# Analog indicators

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Our indicators meet the specifications of the European Directive 73/23/EWG and 89/336/EWG, proven by compliance with the following standards:

- DIN 57 410 or VDE 0410 (Safety requirements for indicating and recording instruments and their accessories)
- IEC 60 051/EN 60 051/DIN EN 60 051 (Measuring instruments with scale indication)
- EN 50 081-2: 1993 EMC (emitted interference, industrial sector)
- EN 50 082-2: 1995 EMC (immunity, industrial sector)

The following explains the key specifications of these regulations for the building of electrical measuring instruments and their required properties.

**Accuracy**

The accuracy of a measuring instrument is given through the limits of intrinsic errors and influence errors.

An error that is determined when the instrument and/or its accessories is/are under reference conditions (Tab. I-1 DIN EN 60 051) is referred to as an intrinsic error, as opposed to an influence error, which occurs when the instrument is not under reference conditions, but within the limits of its nominal range of use (Tab. II-1 DIN EN 60 051).

Our indicators correspond to Class 1.5, unless another accuracy class rating is specified for individual types. As a further option, it may also be possible to customize the measuring instruments for higher accuracy class rating (Class 1).

The class is specified on the scale, e.g.:

1.5 accuracy class index for indication errors, output in a percentage of the reference value.

The reference value generally corresponds to the higher-measuring range value with the following exceptions:

- the sum of the electrical values, which correspond to the limits of the measuring range, independent of sign, when both the mechanical and the electrical zero points are within the scale.
- the length of the scale for instruments with non-linear contracting scales that do not have a separate linear scale.

**Reference values and influence errors**

**Service position**

The nominal position is usually indicated by a position mark. For instruments without a position mark, the reference area for each position lies between horizontal and vertical.

The nominal range of use is 5° in each direction starting from the reference position, whereby the influence error (in addition to the indication error) must not be greater than 50% of the corresponding class error.

**Operating temperature range**

Unless otherwise specified, instruments of Class 0.5 - 5 must operate continuously in ambient temperatures of -25 and +40 °C, without causing permanent damage.

**Temperature influence**

Unless otherwise specified, the reference temperature is 23 °C ± 2 K for instruments of Classes 0.5 - 5.

Nominal range of use is the reference temperature ±10 K. Any additional errors within this temperature range may not be greater than the class error.

**Vibration and mechanical impact resistance**

Influence conditions for vibration and impacts are specified in DIN EN 60 051. Our measuring instruments comply with these requirements and can be supplied as follows (for feasibility, see relevant data sheet):

<table>
<thead>
<tr>
<th>Mechanical strength</th>
<th>Impact resistance</th>
<th>Vibration resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard version</td>
<td>15 g, 11 ms</td>
<td>0.15 mm, 5 to 55 Hz</td>
</tr>
<tr>
<td>Increased demand S 20</td>
<td>30 g, 11 ms</td>
<td>2.5 g, 5 to 55 Hz</td>
</tr>
<tr>
<td>Increased demand S 19</td>
<td>50 g, 11 ms</td>
<td>5.0 g, 5 to 55 Hz</td>
</tr>
</tbody>
</table>

**Effects of vibration and impact**

Unless otherwise specified, measuring instruments and accessories with accuracy class index 1 and higher must withstand the following shake and impact tests as type tests:

- Angled nominal position (angle of scale surface from horizontal, e.g. 120°)
- Vertical nominal position
- Horizontal nominal position

It is also possible to specify a nominal position range, e.g. horizontal to vertical nominal position
Vibration test
The vibration test must be performed using the following values:
- Sweep frequency range: 10 Hz - 55 Hz - 10 Hz
- Vibration amplitude: 0.15 mm (corresponds to 1.5 g at 50 Hz)
- Number of sweep cycles: 5
- Sweep speed: 1 octave per minute
The vibration level is vertical, the measuring instrument is fixed to the vibratory table in its service position.

Impact test
The impact test must be performed using the following values:
- Peak acceleration:
  - 147 m/s² (15 gₐ)
  - 490 m/s² (50 gₐ)
- For a peak acceleration according to a), no further data are required, according to b), the manufacturer must separately specify the peak acceleration value of 490 m/s².
- Wave form: semi-sinusoidal
- Number of impacts: 3 impacts in both directions respectively on 3 axles lying vertically on top of one another (total of 18 impacts)
- Shock duration: 11 ms.
The measuring instrument must be attached so that one of the three axles coincides with the direction of the rotary axle of the moving part of the measuring system.
After this test, the additional error of measurement must not exceed 100% of the value corresponding to the accuracy class index.

Scale and pointer version
The standard DIN 43 802, Part 2 to 4, specifies the scale and pointer versions of the quadrant scale as well as the straight horizontal and vertical scale.
Our square and rectangular indicators with straight scales comply with these standards.
Unless otherwise specified, our measuring instruments comply with the following degree of protection according to DIN VDE 0470:
- IP 50 for housing front panel
- IP 00 for terminals.

Climate-proof measuring instruments
As a "conditionally tropic-proof" option, our measuring instruments are particularly suitable for:
- Moisture-sensitive rooms of the moderate zone
- Inner rooms of dry tropics
- Inner rooms of humid tropics, whereby condensation or seeping water must be prevented through air-conditioning if necessary.

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Normal measuring instruments</th>
<th>Conditionally tropic-proof measuring instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature range</td>
<td>-25 to +40 °C</td>
<td>-25 to +55 °C</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>Max. 85 % (temperature max. +27 °C) only 60 days in the year however, for the rest of the year 75 %, in the middle of the year 65 %</td>
<td>Max. 95 % (temperature max. +25 °C) only 30 days in the year however, for the rest of the year 85 %, in the middle of the year 75 %</td>
</tr>
<tr>
<td>Condensation</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>
Analog indicators

Technical descriptions

Mounting elements for square indicators

- Leaf-spring mounting for panel thickness 1 to 3 mm
- Mounting S for panel thickness 1 to 25 mm
- Mounting B DIN 43 835 for panel thickness 1 to 40 mm

Moving-coil movement

Application
Measuring direct current and direct voltage

Accuracy
Class 1.5 according to DIN EN 60 051 (unless otherwise specified). Greater accuracy class rating available as additional option for many types, see corresponding ordering data.

Jewel bearings with spring-loaded jewels.

Voltmeters
Internal resistance approx. 1000 \( \Omega/V \), greater internal resistance available as additional option for many types, see corresponding Technical specifications sheet. For measuring ranges that are greater than the nominal circuit voltage of the device, separate voltage dividers must be used.

Ammeters
The required shunt resistors are installed or mounted on the rear panel of the indicator.

For separate shunt resistors, a resistance of 60 m\( \Omega \) is taken into account for the supply leads.

Measuring ranges
The measuring ranges comply with DIN 43 701 (series 1 - 1.5 - 2.5 - 4 - 6 and their decadic multiple).

If the zero point is shifted to an arbitrary scale value, the standard series depends on the measuring range. More information on request.

Scale shape
The scale shape is practically linear. Distorted scale characteristics on request.

Service position
We deliver for the vertical service position, unless you specify otherwise when placing your order.

Overload capability
The indicators can be continually overloaded with 120 % of the rated value.
Moving-iron indicators are primarily used for alternating current and alternating voltage measurements in the usual technical frequency range of 15 to 65 Hz. When measuring direct voltages or direct currents, there is usually a 1% increase in errors. Special designs are available which also comply with the accuracy class rating for zero-frequency and periodic quantities.

Moving-iron indicators show the r.m.s. value of the alternating current and its virtual value; they therefore supply indications, which are independent of curve shape and the harmonic content of the current within specific limits. In the case of extreme curve shapes (e.g. pulse run control, generalized phase control) and extreme frequencies, the accuracy class rating is likely to be exceeded for ammeters (saturation of the iron core) and voltmeters (inductance of the field coil). In such cases, please contact us with further details (special designs possible). Due to their spring-loaded toe bearing, our moving-iron indicators are mechanically very robust, have high thermal and dynamic overload capability and provide outstanding magnetic damping. They therefore offer a solution for a wide range of measuring tasks in the field of heavy current metrology.

Measuring ranges
The measuring ranges comply with DIN 43 701 (series 1 - 1.5 - 2.5 - 4 - 6 and their decadic multiple).

Scale shape
The scale graduation starts at approx. a fifth of the full-scale reading.

If required, ammeters can be supplied with overload scales for double overload, some types even for quadruple overload.

Example:
Current transformer 250/5 A
Ammeter Display range 0 to 500 A
Measuring range 50 to 250 A

Accuracy
The accuracy of our moving-iron indicators corresponds to Class 1.5 according to DIN EN 60 051. In the case of individual types, the specified accuracy class rating applies.

Greater accuracy class rating available as additional option for many types, see corresponding Technical specifications sheet.

The specified accuracy only applies to the measuring range marked by points on the scale.

Frequency influence
Our moving-iron indicators for alternating current are calibrated at 50 Hz and maintain the accuracy class rating between 15 and 65 Hz. For a surcharge, we can also supply these indicators with a higher nominal frequency (up to 1000 Hz), see corresponding ordering data.

Power consumption
Voltmeters:
- depending on measuring range, approx. 0.9 to 2.5 VA
Ammeters:
- depending on measuring range, approx. 0.1 to 1.6 VA

Service position
We deliver for the vertical service position, unless you specify otherwise when placing your order.

Overload capability
The overload capability of our moving-iron indicators corresponds to DIN EN 60 051, i.e. they can be continuously overloaded by 20% of the rated current or rated voltage.

However, many types have considerably higher overload capabilities.

Ammeters:
- 50-fold approx. 1 s
- 4-fold approx. 2 to 3 min.
- 2-fold approx. 10 min.

Voltmeters:
- 2-fold approx. 1 min.

Connection
AC indicators can be connected directly over transformers (please specify rated transformation ratio).

DC indicators are designed for direct connection.
**Bimetal movements**

**Application**

Bimetal ammeters are ideally suited for monitoring the thermal load of cables and transformers. They have thermal inertia and display the average r.m.s. value. Short-time current peaks have no influence on the measurement result, while continuous loads result in indication. The high torque of the instruments is approx. one thousand times greater than that of other measuring systems, so that the system pointer is also able to drive a slave pointer.

The slave pointer remains at the maximum value reached, which allows conclusions to be drawn on critical points of the supply networks, and can be subsequently read at any time. A sealable reset knob allows the red slave pointer in our bimetal ammeters to be reset to the position of the measuring system pointer.

As well as these measuring instruments with mean value and maximum indication, we also supply bimetal ammeters combined with a moving-iron movement for displaying the instantaneous value.

MAqs. types with both measuring systems mounted diagonally opposite each other in one device and with minimum mounting depth.

**Measuring ranges**

The full-scale reading for bimetal ammeters and combined moving-iron bimetal ammeters is 1 A or 5 A, maximum scale value is 1.2 or 6 A.

As an additional option, the moving-iron movement is also available for 2-fold overload (i.e. full-scale reading 1 A or 5 A, maximum scale value 2 A or 10 A) available.

When ordering, please specify the transformer rated currents according to DIN 42 600.

**Accuracy**

Indication error for the red slave pointer of the bimetal movements is max. 3 % of full-scale reading; for the moving-iron movement, Class 1.5 according to DIN EN 60 051.

**Frequency range**

15 to 65 Hz for moving-iron movements

**Power consumption**

(bimetal movement or bimetal-plus moving-iron movement)

- Secondary 1 A Mqs. approx. 1.1 VA, MAqs. approx. 1.35 VA
- Secondary 5 A Mqs. approx. 1.9 VA, MAqs. approx. 2.2 VA

**Service position**

We deliver for the vertical service position, unless you specify otherwise when placing your order.

