

Variable Speed Drives

Status of safety-related variable speed drives in regard to the EC Machinery Directive 2006/42/EC



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Background

The revised Machinery Directive (2006/42/EC) gives a broader definition of a safety component than its predecessor - it also provides an indicative list of safety components (Annex V) and lists certain safety components (see Annex IV) that require specific conformity assessment procedures. Meanwhile, manufacturers of electronic variable speed drives are increasingly offering safety-related control functions in their products, resulting in the following questions being asked:

- Does a variable speed drive with safety functions fall within the definition of “safety component” according to Directive 2006/42/EC, and if so, does it fall within one of the categories listed in Annex IV?
- What is the status of a variable speed drive which offers safety functions as an option through the addition of a module which is available for sale separately?
- What requirements apply with regard to an EC Declaration of Conformity and CE marking?

Terminology

The term “Power Drive System” (PDS) was introduced by the EN 61800 series of standards to refer to a variable speed drive with its associated motor and peripheral equipment. Within this series the EN 61800-5-2:2007 harmonised standard applies to a PDS(SR), which is essentially a PDS with the safety-related capability to perform one or more safety functions. The basic electronic drive in a PDS is referred to as the Basic Drive Module (BDM), which is more generally called a variable speed drive. So in relation to a PDS(SR), the BDM will be referred to as a “safety-related variable speed drive” in this document.

A safety-related variable speed drive can be implemented in various ways, as outlined in the following situations:

- a) If the variable speed drive offers integral safety functions, then the entire drive is a safety component.
- b) If the variable speed drive does not offer integral safety functions, but an optional safety module is available that provides safety functions, then the optional safety module is a safety component.
- c) If the variable speed drive offers integral safety functions and an optional safety module is available that provides additional safety functions, then both items are safety components.

Position - Summary

- A safety-related variable speed drive¹ is a safety component within the meaning of Directive 2006/42/EC. Furthermore, some safety-related variable speed drives¹ may be considered “Logic units to ensure safety functions” according to Annex IV of Directive 2006/42/EC (see section (d) in the annex to this document).
- A safety-related variable speed drive¹ requires both an EC Declaration of Conformity (DoC) and CE marking in accordance with Directive 2006/42/EC.

The justification for the above position is given in the Annex to this document.

¹ Or an “optional safety module” as set out in b) and c) of the preceding paragraph.

Annex - Justification

(a) Safety Component

Article 2(c) gives the following definition of a safety component:

‘Safety component’ means a component:

1. which serves to fulfil a safety function,
2. which is independently placed on the market,
3. the failure and/or malfunction of which endangers the safety of persons, and
4. which is not necessary in order for the machinery to function, or for which normal components may be substituted in order for the machinery to function

For either a variable speed drive with integral safety functions, or an optional safety module for use with a variable speed drive, points 1 to 3 are clearly satisfied. The fact that either of these variants might also perform normal operational functions in addition to its specific safety function(s) does not compromise compliance with point 1.

In relation to point 4:

- a) For a variable speed drive with integral safety functions, the entire drive satisfies the second alternative in point 4 because it could be completely replaced by an ordinary variable speed drive in order for the machinery to function.
- b) For a variable speed drive in which all safety functions are provided by an optional safety module, the optional safety module satisfies the first alternative in point 4 because it is not necessary in order for the machinery to function.

(Note: In this situation the variable speed drive is not a safety component, but the optional safety module is a safety component).

Note that the list of safety components in Annex V of the Directive is indicative only, so the absence of a safety-related variable speed drive does not mean that it is not a safety component. Furthermore, it is probable that the broad classification of “logic units to ensure safety functions” in Annex V of the Directive (and also Annex IV of the Directive - see section (d) of this document) would be considered to include a safety-related variable speed drive.

(b) EC Declaration of Conformity and CE marking

A safety-related variable speed drive is a safety component within the meaning of Directive 2006/42/EC. It therefore requires both an EC Declaration of Conformity (DoC) and CE marking in accordance with Directive 2006/42/EC. A manufacturer can of course decide not to market their product as a safety component according to Directive 2006/42/EC, in which case it can only be regarded as an ‘ordinary’ variable speed drive that is unsuitable for implementing safety functions.

A safety-related variable speed drive can offer a variety of safety functions, as well as non-safety functions. In some cases, the manufacturer may choose to list the safety functions on the DoC, but regardless of this, full details, specifications and instructions for use for each of these safety functions must be provided in the user documentation.

(c) Declaration of Incorporation

As explained in (b) above, a safety-related variable speed drive is a safety component within the meaning of Directive 2006/42/EC and therefore requires an EC Declaration of Conformity (DoC). A Declaration of Incorporation is therefore not appropriate.

(d) Conformity Assessment procedures

Article 12 specifies conformity assessment procedures for Directive 2006/42/EC.

If a safety-related variable speed drive is not considered to fall within one of the categories (e.g. “logic units to ensure safety functions”) listed in Annex IV of the Directive, then the manufacturer shall apply the procedure for assessment of conformity with internal checks on the manufacture of machinery described in Annex VIII of the Directive (often referred to as self-certification). In this case, the safety-related variable speed drive shall not have an EC type-examination Certificate, but this does not preclude the manufacturer from offering some other form of independent certification or assessment report.

If the safety-related variable speed drive is considered to fall within one of the categories (e.g. “logic units to ensure safety functions”) listed in Annex IV of the Directive, then the manufacturer shall apply one of the procedures referred to in Article 12(3) or (4) of the Directive:

- If the EC type-examination procedure provided for in Annex IX is applied, then the manufacturer shall obtain an EC type-examination certificate and shall also undertake the internal checks on the manufacture of machinery provided for in Annex VIII, point 3 of the Directive.
- However, if the safety-related variable speed drive is manufactured in accordance with a suitable harmonised standard that is listed in the Official Journal and which covers - by itself or in conjunction with its normative references - all relevant essential health and safety requirements, then the manufacturer can apply the procedure for assessment of conformity with internal checks on the manufacture of machinery provided for in Annex VIII of the Directive (often referred to as self-certification), and an EC type-examination certificate is not required. Although harmonised standard EN 61800-5-2 can be used for this purpose in many cases, in some circumstances it might not cover all relevant essential health and safety requirements.
- A 3rd option “Full Quality Assurance” is provided for in Annex X of the Directive, but this is rarely used.

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