

INTERNATIONAL STANDARD



**Low-voltage switchgear and controlgear – Controller-device interfaces (CDIs) –
Part 1: General rules**

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INTERNATIONAL STANDARD



**Low-voltage switchgear and controlgear – Controller-device interfaces (CDIs) –
Part 1: General rules**

INTERNATIONAL
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CONTROLLER-DEVICE INTERFACES (CDIs) –****Part 1: General rules****FOREWORD**

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International Standard IEC 62026-1 has been prepared by subcommittee 121A: Low-voltage switchgear and controlgear, of IEC technical committee 121: Switchgear and controlgear and their assemblies for low voltage.

This third edition cancels and replaces the second edition published in 2007. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) additional requirements for safety information and instructions, including the measures to be taken, if any, for achieving EMC compliance;
- b) EMC immunity requirements aligned with current IEC 61000-6 series of standards. Radiated radio-frequency electromagnetic fields test level increased to 6 GHz;
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The text of this International Standard is based on the following documents:

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121A/280/FDIS	121A/295/RVD

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This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of the IEC 62026, under the general title *Low-voltage switchgear and controlgear – Controller-device interfaces (CDIs)*, can be found on the IEC website.

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INTRODUCTION

The class of controller-device interfaces (CDIs) covered in this document includes industrial CDIs for control systems, factory automation and process automation.

Industrial CDIs have proliferated to meet specific user needs, but no single CDI meets all needs. The reason for multiple solutions is the wide range of physical, usage, information content and configuration requirements. The physical requirements have resulted in CDIs with widely differing signal and line conditioning mechanisms in order to meet distance, node count and environmental considerations.

While there is wide variation in CDI technologies, there are common components, interfaces and environmental requirements that are specified by this document. Standardized definitions of these common CDI requirements assist the user in comparing and selecting technologies to match the distance, node count, throughput and installation requirements for a specific application.

This document simplifies the CDI selection process by providing a common structure for generating a specific CDI's IEC standard while also allowing specific interface features and capabilities to be included. Clauses 4 to 8 contain the outline of general requirements that the CDI's IEC standard identifies. Clause 9 contains the test specification.

Standardization of CDI aspects also simplifies the task of writing the software for the higher layer functions of industrial control systems, such as supervisory control, operator interface and control strategy programming.

For this document to be complete and usable, it requires the availability of specific CDI standards, which make up the other parts of the IEC 62026 series.

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR – CONTROLLER-DEVICE INTERFACES (CDIs) –

Part 1: General rules

1 Scope

This part of IEC 62026 applies to interfaces between low-voltage switchgear, controlgear, and controllers (e.g. programmable controllers, personal computers, etc.).

This document does not apply to higher level industrial communication networks that have become known as fieldbuses and are considered by IEC subcommittee 65C.

The purpose of this document is to harmonize and define rules, components and requirements of a general nature applicable to industrial CDIs. Those features of the various CDI standards which can be considered as general have therefore been brought together in this document.

For each CDI, two main documents are necessary to determine all requirements and tests:

- a) this document, referred to as “IEC 62026-1” in the relevant CDI parts covering the various types of CDIs;
- b) the specific CDI part of the IEC 62026 series.

A specific CDI part may omit a general requirement if it is not applicable, or it may add to it if it is inadequate in the particular case, ~~but it should not deviate from the requirement unless there is substantial technical justification.~~

NOTE Product-specific requirements for products incorporating a CDI are given in the relevant product standards. These requirements apply in addition to those given in this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60947-1:2007, *Low-voltage switchgear and controlgear – Part 1: General rules*
IEC 60947-1:2007/AMD1:2010
IEC 60947-1:2007/AMD2:2014

IEC 61000-4-2:1995/2008, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*
~~Amendment 1 (1998)~~
~~Amendment 2 (2000)~~

IEC 61000-4-3:2006, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*
IEC 61000-4-3:2006/AMD1:2007
IEC 61000-4-3:2006/AMD2:2010

IEC 61000-4-4:2004/2012, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

IEC 61000-4-5:~~2005~~2014, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*
IEC 61000-4-5:2014/AMD1:2017

IEC 61000-4-6:~~2003~~2013, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*
~~Amendment 1 (2004)~~
~~Amendment 2 (2006)~~

IEC 61000-6-2:~~2005~~2016, *Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity standard for industrial environments*