**Overload capability**

10-fold for 1 s

In the case of greater overloads, a protective current transformer must be connect in series to protect the bimetal movement, thus permitting a 50-fold or 100-fold overload for 1 s. The separate protective current transformer is calibrated together with the bimetal movement and is not replaceable.

**Thermal time lag (setting time)**

15 min. (8 min. on request)

**Diagram of connections for MAqs types**

- Bimetal moving-iron movement
- Bimetal moving-iron movement with separate protective current transformer
- Bimetal moving-iron movement with integral protective current transformer
Analog indicators
Rectangular indicators for direct current or voltage

96 x 48 mm and 48 x 96 mm with moving-coil movement

Measuring range
- 1 mA: 350 Ω
- 1.5 mA: 233 Ω
- 2 mA: 175 Ω
- 2.5 mA: 140 Ω
- 4 mA: 80 Ω
- 5 mA: 70 Ω
- 6 mA: 58 Ω
- 10 mA: 35 Ω
- 15 mA: 23 Ω
- 0/4 to 20 mA: 18 Ω
- 25 mA: 14 Ω
- ≥ 60 mV to ≤ 250 mV: 2.5 kΩ/V
- > 250 mV: 1 kΩ/V

Internal resistance Ri (± 20 %)

Voltage drop at
- > 25 mA to < 1 A: 350 mV (± 20 %)
- ≥ 1 A: 100 mV (± 20 %)

Power consumption if connected to shunt resistor
6 mA (± 20 %)

Error limits
Class 1.5

Housing
Polycarbonate, self-extinguishing and drip-proof according to UL 94 V-0

Front dimensions
- Transverse version: 96 mm x 48 mm
- Upright version: 48 mm x 96 mm

Bezel, matt
- Black (standard), gray (RAL 7037), light gray (RAL 7035), pebble gray (RAL 7032) or dark beige (e.g. RAL 1019)

Mounting depth, without electrical connection
Max. 126 mm

Panel cutout
- Transverse version: 92 +0.8 mm x 45+0.6 mm
- Upright version: 45 +0.6 mm x 92+0.8 mm

Electric connection
Tab connector 6.3 x 0.8 or 2 x 2, 8 x 0.8 (degree of protection IP 20)

Shock protection
Available as optional extra

Reference conditions
- Ambient temperature: 23 °C ± 2 K
- Service position: Vertical nominal position ± 1°
- Other: DIN EN 60 051

Regulations
- Nominal circuit voltage: 660 V
- Degree of protection
  - Housing front: IP 52 according to EN 60 529
  - Connections: IP 20 according to EN 60 529

Overview

Input variables
- Direct current
- Direct voltage

Design

The analog indicator comprises:
- Moving-coil movement with jewel bearings
- Sizes of housing
  - 96 x 48 mm (transverse version)
  - 48 x 96 mm (upright version)
- Polycarbonate housing suitable for
  - Control panel according to DIN 43 700
  - Slots
- Replaceable bezel and glass

Electrical connection is over tab connector.

Technical specifications

Display
- Scale graduation: Coarse-fine
- Pointer: Beam pointer with knife-edge
- Scale length: 65 mm
- Input: DC measuring range corresponding to the ordering data
  - Measuring range
    - 100 µA: 7000 Ω
    - 150 µA: 4667 Ω
    - 250 µA: 2800 Ω
    - 400 µA: 1750 Ω
    - 600 µA: 1167 Ω
## Analog indicators

### Rectangular indicators for direct current or voltage

### 96 x 48 mm and 48 x 96 mm with moving-coil movement

### Selection and ordering data

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Order Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>M0 1 5 9 4</td>
<td>P</td>
</tr>
</tbody>
</table>

### Input variable

- 0 to 20 mA
- 4 to 20 mA, mechanically suppressed
- Input in the ranges:
  - 100 µA to 60 mA
  - Shunt resistor 60 mV or 150 mV, rated current 1 A to 10 kA
  - 60 mV to 600 V
  - Other inputs on request

### Additional designs

- Available for all Order Nos.
- max. 1 add-on per group.

### Device type

- Format
  - Transverse version
  - Upright version

### Measuring instrument models

#### Zero point

- Zero point on the left for transverse version (standard)
- Zero point at the bottom for upright version (standard)
- Zero point in center
- Zero point optionally positioned
- Zero point on the left, mechanically suppressed (not 4 to 20 mA) (max. suppression 20 %; measuring ranges ≥ 250 µA to 250 mV, Ri 1 kΩ/V)
- Zero point on the bottom, mechanically suppressed (not 4 to 20 mA) (max. suppression 20 %; measuring ranges ≥ 250 µA to 250 mV, Ri 1 kΩ/V)

#### Internal resistance for voltmeters

- Standard
  - Ri approx. 10 kΩ/V (measurement input ≥ 5 V/≤ 150 V)
- Without adjusting potentiometer (standard)
  - Control range ± 15 % (measurement input ≥ 6 V/≤ 400 V; only Class 1.5, power consumption approx. 100 µA)

#### Lead resistance if connected to shunt resistors

- 0.06 Ω (standard)
- Deviating from 0.06 Ω, limit values:
  - A/60 mV in Class 1.5, max. 1 Ω
  - A/150 mV in Class 1.5, max. 7 Ω

#### Service position

- Vertical (standard)
- Horizontal
- Other service position (specify angle of scale surface from horizontal in plain text)

1) Specifications in plain text.

### Measuring instrument models

#### Special requirements

- Normal vibration and impact resistance (standard)
- Available for marine applications with the following certifications:
  - Germanischer Lloyd
  - Vibration resistance 2.5 g; impact resistance 30 g

#### Scale versions

- Scale
  - Same as measurement input (standard)
  - Blank scale (start/center/end mark, logo, symbols)

### Scale graduation

- Linear scale
- Scale per curve

### Graduation and pointer

- Single graduation (standard)
- Double graduation

### Additional imprint

- Second numbering
- Lettering
  - Without additional lettering (standard)
    - Without additional lettering: ≤ 15 characters German
    - Without additional lettering: > 15 characters German
  - Lettering: ≤ 15 characters German
  - Lettering: > 15 characters German
  - Lettering: ≤ 15 characters foreign language (using Latin lettering)
  - Lettering: > 15 characters foreign language (using Latin lettering)

### Color marking

- Colored mark, red RAL 2002
- Colored field, yellow RAL 1021, green RAL 6018 or red RAL 2022

### Scale and pointer colors

- Scale, white; printing and pointer black (standard)
- Scale, black; printing and pointer white
- Scale, black; printing and pointer yellow
- Scale, black; printing white, pointer yellow
- Lettering
  - > 15 characters German
  - > 15 characters foreign language

### Lighting

- Without lighting (standard)
- With lighting (direct)
  - Plessyscale, scale and lighting white

### Lamp voltage for lighting

- 24 V
- 28 V

### Housing models

#### Field of application

- Standard
- Conditionally tropic-proof

2) Available as type Pf2S5 on request.

3) Additional one-off engraving costs on request.
## Analog indicators

Rectangular indicators for direct current or voltage

### Dimension drawings

- **96 x 48 mm and 48 x 96 mm**
  - with moving-coil movement

### Selection and ordering data

<table>
<thead>
<tr>
<th>Additional designs</th>
<th>Order No.</th>
<th>Order Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available for all Order Nos.</td>
<td>M01594 - P</td>
<td></td>
</tr>
<tr>
<td>- max. 1 add-on per group, Supplement Order No. with -Z and order code</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Housing models

#### Degree of protection
- Standard
- Housing front panel IP 54, terminal IP 20
- Aseismic (only Class 1.5 - combination with S23 possible)

<table>
<thead>
<tr>
<th>Housing front panel IP 54, terminal IP 20</th>
<th>- Z</th>
<th>S23</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aseismic (only Class 1.5 - combination with S23 possible)</td>
<td>- Z</td>
<td>E36</td>
</tr>
</tbody>
</table>

### Color of bezel
- Black, matt (standard)
- Gray, RAL 7037, matt
- Pebble gray, RAL 7032, matt
- Dark beige, like RAL 1019, matt
- Light gray, RAL 7035, matt

<table>
<thead>
<tr>
<th>Color of bezel</th>
<th>- Z</th>
<th>F12</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Z</td>
<td>F18</td>
<td></td>
</tr>
<tr>
<td>- Z</td>
<td>F14</td>
<td></td>
</tr>
<tr>
<td>- Z</td>
<td>F05</td>
<td></td>
</tr>
</tbody>
</table>

### Glass
- Standard
- Antiglare glass

<table>
<thead>
<tr>
<th>Glass</th>
<th>- Z</th>
<th>G01</th>
</tr>
</thead>
</table>

### Device designation
- Without designation (standard)
- Designation on rear panel

<table>
<thead>
<tr>
<th>Device designation</th>
<th>- Z</th>
<th>K11</th>
</tr>
</thead>
</table>

### Labeling strips
- Without labeling strip (standard)
- Labeling on top of front panel (only for transverse version)

<table>
<thead>
<tr>
<th>Labeling strips</th>
<th>- Z</th>
<th>B75</th>
</tr>
</thead>
</table>

### Shock protection
- Without protection against contact (standard)
- Individual protection against contact (voltmeters and ammeters ≤ 4 A)

<table>
<thead>
<tr>
<th>Shock protection</th>
<th>- Z</th>
<th>B13</th>
</tr>
</thead>
</table>

1) Specifications in plain text.
Analog indicators
Rectangular indicators for direct current or voltage
144 x 72 mm and 72 x 144 mm
with moving-coil movement

Overview

- **Input variables**
  - Direct current
  - Direct voltage

Design

The analog indicator comprises:
- Moving-coil movement with jewel bearings
- Sizes of housing
  - 144 x 72 mm (transverse version)
  - 72 x 144 mm (upright version)
- Sheet-steel housing suitable for
  - Control panel according to DIN 43 700
  - Slots
- Replaceable bezel and glass
- Electrical connection is over tab connector

Technical specifications

- **Display**
  - Scale graduation: Coarse-fine
  - Pointer: Beam pointer with knife-edge
  - Scale length: 96 mm
- **Input**
  - DC measuring range corresponding to the ordering data
  - Measuring range:
    - 100 µA: 2000 Ω
    - 150 µA: 2000 Ω
    - 250 µA: 1080 Ω
    - 400 µA: 497 Ω
    - 600 µA: 163 Ω
- **Measuring range**
  - Internal resistance Ri (± 20 %)
    - 1 mA: 69 Ω
    - 1.5 mA: 26.5 Ω
    - 2 mA: 20 Ω
    - 2.5 mA: 10.8 Ω
    - 4 mA: 7.1 Ω
    - 5 mA: 5.8 Ω
    - 6 mA: 2.4 Ω
    - 10 mA: 1.6 Ω
    - 15 mA: 4 Ω
    - 0/4 to 20 mA: 3 Ω
    - 25 mA: 2.4 Ω
    - > 60 mV to ≤ 250 mV: 1 kΩ/V
    - > 250 mV: 1 kΩ/V
- **Voltage drop at**
  - > 25 mA to < 1 A: 60 mV (± 20 %)
  - ≥ 1 A: 60 mV (± 20 %)
- **Power consumption if connected to shunt resistor**: 6 mA (± 20 %)

Error limits

- **Class**: 1.5
- **Housing**: Sheet steel housing
- **Front dimensions**
  - Transverse version: 144 mm x 72 mm
  - Upright version: 72 mm x 144 mm
- **Bezel, matt**: Black (standard), gray (RAL 7037), light gray (RAL 7035), pebble gray (RAL 7032) or dark beige (e.g. RAL 1019)
- **Mounting depth, without electrical connection**: Max. 168 mm
- **Panel cutout**
  - Transverse version: 138 +1 mm x 68 +0.7 mm
  - Upright version: 68 +0.7 mm x 138 +1 mm
- **Weight**: Approx. 1.0 kg
- **Mounting**: Mounting C DIN 43 835 for panel thickness 1 to 40 mm
- **Electric connection**: Terminal clamp M 5
- **Shock protection**: Available as optional extra

Reference conditions

- **Ambient temperature**: 23 °C ± 2 K
- **Service position**: Vertical nominal position ± 1°
- **Other**: DIN EN 60 051

Regulations

- **Nominal circuit voltage**: 660 V
- **Degree of protection**
  - Housing front: IP 50 according to EN 60 529
  - Connections: IP 00 according to EN 60 529
Selection and ordering data

### Analog indicators 144 x 72 and 72 x 144 with moving-coil movement

- **Measurement input direct current and direct voltage**
  - 0 to 20 mA
  - 4 to 20 mA, mechanically suppressed
  - Input in the ranges:
    - 100 mA to 60 mA
    - Shunt resistor 60 mV or 150 mV, rated current 1 A to 10 kA
    - 60 mV to 600 V
    - Other inputs on request

Additional designs
- Available for all Order Nos.
  - Max. 1 add-on per group.

