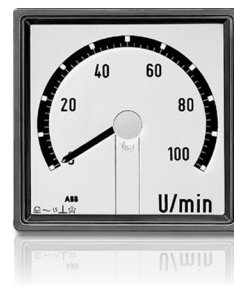
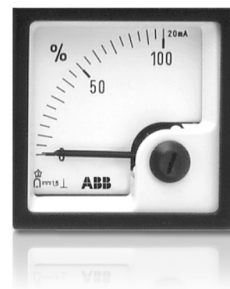


Moving Coil Indicators for direct currents or voltages and sinusoidal alternating currents or voltages



Inputs

- For direct currents or voltages or with rectifier for alternating currents or voltages 100 mA ... 60 A; 60 mV ... 600 V directly

Formats

- Square indicators
48 x 48 mm; 72 x 72 mm; 96 x 96 mm;
144 x 144 mm, with 90° or 240° scales
- Edgewise indicators
72 x 36 mm; 96 x 48 mm; 144 x 72 mm
- Narrow edgewise indicators
48 x 24 mm; 72 x 24 mm; 96 x 24 mm

Mounting orientation

- edgewise or narrow edgewise indicators
transverse or upright format

Alarm signalling

- Square or rectangular indicators
with relay or transistor output
- 1 or 2 contacts (min., max.)

Excellent environmental and mechanical capabilities

General data

Standards

The indicators comply with DIN EN 60051 and with the safety regulations according to DIN EN 61010-1.

In the sections below you can find a short description of the most important parts of these regulations regarding the construction and the characteristics of electrical measuring instruments.

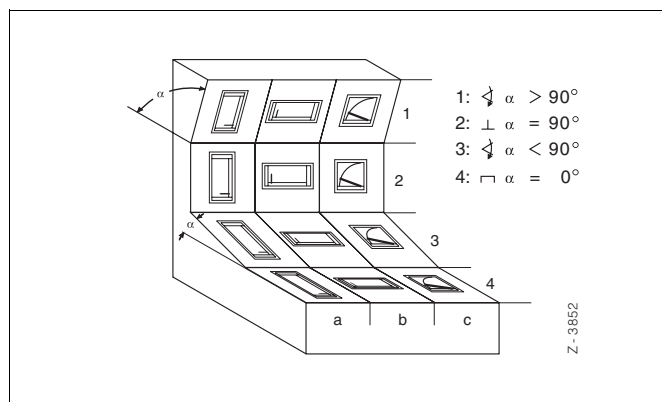
Measured error

The measured error of an indicator or its accessories is given by the limits through basic errors and effects.

The indicators and contact indicators comply with Class 1.5, if no other measured error rating has been given for specific types. Optionally, indicators can also be supplied for higher class measured errors, if this is possible. The class involved is always stated on the scale.

Mounting orientation

Generally, the nominal position is indicated by a position symbol. For indicators without such a position identification, the reference range is any vertical or horizontal position. The nominal mounting orientation is 5° in every direction of the reference position. Note that the effect (in addition to the indicated error) must not be greater than 50 % of the respective classified error.



Temperature effect

If not otherwise stated, the reference temperature is 23 °C ± 2 K for indicators of Class 0.5 to 5. The additional error for a nominal range of ±10 K within this temperature range must not exceed the classified error.

General technical specifications

Application

Without rectifier

Direct current and direct voltage measurement

With rectifier

Alternating current and alternating voltage measurement
40...50...10,000 Hz

Measured error

Class 1.5 to DIN EN 60051

Voltmeter

internal resistance approx. 1000 Ω/V,
higher internal resistance optionally possible depending on type

Ammeter

The required shunts are built in.
For separate shunts, a resistance of 0.035 Ω shall be taken into account.

Environmental conditions to DIN EN 60721-2-1, 2, 5

Conditions	Permissible variables	
	Normal measuring instruments → H, Y, G	Relatively tropicalized instruments → H, V, F
Operating temperature	-25...+40 °C	-25...+55 °C
Relative humidity	max. 85 %, but not more than 60 days per year, otherwise 75 %, annual average 65 % (max. temperature +27 °C)	max. 95 %, but not more than 30 days per year, otherwise 85 %, annual average 75 % (max. temperature +25 °C)
Condensation	none	none

Mechanical category to DIN EN 60068

Vibration = Part 2-6

normal version
frequency range 5...55 Hz
acceleration max. 2.5 g
No. of cycles 5
runtime 1 octave per minute

Shock = Part 2-27

normal version
acceleration max. 15 g
time of action 11 ms

Scale and pointer design

The scales and pointers for square, circular, vertical or horizontal scales comply with DIN 43802, Parts 2 and 4.

