

# INTERNATIONAL STANDARD

**ISO**  
**8999**

First edition  
1993-06-01

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## **Reciprocating internal combustion engines — Graphical symbols**

*Moteurs alternatifs à combustion interne — Symboles graphiques*



Reference number  
ISO 8999:1993(E)

## 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 8999 was prepared by Technical Committee ISO/TC 70, *Internal combustion engines*, Sub-Committee SC 1, *Definitions*.

Annex A of this International Standard is for information only.

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# Reciprocating internal combustion engines — Graphical symbols

## 1 Scope

This International Standard specifies graphical symbols for operator controls, gauges, tell-tale indicators and instructions for reciprocating internal combustion (RIC) engines to provide necessary information on their use and operation.

It is applicable to RIC engines for land, rail traction and marine use, excluding engines used to propel road vehicles and aircraft.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard 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 3461-1:1988, *General principles for the creation of graphical symbols — Part 1: Graphical symbols for use on equipment*.

ISO 3864:1984, *Safety colours and safety signs*.

IEC 73:1991, *Coding of indicating devices and actuators by colours and supplementary means*.

## 3 Definitions

For the purposes of this International Standard, the following definitions apply.

**3.1 basic graphical symbol:** Symbol used individually or in combination to make a composite symbol.

**3.2 composite symbol:** Symbol made from combinations of symbol elements.

## 4 General

**4.1** Symbols shall be as shown in clauses 5 to 7 of this International Standard. In general, symbols are shown in outline form. Where necessary for legibility when reduced to a small size, enclosed areas within symbols or symbol elements may be filled in.

**4.2** The symbols included in clause 5 are basic symbols which may be used for general application as well as to create composite symbols.

**4.3** The composite symbols included in clauses 6 and 7 are developed using basic symbols from clause 5 as elements where applicable to provide families of symbols associated with functions and systems.

**4.4** As required, additional composite symbols may be developed using the basic symbols from clause 5, provided that the characteristics specified in ISO 3461-1 are maintained.

**4.5** Limitations inherent in some reproduction and display technologies may require increased line thickness or other minor modifications of symbols. Such modifications are acceptable provided the symbol remains unchanged in its basic graphical elements, and easily discernible by the operator.

**4.6** Additionally, to improve the appearance and perceptibility of a graphical symbol or to coordinate with the design of the equipment to which it is applied, it may be necessary to change the line thickness or to round off the corners of the symbol. The graphical designer is normally free to make such changes provided that the essential perceptual characteristics of the symbol are maintained. See ISO 3461-1:1988, 10.2.

**4.7** For actual use, all symbols shall be reproduced large enough to be easily discernible by the operator. See ISO 3461-1 for guidelines for proper sizing of symbols. Symbols shall be used in the orientations shown in this International Standard unless otherwise noted for individual symbols.

**4.8** Symbols on controls and displays shall have good contrast to their background. A light symbol on a dark background is preferred for most controls. Displays may use either a light symbol on a dark background or a dark symbol on a light background, depending upon which alternative provides the best visual perception. When a symbol image is reversed (for example, black to white and vice versa) it shall be done for the entire symbol.

**4.9** When using symbols with multifunction controls, understanding is improved and the presentation simplified where symbols are combined to the least extent possible. The example shown in figure 1 is for a typical engine operation key switch, having separate positions for Off, On and Start.

**4.10** The fonts shown in this International Standard are not intended to be restrictive: other fonts may be substituted, but care shall be taken that legibility is maintained.

**4.11** Symbols in this International Standard are presented 32 % of original size. The grid marks "L" denote the corners of the 75 mm square of the graphic grid presented. The grid marks are not part of the symbol but are provided to ensure consistent presentation of all symbol graphics.