CISPR 11:~~2003~~2015, *Industrial, scientific and medical (ISM) ~~radio-frequency~~ equipment – ~~Electromagnetic~~ Radio-frequency disturbance characteristics – Limits and methods of measurement*
~~Amendment 1 (2004)~~
~~Amendment 2 (2006)~~
CISPR 11:2015/AMD1:2016

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org.obp>

3.1

change of state

process of data exchange which occurs only when a device's or controller's data changes state according to specific change criteria

3.2

controller

programmable controller, personal computer or equivalent computing hardware in which the software controlling the application or process runs

3.3

controller-device communication medium

means (such as two or more wires or fibre optic cable) utilized by devices or controllers to transfer data to other devices or controllers

Note 1 to entry: A CDI that has "power on the communication medium" architecture uses two wires that also distribute power within the CDI.

3.4

controller-device interface

CDI

arrangement of nodes and their interconnections that transport information between controllers and devices in an industrial control system

Note 1 to entry: This note applies to the French language only.

3.5

CDI component

device, controller or other component for which the requirements are specified in a CDI part

3.6

CDI power supply

power supply with characteristics and parameters suitable for the CDI's functionality and capability

3.7

CDI power distribution medium

inter-connecting means used to transfer power within a CDI

Note 1 to entry: In the case of a CDI that has "power on the communication medium" architecture, the CDI power distribution medium also transfers data within the CDI.

3.8

device

physical unit containing application elements and that may contain communication elements

EXAMPLE Control circuit device (see 2.2.16 of IEC 60947-1:2007), presence sensing device, pressure sensing device, actuator, annunciator, operator terminal, motor controller, current sensor, valve control, data logger, bar-code scanner, push-button, pilot light, etc.

3.9

device profile

representation of device functionality available to the CDI

3.10

multicast

process of data exchange which occurs when a device or controller produces one message to multiple devices and/or controllers for their appropriate action

3.11

polling

process of data exchange which occurs when a device or a controller sends data to, or requests data from, a specific device or controller

Note 1 to entry: The receiving device responds to the polling by acting according to the data it receives or by returning its status data. When this transaction is completed, the device polls the next device in a predetermined sequence.

3.12

strobing

~~process of data exchange which occurs when a device or a controller sends a single request for data from one or more devices and/or controllers~~

~~NOTE Each device receiving the message then responds with its requested data in a predetermined sequence.~~

3.12

port

particular interface of the specified apparatus with the external electromagnetic environment

Note 1 to entry: See Figure 17 of IEC 60947-1:2007 for examples of ports.

[SOURCE: IEC 60947-1:2007, 2.7.1]

4 Classifications

This clause in the specific CDI parts shall list the classifications below, where applicable, with appropriate details:

- CDI components;
- interfaces;

- topology;
- information exchanges;
- attributes.

5 Characteristics

~~This clause in the specific CDI parts shall list the applicable characteristics described below with appropriate details.~~

5.1 CDI components

Specific CDI parts shall specify requirements for the devices, controllers and other components that may be used.

5.2 Interfaces

Specific CDI parts shall include information on the following, if applicable:

- procedural, such as what needs to happen first, second, etc., when the interface system powers up and down, and establishes and terminates data exchange across the interface;
- information exchanges, such as what a device is requested to do across an interface;

EXAMPLE 1 Polling, change of state.

- services and protocol, i.e. the message structure and content that crosses the interface;

EXAMPLE 2 Peer-to-peer, master-slave.

- device and controller behaviour as viewed from the CDI;
- mechanical, i.e. the shape, construction, pin size, etc.;
- electrical, such as the voltage, current and timing of the bit levels on the CDI;
- functional, i.e. what interface connections provide which functions.

5.3 Topology

Specific CDI parts shall specify the topologies that may be used.

EXAMPLE Daisy chain, star, tree, trunk/drop.

5.4 Information exchanges

Specific CDI parts shall specify the information exchanges that may be used.

5.5 Attributes

Specific CDI parts shall specify the applicable attribute values, including, as a minimum:

- data transmission rate (in bits per second);
- maximum length of communication medium or end to end distance;
- message length for single transmission;

EXAMPLE 4 bits, 8 bytes.

- maximum node count per system;

and other information to support the evaluation of the transmission time of the CDI.

6 Product information

6.1 Instructions for installation, operation and maintenance

The manufacturer shall specify in the documents or catalogues, the conditions for installation, operation and maintenance of the CDI components.