- **Supplement Order No. with -Z and order code**

Device type
- **Format**
  - Transverse version
  - Upright version

Measuring instrument models
- **Zero point**
  - Zero point on the left for transverse version (standard)
  - Zero point at the bottom for upright version (standard)
  - Zero point in center
  - Zero point optionally positioned
  - Zero point on the left, mechanically suppressed (not 4 to 20 mA) (max. suppression 20%)
  - Measuring ranges ≥ 250 µA/250 mV, Ri 1 kΩ/V (only if ordered together with Order No. H01)
  - Zero point on the bottom, mechanically suppressed (not 4 to 20 mA) (max. suppression 20%)
  - Measuring ranges ≥ 250 µA/250 mV, Ri 1 kΩ/V (only if ordered together with Order No. H02)

Internal resistance for voltmeters
- **Standard**
  - Ri approx. 10 kΩ/V (measurement input ≥ 2 V)
  - Ri = 1 kΩ/V ± 1% at nominal temperature (measurement input ≥ 1 V)
  - Ri = 10 kΩ/V ± 1% at nominal temperature (measurement input ≥ 2 V)

Adjusting potentiometer for voltmeters
- **Without adjusting potentiometer (standard)**
  - **With adjusting potentiometer**
    - Control range ± 15% (measurement input ≥ 6 V/≤ 400 V, only Class 1.5)

Lead resistance if connected to shunt resistors...
- 0.06 Ω (standard)
- Deviating from 0.06 Ω, limit values:
  - A/60 mV in Class 1.5 max. 1 Ω
  - A/150 mV in Class 1.5 max. 7 Ω

Accuracy
- **Class 1.5 (standard)**
- **Class 1.0**

Additional designs
- Available for all Order Nos.
  - Max. 1 add-on per group.

Supplement Order No. with -Z and order code

Scale versions
- **Scale**
  - Linear scale
  - Scale per curve

Graduation and pointer
- **Single graduation, coarse-fine (standard)**
  - Double graduation
  - Fine graduation
  - Beam pointer with knife-edge
    - For single graduation (standard)
    - For double graduation
  - Blade beam pointer
    - For single graduation
    - For double graduation

Additional imprint
- **Second numbering**
  - **Lettering**
    - Without additional lettering (standard)
    - Lettering ≤ 15 characters German
    - Lettering > 15 characters German
    - Lettering ≤ 15 characters foreign language
      - Using Latin lettering
      - Using Latin lettering
    - Lettering > 15 characters foreign language
      - Using Latin lettering

Color marking
- **Colored mark, red RAL 2002**
  - **Colored field, yellow RAL 1021**
  - Green RAL 6018 or red RAL 2002

Scale and pointer colors
- **Scale, white; printing and pointer black** (standard)
- **Scale, black; printing and pointer white**
- **Scale, black; printing and pointer yellow**
- **Scale, black; printing white, pointer yellow**

<table>
<thead>
<tr>
<th>Selection and ordering data</th>
<th>Order No.</th>
<th>Order Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog indicators 144 x 72 and 72 x 144 with moving-coil movement</td>
<td>M0 15 84 -</td>
<td>P 11 11</td>
</tr>
<tr>
<td>Measurement input direct current and direct voltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input variable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 to 20 mA</td>
<td>1 2 6 0</td>
<td></td>
</tr>
<tr>
<td>4 to 20 mA, mechanically suppressed</td>
<td>9 2 7 0</td>
<td></td>
</tr>
<tr>
<td>Input in the ranges:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- 100 mA to 60 mA, Ri 1 kΩ/V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Shunt resistor 60 mV or 150 mV, rated current 1 A to 10 kA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- 60 mV to 600 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Other inputs on request</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional designs</td>
<td>M0 15 84 -</td>
<td>P 11 11</td>
</tr>
<tr>
<td>Available for all Order Nos.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Max. 1 add-on per group.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supplement Order No. with -Z and order code</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Device type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Format</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transverse version</td>
<td>- Z H 0 1</td>
<td></td>
</tr>
<tr>
<td>Upright version</td>
<td>- Z H 0 2</td>
<td></td>
</tr>
<tr>
<td>Measuring instrument models</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero point</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero point on the left for transverse version (standard)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero point at the bottom for upright version (standard)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero point in center</td>
<td>- Z N 3 0</td>
<td></td>
</tr>
<tr>
<td>Zero point optionally positioned</td>
<td>- Z N 0 1 1</td>
<td></td>
</tr>
<tr>
<td>Zero point on the left, mechanically suppressed (not 4 to 20 mA) (max. suppression 20%)</td>
<td>- Z N 4 1 1</td>
<td></td>
</tr>
<tr>
<td>Measuring ranges ≥ 250 µA/250 mV, Ri 1 kΩ/V (only if ordered together with Order No. H01)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero point on the bottom, mechanically suppressed (not 4 to 20 mA) (max. suppression 20%)</td>
<td>- Z N 4 3 1</td>
<td></td>
</tr>
<tr>
<td>Measuring ranges ≥ 250 µA/250 mV, Ri 1 kΩ/V (only if ordered together with Order No. H02)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal resistance for voltmeters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ri approx. 10 kΩ/V (measurement input ≥ 2 V)</td>
<td>- Z R 0 3</td>
<td></td>
</tr>
<tr>
<td>Ri = 1 kΩ/V ± 1% at nominal temperature (measurement input ≥ 1 V)</td>
<td>- Z R 1 5</td>
<td></td>
</tr>
<tr>
<td>Ri = 10 kΩ/V ± 1% at nominal temperature (measurement input ≥ 2 V)</td>
<td>- Z R 1 8</td>
<td></td>
</tr>
<tr>
<td>Adjusting potentiometer for voltmeters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without adjusting potentiometer (standard)</td>
<td>- Z J 0 1</td>
<td></td>
</tr>
<tr>
<td>With adjusting potentiometer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control range ± 15% (measurement input ≥ 6 V/≤ 400 V, only Class 1.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lead resistance if connected to shunt resistors...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A/60 mV and... A/150 mV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.06 Ω (standard)</td>
<td>- Z Z 2 6 1</td>
<td></td>
</tr>
<tr>
<td>Deviating from 0.06 Ω, limit values:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A/60 mV in Class 1.5 max. 1 Ω</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A/150 mV in Class 1.5 max. 7 Ω</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accuracy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class 1.5 (standard)</td>
<td>- Z K 0 2</td>
<td></td>
</tr>
<tr>
<td>Class 1.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) Specifications in plain text.

2) 0 to 1 mA, 0 to 20 mA, 4 to 20 mA, ≥ 1.5 V.

3) Additional one-off engraving costs on request.
Analog indicators

Rectangular indicators for direct current or voltage

144 x 72 mm and 72 x 144 mm
with moving-coil movement

### Selection and ordering data

<table>
<thead>
<tr>
<th>Additional designs</th>
<th>Order No.</th>
<th>Order Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available for all Order Nos.</td>
<td>M01584</td>
<td>-</td>
</tr>
<tr>
<td>- max. 1 add-on per group</td>
<td></td>
<td>-Z</td>
</tr>
<tr>
<td>Supplement Order No. with -Z and order code</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Scale versions

- **Lighting**
  - Without lighting (standard)
  - With lighting (direct)
    - (plexiscale, scale and lighting white)
    - (must be supplemented with Order No. B78 or B79)
  - Optical fiber with mask, lighting white
    - (must be supplemented with Order No. (S52, S53 or S54) and (B78 or B79))
  - Optical fiber with mask, lighting red
    - (must be supplemented with Order No. (S52, S53 or S54) and (B78 or B79))

#### Lamp voltage for lighting

- 24 V
  - Z B78
- 28 V
  - Z B79

#### Housing models

- **Field of application**
  - Standard
  - Conditionally tropic-proof
    - Z B16

- **Degree of protection**
  - Standard
    - Z S22
  - Aseismic (only Class 1.5 - combination with S22 possible)
    - Z E36

#### Color of bezel

- Black, matt (standard)
  - Z F12
- Gray, RAL 7037, matt
  - Z F18
- Pebble gray, RAL 7032, matt
  - Z F18
- Dark beige, like RAL 1019, matt
  - Z F14
- Light gray, RAL 7035, matt
  - Z F05

#### Glass

- Standard
  - Z G01
- Antiglare glass
  - Z G01

#### Device designation

- Without designation (standard)
  - Z K11
- Designation on rear panel
  - Z K11

#### Labeling strips

- Without labeling strip (standard)
  - Z B75
- Labeling on top or bottom of front panel
  - Z B75

#### Shock protection

- Without protection against contact (standard)
  - Z B13
- Individual protection against contact (voltmeters and ammeters ≤ 4 A)
  - Z B13

1) Additional one-off engraving costs on request.
2) Specifications in plain text.
3) Not on bottom for transverse version.
Analog indicators
Square indicators for direct current or voltage
72 x 72 mm
with moving-coil movement

Overview

Input variables
- Direct current
- Direct voltage

Design

The analog indicator comprises:
- Moving-coil movement with jewel bearings
- Housing size 72 x 72 mm
- Polycarbonate housing suitable for:
  - Control panel according to DIN 43 700
  - Slots
- Replaceable bezel and glass
- The indicator has an interchangeable scale
  Electrical connection is over screw terminals.

Technical specifications

Display
- Scale graduation: Coarse-fine
- Pointer: Beam pointer with knife-edge
- Scale length: 66 mm
- Interchangeable scale: Yes

Input
- Measuring range: DC measuring range corresponding to the ordering data
- Internal resistance Ri:
  - 1 mA: 79 Ω (± 20 %)
  - 1.5 mA: 37.5 Ω (± 20 %)
  - 2 mA: 21 Ω (± 20 %)
  - 2.5 mA: 11.4 Ω (± 20 %)
  - 4 mA: 6.7 Ω (± 30 %)
  - 5 mA: 4.8 Ω (± 30 %)
  - 6 mA: 3 Ω (± 30 %)
  - 10 mA: 3.4 Ω (± 30 %)
  - 15 mA: 4 Ω (± 30 %)
  - 0/4 to 20 mA: 3 Ω (± 30 %)
  - 25 mA: 2.4 Ω (± 30 %)
  - ≥ 60 mV: 1 kΩ/V
- Voltage drop at:
  - > 25 mA: 60 mV (± 20 %)
- Power consumption if connected to shunt resistor: 6 mA (± 20 %)

Error limits
- Class: 1.5

Housing
- Polycarbonate, self-extinguishing and drip-proof according to UL 94 V - 0
- Sheet-steel housing available as optional extra.

Front dimensions: 72 mm x 72 mm
Bezel, matt
- Black (standard),
- gray (RAL 7037),
- light gray (RAL 7035),
- pebble gray (RAL 7032) or
cold beige (e.g. RAL 1019).