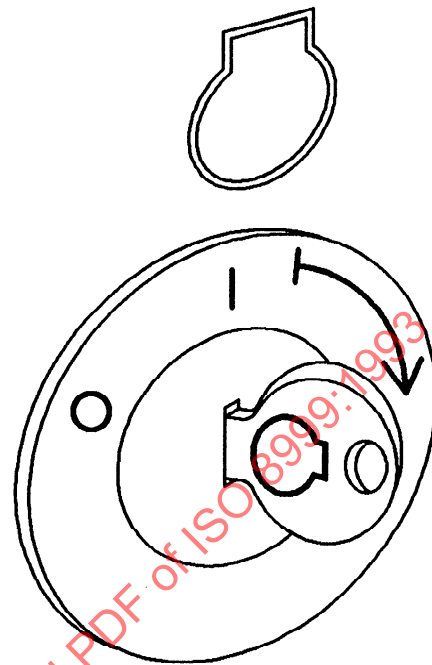


**Figure 1**

**4.12** Microfiches of the symbols are available from the ISO/TC 145 Secretariat.

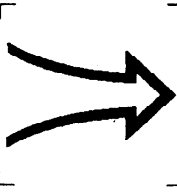
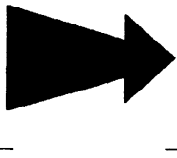
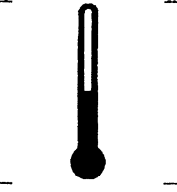
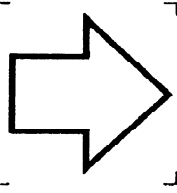
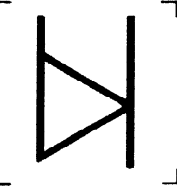
**4.13** When used on optical indicators or tell-tales, the following colours have the meanings indicated:

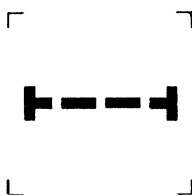
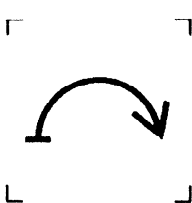
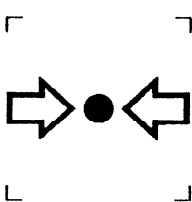
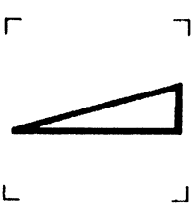
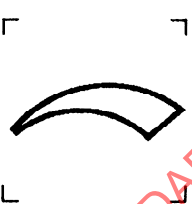
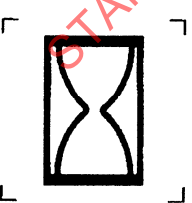
- red: danger, unsafe or malfunction
- yellow or amber: caution
- green: safe or normal

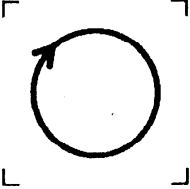
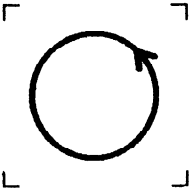
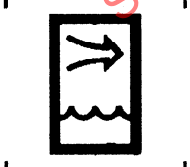
**NOTE 1** Where practical, the indicators should be banded such that red are positioned above yellow/amber which are positioned above green.

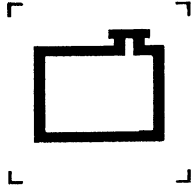
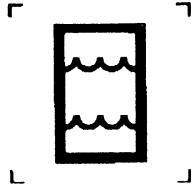
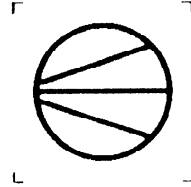
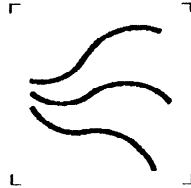
## 5 Basic symbols