Type of protection

If not otherwise specified, the indicators comply with DIN EN 60529

- IP 52 for case
- IP 00 for terminals

Mounting orientation

vertical, if not otherwise specified,
acc. to 2c for square indicators and 2b for edgewise indicators in the
illustration on page 2.

Narrow front panel to DIN 43700

Standard model

dull black RAL 9005
exchangeable front pane/front panel (only for square indicators with
90°scale and plastic housing)

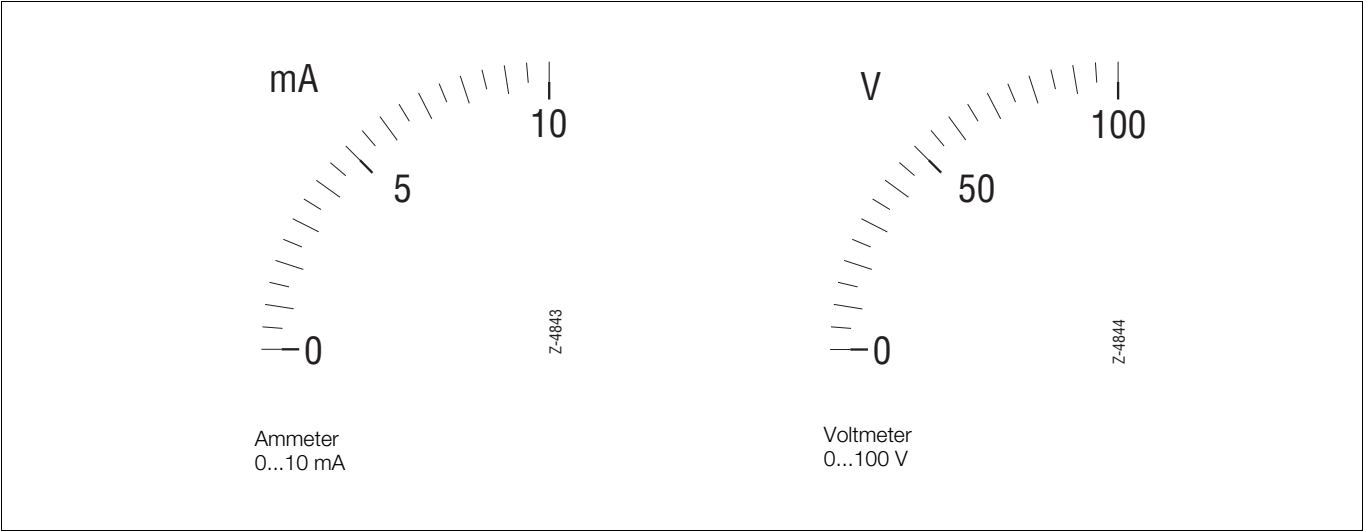
Reference conditions

curve	without rectifier	with rectifier
frequency		sinusoid,
ambient temp.	23 °C ± 1 K	distortion factor < 1 %
mount. orientation	vertical	50 Hz ± 5 Hz
others	DIN EN 60051	23 °C ± 1 K
		vertical
		DIN EN 60051

Temperature effect

< 1 %/10 K

Moving coil indicator dials



Square indicators, 90° scale

Application

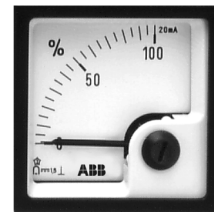
Without rectifier

Direct current and direct voltage measurement

With rectifier

Alternating current and alternating voltage measurement
40...50...10,000 Hz

With or without alarm signalling.