Mounting depth, without electrical connection: 43.5 mm;
62.5 mm at BV 3340 of Federal Navy (Order No. N98)
Panel cutout: 68 ± 0.7 mm x 68 ± 0.7 mm
Weight: Approx. 0.2 kg
Mounting:
- Mounting S for panel thickness
  1 to 25 mm
Electric connection:
- M4 (voltmeters & ammeters ≤ 4 A)
  or M6 (ammeters > 4 A).
- Screw terminals M 4 with self-lifting clamps; Screws suitable for
  Philips and normal screwdrivers.

Shock protection: Available as optional extra

Reference conditions
- Ambient temperature: 23 °C ± 2 K
- Service position: Vertical nominal position ± 1°

Other
- DIN EN 60 051

Regulations
- Nominal circuit voltage: 1000 V
- Degree of protection:
  - Housing front: IP 52 according to EN 60 529
  - Connections: IP 00 according to EN 60 529

Siemens MP 12 · 2003 1/13
### Analog indicators

**Square indicators for direct current or voltage**

*72 x 72 mm with moving-coil movement*

#### Selection and ordering data

<table>
<thead>
<tr>
<th>Analog indicator 72 x 72 with moving-coil movement</th>
<th>Order No. Order Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement input direct current and direct voltage</td>
<td>M0 16 01 - P Y 0 6 1</td>
</tr>
</tbody>
</table>

#### Input variable

- **0 to 20 mA**
- **4 to 20 mA, mechanically suppressed**
- **Input in the ranges:**
  - At shunt resistor
    - ... /60 mA
    - ... /150 mV
  - 100 µA to 60 mA
  - 60 mV to 600 mV
  - 1 V to 600 V
  - Other inputs on request

#### Additional designs

- Max. 1 add-on per group.
  - Supplement Order No. with -Z and order code

#### Measuring instrument models

**Zero point**

- Zero point on left (standard)
- Zero point in center
- Zero point optionally positioned
- Zero point on the left, mechanically suppressed (not 4 to 20 mA)

#### Internal resistance for voltmeters

- Standard
- Ri approx. 10 kΩ/V (meas. input ≥ 2 V)
- Ri = 1 kΩ/V ± 1 % at nominal temperature (meas. input ≥ 1 V)
- Ri = 10 kΩ/V ± 1 % at nominal temperature (meas. input ≥ 2 V)

#### Adjusting potentiometer for voltmeters

- Without adjusting potentiometer (standard)
- With adjusting potentiometer
  - Control range ± 15 %
  - (meas. input ≥ 6 V, ≤ 550 mV; only standard Ri, only Class 1.5)

#### Lead resistance if connected to shunt resistors... A/60 mV and... A/150 mV

- 0.06 Ω (standard)
- Deviating from 0.06 Ω, limit values:
  - A/60 mV in Class 1.5 max. 1 Ω
  - A/150 mV in Class 1.5 max. 7 Ω

#### Accuracy

- Class 1.5 (standard)
- Class 1.0 (measurement input ≥ 40 µA/ ≥ 60 mV, only in conj. with fine graduation and blade beam pointer)

#### Service position

- Vertical (standard)
- Horizontal
- Other service position (specify angle of scale surface from horizontal in plain text)

#### Additional designs

- Available for all Order Nos.
  - Max. 1 add-on per group.
  - Supplement Order No. with -Z and order code

#### Selection and ordering data

<table>
<thead>
<tr>
<th>Additional designs</th>
<th>Order No. Order Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available for all Order Nos.</td>
<td>M0 16 01 - P Y 0 6 1</td>
</tr>
<tr>
<td>- Max. 1 add-on per group. Supplement Order No. with -Z and order code</td>
<td></td>
</tr>
</tbody>
</table>

#### Measuring instrument models

**Special requirements**

- Normal vibration and impact resistance (standard)
- Available for marine applications with the following certifications (only Class 1.5; measurement input ≥ 250 µA/ ≥ 250 mV; connection to shunt resistor ≥ 60 mV):
  - BV 0591 of Federal Navy
  - Germanischer Lloyd
  - Maritime Register of Shipping
  - BV 3340 of Federal Navy
  - Vibration resistance 2.5 g;
    - impact resistance 30 g
  - Vibration resistance 5 g;
    - impact resistance 50 g

#### Scale versions

**Scale**

- Linear scale
- Scale per curve

#### Graduation and pointer

- Single graduation, coarse-fine (standard)
- Double graduation
- Fine graduation
- Beam pointer with knife-edge
  - for single graduation (standard)
  - for double graduation
  - Blade beam pointer
  - for single graduation
  - for double graduation

#### Additional imprint

- Second numbering
- Lettering
  - Without additional lettering (standard)
  - Lettering ≤ 15 characters German
  - Lettering > 15 characters German
  - Lettering ≤ 15 characters foreign language (using Latin lettering)
  - Lettering > 15 characters foreign language (using Latin lettering)

#### Color marking

- Colored mark, red RAL 2002
- Colored field, yellow RAL 1021, green RAL 6018 or red RAL 2002

#### Scale type

- Flat interchangeable scale (standard)
- Flat screw scale
- Mirror screw scale (conditionally with fine graduation and blade beam pointer)

1) Specifications in plain text.
## Analog indicators

### Square indicators for direct current or voltage

#### with moving-coil movement

72 x 72 mm

### Selection and ordering data

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Order Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>M0 16 01</td>
<td></td>
</tr>
</tbody>
</table>

#### Additional designs

- Available for all Order Nos.
- max. 1 add-on per group.

Supplement Order No. with -Z and order code

#### Scale versions

<table>
<thead>
<tr>
<th>Scale and pointer colors</th>
<th>Order Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale, black; printing and pointer black (standard)</td>
<td>- Z S 5 2 1</td>
</tr>
<tr>
<td>Scale, black; printing and pointer yellow (only for devices for connection to transducers and shunt resistors)</td>
<td>- Z S 5 4 1</td>
</tr>
<tr>
<td>Without scale; pointer, black (only for devices for connection to transducers and shunt resistors)</td>
<td>- Z S 6 2</td>
</tr>
<tr>
<td>Without scale; pointer, yellow (only for devices for connection to transducers and shunt resistors)</td>
<td>- Z S 6 4</td>
</tr>
</tbody>
</table>

#### Lighting

<table>
<thead>
<tr>
<th>Lamp voltage for lighting</th>
<th>Order Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 V</td>
<td>- Z B 7 7</td>
</tr>
<tr>
<td>24 V</td>
<td>- Z B 7 8</td>
</tr>
<tr>
<td>28 V</td>
<td>- Z B 7 9</td>
</tr>
</tbody>
</table>

#### Housing models

<table>
<thead>
<tr>
<th>Field of application</th>
<th>Order Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>- Z B 1 6</td>
</tr>
<tr>
<td>Conditionally tropic-proof</td>
<td>- Z S 2 2</td>
</tr>
<tr>
<td>Aseismic (only Class 1.5 - combination with S22 possible)</td>
<td>- Z E 3 6</td>
</tr>
</tbody>
</table>

#### Degree of protection

| Standard             | - Z S 2 2 |
| Housing front panel IP 54, terminal IP 00 | - Z E 3 6 |

#### Color of bezel

| Black, matt (standard) | - Z F 1 2 |
| Gray, RAL 7037, matt | - Z F 1 8 |
| Dark beige, like RAL 1019, matt | - Z F 1 4 |
| Light gray, RAL 7035, matt | - Z F 0 5 |

#### Intermediate frame, 3 mm high

| Without intermediate frame (standard) | - Z Z 3 1 |
| Intermediate frame, black, gloss (only in conjunction with mounting S or B) | - Z Z 3 2 |

#### Glass

| Standard             | - Z G 0 1 |

#### Optic fiber with mask, lighting white (only when ordered together with Order No. S57) | - Z Z 6 7 |

#### Lamp voltage for lighting

| 12 V | - Z B 7 7  |
| 24 V | - Z B 7 8  |
| 28 V | - Z B 7 9  |

#### Housing models

<table>
<thead>
<tr>
<th>Housing</th>
<th>Order Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard housing (standard housing in conjunction with mounting B92 also suitable for Mauell and H&amp;B Unibloc slots)</td>
<td>- Z M 4 0</td>
</tr>
</tbody>
</table>

#### Mounting

<table>
<thead>
<tr>
<th>Mounting</th>
<th>Order Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting S (panel thickness 1 to 25 mm)</td>
<td>- Z B 9 2</td>
</tr>
<tr>
<td>2 leaf-springs (panel thickness 1 to 3 mm)</td>
<td>- Z B 2 1</td>
</tr>
<tr>
<td>4 leaf-springs (panel thickness 1 to 3 mm)</td>
<td>- Z B 2 2</td>
</tr>
<tr>
<td>Mounting B (panel thickness 1 to 40 mm)</td>
<td>- Z B 1 5</td>
</tr>
<tr>
<td>Subklew fasteners (mounting S without pivot)</td>
<td>- Z B 2 3</td>
</tr>
</tbody>
</table>

#### Device designation

<table>
<thead>
<tr>
<th>Designation</th>
<th>Order Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without designation</td>
<td>- Z K 1 1 2</td>
</tr>
<tr>
<td>Designation on rear panel</td>
<td>- Z K 3 5</td>
</tr>
</tbody>
</table>

#### Constants indication

| Without constant indication (standard) | - Z K 3 5 2 |
| Constant indication 1-1.5-2.5-3-4-5-6-7.5-8-10 | - Z K 3 5 2 |
| 1 adjustable set pointer | - Z M 0 1 |

#### Shock protection

| Without protection against contact (standard) | - Z B 1 3 |
| Overall protection against contact (voltmeters and ammeters ≤ 4 A) | - Z B 0 8 |

#### Labels

| Without labeling strip | - Z B 7 5 2 |
| Labeling on the bottom of the front panel | - Z B 7 5 2 |

2) Specifications in plain text.

### Dimension drawings

![Dimension drawings](image-url)

Analog indicator type V-PQs 72, dimensions in mm
Analog indicators
Square indicators for direct current or voltage
96 x 96 mm
with moving-coil movement

Overview
Input variables
- Direct current
- Direct voltage

Design
The analog indicator comprises:
• Moving-coil movement with jewel bearings
• Housing size 96 x 96 mm
• Polycarbonate housing suitable for
  - Control panel according to DIN 43 700
  - Slots
• Replaceable bezel and glass
• The indicator has an interchangeable scale
Electrical connection is over screw terminals.