| No. | Symbol                                                                              | Description            | Application                                                                                                                                 | ISO/IEC Registration No. |
|-----|-------------------------------------------------------------------------------------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| 5.1 |    | Engine                 | To signify functions associated with the engine.                                                                                            | ISO 7000-1156            |
| 5.2 |    | Malfunction            | To indicate a possible malfunction.<br>A red colour indicator with a basic symbol may be used alternatively to indicate a malfunction.      | ISO 7000-1603            |
| 5.3 |   | Fuel                   | To signify the fuel quantity indicator.<br>To signify functions associated with fuel.<br>At the fuel fill to indicate a gasoline-type fuel. | ISO 7000-0245 B          |
| 5.4 |  | Unleaded gasoline fuel | To signify functions associated with fuel.<br>At the fuel fill to indicate unleaded gasoline fuel.                                          | Variant of ISO 7000-0237 |
| 5.5 |  | Diesel fuel            | To signify functions associated with fuel.<br>At the fuel fill to indicate diesel fuel.                                                     | ISO 7000-1541            |
| 5.6 |  | Liquid coolant         | To signify functions associated with liquid-type coolant.                                                                                   | ISO 7000-0536            |

| No.  | Symbol                                                                              | Description       | Application                                                                                                                                                                                                                                    | ISO/IEC Registration No.     |
|------|-------------------------------------------------------------------------------------|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| 5.7  |    | Intake air        | To signify functions associated with intake air.                                                                                                                                                                                               | ISO 7000-1604                |
| 5.8  |    | Exhaust gas       | To signify functions associated with exhaust gas.                                                                                                                                                                                              | ISO 7000-1605                |
| 5.9  |   | Temperature       | To signify functions associated with temperature.                                                                                                                                                                                              | ISO 7000-0034                |
| 5.10 |  | Flow/direction    | To indicate the direction of a function.<br>To signify functions associated with controls.                                                                                                                                                     | ISO 7000-0251                |
| 5.11 |  | Level indicator   | To signify a liquid level.<br><br>NOTE 2 This symbol should be used in the orientation shown. When used in composite symbols to indicate fluid levels, the vertical line at the apex of the pointer may be replaced by the appropriate symbol. | Application of ISO 7000-0159 |
| 5.12 |  | Oil (lubricating) | To identify functions associated with lubricating oil.                                                                                                                                                                                         | ISO 7000-1056                |

| No.  | Symbol                                                                              | Description                                        | Application                                                                                                                                                                        | ISO/IEC Registration No. |
|------|-------------------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| 5.13 |    | Filter                                             | To signify functions associated with filtering.                                                                                                                                    | ISO 7000-1369            |
| 5.14 |    | Cranking                                           | To signify functions associated with starting or cranking.                                                                                                                         | ISO 7000-1365            |
| 5.15 |   | Pressure                                           | To signify functions associated with pressure.<br><br>NOTE 3 When used in composite symbols, the appropriate symbol is used between the arrows to indicate the medium pressurized. | ISO 7000-1701            |
| 5.16 |  | Continuous adjustment linear increase/decrease     | To identify a linear control which regulates a quantity. The quantity increases with the symbol width.                                                                             | IEC 417-5004             |
| 5.17 |  | Continuous adjustment rotational increase/decrease | To identify a rotary control which regulates a quantity. The quantity increases with the symbol width.<br><br>Radius is dependent on control diameter.                             | ISO 7000-1364            |
| 5.18 |  | Elapsed hours                                      | To indicate the cumulative elapsed hours of operating time.                                                                                                                        | ISO 7000-1366            |

| No.  | Symbol                                                                              | Description                    | Application                                                                                                                      | ISO/IEC Registration No. |
|------|-------------------------------------------------------------------------------------|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| 5.19 |    | Clockwise rotation             | To indicate engine or equipment rotation in a clockwise direction.                                                               | ISO 7000-0258            |
| 5.20 |    | Counter-clockwise rotation     | To indicate engine or equipment rotation in a counter-clockwise direction.                                                       | ISO 7000-0937            |
| 5.21 |   | Air-cooled oil cooler          | To signify functions associated with oil coolers.<br>Upper symbol is medium being cooled; lower symbol is cooling medium.        | ISO 7000-1542            |
| 5.22 |  | Liquid-cooled oil cooler       | To signify functions associated with oil coolers.<br>Upper symbol is medium being cooled; lower symbol is cooling medium.        | ISO 7000-1543            |
| 5.23 |  | Air-to-air charge air cooler   | To signify functions associated with charge air coolers.<br>Upper symbol is medium being cooled; lower symbol is cooling medium. | ISO 7000-1544            |
| 5.24 |  | Air-to-water charge air cooler | To signify functions associated with charge air coolers.<br>Upper symbol is medium being cooled; lower symbol is cooling medium. | ISO 7000-1545            |