Device specifications

	Square indicators, 90° scale				Contact indicators
Front dimensions (mm)	48 x 48	72 x 72	96 x 96	144 x 144	96 x 96
Scale length (mm)	41	61	97	146	78
Class	1.5	1.5	1.5	1.5	1.5
Weight (kg)	0.11	0.15	0.2	0.25	0.5
Operating voltage	300 V	300 V	600 V	600 V	600 V
Measuring voltage category	CAT III	CAT III	CAT III	CAT III	CAT III
Degree of pollution	2	2	2	2	2
Front panel protection	IP 52	IP 52	IP 52	IP 52	IP 40
Mounting	Screwed spindle	Screwed spindle	Screwed spindle	Screwed spindle	Screwed brackets
Housing material	Polycarbonate to UL94V-0	Polycarbonate to UL94V-0	Polycarbonate to UL94V-0	Polycarbonate to UL94V-0	Sheet metal

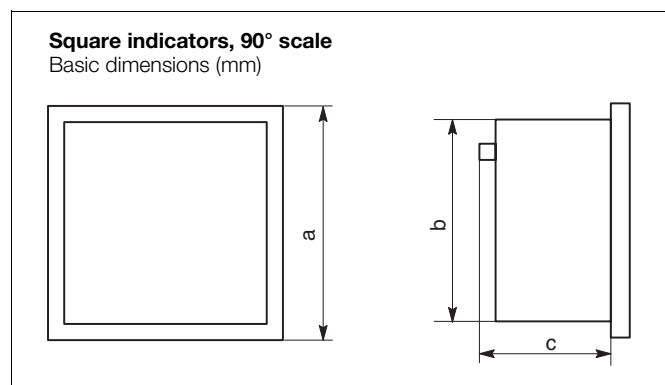
Mechanical construction

Front dimensions (mm)	Rated dims.	Cutout dimensions	Mounting depth	Connectors moving coil	
Moving coil indic.	h	b	c	< 4 A	> 4 A
48 x 48	5	45 ^{+0.6} x 45 ^{+0.6}	53	M4	M6
72 x 72	5	68 ^{+0.7} x 68 ^{+0.7}	53	M4	M6
96 x 96	5	92 ^{+0.8} x 92 ^{+0.8}	53	M4	M6
96 x 96 with contacts	5	92 ^{+0.8} x 92 ^{+0.8}	78	M5	M5
144 x 144	8	138 ⁺¹ x 138 ⁺¹	53	M4	M6

Voltage drop (mV) ± 20 %

	Moving coil indicators		Contact indicators
	Front dimensions		Front dimensions
	48 x 48	72 x 72 96 x 96 144 x 144	96 x 96
Measuring range			
100 µA	270	400	500
150 µA	270	400	540
250 µA	270	400	550
400 µA	270	400	520
600 µA	270	400	160
1 mA	30	40	60
1.5 mA	90	200	60
2.5 mA	90	200	60
4 mA	90	200	60
5 mA	100	200	60
6 mA	100	200	60
10 mA	100	200	60
15 mA	15	15	60
20 mA	60	60	60
25 mA	60	60	60
Connection to NW	1 kΩ/V	1 kΩ/V	
≥ 60 mV...≤ 600 V	1 kΩ/V, tolerance ± 20 %		

Dimensional drawings



Square indicators, 90° scale, with alarm signalling

Application

The contact indicator HO 96 with one or two alarm values is installed in a sheet metal case and is suitable for monitoring currents or voltages. When using transmitters, it is possible to monitor frequencies, power, the power factor, or other physical variables.

The device is equipped with one or two relay outputs with change-over contacts. The contacts are optionally available as min. or max. contacts.

- **Min.** minimum contact
- **Max.** maximum contact
- **Min./Max.** minimum and maximum contact
- **Min./Min.** minimum and early warning contact
- **Max./Max.** maximum and early warning contact

The standard version relays operate according to the NC operating principle: they open, when an alarm limit is exceeded or fallen below or in case of a power failure. Optionally, the devices are available with NO contact operation. The alarm values and zero can be adjusted from the front.

The indicators provide for permanent contact output, i.e. the output signal is maintained as long as the pointer does not exceed/fall below the set contact mark. The device is available with either NC or NO contact operation (optional).

A voltage is applied to the relays of the model with **NC contact operation** in the non-operative state, i.e. the relays are closed (output signal H with logic output) and are only released (output signal L) when a contact mark is exceeded or fallen below. In case of an electronic failure or power failure the relays open as well, even if no alarm value has been violated (self-monitoring). A short-time power failure will lead to the same result.