Technical specifications
Display
Scale graduation Coarse-fine
Pointer Beam pointer with knife-edge
Scale length 94 mm
Interchangeable scale Yes
Input
Measuring range Internal resistance $R_i$
- 1 mA $79 \Omega$ (± 20 %)
- 1.5 mA $37.5 \Omega$ (± 20 %)
- 2 mA $21 \Omega$ (± 20 %)
- 2.5 mA $11.4 \Omega$ (± 20 %)
- 4 mA $6.7 \Omega$ (± 30 %)
- 5 mA $4.8 \Omega$ (± 30 %)
- 6 mA $3 \Omega$ (± 30 %)
- 10 mA $3.4 \Omega$ (± 30 %)
- 15 mA $4 \Omega$ (± 30 %)
- 0/4 to 20 mA $3 \Omega$ (± 30 %)
- 25 mA $2.4 \Omega$ (± 30 %)
- $\geq$ 60 mV $1 \kappa \Omega$
Voltage drop at
• $> 25$ mA 60 mV (± 20 %)
Power consumption if connected to shunt resistor 6 mA (± 20 %)
Error limits
Class 1.5
Housing Polycarbonate, self-extinguishing and drip-proof according to UL 94 V - 0
Sheet-steel housing available as optional extra.
Front dimensions 96 mm x 96 mm
Bezel, matt Black (standard), gray (RAL 7037), light gray (RAL 7035), pebble gray (RAL 7032) or dark beige (e.g. RAL 1019)
Mounting depth, without electrical connection 43.5 mm, 62.5 mm at BV 3340 of Federal Navy (Order No. N98)
Panel cutout 92°±0.8 mm x 92°±0.8 mm
Weight Approx. 0.25 kg
Mounting Mounting S for panel thickness 1 to 25 mm
Electric connection M4 (voltmeters & ammeters $\leq$ 4 A) or M6 (ammeters $> 4$ A).
Screw terminals M 4 with self-lifting clamps; Screws suitable for Philips and normal screwdrivers.
Shock protection Available as optional extra
Reference conditions
Ambient temperature 23 °C ± 2 K
Service position Vertical nominal position ± 1°
Other DIN EN 60 051
Regulations
Nominal circuit voltage 1000 V
Degree of protection
• Housing front IP 52 according to EN 60 529
• Connections IP 00 according to EN 60 529
Analog indicators

Square indicators for direct current or voltage

96 x 96 mm
with moving-coil movement

Selection and ordering data

<table>
<thead>
<tr>
<th>Analog indicator 96 x 96 with moving-coil movement</th>
<th>Order No.</th>
<th>Order Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement input direct current and direct voltage</td>
<td>M0 1 6 0 4</td>
<td>- Z 7 7 7</td>
</tr>
</tbody>
</table>

Input variable
- 0 to 20 mA
- 4 to 20 mA, mechanically suppressed
- Input in the ranges:
  - At shunt resistor
  - ... 60 mV
  - ... 150 mV
  - 100 μA to 60 mA
  - 60 mV to 600 mV
  - 1 V to 600 V

Additional designs
Available for all Order Nos.
- max. 1 add-on per group.
  - Supplement Order No. with -Z and order code

Measuring instrument models

Zero point
- Zero point on left (standard)
- Zero point in center
- Zero point optionally positioned
- Zero point on the left, mechanically suppressed (not 4 to 20 mA)

Internal resistance for voltimeters
- Standard
- Ri approx. 10 kΩ/V
- Ri = 1 kΩ/V ± 1 % at nominal temperature
- Ri = 10 kΩ/V at 1 % at nominal temperature

Adjusting potentiometer for voltimeters
- Without adjusting potentiometer (standard)
- With adjusting potentiometer
  - Control range ± 15 %
  - Measurement input ≥ 8 V ≤ 550 V; only standard Ri; only Class 1.5

Lead resistance if connected to shunt resistors
- A/60 mV and ... A/150 mV
- 0.06 Ω (standard)
- Deviating from 0.06 Ω, limit values:
- A/60 mV in Class 1.5 max. 1 Ω
- A/150 mV in Class 1.5 max. 7 Ω

Accuracy
- Class 1.5 (standard)
- Class 1.0
  - (measurement input ≥ 40 mA/ ≥ 60 mV)

Service position
- Vertical (standard)
- Horizontal
- Other service position (specify angle of scale surface from horizontal in plain text)

Additional designs
Available for all Order Nos.
- max. 1 add-on per group.
  - Supplement Order No. with -Z and order code

Additional features

Special requirements
- Normal vibration and impact resistance (standard)

Available for marine applications with the following certifications (only Class 1.5; measurement input ≥ 250 μA/ ≥ 250 mV, connection to shunt resistor ≥ 60 mV):
- BV 0591 of Federal Navy
- Germanischer Lloyd
- Maritime Register of Shipping
- BV 3340 of Federal Navy
- Vibration resistance 2.5 g;
- impact resistance 30 g
- Vibration resistance 5 g;
- impact resistance 50 g

Scale versions

Linear scale
- Z Y 0 6
- Scale per curve
- Z S 2 6

Graduation and pointer
- Single graduation, coarse-fine (standard)
- Double graduation
- Fine graduation
- Beam pointer with knife-edge
  - for single graduation (standard)
  - for double graduation
- Blade beam pointer
  - for single graduation
  - for double graduation

Additional imprint
- Second numbering
- Lettering
  - Without additional lettering (standard)
  - Lettering ≤ 15 characters German
  - Lettering > 15 characters German
  - Lettering ≤ 15 characters foreign language (using Latin lettering)
  - Lettering > 15 characters foreign language (using Latin lettering)

Color marking
- Colored mark, red RAL 2002
- Colored field, yellow RAL 1021, green RAL 6018 or red RAL 2002

Scale type
- Flat interchangeable scale (standard)
- Flat screw scale
- Mirror interchangeable scale (conditionally with fine graduation and blade beam pointer)
- Mirror screw scale (conditionally with fine graduation and blade beam pointer)

1) Specifications in plain text.

2) Contains sheet-steel housing with cone-head rivets (Order No. M40) and mounting B (Order No. B22).

3) The type is different in Pqs 96 and the Order No. in M01616-P.
## Analog indicators

### Square indicators for direct current or voltage

96 x 96 mm with moving-coil movement

---

### Selection and ordering data

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Order Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>M0 1 6 0 4</td>
<td>-</td>
</tr>
</tbody>
</table>

#### Additional designs

- Available for all Order Nos.
- Supplement Order No. with -Z and order code

#### Scale versions

**Scale and pointer colors**

- Scale, white; printing and pointer black (standard)
- Scale, black; printing and pointer white
- Scale, black; printing and pointer yellow
- Without scale; pointer, black (only for devices for connection to transducers and shunt resistors)
- Without scale; pointer, white (only for devices for connection to transducers and shunt resistors)

#### Lighting

- Without lighting (standard)
- With lighting (direct)

#### Lamp voltage for lighting

- 12 V
- 24 V
- 28 V

#### Housing models

**Field of application**

- Standard
- Conditionally tropic-proof

**Degree of protection**

- Standard
- Housing front panel IP 54, terminal IP 00
- Aseismic (only Class 1.5 - combination with S22 possible)

**Color of bezel**

- Black, matt (standard)
- Gray, RAL 7037, matt
- Pebble gray, RAL 7032, matt
- Dark beige, like RAL 1019, matt
- Light gray, RAL 7035, matt

**Intermediate frame, 3 mm high**

- Without intermediate frame (standard)
- Intermediate frame, black, gloss (only in conjunction with mounting S or B)
- Intermediate frame, gray RAL 7037, gloss (only in conjunction with mounting S or B)

**Glass**

- Standard
- Antiglare glass

---

1) Additional one-off engraving costs on request.

---

### Additional specifications

- Max. 1 add-on per group.

---

### Housing models

**Housing**

- Standard housing (standard housing in conjunction with mounting B92 also suitable for Mauell and H&B Unibloc slots)
- Sheet-steel housing with cone-head rivets

#### Mounting

- Mounting S (panel thickness 1 to 25 mm) (standard)
- 2 leaf-springs (panel thickness 1 to 3 mm)
- 4 leaf-springs (panel thickness 1 to 3 mm)
- Mounting B (panel thickness 1 to 40 mm) (only if ordered together with Order No. M40)
- Subklew fasteners (mounting S without pivot)
- Without mounting

#### Device designation

- Without designation (standard)
- Designation on rear panel

#### Device designation

- Without constant indication (standard)
- Constant indication 1-1.5-2-2.5-3-4-5-6-7.5-8-10

#### Adjustable set pointer

- Without adjustable set pointer (standard)
- 1 adjustable set pointer, red

#### Shock protection

- Without protection against contact (standard)
- Overall protection against contact
- Individual protection against contact (voltmeters and ammeters ≤ 4 A)

---

### Dimension drawings

Analog indicator type V-Pqs 96, dimensions in mm
## Overview

### Input variables
- Alternating current 15 to 65 Hz
- Alternating voltage 15 to 65 Hz

### Design
The analog indicator comprises:
- Moving-iron movement with jewel bearings
- Housing size 72 x 72 mm
- Polycarbonate housing suitable for
  - Control panel according to DIN 43 700
  - Slots
- Replaceable bezel and glass
- The indicator has an interchangeable scale
- Electrical connection is over screw terminals.

## Technical specifications

### Display
- Scale graduation: Coarse-fine
- Pointer: Beam pointer with knife-edge
- Scale length: 66 mm
- Interchangeable scale: Yes

### Input
- DC measuring range corresponding to the ordering data

## Power consumption

<table>
<thead>
<tr>
<th>Condition</th>
<th>Power Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>If connected to voltage transformer</td>
<td></td>
</tr>
<tr>
<td>• Secondary/100 V (120 V)</td>
<td>Approx. 1.0 VA (1.4 VA)</td>
</tr>
<tr>
<td>• Secondary/110 V (132 V)</td>
<td>Approx. 1.4 VA (2.0 VA)</td>
</tr>
<tr>
<td>If connected to current transformer</td>
<td></td>
</tr>
<tr>
<td>• Secondary 1 A</td>
<td>Approx. 0.25 VA</td>
</tr>
<tr>
<td>• Secondary 5 A</td>
<td>Approx. 0.30 VA</td>
</tr>
</tbody>
</table>

## Error limits

<table>
<thead>
<tr>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5</td>
</tr>
</tbody>
</table>

## Housing
- Polycarbonate, self-extinguishing and drip-proof according to UL 94 V-0
- Sheet-steel housing available as optional extra.

### Front dimensions
- 72 mm x 72 mm

### Bezel, matt
- Black (standard), gray (RAL 7037), light gray (RAL 7035), pebble gray (RAL 7032) or dark beige (e.g. RAL 1019)

### Mounting depth, without electrical connection
- 43.5 mm

### Panel cutout
- 68+0.7 mm x 68+0.7 mm

### Weight
- Approx. 0.2 kg

### Electric connection
- M4 (voltmeter & ammeter ≤ 9 A), M6 (ammeter > 9 A to ≤ 60 A) or M8 (ammeter > 60 A to ≤ 100 A). Screw terminals M 4 with self-lifting clamps; Screws suitable for Philips and normal screwdrivers.

### Shock protection
- Available as optional extra

## Reference conditions

### Ambient temperature
- 23 °C ± 2 K

### Service position
- Vertical nominal position ± 1°

### Other
- DIN EN 60 051

## Regulations

### Nominal circuit voltage
- 1000 V

### Degree of protection
- Housing front: IP 52 according to EN 60 529
- Connections: IP 00 according to EN 60 529
## Analog indicators

**Square indicators for alternating current or voltage, 15 to 65 Hz**

### 72 x 72 mm with moving-iron movement

### Selection and ordering data

<table>
<thead>
<tr>
<th>Measurement input alternating current or alternating voltage</th>
<th>Order No.</th>
<th>Order Code</th>
</tr>
</thead>
</table>
| A/1 A, connection to current transformer                      | M0 16 01 | E   4990 - Z Y06 1
| A/5 A, connection to current transformer                      | M0 16 01 | E   4990 - Z Y06 1
| In the ranges:                                               |           |            |
| 100 mA to 6 A                                                 | M0 16 01 | E   9999 - Z Y06 1
| 6 V to 100 V                                                  | M0 16 01 | E   9999 - Z Y06 1
| Voltage transformer secondary 100 V/110 V primary            | M0 16 01 | E   9999 - Z Y06 1
| Other inputs on request                                      | M0 16 01 | E   9999 - Z Y06 1

### Additional designs

Available for all Order Nos. - max. 1 add-on per group
- Supplement Order No. with -Z and order code

### Measuring instrument models

<table>
<thead>
<tr>
<th>Measurement input</th>
<th>Order No.</th>
<th>Order Code</th>
</tr>
</thead>
</table>
| Alternating current/voltage (standard) | M0 16 01 | E   Z M54 1
| Direct/Alternating current and direct/alternating voltage | M0 16 01 | E   Z M53 1

### Nominal frequency

- 15 to 65 Hz (standard)
- 1, Hz
- Hz

### Shielding

- Installation conditions, normal (standard)
- Increased external field protection

### Service position

- Vertical (standard)
- Horizontal
- Other service position (specify angle of scale surface from horizontal in plain text)

### Special requirements

- Normal vibration and impact resistance (standard)
- Available for marine applications with the following certifications (only Class 1.5; Measurement input ≥ 100 mA/± 6 V):
  - BV 0591 of Federal Navy
  - Germanischer Lloyd
  - Maritime Register of Shipping
  - Vibration resistance 2.5 g; impact resistance 30 g;
  - Vibration resistance 5 g; impact resistance 50 g

### Scale versions

<table>
<thead>
<tr>
<th>Scale</th>
<th>Order No.</th>
<th>Order Code</th>
</tr>
</thead>
</table>
| Same as measurement input (standard) | M0 16 01 | E   Z B85 1
| Blank scale (start/end mark, logo, symbols) | M0 16 01 | E   Z B85 1

1) Specifications in plain text.
2) Contains sheet-steel housing with cone-head rivets (Order No. M40) and mounting B (Order No. B22).