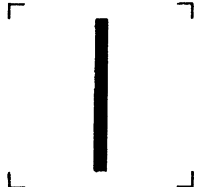
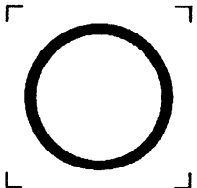
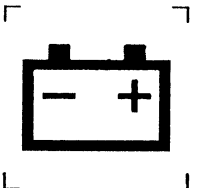
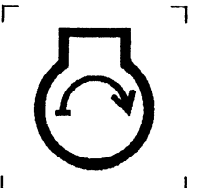
| No.  | Symbol                                                                              | Description                                 | Application                                                                                                                                  | ISO/IEC Registration No. |
|------|-------------------------------------------------------------------------------------|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| 5.25 |    | Radiator                                    | To signify the functions associated with radiators for cooling engine coolant.<br>Cooling medium is air.                                     | ISO 7000-1390            |
| 5.26 |    | Water-to-water heat exchanger (Keel cooler) | To signify functions associated with water-to-water heat exchangers.<br>Upper symbol is medium being cooled; lower symbol is cooling medium. | ISO 7000-1546            |
| 5.27 |   | Pneumatic system                            | To indicate a pneumatic system.                                                                                                              | ISO 7000-0231            |
| 5.28 |  | Air                                         | To indicate functions associated with the use of ambient air.                                                                                | ISO 7000-0537            |

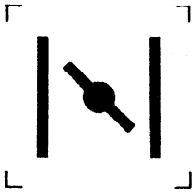
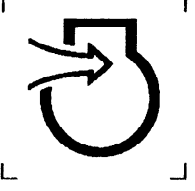
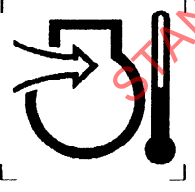
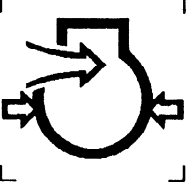
## 6 Safety signs

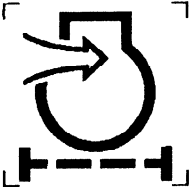
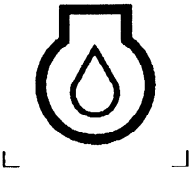
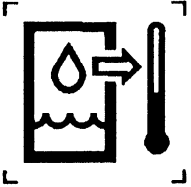
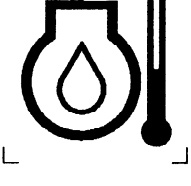
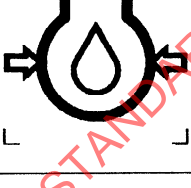
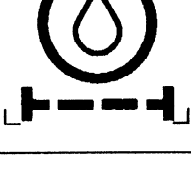
Safety signs shall be in accordance with ISO 3864.

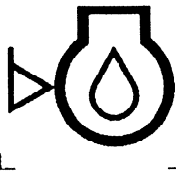
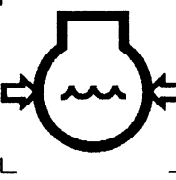
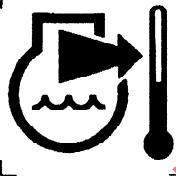
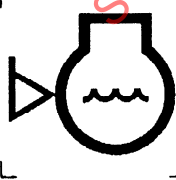
| No. | Sign                                                                                | Description                         | Application                                                                   |
|-----|-------------------------------------------------------------------------------------|-------------------------------------|-------------------------------------------------------------------------------|
| 6.1 |    | Caution/warning                     | To indicate a risk of personal injury.                                        |
| 6.2 |    | Caution/warning: pressurized        | To indicate a risk of personal injury from pressurized fluids.                |
| 6.3 |   | Caution/warning: electrical hazard  | To indicate a risk of personal injury from high voltage or current sources.   |
| 6.4 |  | Caution/warning: temperature hazard | To indicate a risk of personal injury from high temperature.                  |
| 6.5 |  | No smoking                          | To indicate locations where smoking is hazardous and is therefore prohibited. |
| 6.6 |  | Fire risk                           | To indicate areas or materials which are a high fire risk.                    |