The relays of a model with **NO contact operation** are current-less/open (output signal L with logic output) in the non-operative state and pick up (output signal H) when the contact mark is exceeded or fallen below.

Technical data

Rated conditions

Ambient temperature: 23 °C ± 1 K

Mounting orientation

vertical, if not otherwise specified,
2c in the illustration on page 2

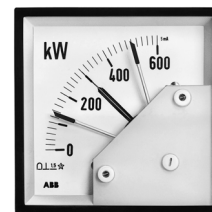
Auxiliary voltage: 230 V AC (198...242 V), 48...62 Hz

Test voltage: 2.2 kV, 50 Hz

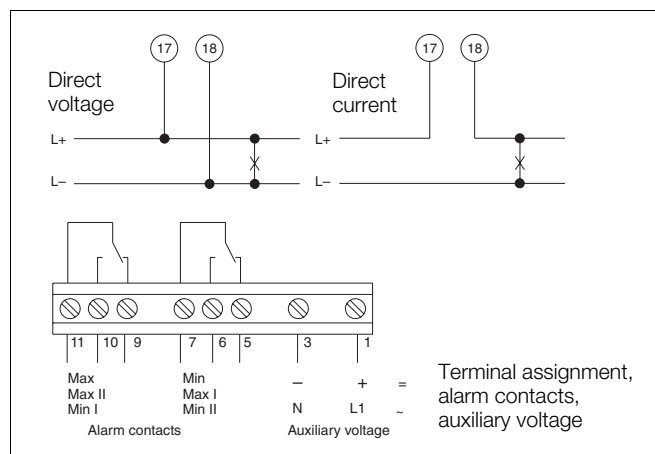
Power consumption for contacts: max. 1.2 VA

Electrical isolation between measuring circuit and auxiliary voltage

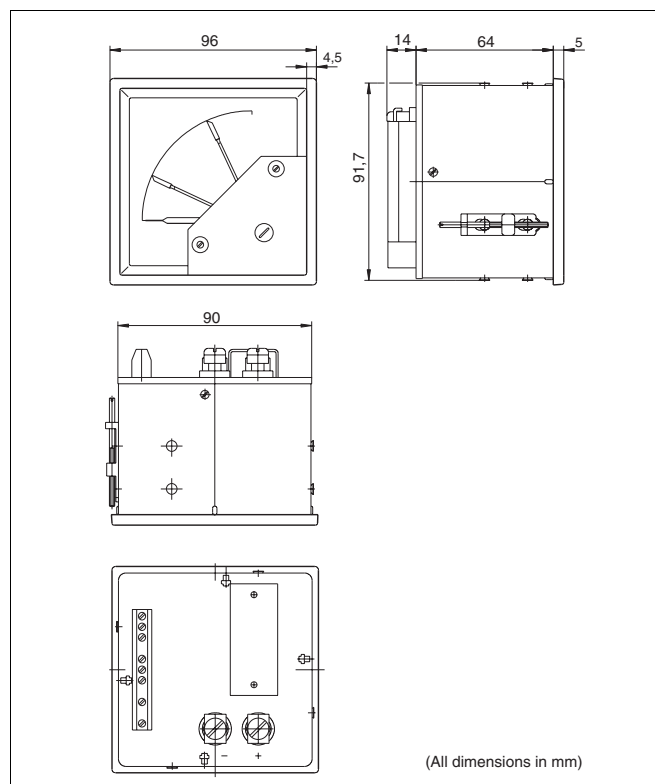
See previous page for more technical data



Connection diagrams



Dimensional drawings



Square indicators, 240° scale

Application

Without rectifier

Direct current and direct voltage measurement

With rectifier

Alternating current and alternating voltage measurement
40...50...10,000 Hz



Technical data

Scales

scale background white, pointers and numerals black
bar-type scale as special feature

Mechanism

moving-coil (linear)