### Selection and ordering data

<table>
<thead>
<tr>
<th>Additional designs</th>
<th>Order No.</th>
<th>Order Code</th>
</tr>
</thead>
</table>
| Available for all Order Nos. | M0 16 01 | E   Z D31 1
| Fine graduation | M0 16 01 | E   Z F31 1
| Beam pointer with knife-edge | M0 16 01 | E   Z Z1 1
| For single graduation (standard) | M0 16 01 | E   Z Z2 1
| For double graduation | M0 16 01 | E   Z Z4 1

### Scale versions

<table>
<thead>
<tr>
<th>Graduation and pointer</th>
<th>Order No.</th>
<th>Order Code</th>
</tr>
</thead>
</table>
| Single graduation, coarse-fine (standard) | M0 16 01 | E   Z D31 1
| Double graduation | M0 16 01 | E   Z F31 1

### Additional imprint

- Second numbering
- Lettering
- Without additional lettering (standard)
- Lettering ≤ 15 characters German
- Lettering > 15 characters German
- Lettering ≤ 15 characters foreign language
- Lettering > 15 characters foreign language
- Lettering > 15 characters foreign language

### Color marking

- Colored mark, red RAL 2002
- Colored field, yellow RAL 1021, green RAL 6018 or red RAL 2002

### Scale type

- Flat interchangeable scale (standard)
- Flat screw scale

### Overload

- No overload (standard)
- 2-fold (only for ammeters)
- 2-fold (only for ammeters; full-scale reading ≤ 40 A)

### Scale and pointer colors

- Scale, white; printing and pointer black (standard)
- Scale, black; printing and pointer white
- Scale, black; printing and pointer yellow
- Without scale; Pointer, white (only for devices with connection to current and voltage transformers)
- Without scale; Pointer, yellow (only for devices with connection to current and voltage transformers)

### Lighting

- Without lighting (standard)
- With lighting (direct)

3) Additional one-off engraving costs on request.
### Analog indicators

Square indicators for alternating current or voltage, 15 to 65 Hz

| Dimensions | 72 x 72 mm with moving-iron movement |

#### Selection and ordering data

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Order Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>M0 1 6 0 1</td>
<td>- Z B 7 7</td>
</tr>
<tr>
<td>M0 1 6 0 1</td>
<td>- Z B 7 8</td>
</tr>
<tr>
<td>M0 1 6 0 1</td>
<td>- Z B 7 9</td>
</tr>
</tbody>
</table>

#### Additional designs

| Available for all Order Nos. | - max. 1 add-on per group. |
| Supplement Order No. with -Z and order code |

#### Housing models

<table>
<thead>
<tr>
<th>Lamp voltage for lighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 V</td>
</tr>
<tr>
<td>24 V</td>
</tr>
<tr>
<td>28 V</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Field of application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
</tr>
<tr>
<td>Conditionally tropic-proof</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Degree of protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
</tr>
<tr>
<td>Housing front panel IP 54, terminal IP 00</td>
</tr>
<tr>
<td>Aseismic (only Class 1.5 - combination with S22 possible)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Color of bezel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black, matt (standard)</td>
</tr>
<tr>
<td>Gray, RAL 7037, matt</td>
</tr>
<tr>
<td>Pebble gray, RAL 7032, matt</td>
</tr>
<tr>
<td>Dark beige, like RAL 1019, matt</td>
</tr>
<tr>
<td>Light gray, RAL 7035, matt</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intermediate frame, 3 mm high</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without adjustable set pointer (standard)</td>
</tr>
<tr>
<td>1 adjustable set pointer, red</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Glass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
</tr>
<tr>
<td>Antiglare glass</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Housing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard housing (standard housing in conjunction with mounting B92 also suitable for Mauell and H&amp;B Unibloc slots)</td>
</tr>
<tr>
<td>Sheet-steel housing with cone-head rivets</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting S (panel thickness 1 to 25 mm) (standard)</td>
</tr>
<tr>
<td>2 leaf-springs (panel thickness 1 to 3 mm)</td>
</tr>
<tr>
<td>4 leaf-springs (panel thickness 1 to 3 mm)</td>
</tr>
<tr>
<td>Mounting B (panel thickness 1 to 40 mm) (only if ordered together with Order No. M40)</td>
</tr>
<tr>
<td>Subklee fasteners (mounting S without pivot)</td>
</tr>
<tr>
<td>Without mounting</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Device designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without designation (standard)</td>
</tr>
<tr>
<td>Designation on rear panel</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Constants indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without constant indication (standard)</td>
</tr>
<tr>
<td>Constant indication</td>
</tr>
</tbody>
</table>

1. Specifications in plain text.

#### Dimension drawings

![Analog indicator type V-Aqs 72, dimensions in mm](image-url)
Analog indicators
Square indicators for alternating current or voltage, 15 to 65 Hz

96 x 96 mm with moving-iron movement

Overview
Input variables
- Alternating current 15 to 65 Hz
- Alternating voltage 15 to 65 Hz

Design
The analog indicator comprises:
- Moving-iron movement with jewel bearings
- Housing size 96 x 96 mm
- Polycarbonate housing suitable for
  - Control panel according to DIN 43 700
  - Slots
- Replaceable bezel and glass
- The indicator has an interchangeable scale
- Electrical connection is over screw terminals.

Technical specifications

<table>
<thead>
<tr>
<th>Display</th>
<th>Coarse-fine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pointer</td>
<td>Beam pointer with knife-edge</td>
</tr>
<tr>
<td>Scale length</td>
<td>94 mm</td>
</tr>
<tr>
<td>Interchangeable scale</td>
<td>Yes</td>
</tr>
</tbody>
</table>

| Input          | DC measuring range corresponding to the ordering data |

Power consumption

If connected to voltage transformer
- Secondary/100 V (120 V) Approx. 1.0 VA (1.4 VA)
- Secondary/110 V (132 V) Approx. 1.4 VA (2.0 VA)

If connected to current transformers
- Secondary 1 A Approx. 0.25 VA
- Secondary 5 A Approx. 0.30 VA

Error limits

| Class | 1.5 |

Housing
- Polycarbonate, self-extinguishing and drip-proof according to UL 94 V-0
- Sheet-steel housing available as optional extra.

<table>
<thead>
<tr>
<th>Front dimensions</th>
<th>96 mm x 96 mm</th>
</tr>
</thead>
</table>

Bezel, matt
- Black (standard), gray (RAL 7037), light gray (RAL 7035), pebble gray (RAL 7032) or dark beige (e.g. RAL 1019)

Mounting depth, without electrical connection
- 43.5 mm

Panel cutout
- 92±0.8 mm x 92±0.8 mm

Weight
- Approx. 0.25 kg

Mounting
- Mounting S for panel thickness 1 to 25 mm

Electric connection
- M4 (voltmeters & ammeters ≤ 9 A), M6 (ammeters > 9 A to ≤ 60 A) or M8 (ammeters > 60 A to ≤ 100 A)
- Screw terminals M4 with self-releasing terminal clamp; Screws suitable for Philips and normal screwdrivers.

Shock protection
- Available as optional extra

Reference conditions

<table>
<thead>
<tr>
<th>Ambient temperature</th>
<th>23 °C ± 2 K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service position</td>
<td>Vertical nominal position ± 1°</td>
</tr>
<tr>
<td>Other</td>
<td>DIN EN 60 051</td>
</tr>
</tbody>
</table>

Regulations

<table>
<thead>
<tr>
<th>Nominal circuit voltage</th>
<th>1000 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of protection</td>
<td>IP 52 according to EN 60 529</td>
</tr>
<tr>
<td>Connections</td>
<td>IP 00 according to EN 60 529</td>
</tr>
</tbody>
</table>
### Analog indicators

Square indicators for alternating current or voltage, 15 to 65 Hz

#### Selection and ordering data

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Order Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 0 1 6 0 4 -</td>
<td>E *** ***</td>
<td>Analog indicator 96 x 96 with moving-iron movement</td>
</tr>
</tbody>
</table>

#### Measurement input

- Alternating current/voltage
- Direct current/voltage
- Direct alternating current and direct/alternating voltage

#### Measurement models

- Nominal frequency: 15 to 65 Hz (standard)
- Number of Hz: (one frequency in the range > 65 to 500 Hz) for voltmeters ≥ 40 V with standard ranges and ammeters ≤ 6 A
- Frequency: (one frequency in the range > 65 to 500 Hz) for ammeters > 6 A

#### Shielding

- Installation conditions, normal (standard)
- Increased external field protection

#### Accuracy

- Class 1.5 (standard)
- Class 1.0 (only for alternating current/voltages 50 Hz)

#### Service position

- Vertical (standard)
- Horizontal
- Other service position (specify angle of scale surface from horizontal in plain text)

#### Special requirements

- Normal vibration and impact resistance (standard)
- Available for marine applications with the following certifications (only Class 1.5; Measurement input ≥ 100 mA/≤ 6 V):
  - BV 0591 of Federal Navy
  - Germanischer Lloyd
  - Maritime Register of Shipping
  - Vibration resistance 2.5 g; impact resistance 30 g
  - Vibration resistance 5 g; impact resistance 50 g

#### Specifications

1) Specifications in plain text.
2) Contains sheet-steel housing with cone-head rivets (Order No. M40) and mounting B (Order No. B22).