When relevant, safety information and instructions shall be provided in order to achieve the safe use of the CDI. Such information shall be easily understood by the user, for example in the form of commonly used symbols and/or drawings. The instructions shall also specify the measures to be taken, if any, for achieving EMC compliance as described in 8.2.

6.2 Profiles

Devices and controllers shall be marked with, or shall include in the instructions for operation, the identification of the device profile(s) supported.

6.3 Marking

CDI components shall be marked as follows:

- a) manufacturer's name or trade mark;
- b) type designation or other marking which makes it possible to identify the CDI component and to get the relevant information from the manufacturer or his catalogue;
- c) reference to the relevant CDI parts;
- d) any additional marking required by the relevant CDI parts.

For CDI components that do not have the physical space to accommodate the required markings, the information shall be provided on a label or in the manufacturer's documentation.

6.4 Degree of protection

The manufacturer shall state the degree of protection according to Annex C of IEC 60947-1:2007 and IEC 60947-1:2007/AMD1:2010.

7 Normal service, mounting and transport conditions

7.1 General

The following requirements given in 7.2, 7.3 and 7.4 shall be met for all CDI components.

NOTE If the conditions for operation differ from those given in this document or by the manufacturer, the user should state the deviation from the standard conditions and acquire an agreement with the manufacturer on the suitability for use under such conditions. Information given in the manufacturer's catalogue may take the place of such an agreement.

7.2 Normal service conditions

7.2.1 General

~~All CDI components shall be designed and used according to the relevant CDI parts.~~

CDI components shall be selected to meet expected environmental conditions.

7.2.2 Ambient air temperature

~~The operating characteristics of all CDI components shall be maintained at least over the~~ CDI components shall operate as intended within an ambient air temperature range of -5 °C to +40 °C.

7.2.3 Altitude

CDI components shall be capable of operating at altitudes of up to 2 000 m.

NOTE For CDI components intended to be used at higher altitudes, ~~it is necessary to take into account~~ both the reduction of the dielectric strength and the cooling effect of air shall be considered.

7.2.4 Climatic conditions

7.2.4.1 Humidity

CDI components shall be capable of operating ~~correctly~~ as intended at +40 °C with a relative air humidity of 50 % and with higher relative humidity at lower temperatures, for example 90 % at +20 °C. Special measures may be necessary in cases of occasional condensation due to variations in temperature.

7.2.4.2 Pollution degree

Unless otherwise stated by the manufacturer, CDI components shall be intended for installation under environmental conditions of pollution degree 3, as defined in 6.1.3.2 of IEC 60947-1:2007. However, other pollution degrees may apply, depending upon the micro-environment.

7.3 Conditions during transport and storage

A special agreement shall be made between user and manufacturer if the conditions during transport and storage, for example temperature and humidity, differ from those defined in 7.2. Otherwise, the following temperature range applies during transport and storage: between -25 °C and +55 °C and, for short periods not exceeding 24 h, up to +70 °C.

7.4 Mounting

Mounting dimensions and conditions of the CDI components shall be specified in the specific CDI parts or, if not specified, shall be stated in the manufacturer's instructions.

8 Constructional and performance requirements

8.1 General

All products incorporating a CDI shall comply with their relevant product standards in addition to this document.

The constructional and performance requirements shall be specified in the specific CDI parts. Requirements shall be specified for

- power supply;
- device;
- controller;
- electromechanical components;
- communication medium.

The requirements shall include but are not limited to

- general requirements;
- connections and ports;
- functions of the device or controller during initiating, sending, receiving and responding to messages, I/O configuration and diagnostic messages;
- electromagnetic compatibility (EMC).

8.2 Electromagnetic compatibility (EMC)

8.2.1 Immunity

CDIs shall meet the minimum requirements given in Table 1, except where a different test level is given and justified in the specific CDI parts.