Class

1.5

Temperature effect

< 1 %/10 K

Own consumption with rectifier

< 100 mA voltage drop approx. 1.2 V
> 100 mA P_v approx. 0.15 VA

Front panel

narrow to DIN 43700

Front color

dull black RAL 9005

Mounting orientation

vertical if not otherwise specified,
2c in the illustration on page 2

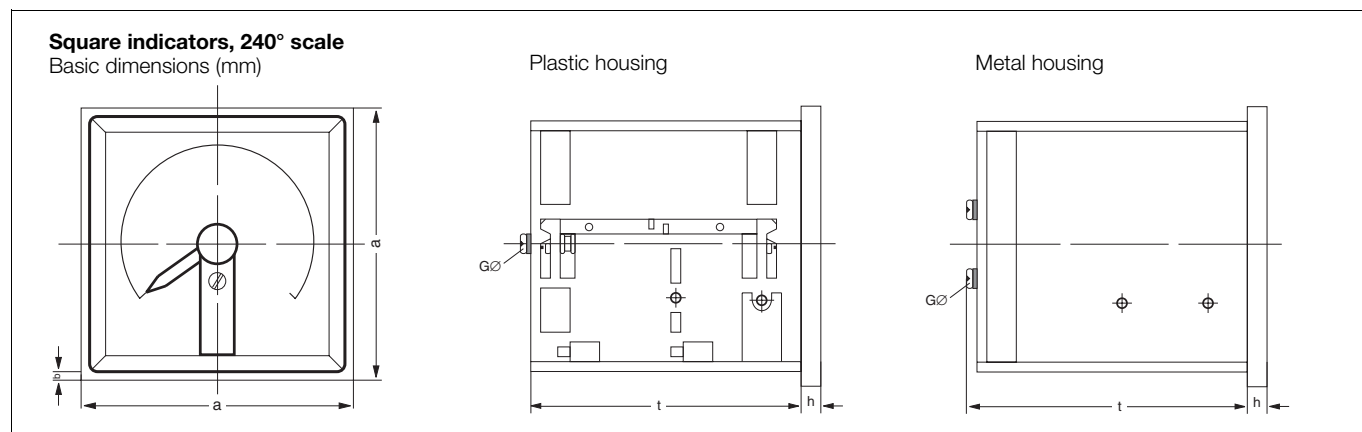
Device specifications

	Square indicators, 240° scale			
Front dimensions (mm)	48 x 48	72 x 72	96 x 96	144 x 144
Scale length (mm)	73	117	161	245
Class	1.5	1.5	1.5	1.5
Weight (kg)	Plastic Metal	0.2 0.65	0.25 0.75	0.26 0.75 0.85
Isolating voltage	600 V	600 V	600 V	600 V
Test voltage	Plastic Metal	2 kV 2 kV	3 kV 2 kV	3 kV 2 kV — 2 kV
Front panel protection	Plastic Metal	IP 50 IP 52	IP 50 IP 52	IP 50 IP 52 — IP 52
Mounting	Plastic Metal	screwed spindle spring brackets	screwed spindle spring brackets	screwed spindle spring brackets — screwed brackets
Housing material	H__NX/240° H__X/240°	Polycarbon. to UL94V-0 or metal	Polycarbon. to UL94V-0 or metal	Polycarbon. to UL94V-0 or metal Metal

Mechanical construction

Front dimensions (mm)	Rated dimensions	Cutout dimensions	Mounting depth		Connectors	
			Plastic	Metal	< 10 mA	> 10 mA
	h	l1 x l2	t	t	< 10 mA	> 10 mA
48 x 48	5	45 ^{+0.6} x 45 ^{+0.6}	65	83	M4	M6
72 x 72	5	68 ^{+0.7} x 68 ^{+0.7}	65	74.5	M4	M6
96 x 96	5	92 ^{+0.8} x 92 ^{+0.8}	65	74.5	M4	M6
144 x 144	8	138 ⁺¹ x 138 ⁺¹	—	97.5	M4	—

Dimensional drawings



Internal resistance / Voltage drop / Current drain				
	Front dimensions (mm)			
	48 x 48 72 x 72 96 x 96 144 x 144			
Measuring range	R _i Ω	Tolerance		
100 μA 150 μA 250 μA 400 μA 600 μA	9140 9140 7310 2315 1550	± 20 %		
1 mA 1.5 mA 2.5 mA 4 mA 5 mA 6 mA	290 195 47 30 17 15			
10 mA 15 mA 20 mA 4...20 mA 25 mA	5.9 4.8 4.3 4.3 4.0		± 30 %	
> 25 mA	Voltage drop 60 mV			
Connection to NW	Current drain 5 mA			
< 1 V > 1 V	200 Ω/V 1000 Ω/V	± 20 %		