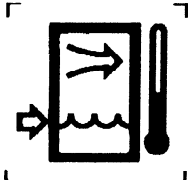
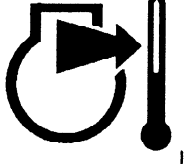
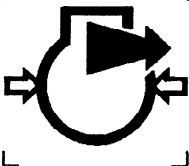
## 7 Engine symbols

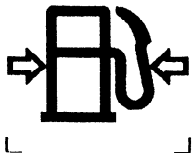
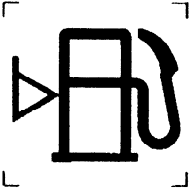
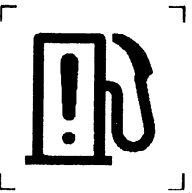
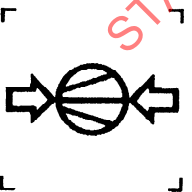
| No. | Symbol                                                                              | Description                      | Application                                                                             | ISO/IEC Registration No. |
|-----|-------------------------------------------------------------------------------------|----------------------------------|-----------------------------------------------------------------------------------------|--------------------------|
| 7.1 |    | On                               | To identify a control or control position to cause equipment to operate.                | IEC 417-5007             |
| 7.2 |    | Off                              | To identify a control or control position to cease equipment operation.                 | IEC 417-5008             |
| 7.3 |   | Battery charging condition       | To indicate the condition of battery charging.                                          | ISO 7000-0247            |
| 7.4 |  | Engine cranking                  | To indicate engine cranking control. Recommended for use with single function controls. | ISO 7000-1387            |
| 7.5 |  | Engine start aid, diesel preheat | To indicate the control to activate preheating of engine intake air.                    | ISO 7000-0457            |
| 7.6 |  | Engine start aid, gas injection  | To indicate the control to activate gas injection for starting.                         | ISO 7000-1547            |

| No.  | Symbol                                                                              | Description                   | Application                                                                                           | ISO/IEC Registration No. |
|------|-------------------------------------------------------------------------------------|-------------------------------|-------------------------------------------------------------------------------------------------------|--------------------------|
| 7.7  |    | Engine start aid, choke       | To indicate the control to operate the choke.                                                         | ISO 7000-0243            |
| 7.8  |    | Engine start aid, prime       | To indicate the control to operate a fuel primer.                                                     | ISO 7000-1370            |
| 7.9  |   | Engine stop                   | To indicate the engine stop control.<br>To indicate that the engine has stopped or should be stopped. | ISO 7000-1388            |
| 7.10 | Use of a red domed push-button control with no symbol, as standardized in IEC 73.   | Emergency engine stop         | To indicate a control for stopping the engine quickly in case of an emergency.                        | —                        |
| 7.11 |  | Engine intake air             | To indicate engine intake air.                                                                        | ISO 7000-1381            |
| 7.12 |  | Engine intake air temperature | To indicate engine intake air temperature.                                                            | ISO 7000-1383            |
| 7.13 |  | Engine intake air pressure    | To indicate engine intake air pressure.                                                               | ISO 7000-1382            |

