-1(1992) see below for referenced standards	EN55011 (Class A) or EN50081-2(1994)	EN50082-2 (1992) see below for referenced standards
New EMC Product Standard (draft) for Power Drive Systems IEC-22G/31/FDIS+ (will become EN 61800-3)	Unrestricted distribution (CEMEP-1): < 25 A Class B > 25 A Class A Restricted distribution (CEMEP-2) Class A	see below ↓	EMC measures do not have to be implemented If interference in a neighbouring installation occurs, the operator is responsible for taking measures to prevent interference. In this case the required emission levels must be adhered to at the point of supply to the effected neighbouring installation.	see below ↓	EMC measures do not have to be implemented If interference in a neighbouring installation occurs, the operator is responsible for taking measures to prevent interference. In this case the required emission levels must be adhered to at the point of supply to the effected neighbouring installation.	see below ↓

Standards for immunity:

IEC801-2 (IEC1000-4-2*):	Electrostatic discharge (e.g. from electrostatically charged persons)
IEC801-3 (IEC1000-4-3/6*):	Electromagnetic fields (e.g. from portable telephones)
IEC801-4 (IEC1000-4-4*):	Fast electrical transients (burst) (e.g. from opening contacts in inductive circuits)
IEC801-5 (IEC1000-4-5):	Voltage surges (e.g. on local lightning strikes).

+ This new Product Standard Draft has not yet been finally passed and more important, is not EC approved. An EC Declaration of Conformity for EMC can only be issued with the approval of a "Competent Body". It is anticipated this standard will be officially released during Q 3/4 1996.

* New standards to be introduced in the near future

Fig. 7-2: EMC Emission and Immunity Standards applicable to 620 Vector drive modules and similar equipment

When using the generic EMC standards, the 'Residential, commercial and light industry' emission limits (Class B) are more stringent than the 'Industrial' (class A) limits, and so equipment which meets EN50081-1(1992) automatically meets EN50081-2(1994). Similarly, the 'Industrial' immunity requirements are more stringent than the 'Residential, commercial and light industry' requirements, and equipment which meets prEN50082-2(1992) automatically meets EN50082-1(1992).

More and more Product Specific standards are being released with less onerous EMC requirements than the Generic Standards. When the new EMC Drive Product Standard for Power Drive System (EN61800-3) becomes available (Q 3/4 1996), EMC filters will only be **mandatory** in 'residential' type EMC environments (if this is the most appropriate standard to use for demonstrating conformance of the relevant apparatus). EMC competent bodies are today using the draft EMC Drive Product Standard to demonstrate conformance using the technical construction file route. The EMC Drive Product Standard as CEMEP is discussed in more detail in the Eurotherm Application manual entitled 'EMC Installation Guidelines for modules and systems', part number HA388879, available from your local Eurotherm Drives office.

It is important for the customer to identify what EMC standards are to be applied to the final machine/system and in what EMC environment it will operate, so that any additional compliance costs can be minimised. It should be remembered that when two or more EMC compliant components are combined to form the final machine/system, the resulting machine/system may not be compliant. Emissions from combined components tend to be additive, whilst the immunity remains constant.

Filter Selection

620 Vector drive modules can be **'CE'** marked (as in CEMEP validity field 1) when used with the specified specially designed EMC filters to comply with the mains terminal limits of EN55011 Class B (or EN50081-1) as indicated previously, and when installed in accordance with the **EMC installation instructions** in this Product Manual (chapter 3). The Class B limit is the most stringent limit applied in Europe to date, and allows product to be used in either the 'residential, commercial and light industrial' or 'industrial' EMC environments. Refer to **Consideration of EMC environments**, in this chapter for more details. The specified EMC filters for the 620 Vector drive modules are summarised in table 3-3 in Chapter 3. The fitment of the specified EMC filter is **mandatory** where **'CE'** marking is applied.

If the customer is treating the 620 Vector drive module as a **component for supply to EMC competent professional assemblers** (CEMEP validity field 2)and is taking the EMC responsibility, then the filters are optional and may assist the customer in achieving EMC compliance. In this situation the customer may also achieve compliance by less expensive more global measures depending on the limits to be achieved, such as the use of a combination of global or local filtering and screening methods, natural mitigation through distance or use of distributed parasitic elements of the existing installation.

Filter Installation

The required EMC emission and immunity performance, and 'CE' marking of 620 Vector drive modules can only be achieved when the **EMC installation instructions** in Chapter 3 are adhered to.

Specification of Achievable EMC Emission and Immunity

620 Vector drive modules with the option to be **'CE'** marked meet the following EMC emission limits provided they are installed with the specified EMC filters for **'CE'** marking in accordance with the EMC installation instructions.

Port	Phenomenon	Basic standard	Level	Generic standard
Enclosure Port	radiated	EN55011 (1991)	Class B (cubicle mount)	EN50081-1 (1992)
			Class A (wall mount)	EN50081-2 (1994)
AC Power Port	conducted (with specified filter)	EN55011 (1991)	Class B	EN50081-1 (1992)
AC Power Port	conducted (**no filter**)	EN55011 (1991)	130dBµV @ 150kHz* (common mode) 130dBµV @ 150kHz* (differential mode) Reducing with frequency by 20dB/decade	

* 6kHz switching frequency, 50 metres screened motor cable.