Table 1 – Immunity requirements

Type of test	Reference standard	Test levels (where applicable)	Performance criterion
Electrostatic discharges	IEC 61000-4-2:2008	8 kV / air discharge 4 kV / contact discharge	B
Radiated radio-frequency electromagnetic fields (80 MHz to 1 GHz and 1,4 GHz to 2,0 GHz)	IEC 61000-4-3:2006	10 V/m	A
Radiated radio-frequency electromagnetic fields (1,4 GHz to 6 GHz)	IEC 61000-4-3:2006	3 V/m	A
Electrical fast transients/bursts	IEC 61000-4-4:2012	1 kV/5 kHz for all cables that contain CDI communication media. 2 kV/5 kHz for all other cables and ports.	B
Surges (1,2/50 µs – 8/20 µs)	IEC 61000-4-5:2014 and IEC 61000-4- 5:2014/AMD1:2017	2 kV (AC mains line-to-earth) 1 kV (AC mains line-to-line)	B
Conducted radio-frequency disturbances (150 kHz to 80 MHz)	* IEC 61000-4-6:2013	10 V	A
Voltage dips and interruptions	-	See specific CDI parts	-

Performance criteria and specified limits shall be given in the specific CDI parts using the general performance criteria of IEC 61000-6-2.

8.2.2 Emission

CDIs shall meet the requirements given in CISPR 11:2015 and CISPR 11:2015/AMD1:2016 for class A, group 1.

These requirements apply to CDIs exclusively used in an industrial environment. When they may be used in a non-industrial environment, the following warning shall be included in the instructions for use:

Attention

This is a class A product. In a non-industrial environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

8.2.3 EMC tests

Electromagnetic compatibility tests shall be made in accordance with 9.3.

9 Tests**9.1 General**

Tests shall be made to verify compliance with the requirements of this document.

9.2 Type tests

Type tests are intended to verify compliance to this document. Where applicable, they shall include:

- power supply;
- device;
- controller;
- electromechanical components;
- communication medium.

They shall include, as appropriate, the verification of

- general requirements;
- connections and ports;
- functions of the device or controller during initiating, sending, receiving and responding to messages, I/O configuration and diagnostic messages;
- electromagnetic compatibility (EMC).

9.3 Electromagnetic compatibility

The specific CDI parts shall detail the test methods and test set-ups.

Emission and immunity tests are type tests and shall be carried out under representative conditions, both operational and environmental, using the manufacturer's instructions for installation.

The tests shall be carried out in accordance with the reference EMC standards. However, the specific CDI parts shall specify any additional measures necessary to verify the performance.

Bibliography

IEC 61000-6 (all parts), *Electromagnetic compatibility (EMC) – Part 6: Generic standards*

IEC 62026 (all parts), *Low-voltage switchgear and controlgear – Controller-device interfaces (CDIs)*

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NORME INTERNATIONALE

**Low-voltage switchgear and controlgear – Controller-device interfaces (CDIs) –
Part 1: General rules**

**Appareillage à basse tension – Interfaces appareil de commande-appareil (CDI) –
Partie 1: Règles générales**

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INTRODUCTION

The class of controller-device interfaces (CDIs) covered in this document includes industrial CDIs for control systems, factory automation and process automation.

Industrial CDIs have proliferated to meet specific user needs, but no single CDI meets all needs. The reason for multiple solutions is the wide range of physical, usage, information content and configuration requirements. The physical requirements have resulted in CDIs with widely differing signal and line conditioning mechanisms in order to meet distance, node count and environmental considerations.

While there is wide variation in CDI technologies, there are common components, interfaces and environmental requirements that are specified by this document. Standardized definitions of these common CDI requirements assist the user in comparing and selecting technologies to match the distance, node count, throughput and installation requirements for a specific application.

This document simplifies the CDI selection process by providing a common structure for generating a specific CDI's IEC standard while also allowing specific interface features and capabilities to be included. Clauses 4 to 8 contain the outline of general requirements that the CDI's IEC standard identifies. Clause 9 contains the test specification.

Standardization of CDI aspects also simplifies the task of writing the software for the higher layer functions of industrial control systems, such as supervisory control, operator interface and control strategy programming.

For this document to be complete and usable, it requires the availability of specific CDI standards, which make up the other parts of the IEC 62026 series.

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LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR – CONTROLLER-DEVICE INTERFACES (CDIs) –

Part 1: General rules

1 Scope

This part of IEC 62026 applies to interfaces between low-voltage switchgear, controlgear, and controllers (e.g. programmable controllers, personal computers, etc.).

This document does not apply to higher level industrial communication networks that have become known as fieldbuses and are considered by IEC subcommittee 65C.

The purpose of this document is to harmonize and define rules, components and requirements of a general nature applicable to industrial CDIs. Those features of the various CDI standards which can be considered as general have therefore been brought together in this document.