Edgewise/narrow edgewise indicators

Application

Without rectifier

Direct current and direct voltage measurement

With rectifier

Alternating current and alternating voltage measurement
40...50...10,000 Hz

Tolerances

internal resistance $R \pm 20 \%$
exception $R < 10 \Omega \pm 30 \%$
voltage drop $\pm 20 \%$

Reference conditions

Without rectifier

ambient temperature $23^\circ\text{C} \pm 2 \text{ K}$
mounting orientation vertical
others DIN EN 60051

With rectifier

curve sinusoid, distortion factor $< 1 \%$
frequency $50 \text{ Hz} \pm 2 \%$
ambient temperature $23^\circ\text{C} \pm 2 \text{ K}$
mounting orientation vertical
others DIN EN 60051



Own consumption

Ammeter

$< 100 \text{ mA}$ approx. 1 VA
 $> 100 \text{ mA}$ approx. 1.5 VA

Voltmeter

approx. $1000 \Omega/\text{V}$

Indication

Scale division

finely coarse

Pointer

Bar-type pointer with lip

Device specifications

Rectangular housing	Edgewise indicators			Narrow edgewise indicators			Contact indicators	
Front dimensions (mm)	72 x 36	96 x 48	144 x 72	48 x 24	72 x 24	96 x 24	96 x 48	96 x 24
Scale length (mm)	45	67	92	32	52	60	66	66
Class	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Weight (kg)	0.2	0.45	0.6	0.08	0.1	0.12	0.2 0.5 w. power unit	0.2
Operating voltage	according to DIN 61010			according to DIN 61010			according to DIN 61010	
Measuring voltage category	CAT III	CAT III	CAT III	CAT III	CAT III	CAT III	CAT III	CAT III
Degree of pollution	2	2	2	2	2	2	2	2
Front panel protection	IP 52	IP 52	IP 52	IP 52	IP 52	IP 52	IP 52	IP 52
Mounting	Screwed bracket	Screwed bracket	Screwed bracket	Screwed bracket	Screwed bracket	Screwed bracket	Screwed spindle	Screwed spindle
Housing material	Sheet metal	Sheet metal	Polycarbonate to UL94V-0	Polycarbonate to UL94V-0	Polycarbonate to UL94V-0	Polycarbonate to UL94V-0	Plastic to UL94V-0	Plastic to UL94V-0
Connectors	Terminal clip							
Tab connector (mm)	M3	M3	6.3 x 0.8	2.8 x 0.8	6.3 x 0.8	6.3 x 0.8	6.3 x 0.8 or 2.8 x 0.8	