All 620 Vector drive modules meet the following EMC immunity performance criteria as defined in prEN50082-2 (1992) when installed and used as recommended.

Port	Phenomenon	Test Standard	Level	Acceptance Criterion	Generic Standard
Enclosure Port	ESD RF Field	IEC 801-2* IEC 801-3	4 kV CD, 8 kV AD 10 V/m, 1 kHz AM	self recovery no change	EN50082-1 (1992) Draft prEN50082-2 (1992)
Power Ports	Fast Transient Burst, Surge	IEC 801-4, IEC 801-5	2 kV 1 kV (P-P), 2 kV (P-E) available early 1996	self recovery self recovery	
Signal & Control	Fast Transient Burst	IEC 801-4	2 kV	self recovery	
Power Interfaces	Fast Transient Burst	IEC 801-4	2 kV	self recovery	

* only for cubicle mount (wall mount available 1/96)

The EMC filters for 620 Vector drive modules may be flash tested in circuit up to DC 2850 V for 1 min Ensure all 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 is not recommended as it may degrade the insulation.

EMC Responsibility of MANUFACTURERS/SUPPLIERS/INSTALLERS

For end users of 620 Vector drive modules, a correctly installed power drive system (PDS) created from the supplied 620 Vector drive will be compliant with the generic emission standards EN50081-1(1992) & EN50081-2(1994) and for immunity EN50082-1(1992) & prEN50082-2(1992) as previously indicated. Manufacturers/suppliers/installers of relevant apparatus may use this compliance as a basis for their own justification of overall compliance with the EMC Directive.

If it is the responsibility of the manufacturer/supplier/installer to establish EMC conformity and to 'CE' mark. There are three methods of demonstrating conformity:

1) Self certification to a relevant standard

2) Third party testing to a relevant standard

3) Writing a technical construction file stating the technical rationale as to why the relevant apparatus is compliant. An EMC "competent body" must then assess this and issue a technical report or certificate to demonstrate compliance.

Upon demonstrating EMC compliance an EC-Declaration of Conformity for the apparatus or machine may be issued and a **'CE'** mark applied.

Professional end users with EMC expertise who are using drive modules and cubicle systems defined as components who supply, place on the market or install the relevant apparatus must take responsibility for demonstrating EMC conformance and applying the 'CE' mark and issuing an EC Declaration of Conformity.

Eurotherm Guide

More information is available in a separate Eurotherm Guide entitled “Short Form Overview of European Directives for Variable Speed Drives and Applications” part number HA389770 available from your local Eurotherm Drives office.

EC Declaration of Conformity for EMC

CE

EUROTHERM
DRIVES

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

620 Vector Drives

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

.....	.....	.....
Dr Martin Payn,	Dr Dan Slattery,	Date
Conformance Officer	Technical Director	
Eurotherm Drives Ltd	Eurotherm Drives Ltd	

* For information only

EUROTHERM DRIVES LIMITED
NEW COURTWICK LANE, LITTLEHAMPTON, WEST SUSSEX BN17 7PD
TELEPHONE: 01903 721311 FAX: 01903 723938
Registered number: 1159876 England. Registered Office: Leonardslee, Lower Beeding, Horsham, West Sussex RH13 6PP

Manufacturers EMC Declaration

EUROTHERM
DRIVES

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 following electronic products

620 Vector Drives

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)

.....	.....	.....
Dr Martin Payn,	Dr Dan Slattery,	Date
Conformance Officer	Technical Director	
Eurotherm Drives Ltd	Eurotherm Drives Ltd	

[#] Compliant with these immunity standards without specified EMC filters

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Machinery Directive

The MACHINERY DIRECTIVE requires **'CE'** marking of the complete machine. 620 Vector Drive modules are classified as components and therefore **'CE'** marking to the MACHINERY DIRECTIVE is not applicable. However a 'Manufacturers Declaration' (not to be confused with a 'Declaration of Incorporation') defining safety consideration may be required by some machine builders. For this reason the following declaration has been issued.

EUROTHERM
DRIVES

MANUFACTURERS DECLARATION

The following electronic products

620 Vector Drives

are components to be incorporated into machinery and may not be operated alone.

The complete machinery or installation using this equipment may only be put into service when the safety considerations of the Directive 89/392/EEC are fully adhered to.

Particular reference should be made to

EN60204-1 (Safety of Machinery - Electrical Equipment of Machines).

All instructions, warnings and safety relevant information of the Product Manual must also be adhered to.

.....	.....	.....
Dr Martin Payn, Conformance Officer Eurotherm Drives Ltd	Dr Dan Slattery, Technical Director Eurotherm Drives Ltd	Date

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Low Voltage Directive

Modules and Systems

The Low Voltage Directive 73/23/EEC as amended by 93/68/EEC implemented by S.I. 1989/728 requires ‘CE’ marking of applicable electrical items from 1/1/97.

Eurotherm Drives Ltd build to the standards required by the Low Voltage Directive.

Eurotherm Drives Modules

Eurotherm Drives Ltd will CE Mark new and existing modules to the Low Voltage Directive from the ‘compliance

Eurotherm Drives Systems

Eurotherm Drives Ltd will CE mark the manufactured system to the Low Voltage Directive when all the applicable specified components are available in compliance with the same Low Voltage Directive.