For each CDI, two main documents are necessary to determine all requirements and tests:

- a) this document, referred to as “IEC 62026-1” in the relevant CDI parts covering the various types of CDIs;
- b) the specific CDI part of the IEC 62026 series.

A specific CDI part may omit a general requirement if it is not applicable, or it may add to it if it is inadequate in the particular case.

NOTE Product-specific requirements for products incorporating a CDI are given in the relevant product standards. These requirements apply in addition to those given in this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60947-1:2007, *Low-voltage switchgear and controlgear – Part 1: General rules*
IEC 60947-1:2007/AMD1:2010
IEC 60947-1:2007/AMD2:2014

IEC 61000-4-2:2008, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

IEC 61000-4-3:2006, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*
IEC 61000-4-3:2006/AMD1:2007
IEC 61000-4-3:2006/AMD2:2010

IEC 61000-4-4:2012, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

IEC 61000-4-5:2014, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*
IEC 61000-4-5:2014/AMD1:2017

IEC 61000-4-6:2013, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-6-2:2016, *Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity standard for industrial environments*

CISPR 11:2015, *Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement*
CISPR 11:2015/AMD1:2016

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

change of state

process of data exchange which occurs only when a device's or controller's data changes state according to specific change criteria

3.2

controller

programmable controller, personal computer or equivalent computing hardware in which the software controlling the application or process runs

3.3

controller-device communication medium

means (such as two or more wires or fibre optic cable) utilized by devices or controllers to transfer data to other devices or controllers

Note 1 to entry: A CDI that has "power on the communication medium" architecture uses two wires that also distribute power within the CDI.

3.4

controller-device interface

CDI

arrangement of nodes and their interconnections that transport information between controllers and devices in an industrial control system

Note 1 to entry: This note applies to the French language only.

3.5

CDI component

device, controller or other component for which the requirements are specified in a CDI part

3.6

CDI power supply

power supply with characteristics and parameters suitable for the CDI's functionality and capability

3.7

CDI power distribution medium

inter-connecting means used to transfer power within a CDI

Note 1 to entry: In the case of a CDI that has "power on the communication medium" architecture, the CDI power distribution medium also transfers data within the CDI.

3.8

device

physical unit containing application elements and that may contain communication elements

EXAMPLE Control circuit device (see 2.2.16 of IEC 60947-1:2007), presence sensing device, pressure sensing device, actuator, annunciator, operator terminal, motor controller, current sensor, valve control, data logger, bar-code scanner, push-button, pilot light, etc.

3.9

device profile

representation of device functionality available to the CDI

3.10

multicast

process of data exchange which occurs when a device or controller produces one message to multiple devices and/or controllers for their appropriate action

3.11

polling

process of data exchange which occurs when a device or a controller sends data to, or requests data from, a specific device or controller

Note 1 to entry: The receiving device responds to the polling by acting according to the data it receives or by returning its status data. When this transaction is completed, the device polls the next device in a predetermined sequence.

3.12

port

particular interface of the specified apparatus with the external electromagnetic environment

Note 1 to entry: See Figure 17 of IEC 60947-1:2007 for examples of ports.

[SOURCE: IEC 60947-1:2007, 2.7.1]

4 Classifications

This clause in the specific CDI parts shall list the classifications below, where applicable, with appropriate details:

- CDI components;
- interfaces;
- topology;
- information exchanges;
- attributes.

5 Characteristics

5.1 CDI components

Specific CDI parts shall specify requirements for the devices, controllers and other components that may be used.

5.2 Interfaces

Specific CDI parts shall include information on the following, if applicable:

- procedural, such as what needs to happen first, second, etc., when the interface system powers up and down, and establishes and terminates data exchange across the interface;
- information exchanges, such as what a device is requested to do across an interface;

EXAMPLE 1 Polling, change of state.

- services and protocol, i.e. the message structure and content that crosses the interface;

EXAMPLE 2 Peer-to-peer, master-slave.

- device and controller behaviour as viewed from the CDI;
- mechanical, i.e. the shape, construction, pin size, etc.;
- electrical, such as the voltage, current and timing of the bit levels on the CDI;
- functional, i.e. what interface connections provide which functions.

5.3 Topology

Specific CDI parts shall specify the topologies that may be used.

EXAMPLE Daisy chain, star, tree, trunk/drop.

