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**Road vehicles — Symbols for  
electrotechnical diagrams**

*Véhicules routiers — Symboles pour les schémas électrotechniques*

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The main task of technical committees is to prepare International Standards, but in exceptional circumstances a technical committee may propose the publication of a Technical Report of one of the following types:

- type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;
- type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;
- type 3, when a technical committee or subcommittee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

ISO/TR 12343, which is a Technical Report of type 2, was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 3, *Electrical and electronic equipment*.

Annexes A to C of this Technical Report are for information only.

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# Road vehicles — Symbols for electrotechnical diagrams

## 1 Scope

This Technical Report specifies graphical symbols for components, elements of components, and functional units, for use on diagrams for electrical equipment of road vehicles. Thus, the symbols can be used independently, or grouped together describing more complex functions or devices. Annex A gives application examples of the symbols in this Technical Report.

The Technical Report consists of symbols applicable to road vehicles, which are not covered by IEC 60617. Therefore, if a certain symbol cannot be found, IEC 60617 should be consulted.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Technical Report. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Technical Report are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 31 (all parts), *Quantities and units*.

ISO 2575:1995, *Road vehicles — Symbols for controls, indicators and tell-tales*.

ISO/IEC 11714-1:1996, *Design of graphical symbols for use in the technical documentation of products — Part 1: Basic rules*.

IEC 60027 (all parts), *Letter symbols to be used in electrical technology*.

IEC 60050 (all parts), *Electrotechnical Vocabulary*.

IEC 60417:1973, *Graphical symbols for use on equipment*.

IEC 60617 (all parts), *Graphical symbols for diagrams*.

IEC 61082-1:1991, *Preparation of documents used in electrotechnology — Part 1: General requirements*.

IEC 61346-1:1996, *Industrial systems, installations and equipment and industrial products — Structuring principles and reference designations — Part 1: Basic rules*.

## 3 Definitions

For the purposes of this Technical Report, the definitions given in IEC 60617-1, IEC 60050, and IEC 61082-1 apply.

## 4 General principles

### 4.1 Letter symbols for quantities and units

Letter symbols according to ISO 31, IEC 60027 and IEC 60617 shall be used.

### 4.2 Grid system

The graphical symbols in this Technical Report are designed with respect to the grid system and line thickness according to ISO/IEC 11714-1. Among the available modules, the module 2,5 mm has been chosen. If needed, another module according to ISO/IEC 11714-1 may be used.

### 4.3 Enclosing frame

If necessary, the symbols in this Technical Report, or symbols derived from it, may be enclosed with a solid line frame, usually a rectangle, symbolizing the delimitation of the component or device. The frame may symbolize the envelope or chassis of the item, if any.

Inside the frame one can thus find:

- a symbol taken from this Technical Report or a symbol derived from the Technical Report;
- symbols for the terminals of the component or device;
- terminal designations;
- internal connections between terminals which are integral parts of the component or device.

This is illustrated by three examples in annex B.

### 4.4 Numbering of symbols

The reference numbers in this Technical Report consist of the section number and sequential number. Examples of applications of general symbols are indicated by the letter "a" following the symbol number.

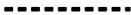
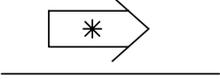
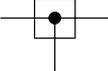
## 5 General symbols and symbol elements

### Outlines and enclosures

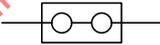
No.	Symbol	Description
05-01	Form 1  Form 2  Form 3 	Optional item, equipment or functional unit (dotted boundary lines)  NOTE — Suitable symbols or legends should be inserted or added to the symbol outline to indicate the item, equipment or function.

## 6 Conductors, connecting devices and contacts

### Conductors

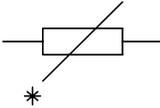
06-01		Optional conductor, general symbol (dotted line)
06-02		Data bus, uni-directional NOTE — The type of data bus may be indicated in place of the asterisk.
06-03		Data bus, bi-directional NOTE — The type of data bus may be indicated in place of the asterisk.
06-04		Junction (complete symbol with frame) NOTE — Represents a device including a junction (e.g a terminal block) and conductors. All conductors may not necessarily be shown.