Internal resistance R_i

		Edgewise indicators			Narrow edgewise indicators			Contact indicators		
Meas. range	Front dim. (mm)	72 x 36	96 x 48	144 x 72	48 x 24	72 x 24	96 x 24	96 x 24	96 x 48	Tolerance
100 μA		4900 Ω	4900 Ω	2800 Ω	1000 Ω	680 Ω	2000 Ω	2000 Ω	2000 Ω	± 20 %
150 μA		3600 Ω	3600 Ω	2200 Ω	835 Ω	480 Ω	1500 Ω	2000 Ω	2000 Ω	
250 μA		2200 Ω	2200 Ω	740 Ω	500 Ω	300 Ω	900 Ω	710 Ω	1080 Ω	
400 μA		1300 Ω	1300 Ω	630 Ω	310 Ω	205 Ω	560 Ω	339 Ω	497 Ω	
600 μA		250 Ω	250 Ω	260 Ω	210 Ω	110 Ω	390 Ω	145 Ω	153 Ω	
1 mA		48 Ω	48 Ω	48 Ω	32 mV	31 Ω	47 Ω	25 Ω	69 Ω	± 20 %
1.5 mA		60 mV	60 mV	60 mV	46 mV	24 Ω	40 Ω	23.5 Ω	26.5 Ω	
2 mA		60 mV	60 mV	60 mV	46 mV	22 Ω	30 Ω	—	—	
2.5 mA		60 mV	60 mV	60 mV	46 mV	20 Ω	25 Ω	6.8 Ω	10.8 Ω	
4 mA		60 mV	60 mV	60 mV	46 mV	17 Ω	15 Ω	5.4 Ω	7.1 Ω	
5 mA		60 mV	60 mV	60 mV	46 mV	16 Ω	11 Ω	3 Ω	5.8 Ω	± 30 %
6 mA		60 mV	60 mV	60 mV	46 mV	60 mV	60 mV	1.9 Ω	2.4 Ω	
10 mA		60 mV	60 mV	60 mV	46 mV	60 mV	60 mV	1.6 Ω	1.6 Ω	
15 mA		60 mV	60 mV	60 mV	46 mV	60 mV	60 mV	60 mV	60 mV	
20 mA		60 mV	60 mV	60 mV	46 mV	60 mV	60 mV	60 mV	60 mV	
25 mA		60 mV	60 mV	60 mV	46 mV	60 mV	60 mV	60 mV	60 mV	± 20 %
> 25 mA...60 A DC		60 mV	60 mV	60 mV	60 mV	60 mV	60 mV	60 mV		± 20 %
0.1...600 mA AC		1.5 V	1.5 V	1.5 V	1.5 V	1.5 V	1.5 V	0.1...100 mA < 0.6 VA		± 20 %
1...2.5 A AC		0.2 V	0.2 V	0.2 V	0.2 V	0.2 V	0.2 V	0.15...1 A < 0.6 VA		
> 2.5 A AC		0.3 V	0.3 V	0.3 V	0.3 V	0.3 V	0.3 V	1.5...6 A < 0.6 VA		
1.5...600 V AC		900 Ω/V	900 Ω/V	900 Ω/V	900 Ω/V	900 Ω/V	900 Ω/V	< 3.6 VA		
Connection to NW ≥ 60...600 mV		1 kΩ/V	1 kΩ/V	1 kΩ/V	1 kΩ/V	1 kΩ/V	1 kΩ/V	1 kΩ/V		± 20 %
0/4...20 mA		900 mV	900 mV	900 mV	46 mV	46 mV	46 mV	60 mV		± 20 %

Mechanical construction

Front dimensions (mm)	Rated dimensions		Cutout dimensions	Mounting depth	Connectors: Moving coil	
Edgewise indicators	a1 x a2	h	l1 x l2	t	< 4 A	> 4 A
48 x 24	48 x 24	5	45 ^{+0.6} x 22.2 ^{+0.3}	75	Tab connector 2.8 x 0.8 mm	
72 x 24	72 x 24	5	68 ^{+0.7} x 22.2 ^{+0.3}	98	Tab connector 6.3 x 0.8 mm	
96 x 24	96 x 24	5	92 ^{+0.8} x 22.2 ^{+0.3}	108	Tab connector 6.3 x 0.8 mm	
72 x 36	72 x 36	5	68 ^{+0.7} x 33 ^{+0.6}	94	M3	M5
96 x 48	96 x 48	5	92 ^{+0.8} x 45 ^{+0.6}	107	M3	M5
144 x 72	144 x 72	8	138 ⁺¹ x 68 ^{+0.7}	192	6.3 x 0.8	M5
Contact indicators						
96 x 48	96 x 48	5	92 ^{+0.8} x 45 ^{+0.6}	146	Tab connector 6.3 x 0.8 or 2.8 x 0.8 mm	
96 x 24	96 x 24	5	92 ^{+0.8} x 22.2 ^{+0.3}	146	Tab connector 6.3 x 0.8 or 2.8 x 0.8 mm	

Dimensional drawings

Edgewise indicators
Basic dimensions (mm)

Z-17869

Mounting
B-Mounting

Screwed spindle

Z - 17865

1) Individual protection against accidental contact
2) Overall protection against accidental contact (22 mm only with format 48 x 48 mm)

Edgewise/narrow edgewise indicators with alarm signalling

Application

Edgewise / narrow edgewise indicators with alarm signalling feature indicate the actual value and control one or several relays for one or several adjustable contact marks whose contacts can be used for monitoring or for open or closed loop control.

They are optionally available with logic output (transistor output).