5.4 Information exchanges

Specific CDI parts shall specify the information exchanges that may be used.

5.5 Attributes

Specific CDI parts shall specify the applicable attribute values, including, as a minimum:

- data transmission rate (in bits per second);
- maximum length of communication medium or end to end distance;
- message length for single transmission;

EXAMPLE 4 bits, 8 bytes.

- maximum node count per system;

and other information to support the evaluation of the transmission time of the CDI.

6 Product information

6.1 Instructions for installation, operation and maintenance

The manufacturer shall specify in the documents or catalogues, the conditions for installation, operation and maintenance of the CDI components.

When relevant, safety information and instructions shall be provided in order to achieve the safe use of the CDI. Such information shall be easily understood by the user, for example in the form of commonly used symbols and/or drawings. The instructions shall also specify the measures to be taken, if any, for achieving EMC compliance as described in 8.2.

6.2 Profiles

Devices and controllers shall be marked with, or shall include in the instructions for operation, the identification of the device profile(s) supported.

6.3 Marking

CDI components shall be marked as follows:

- a) manufacturer's name or trade mark;
- b) type designation or other marking which makes it possible to identify the CDI component and to get the relevant information from the manufacturer or his catalogue;
- c) reference to the relevant CDI part;
- d) any additional marking required by the relevant CDI part.

For CDI components that do not have the physical space to accommodate the required markings, the information shall be provided on a label or in the manufacturer's documentation.

6.4 Degree of protection

The manufacturer shall state the degree of protection according to Annex C of IEC 60947-1:2007 and IEC 60947-1:2007/AMD1:2010.

7 Normal service, mounting and transport conditions

7.1 General

The requirements given in 7.2, 7.3 and 7.4 shall be met for all CDI components.

If the conditions for operation differ from those given in this document or by the manufacturer, the user should state the deviation from the standard conditions and acquire an agreement with the manufacturer on the suitability for use under such conditions. Information given in the manufacturer's catalogue may take the place of such an agreement.

7.2 Normal service conditions

7.2.1 General

CDI components shall be selected to meet expected environmental conditions.

7.2.2 Ambient air temperature

CDI components shall operate as intended within an ambient air temperature range of -5 °C to +40 °C.

7.2.3 Altitude

CDI components shall be capable of operating at altitudes of up to 2 000 m.

For CDI components intended to be used at higher altitudes, both the reduction of the dielectric strength and the cooling effect of air shall be considered.

7.2.4 Climatic conditions

7.2.4.1 Humidity

CDI components shall be capable of operating as intended at +40 °C with a relative air humidity of 50 % and with higher relative humidity at lower temperatures, for example 90 % at +20 °C. Special measures may be necessary in cases of occasional condensation due to variations in temperature.

7.2.4.2 Pollution degree

Unless otherwise stated by the manufacturer, CDI components shall be intended for installation under environmental conditions of pollution degree 3, as defined in 6.1.3.2 of IEC 60947-1:2007. However, other pollution degrees may apply, depending upon the micro-environment.

7.3 Conditions during transport and storage

A special agreement shall be made between user and manufacturer if the conditions during transport and storage, for example temperature and humidity, differ from those defined in 7.2. Otherwise, the following temperature range applies during transport and storage: between $-25\text{ }^{\circ}\text{C}$ and $+55\text{ }^{\circ}\text{C}$ and, for short periods not exceeding 24 h, up to $+70\text{ }^{\circ}\text{C}$.

7.4 Mounting

Mounting dimensions and conditions of the CDI components shall be specified in the specific CDI parts or, if not specified, shall be stated in the manufacturer's instructions.

8 Constructional and performance requirements

8.1 General

All products incorporating a CDI shall comply with their relevant product standards in addition to this document.

The constructional and performance requirements shall be specified in the specific CDI parts. Requirements shall be specified for

- power supply;
- device;
- controller;
- electromechanical components;
- communication medium.

The requirements shall include but are not limited to

- general requirements;
- connections and ports;
- functions of the device or controller during initiating, sending, receiving and responding to messages, I/O configuration and diagnostic messages;
- electromagnetic compatibility (EMC).

8.2 Electromagnetic compatibility (EMC)

8.2.1 Immunity

CDIs shall meet the minimum requirements given in Table 1, except where a different test level is given and justified in the specific CDI parts.