### Connecting devices

06-10		Connection device, consisting of two terminals and a connecting link (complete symbol with frame)
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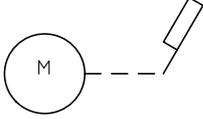
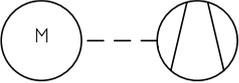
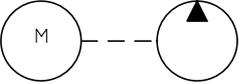
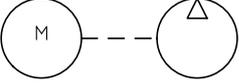
## 7 Circuit elements

### Passive components

07-01		* dependent resistor NOTE — The asterisk should be replaced by letter symbol for the characteristic quantity, for example $\theta$ for a temperature dependent resistor.
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## 8 Electrical devices and subsystems

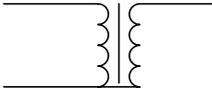
## Rotating machines

08-01		Motor for windscreen wiper
08-02		Motor for fan
08-03		Motor for fluid pump (e.g. fuel pump, water pump, or hydraulic oil pump)
08-04		Motor for gas pump (e.g. air pump or compressor)

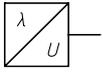
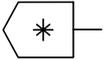
## Light sources

08-30		Lamp with two filaments
08-31		Discharge lamp
08-32		Lamp, reserved for turn signal
08-33		Indicating lamp
08-34		Beam light with a two filament lamp
08-35		Rotating warning light

**Ignition system**

08-40		Ignition coil
08-41		High-tension distributor, general symbol

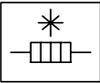
**Converters, feedback controllers, sensors and measuring transducers**

08-50		Measuring transducer with integrated lambda sensor (voltage as secondary quantity)
08-51		Sensor (probe) NOTE — The asterisk should be replaced by a letter symbol for the type of sensor; e.g. $\lambda$ . May be connected to symbol 08-50 showing a measuring transducer with separate lambda sensor.
08-52		Feedback controller, general symbol NOTE — The asterisk should be replaced by a letter symbol for the type of controller; e.g. $U$ for voltage controller, $n$ for speed controller, $\theta$ for temperature controller.

**Communication devices**

08-60		Printer NOTE — Based on IEC 60617-9:1996, 09-06-04
08-61		Video recorder (derived from symbols in IEC 60417) NOTE — Symbols for other communication devices can be found in IEC 60417.

## Miscellaneous

08-70		<p>Heating device, general symbol</p> <p>NOTE — The symbol may be completed for showing different types of heating devices, see examples below.</p> <p>* Symbols according to ISO 2575 are recommended, for example symbol no.</p> <ul style="list-style-type: none"><li>— 6.36 for engine heater</li><li>— 6.20 for cigar lighter</li><li>— 6.34 for glowplug (Diesel pre-heat)</li><li>— 6.24 for heated windscreen</li><li>— 6.25 for heated rear window</li></ul>
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## Annex A (informative)

### Application examples

#### A.1 General symbols and symbol elements

##### Mechanical controls

05-10a		Latching device for three-position switch, latching in centre position
05-11a		Latching device for two-position switch with manual reset from latched position

#### A.2 Conductors, connecting devices and contacts

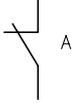
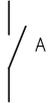
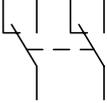
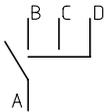
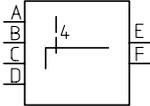
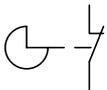
##### Conductors

06-01a		Four screened conductors
06-02a		Four conductors, two of them are screened  NOTE — Arrows are pointing at screened conductors.
06-03a		Four conductors, two of them are twisted  NOTE — Arrows are pointing at twisted conductors

##### Connecting devices

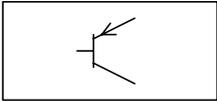
06-10a		Example of a connection device shown with six poles (complete symbol with frame). Multi-line representation.
06-11a		Example of a connection device shown with six poles (complete symbol with frame). Single-line representation

Contacts

06-20a		Make contact, affected																																									
06-21a		Break contact, affected																																									
06-22a		Two-way, two-pole make contact																																									
06-23a	 <table border="1"> <thead> <tr> <th rowspan="2">Position</th> <th colspan="4">Terminal</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> <th>D</th> </tr> </thead> <tbody> <tr> <td>1</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>×</td> <td>×</td> <td></td> <td>×</td> </tr> <tr> <td>3</td> <td>×</td> <td></td> <td>×</td> <td>×</td> </tr> <tr> <td>4</td> <td>×</td> <td></td> <td></td> <td>×</td> </tr> </tbody> </table>	Position	Terminal				A	B	C	D	1					2	×	×		×	3	×		×	×	4	×			×	<p>Single-pole, four-position combination switch</p> <p>Example: Main switch for fan.</p>												
Position	Terminal																																										
	A	B	C	D																																							
1																																											
2	×	×		×																																							
3	×		×	×																																							
4	×			×																																							
06-24a	 <table border="1"> <thead> <tr> <th rowspan="2">Position</th> <th colspan="6">Terminal</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> <th>F</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>×</td> <td>×</td> <td>×</td> <td>×</td> <td>×</td> <td>×</td> </tr> <tr> <td>2</td> <td>×</td> <td>×</td> <td></td> <td>×</td> <td>×</td> <td>×</td> </tr> <tr> <td>3</td> <td>×</td> <td></td> <td>×</td> <td>×</td> <td>×</td> <td>×</td> </tr> <tr> <td>4</td> <td>×</td> <td></td> <td></td> <td>×</td> <td>×</td> <td>×</td> </tr> </tbody> </table>	Position	Terminal						A	B	C	D	E	F	1	×	×	×	×	×	×	2	×	×		×	×	×	3	×		×	×	×	×	4	×			×	×	×	<p>Example of a four-position switch with six terminals (in this case a starter switch)</p>
Position	Terminal																																										
	A	B	C	D	E	F																																					
1	×	×	×	×	×	×																																					
2	×	×		×	×	×																																					
3	×		×	×	×	×																																					
4	×			×	×	×																																					
06-25a		Manually operated make contact switch with non-automatic return																																									
06-26a		Manually operated make contact with automatic return																																									
06-27a		Mechanically operated make contact switch with automatic return, for example; brake light switch																																									
06-28a		Cam-operated switch, break contact, for example ignition breaker points																																									