### Additional designs

- Order No. Order Code

#### Selection and ordering data

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Order Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 0 1 6 0 4 -</td>
<td>E *** ***</td>
<td>Available for all Order Nos.</td>
</tr>
</tbody>
</table>

#### Scale versions

- Scale
  - Same as measurement input (standard)
  - Blank scale (start/end mark, logo, symbols)

#### Graduation and pointer

- Single graduation, course-fine (standard)
- Double graduation
- Flat graduation
- Beam pointer with knife-edge
  - for single graduation (standard)
  - for double graduation
- Blade beam pointer
  - for single graduation
  - for double graduation

#### Additional imprint

- Second numbering
- Lettering
  - Without additional lettering (standard)
  - Lettering ≤ 15 characters German
  - Lettering > 15 characters German
  - Lettering ≤ 15 characters foreign language (using Latin lettering)
  - Lettering > 15 characters foreign language (using Latin lettering)

#### Color marking

- Colored mark, red RAL 2002
- Colored field, yellow RAL 1021, green RAL 6018 or red RAL 2002

#### Scale type

- Flat interchangeable scale (standard)
- Flat screw scale

#### Overload

- No overload (standard)
- 1.2-fold
- 2-fold (only for ammeters)
- 4-fold (only for ammeters; full-scale reading ≤ 40 A)

#### Scale and pointer colors

- Scale, white; printing and pointer black (standard)
- Scale, black; printing and pointer white
- Scale, black; printing and pointer yellow
  - Without scale; Pointer, black
  - Without scale; Pointer, white
  - Without scale; Pointer, yellow
  - Only for devices with connection to current and voltage transformers

3) Additional one-off engraving costs on request.
**Analog indicators**

Square indicators for alternating current or voltage, 15 to 65 Hz

96 x 96 mm with moving-iron movement

---

### Selection and ordering data

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Order Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 0 1 6 0 4 - E ☐ ☐ ☐ ☐</td>
<td></td>
</tr>
</tbody>
</table>

### Scale versions

**Lighting**

- Without lighting (standard)
- With lighting (direct) (plexiscale, scale and lighting, white)

**Lamp voltage for lighting**

- 12 V  - Z B 7 7
- 24 V  - Z B 7 8
- 28 V  - Z B 7 9

### Housing models

**Field of application**

- Standard
- Conditionally tropic-proof  - Z B 1 6

**Degree of protection**

- Standard
- Housing front panel IP 54, terminal IP 00  - Z S 2 2
- Aseismic (only Class 1.5 - combination with S22 possible)  - Z E 3 6

**Color of bezel**

- Black, matt (standard)  - Z F 1 2
- Gray, RAL 7037, matt  - Z F 1 8
- Pebble gray, like RAL 1019, matt  - Z F 1 4
- Light gray, RAL 7035, matt  - Z F 0 5

**Intermediate frame, 3 mm high**

- Without intermediate frame (standard)  - Z Z 3 1
- Intermediate frame, black, gloss (only in conjunction with mounting S or B)  - Z Z 3 2

**Glass**

- Standard  - Z G 0 1
- Antiglare glass

**Housing**

- Standard housing (standard housing in conjunction with mounting B92 also suitable for Mauell and H&B Unibloc slots)
- Sheet-steel housing with cone-head rivets  - Z M 4 0

**Mounting**

- Mounting S (panel thickness 1 to 25 mm) (standard)  - Z B 9 2
- 2 leaf-springs (panel thickness 1 to 3 mm)  - Z B 2 1
- 4 leaf-springs (panel thickness 1 to 3 mm)  - Z B 2 2
- Mounting B (panel thickness 1 to 40 mm) (only if ordered together with Order No. M40)  - Z B 1 5
- Subklew fasteners (mounting S without pivot)  - Z B 2 3
- Without mounting

---

### Dimension drawings

Analog indicator type V-Aqs 96, dimensions in mm

---

1) Specifications in plain text.
Analog indicators

Square indicators for alternating current

96 x 96 mm with bimetal movement for mean and maximum value

- Analog Indicator V-Mqs 96

Overview

Input variables
- Alternating current

Special features
- Mean value indication
- Maximum value indication

Design

The analog indicator comprises:
- Bimetal movement with jewel bearings
- Housing size 96 x 96 mm
- Polycarbonate housing suitable for - Control panel according to DIN 43 700 - Slots
- Replaceable bezel and glass
- The indicator has an interchangeable scale

Electrical connection is over screw terminals.

Technical specifications

<table>
<thead>
<tr>
<th>Display</th>
<th>Coarse-fine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pointer</td>
<td>Beam pointer with knife-edge</td>
</tr>
<tr>
<td>Scale length</td>
<td>94 mm</td>
</tr>
<tr>
<td>Indication errors</td>
<td>Max. ± 3 %</td>
</tr>
<tr>
<td>Interchangeable scale</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Input

DC measuring range corresponding to the ordering data

Power consumption

If connected to current transformers
- Secondary 1 A: Approx. 1.1 VA
- Secondary 5 A: Approx. 1.9 VA

Housing

Polycarbonate, self-extinguishing and drip-proof according to UL 94 V-0
Sheet-steel housing available as optional extra.

Front dimensions: 96 mm x 96 mm
Bezel, matt: Black (standard), gray (RAL 7037), light gray (RAL 7035), pebble gray (RAL 7032) or dark beige (e.g. RAL 1019)

Mounting depth, without electrical connection: 43.5 mm
Panel cutout: 92 +/- 0.8 mm x 92 +/- 0.8 mm
Weight: Approx. 0.25 kg
Mounting: Mounting S for panel thickness 1 to 25 mm
Electric connection: Screw terminals M 4 with self-releasing terminal clamp; Screws suitable for Philips and normal screwdrivers.

Shock protection: Available as optional extra

Reference conditions

Ambient temperature: 23 °C ± 2 K
Service position: Vertical nominal position ± 1°
Other: DIN EN 60 051

Regulations

Nominal circuit voltage: 1000 V
Degree of protection
- Housing front: IP 52 according to EN 60 529
- Connections: IP 00 according to EN 60 529
**Analog indicators**

**Square indicators for alternating current**

96 x 96 mm with bimetal movement for mean and maximum value

### Selection and ordering data

**Analog indicator 96 x 96 with bimetal movement for mean value and maximum value**

Measurement input alternating current

**Input variable**

- ... A, connection, direct (1 or 5 A)
- ... A/1 A, connection to current transformer
- ... A/5 A, connection to current transformer

**Additional designs**

Available for all Order Nos.
- max. 1 add-on per group.
- Supplement Order No. with -Z and order code

### Measuring instrument models

**Setting time**

- 15 min (standard)
- 8 min

**Overload**

- 1.2-fold (standard)
- 1.5-fold (only for 0 to 5 A or secondary 5 A)
- Overload 1.2-fold with integral protective current transformer 50-fold/1s
- Overload 1.2-fold with separate protective current transformer 100-fold/1s

**Service position**

- Vertical (standard)
- Horizontal
- Other service position (specify angle of scale surface from horizontal in plain text)

**Scale versions**

- Same as measurement input (standard)
- Blank scale (start/end mark, logo, symbols)

**Additional imprint**

- Second numbering
- Lettering
  - Without additional lettering (standard)
  - Lettering ≤ 15 characters German
  - Lettering > 15 characters German
  - Lettering ≤ 15 characters foreign language (using Latin lettering)
  - Lettering > 15 characters foreign language (using Latin lettering)

**Color marking**

- Colored mark, red RAL 2002
- Colored field, yellow RAL 1021, green RAL 6018 or red RAL 2002

**Scale and pointer colors**

- Scale, white; printing and pointer black (standard)
- Scale, black; printing and pointer white
- Scale, black; printing and pointer yellow
- Without scale; Pointer, black
- Without scale; Pointer, white
- Without scale; Pointer, yellow

**Selection and ordering data**

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Order Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 0 1 6 0 4</td>
<td>...</td>
</tr>
</tbody>
</table>

1) Specifications in plain text.

2) Additional one-off engraving costs on request.

### Additional designs

Available for all Order Nos.
- max. 1 add-on per group.
- Supplement Order No. with -Z and order code

### Housing models

**Color of bezel**

- Standard
- Antiglare glass

**Housing**

- Standard housing
- Sheet-steel housing with cone-head rivets

### Mounting

- Mounting S (panel thickness 1 to 25 mm)
- Mounting B (panel thickness 1 to 5 A or secondary 5 A)

**Housing models**

- Standard housing
- Sheet-steel housing with cone-head rivets

### Device designation

- Without designation (standard)
- Designation on rear panel

**Constants indication**

- Without constant indication (standard)
- Constant indication

**Shock protection**

- Without protection against contact (standard)
- Overall protection against contact
- Individual protection against contact

### Dimension drawings

Analog indicator type V-Mqs 96, dimensions in mm
Analog indicators

Square indicators for alternating current

72 x 72 mm with bimetal moving-iron movement for mean, maximum and instantaneous value

Overview

Input variables
- Alternating current

Special features
- Mean value indication
- Maximum value indication
- Instantaneous value indication

Design

The analog indicator comprises:
- Bimetal moving-iron movement with jewel bearings
- Housing size 72 x 72 mm
- Polycarbonate housing suitable for - Control panel according to DIN 43 700 - Slots
- Replaceable bezel and glass
- The indicator has an interchangeable scale

Electrical connection is over screw terminals.

Technical specifications

<table>
<thead>
<tr>
<th>Display</th>
<th>Coarse-fine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pointer</td>
<td>Beam pointer with knife-edge</td>
</tr>
<tr>
<td>Scale graduation</td>
<td>Coarse-fine</td>
</tr>
<tr>
<td>Pointer</td>
<td>Beam pointer with knife-edge</td>
</tr>
<tr>
<td>Scale length</td>
<td>66 mm</td>
</tr>
<tr>
<td>Bimetal</td>
<td>66 mm</td>
</tr>
<tr>
<td>Moving-iron</td>
<td>60 mm</td>
</tr>
<tr>
<td>Indication error, bimetal</td>
<td>Max. ± 3 %</td>
</tr>
<tr>
<td>Interchangeable scale</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Input

DC measuring range corresponding to the ordering data

Power consumption

If connected to current transformers
- Secondary 1 A
  - Bimetal | Approx. 1.1 VA |
  - Moving-iron | Approx. 0.25 VA |
- Secondary 5 A
  - Bimetal | Approx. 1.9 VA |
  - Moving-iron | Approx. 0.3 VA |

Error limits

Class, moving-iron | 1.5 |

Housing

Polycarbonate, self-extinguishing and drip-proof according to UL 94 V - 0
Sheet-steel housing available as optional extra.

Front dimensions | 72 mm x 72 mm |

Bezel, matt
- Black (standard), gray (RAL 7037), light gray (RAL 7035), pebble gray (RAL 7032) or dark beige (e.g. RAL 1019)

Mounting depth, without electrical connection | 43.5 mm |

Panel cutout | 68 ± 0.7 mm x 68 ± 0.7 mm |

Weight | Approx. 0.3 kg |

Mounting

Mounting S for panel thickness 1 to 25 mm

Electric connection

Screw terminals M 4 with self-releasing terminal clamp; Screws suitable for Philips and normal screwdrivers.

Shock protection

Available as optional extra

Reference conditions

Ambient temperature | 23 °C ± 2 K |

Service position | Vertical nominal position ± 1° |

Other

DIN EN 60 051

Regulations

Nominal circuit voltage | 1000 V |

Degree of protection
- Housing front | IP 50 according to EN 60 529 |
- Connections | IP 00 according to EN 60 529 |
### Analog Indicators