Table 1 – Immunity requirements

Type of test	Reference standard	Test levels (where applicable)	Performance criterion
Electrostatic discharges	IEC 61000-4-2:2008	8 kV / air discharge 4 kV / contact discharge	B
Radiated radio-frequency electromagnetic fields (80 MHz to 1 GHz)	IEC 61000-4-3:2006	10 V/m	A
Radiated radio-frequency electromagnetic fields (1,4 GHz to 6 GHz)	IEC 61000-4-3:2006	3 V/m	A
Electrical fast transients/bursts	IEC 61000-4-4:2012	1 kV/5 kHz for all cables that contain CDI communication media. 2 kV/5 kHz for all other cables and ports.	B
Surges (1,2/50 μ s – 8/20 μ s)	IEC 61000-4-5:2014 and IEC 61000-4-5:2014/AMD1:2017	2 kV (AC mains line-to-earth) 1 kV (AC mains line-to-line)	B
Conducted radio-frequency disturbances (150 kHz to 80 MHz)	IEC 61000-4-6:2013	10 V	A
Voltage dips and interruptions	-	See specific CDI parts	-

Performance criteria and specified limits shall be given in the specific CDI parts using the general performance criteria of IEC 61000-6-2.

8.2.2 Emission

CDIs shall meet the requirements given in CISPR 11:2015 and CISPR 11:2015/AMD1:2016 for class A, group 1.

These requirements apply to CDIs exclusively used in an industrial environment. When they may be used in a non-industrial environment, the following warning shall be included in the instructions for use:

Attention This is a class A product. In a non-industrial environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

8.2.3 EMC tests

Electromagnetic compatibility tests shall be made in accordance with 9.3.

9 Tests

9.1 General

Tests shall be made to verify compliance with the requirements of this document.

9.2 Type tests

Type tests are intended to verify compliance to this document. Where applicable, they shall include:

- power supply;
- device;
- controller;
- electromechanical components;
- communication medium.

They shall include, as appropriate, the verification of

- general requirements;
- connections and ports;
- functions of the device or controller during initiating, sending, receiving and responding to messages, I/O configuration and diagnostic messages;
- electromagnetic compatibility (EMC).

9.3 Electromagnetic compatibility

The specific CDI parts shall detail the test methods and test set-ups.

Emission and immunity tests are type tests and shall be carried out under representative conditions, both operational and environmental, using the manufacturer's instructions for installation.

The tests shall be carried out in accordance with the reference EMC standards. However, the specific CDI parts shall specify any additional measures necessary to verify the performance.

Bibliography

IEC 61000-6 (all parts), *Electromagnetic compatibility (EMC) – Part 6: Generic standards*

IEC 62026 (all parts), *Low-voltage switchgear and controlgear – Controller-device interfaces (CDIs)*

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

**APPAREILLAGE À BASSE TENSION –
INTERFACES APPAREIL DE COMMANDE-APPAREIL (CDI) –****Partie 1: Règles générales****AVANT-PROPOS**

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La Norme internationale IEC 62026-1 a été établie par le sous-comité 121A: Appareillage à basse tension, du comité d'études 121 de l'IEC: Appareillages et ensembles d'appareillages basse tension.

Cette troisième édition annule et remplace la deuxième édition parue en 2007. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

- a) exigences supplémentaires pour les informations et les instructions relatives à la sécurité, notamment les mesures à prendre, s'il y a lieu, pour parvenir à la conformité CEM;

- b) alignement des exigences CEM concernant l'immunité sur celles de la série de normes IEC 61000-6. Niveau d'essai des champs électromagnétiques rayonnés aux fréquences radioélectriques porté à 6 GHz;
- c) alignement des exigences CEM concernant les émissions sur celles de la publication CISPR 11 actuelle.

Le texte de cette Norme internationale est issu des documents suivants:

FDIS	Rapport de vote
121A/280/FDIS	121A/295/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette Norme internationale.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2.

Une liste de toutes les parties de la série IEC 62026, publiées sous le titre général *Appareillage à basse tension – Interfaces appareil de commande-appareil (CDI)*, peut être consultée sur le site web de l'IEC.

Le comité a décidé que le contenu de ce document ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous "<http://webstore.iec.ch>" dans les données relatives au document recherché. A cette date, le document sera

- reconduit,
- supprimé,
- remplacé par une édition révisée, ou
- amendé.