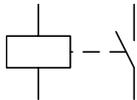
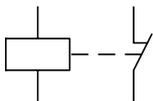
### A.3 Circuit elements

#### Semiconductors

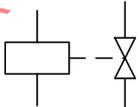
07-10a		Circuit with active semiconductors NOTE — The circuit designation may be indicated.
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### A.4 Electrical devices and subsystems

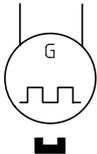
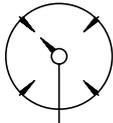
#### Relays

08-10a		Relay with one make contact
08-11a		Relay with one break contact

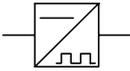
#### Electrically controlled mechanical devices

08-20a		Solenoid controlled shut-off valve
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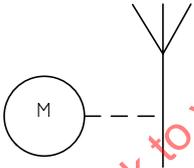
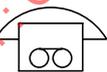
#### Ignition system

08-40a		Single phase generator with permanent-magnet excitation, for example inductive pick-up
08-41a		High-tension distributor with four secondary connections

**Converters, feedback controllers, sensors and measuring transducers**

08-50a		Temperature measuring transducer (in this case with temperature as a primary quantity and voltage as a secondary quantity)
08-51a		Pulse generator, e.g. flashing unit
08-52a		Motion detector with integrated sensor (voltage as secondary quantity)
08-53a		Angle sensor

**Communication devices**

08-60a		Motor antenna
08-61a		Automatic answering machine

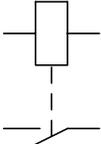
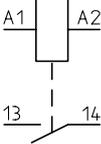
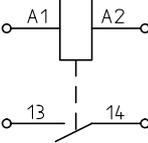
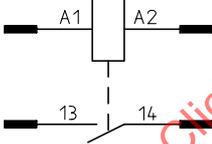
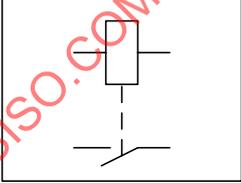
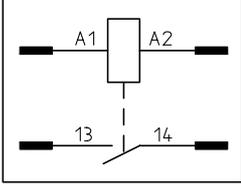
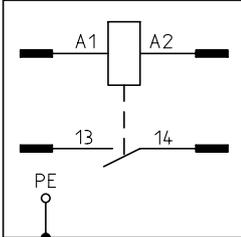
**Miscellaneous**

08-70a		Space (coupé) heating device
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## Annex B (informative)

### Application of an enclosing frame

Example 1 — Electromechanical all-or-nothing-relay

No.	Symbol and supplements	Description
1		Symbol for a relay with one closing contact
2		Symbol according to No. 1 supplemented with — terminal designations
3		Symbol according to No. 1 supplemented with — general symbols for terminal — terminal designations
4		Symbol according to No. 1 supplemented with — symbols for plug-type terminal — terminal designations
5		Symbol according to No. 1 supplemented with — enclosing rectangle — terminal designations
6		Symbol according to No. 1 supplemented with — symbols for plug-type terminal — terminal designations — enclosing rectangle
7		Symbol according to No. 1 supplemented with — symbols for plug-type terminal — terminal designations — enclosing rectangle representing a conductive enclosure — general symbol for a terminal in direct contact with the enclosure

8		Symbol according to No. 7, simplified
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Example 2 — Complex control switch

No.	Symbol and supplements	Description
1		Symbol for a complex control switch
2		Symbol according to No. 1 supplemented with — terminal designations
3		Symbol according to No. 1 supplemented with — general symbols for terminal — terminal designations
4		Symbol according to No. 1 supplemented with — symbols for plug-type terminal — terminal designations
5		Symbol according to No. 1 supplemented with — enclosing rectangle — terminal designations
6		Symbol according to No. 1 supplemented with — symbols for plug-type terminal — terminal designations — enclosing rectangle
7		Symbol according to No. 1 supplemented with — symbols for plug-type terminal — terminal designations — enclosing rectangle symbolizing a conductive enclosure — general symbol for a plug-type terminal in direct contact with the enclosure