| No.  | Symbol                                                                              | Description                                     | Application                                                                                                                                                                                                                                              | ISO/IEC Registration No. |
|------|-------------------------------------------------------------------------------------|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| 7.14 |    | Engine intake air filter                        | To indicate the engine intake air filter or filter condition.                                                                                                                                                                                            | ISO 7000-1170            |
| 7.15 |    | Engine oil                                      | To indicate engine oil.<br>To identify the engine oil fill.<br><br>NOTE 4 When necessary to indicate oil type or classification, that indication should appear directly below the oil symbol; for example, for ISO-L-ESF the letters SF should be added. | ISO 7000-1372            |
| 7.16 |   | Liquid-cooled oil cooler oil outlet temperature | To indicate the oil outlet temperature of the oil cooler.                                                                                                                                                                                                | ISO 7000-1548            |
| 7.17 |  | Engine oil temperature                          | To indicate engine oil temperature.                                                                                                                                                                                                                      | ISO 7000-1375            |
| 7.18 |  | Engine oil pressure                             | To indicate engine oil pressure.                                                                                                                                                                                                                         | ISO 7000-1374            |
| 7.19 |  | Engine oil filter                               | To indicate the engine oil filter or filter condition.                                                                                                                                                                                                   | ISO 7000-1376            |

| No.  | Symbol                                                                              | Description                            | Application                                                                       | ISO/IEC Registration No. |
|------|-------------------------------------------------------------------------------------|----------------------------------------|-----------------------------------------------------------------------------------|--------------------------|
| 7.20 |    | Engine oil level                       | To indicate engine oil level.                                                     | ISO 7000-1373            |
| 7.21 |    | Engine coolant                         | To indicate liquid engine coolant.<br>To identify the liquid engine coolant fill. | ISO 7000-1377            |
| 7.22 |   | Engine coolant temperature             | To indicate the liquid engine coolant temperature.                                | ISO 7000-1380            |
| 7.23 |  | Engine coolant pressure                | To indicate the liquid engine coolant pressure.                                   | ISO 7000-1379            |
| 7.24 |  | Engine exhaust gas coolant temperature | To indicate the temperature of water used to cool the engine exhaust gas.         | ISO 7000-1549            |
| 7.25 |  | Engine coolant level                   | To indicate engine coolant level.                                                 | ISO 7000-1378            |

| No.  | Symbol                                                                              | Description                                  | Application                                                                       | ISO/IEC Registration No. |
|------|-------------------------------------------------------------------------------------|----------------------------------------------|-----------------------------------------------------------------------------------|--------------------------|
| 7.26 |    | Charge air cooler, coolant inlet temperature | To indicate the liquid coolant temperature at the inlet to the charge air cooler. | ISO 7000-1550            |
| 7.27 |    | Engine exhaust gas                           | To indicate engine exhaust gas.                                                   | ISO 7000-1384            |
| 7.28 |   | Engine exhaust gas temperature               | To indicate engine exhaust gas temperature.                                       | ISO 7000-1386            |
| 7.29 |  | Engine exhaust gas pressure                  | To indicate engine exhaust gas pressure.                                          | ISO 7000-1385            |
| 7.30 |  | Engine malfunction                           | To indicate a possible malfunction of the engine.                                 | ISO 7000-1371            |
| 7.31 |  | Fuel temperature                             | To indicate fuel temperature.                                                     | ISO 7000-1394            |

| No.  | Symbol                                                                              | Description               | Application                                                                                  | ISO/IEC Registration No. |
|------|-------------------------------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------------|--------------------------|
| 7.32 |    | Fuel pressure             | To indicate fuel pressure.                                                                   | ISO 7000-1392            |
| 7.33 |    | Fuel filter               | To indicate the fuel filter or filter condition.                                             | ISO 7000-1393            |
| 7.34 |   | Fuel level                | To indicate fuel level.                                                                      | ISO 7000-1551            |
| 7.35 |  | Fuel shut-off             | To indicate the control to shut off the fuel supply. (Not to be used as engine stop symbol.) | Variant of ISO 7000-1395 |
| 7.36 |  | Fuel system malfunction   | To indicate a possible fuel system malfunction.                                              | ISO 7000-1391            |
| 7.37 |  | Pneumatic system pressure | To indicate the pressure in a pneumatic system.                                              | ISO 7000-1552            |