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INTRODUCTION

La classe d'interfaces appareil de commande-appareil (CDI) couverte par le présent document inclut les CDI industrielles pour les systèmes de commande, l'automatisation d'usine et les processus automatisés.

Les CDI industrielles ont proliféré pour satisfaire aux besoins d'utilisateurs spécifiques, mais aucune CDI ne satisfait à tous les besoins. Des solutions multiples ont été mises en œuvre pour répondre à l'éventail des exigences concernant le matériel, l'utilisation, le contenu d'information et la configuration. Les exigences matérielles ont conduit à des CDI ayant des signaux et des mécanismes d'adaptation de ligne qui diffèrent fortement pour satisfaire aux aspects de distance, de nombre de nœuds et d'environnement.

Bien qu'il y ait une grande diversité de techniques de CDI, il existe des exigences communes aux composants, aux interfaces et aux conditions d'environnement qui sont spécifiées dans le présent document. Des définitions normalisées de ces exigences communes aux CDI aident l'utilisateur à comparer et à choisir les techniques correspondant aux exigences de distance, de nombre de nœuds, d'entrée-sortie et d'installation pour une application donnée.

Le présent document simplifie le processus de choix d'une CDI en fournissant une structure commune permettant de créer une norme IEC pour une CDI particulière, tout en autorisant aussi l'inclusion de caractéristiques et d'aptitudes spécifiques à cette interface. Les Articles 4 à 8 contiennent l'esquisse des exigences générales que la norme IEC spécifique à une CDI identifie. L'Article 9 contient les spécifications relatives aux essais.

La normalisation des aspects des CDI simplifie aussi l'écriture du logiciel pour les fonctions de la couche supérieure des systèmes de commande industriels, telles que la programmation de la commande de supervision, de l'interface opérateur et de la stratégie de commande.

Pour que le présent document soit complet et utilisable, il requiert la disponibilité de normes relatives aux CDI particulières, qui constituent les autres parties de la série IEC 62026.

APPAREILLAGE À BASSE TENSION – INTERFACES APPAREIL DE COMMANDE-APPAREIL (CDI) –

Partie 1: Règles générales

1 Domaine d'application

La présente partie de l'IEC 62026 s'applique aux interfaces entre l'appareillage à basse tension et des appareils de commande (par exemple automates programmables, ordinateurs personnels, etc.).

Le présent document ne s'applique pas aux réseaux de communication industriels de plus haut niveau connus sous le nom de bus de terrain et qui relèvent du sous-comité 65C de l'IEC.

Le présent document vise à harmoniser et définir les règles, les composants et les exigences de nature générale applicables aux CDI industrielles. Les caractéristiques générales des normes des différentes CDI ont donc été rassemblées dans le présent document.

Pour chaque CDI, deux documents principaux sont nécessaires pour définir l'ensemble des exigences et des essais:

- a) le présent document, cité sous la référence "IEC 62026-1" dans les parties pertinentes couvrant les différents types de CDI;
- b) la partie de la série IEC 62026 spécifique à une CDI.

Une partie relative à une CDI particulière peut omettre une exigence générale si elle n'est pas applicable, ou elle peut la compléter si elle ne convient pas dans le cas particulier.

NOTE Les exigences spécifiques aux produits incorporant une CDI sont données dans les normes de produit pertinentes. Ces exigences s'appliquent en plus de celles données dans le présent document.

2 Références normatives

Les documents suivants sont cités dans le texte de sorte qu'ils constituent, pour tout ou partie de leur contenu, des exigences du présent document. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

IEC 60947-1:2007, *Appareillage à basse tension – Partie 1: Règles générales*
IEC 60947-1:2007/AMD1:2010
IEC 60947-1:2007/AMD2:2014

IEC 61000-4-2:2008, *Compatibilité électromagnétique (CEM) – Partie 4-2: Techniques d'essai et de mesure – Essai d'immunité aux décharges électrostatiques*

IEC 61000-4-3:2006, *Compatibilité électromagnétique (CEM) – Partie 4-3: Techniques d'essai et de mesure – Essai d'immunité aux champs électromagnétiques rayonnés aux fréquences radioélectriques*
IEC 61000-4-3:2006/AMD1:2007
IEC 61000-4-3:2006/AMD2:2010

IEC 61000-4-4:2012, *Compatibilité électromagnétique (CEM) – Partie 4-4: Techniques d'essai et de mesure – Essais d'immunité aux transitoires électriques rapides en salves*