#### 72 x 72 mm with bimetal-moving-iron movement for mean, instantaneous and instantaneous value

<table>
<thead>
<tr>
<th>Selection and ordering data</th>
<th>Order No.</th>
<th>Order Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog indicator 72 x 72 with bimetal-moving-iron movement for mean value, maximum and instantaneous value</td>
<td>M01603</td>
<td>C - - - -</td>
</tr>
<tr>
<td>Measurement input alternating current, measuring system 1: Bimetal, measuring system 2: Moving-iron</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input variable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- A, connection, direct (1 or 5 A)</td>
<td>9999 - Z Y06</td>
<td></td>
</tr>
<tr>
<td>- A/1 A, connection to current transformer</td>
<td>3990 - Z Y06</td>
<td></td>
</tr>
<tr>
<td>- A/5 A, connection to current transformer</td>
<td>4990 - Z Y06</td>
<td></td>
</tr>
<tr>
<td>Additional designs</td>
<td>M01603</td>
<td>C - - - -</td>
</tr>
<tr>
<td>Available for all Order Nos.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- max. 1 add-on per group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supplement Order No. with -Z and order code</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measuring instrument models</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Setting time for bimetal movements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- 15 min (standard)</td>
<td>- Z E08</td>
<td></td>
</tr>
<tr>
<td>- 8 min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overload for bimetal movements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- 1.2-fold (standard)</td>
<td>- Z U18</td>
<td></td>
</tr>
<tr>
<td>- 1.5-fold (only for 0 to 5 A or secondary 5 A)</td>
<td>- Z U21</td>
<td></td>
</tr>
<tr>
<td>Overload 1.2-fold with separate protective current transformer 100-fold/1s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overload for moving-iron movements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- 1.2-fold (standard)</td>
<td>- Z U22</td>
<td></td>
</tr>
<tr>
<td>- Double</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Vertical (standard)</td>
<td>- Z G21</td>
<td></td>
</tr>
<tr>
<td>- Horizontal</td>
<td>- Z G24</td>
<td></td>
</tr>
<tr>
<td>- Other service position (specify angle of scale surface from horizontal in plain text)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scale versions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scale</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Same as measurement input (standard)</td>
<td>- Z B85</td>
<td></td>
</tr>
<tr>
<td>- Blank scale (start/end mark, logo, symbols)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional imprint</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Lettering</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Without additional lettering (standard)</td>
<td>- Z S02</td>
<td></td>
</tr>
<tr>
<td>- Lettering ≤ 15 characters German</td>
<td>- Z S10</td>
<td></td>
</tr>
<tr>
<td>- Lettering &gt; 15 characters German</td>
<td>- Z S12</td>
<td></td>
</tr>
<tr>
<td>- Lettering ≤ 15 characters foreign language (using Latin lettering)</td>
<td>- Z S11</td>
<td></td>
</tr>
<tr>
<td>- Lettering &gt; 15 characters foreign language (using Latin lettering)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Color marking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Colored mark, red RAL 2002</td>
<td>- Z F21</td>
<td></td>
</tr>
<tr>
<td>- Colored field, yellow RAL 1021, green RAL 6018 or red RAL 2002</td>
<td>- Z F22</td>
<td></td>
</tr>
<tr>
<td>Scale and pointer colors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Scale, white; printing and pointer black (standard)</td>
<td>- Z S62</td>
<td></td>
</tr>
<tr>
<td>- Scale, black; printing and pointer white</td>
<td>- Z S63</td>
<td></td>
</tr>
<tr>
<td>- Scale, black; printing and pointer yellow</td>
<td>- Z S64</td>
<td></td>
</tr>
<tr>
<td>- Without scale; Pointer, black</td>
<td>- Z S62</td>
<td></td>
</tr>
<tr>
<td>- Without scale; Pointer, white</td>
<td>- Z S63</td>
<td></td>
</tr>
<tr>
<td>- Without scale; Pointer, yellow</td>
<td>- Z S64</td>
<td></td>
</tr>
</tbody>
</table>

1) Specifications in plain text.
2) Additional one-off engraving costs on request.
Analog indicators
Square indicators for alternating current
96 x 96 mm with bimetal moving-iron movement for mean, maximum and instantaneous value

### Overview

**Input variables**
- Alternating current

**Special features**
- Mean value indication
- Maximum value indication
- Instantaneous value indication

### Design

The analog indicator comprises:
- Bimetal moving-iron movement with jewel bearings
- Housing size 96 x 96 mm
- Polycarbonate housing suitable for
  - Control panel according to DIN 43 700
  - Slots
- Replaceable bezel and glass
- The indicator has an interchangeable scale

Electrical connection is over screw terminals.

### Technical specifications

<table>
<thead>
<tr>
<th><strong>Display</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale graduation</td>
<td>Coarse-fine</td>
</tr>
<tr>
<td>Pointer</td>
<td>Beam pointer with knife-edge</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Scale length</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bimetal</td>
<td>94 mm</td>
</tr>
<tr>
<td>Moving-iron</td>
<td>81 mm</td>
</tr>
</tbody>
</table>

| **Indication error, bimetal** | Max. ± 3 % |
| **Interchangeable scale** | Yes |

<table>
<thead>
<tr>
<th><strong>Input</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DC measuring range corresponding to the ordering data</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Power consumption</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>If connected to current transformers</td>
<td></td>
</tr>
<tr>
<td>Secondary 1 A</td>
<td></td>
</tr>
<tr>
<td>Bimetal</td>
<td>Approx. 1.1 VA</td>
</tr>
<tr>
<td>Moving-iron</td>
<td>Approx. 0.25 VA</td>
</tr>
<tr>
<td>Secondary 5 A</td>
<td></td>
</tr>
<tr>
<td>Bimetal</td>
<td>Approx. 1.9 VA</td>
</tr>
<tr>
<td>Moving-iron</td>
<td>Approx. 0.3 VA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Error limits</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Class, moving-iron</td>
<td>1.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Housing</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Polycarbonate, self-extinguishing and drip-proof according to UL 94 V-0</td>
<td></td>
</tr>
<tr>
<td>Sheet-steel housing available as optional extra.</td>
<td></td>
</tr>
</tbody>
</table>

| Front dimensions | 96 mm x 96 mm |
| Bezel, matt | Black (standard), gray (RAL 7037), light gray (RAL 7035), pebble gray (RAL 7032) or dark beige (e.g. RAL 1019) |

| Mounting depth, without electrical connection | 43.5 mm |
| Panel cutout | 92 +0.8 mm x 92 +0.8 mm |
| Weight | Approx. 0.35 kg |

| Mounting | Mounting S for panel thickness 1 to 25 mm |
| Electric connection | Screw terminals M 4 with self-releasing terminal clamp; Screws suitable for Philips and normal screwdrivers. |

| Shock protection | Available as optional extra |

<table>
<thead>
<tr>
<th><strong>Reference conditions</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature</td>
<td>23 °C ± 2 K</td>
</tr>
<tr>
<td>Service position</td>
<td>Vertical nominal position ± 1°</td>
</tr>
</tbody>
</table>

| **Other** |  |
| DIN EN 60 051 |

<table>
<thead>
<tr>
<th><strong>Regulations</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal circuit voltage</td>
<td>1000 V</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Degree of protection</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing front</td>
<td>IP 50 according to EN 60 529</td>
</tr>
<tr>
<td>Connections</td>
<td>IP 00 according to EN 60 529</td>
</tr>
</tbody>
</table>
Analog indicators

Square indicators for alternating current

96 x 96 mm with bimetal moving-iron movement

for mean, maximum and instantaneous value

### Selection and ordering data

<table>
<thead>
<tr>
<th>Analog indicator 96 x 96 with bimetal moving-iron movement for mean, maximum and instantaneous value</th>
<th>Order No.</th>
<th>Order Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement input alternating current, measuring system 2: Moving-iron</td>
<td>M0 1 6 0 6 -</td>
<td>C 1 1 1 1 1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input variable</th>
<th>9 9 9 9 -</th>
<th>Z 0 6 1 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>... A, connection, direct (1 or 5 A)</td>
<td>3 9 9 0 -</td>
<td>Z 0 6 1 1</td>
</tr>
<tr>
<td>... A/1 A, connection to current transformer</td>
<td>4 9 9 0 -</td>
<td>Z 0 6 1 1</td>
</tr>
</tbody>
</table>

### Measuring instrument models

<table>
<thead>
<tr>
<th>Setting time for bimetal movements</th>
<th>1 5 min (standard)</th>
<th>- Z E 0 8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8 min</td>
<td>-</td>
</tr>
</tbody>
</table>

### Overload for bimetal movements

<table>
<thead>
<tr>
<th>1.2-fold (standard)</th>
<th>- Z U 1 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5-fold (only for 0 to 5 A or secondary 5 A)</td>
<td>- Z U 2 0</td>
</tr>
<tr>
<td>Overload 1.2-fold with integral protective current transformer 50-fold/1s</td>
<td>- Z U 2 1</td>
</tr>
<tr>
<td>Overload 1.2-fold with separate protective current transformer 100-fold/1s</td>
<td></td>
</tr>
</tbody>
</table>

### Overload for moving-iron movements

<table>
<thead>
<tr>
<th>1.2-fold (standard)</th>
<th>- Z U 2 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double</td>
<td>-</td>
</tr>
</tbody>
</table>

### Service position

| Vertical (standard) | - Z G 2 1 |
| Other service position (specify angle of scale surface from horizontal in plain text) | - Z G 2 4 1 1 |

### Scale versions

<table>
<thead>
<tr>
<th>Scale</th>
<th>Same as measurement input (standard)</th>
<th>- Z B 8 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blank scale</td>
<td>(start/end mark, logo, symbols)</td>
<td>- Z F 1 1 1 1</td>
</tr>
</tbody>
</table>

### Additional imprint

<table>
<thead>
<tr>
<th>Lettering</th>
<th>Without additional lettering (standard)</th>
<th>- Z S 0 2 1 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lettering ≤ 15 characters</td>
<td>German</td>
<td>- Z S 1 0 1 1</td>
</tr>
<tr>
<td>Lettering ≤ 15 characters</td>
<td>foreign language</td>
<td>(using Latin lettering)</td>
</tr>
<tr>
<td>Lettering &gt; 15 characters</td>
<td>foreign language</td>
<td>(using Latin lettering)</td>
</tr>
</tbody>
</table>

### Color marking

| Colored field, yellow RAL 1021, green RAL 6018 or red RAL 2002 | - Z F 2 2 1 1 |
| Colored mark, red RAL 2002 | - Z F 2 1 1 1 |

### Scale and pointer colors

| Scale, white; printing and pointer black (standard) | - Z S 5 2 2 1 |
| Scale, black; printing and pointer white | - Z S 5 3 2 1 |
| Scale, black; printing and pointer yellow | - Z S 6 2 1 |
| Without scale; Pointer, black | - Z S 6 2 |
| Without scale; Pointer, white | - Z S 6 3 |
| Without scale; Pointer, yellow | - Z S 6 4 |

1) Specifications in plain text.
2) Additional one-off engraving costs on request.

### Additional designs

<table>
<thead>
<tr>
<th>Available for all Order Nos.</th>
<th>- max. 1 add-on per group.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplement Order No. with - Z and order code</td>
<td></td>
</tr>
</tbody>
</table>

### Housing models

<table>
<thead>
<tr>
<th>Color of bezel</th>
<th>Black, matt (standard)</th>
<th>- Z F 1 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gray, RAL 7037, matt</td>
<td>- Z F 1 8</td>
<td></td>
</tr>
<tr>
<td>Pebble gray, RAL 7022, matt</td>
<td>- Z F 1 4</td>
<td></td>
</tr>
<tr>
<td>Dark beige, like RAL 1019, matt</td>
<td>- Z F 0 5</td>
<td></td>
</tr>
<tr>
<td>Light gray, RAL 7035, matt</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Intermediate frame, 3 mm high

<table>
<thead>
<tr>
<th>Without intermediate frame (standard)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermediate frame, black, gloss (only in conjunction with mounting S or B)</td>
</tr>
<tr>
<td>Intermediate frame, gray RAL 7037, gloss (only in conjunction with mounting S or B)</td>
</tr>
</tbody>
</table>

### Glass

<table>
<thead>
<tr>
<th>Standard housing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheet-steel housing with cone-head rivets</td>
</tr>
</tbody>
</table>

### Mounting

| Mounting S (panel thickness 1 to 25 mm) (standard) | - Z B 9 2 |
| 2 leaf-springs (panel thickness 1 to 3 mm) | - Z B 2 1 |
| 4 leaf-springs (panel thickness 1 to 3 mm) | - Z B 2 2 |
| Mounting B (panel thickness 1 to 40 mm) (only if ordered together with Order No. M40) |

### Device designation

| Without designation (standard) | - Z K 1 1 1 1 |
| Designation on rear panel |

### Constants indication

| Without constant indication (standard) | - Z K 3 5 |
| 1-1.5-2-2.5-3-4-5-6-7.5-8-10 |

### Shock protection

| Without protection against contact (standard) | - Z B 0 8 |
| Overall protection against contact | - Z B 1 3 |
| Individual protection against contact |

### Dimension drawings

![Analog indicator type V-MAqs 96, dimensions in mm](image)