The pointer of the edgewise / narrow edgewise indicators with alarm signalling is scanned contactless. Switching is initiated when the pointer reaches the scale value set with the contact mark.

Contact operation

The switching action is triggered either by a maximum contact when the set scale value is exceeded, or a by minimum contact when the set scale value is undershot. The indicators can be provided with one contact mark (maximum or minimum contact), or with two contact marks (maximum and minimum contact, two maximum or two minimum contacts).

The indicators provide for permanent contact output, i.e. the output signal is maintained as long as the pointer does not swing back over set contact mark. Either NC or NO contact operation (optional) are possible. When using a device with logic output, both ways are possible since they are connected to separate terminals

A voltage is applied to the relays of the model with **NC contact operation** in the non-operative state, i.e. the relays are closed (output signal H with logic output) and are only released (output signal L) when a contact mark is exceeded or fallen below. In case of an electronic failure or power failure the relays open as well, even if no alarm value has been violated (self-monitoring). A short-time power failure will lead to the same result.

The relays of a model with **NO contact operation** are current-less/open (output signal L with logic output) in the non-operative state and pick up (output signal H) when the contact mark is exceeded or fallen below.

Measuring ranges

The measuring ranges are in accordance with DIN 43701 (standard progression: 1 - 1.2 - 1.5 - 2 - 2.5 - 3 - 4 - 5 - 6 - 8 and their decadic multiples).

Technical data

Front dimensions

96 x 48 mm/48 x 96 mm; 96 x 24 mm/24 x 96 mm

Relative switching error

1 % max. error referred to the scale length

Repeatable error

0.1 % with rated auxiliary voltage and at 23 °C

Number of contact marks

1 or 2

Minimum spacing between contact marks

3 %, referred to scale length

Output contact

1 change-over contact per contact mark, built-in

Switching capacity with resistive load

max. switching voltage 250 V AC/DC
max. switching current 2 A
rated switching capacity 500 VA/50 W

Life span with rated switching capacity

> 10⁶ switching cycles

Response accuracy

± 1 % of the scale length

Power supply

refer to the ordering information for the permissible auxiliary voltage tolerance
24 V ± 15 %, 4.5 W
24 V, 115 V, 230 V ± 10 %
45...50...65 Hz, 4 VA

Current or power consumption

4 VA/4.5 W, both relays energized

Connection diagrams, contact pinouts		
	SO 96 / 24 W	SO 96 PW
Measured variable U, I	12–	12–
U, I	11 +	11 +
MIN 	41 42 43	41 42 43
 + Z - 178773	81 + 82 –	81 + 82 –
MAX 	51 52 53	51 52 53
 + Z - 178773	85 + 86 –	85 + 86 –
Auxiliary voltage DC + –	L + L –	L + L –
AC L N		L N

Ordering information

Moving Coil Indicator		Variant digit No.	1 - 8	Code			
Square, 90° scale, for direct and alternating currents/voltages		Catalog No.					
H48-NW	48 x 48 mm		V30348A-				
H72-NW	72 x 72 mm		V30471A-				
H96-NW	96 x 96 mm		V30472A-				
H144-W	144 x 144 mm		V30475A-				
Measuring Range							
0...20 mA DC				634			
4...20 mA DC				601			
0...10 V DC				514			
Via shunt ...A/60 mV Indicate ZWU code No.				501			
Via shunt ...A/150 mV Indicate ZWU code No.				502			
100 µA...60 A DC Measuring range according to table, indicate code No.			1)	6__			
100 µA...6 A AC Measuring range according to table, indicate code No.			1)	8__			
60 mV...600 V DC Measuring range according to table, indicate code No.			1)	5__			
2.5 V...600 V AC Measuring range according to table, indicate code No.			1)	7__			
As specified (in clear text)				ZAM			
Scale							
Same as measuring range				ZSA			
According to table Indicate code No., see scale table				ZSD			
Linear scale acc. to standard dimensions				ZEJ			
0...100 %				ZSP			
Without graduation of start/end, marked with symbol strip and company logo				ZSN			
As specified (in clear text)				ZEM			

See also table "special features"

1) See measuring range table for moving coil indicators with/without rectifier/contacts

Standard dim.: 1 - 1.2 - 1.5 - 2 - 2.5 - 3 - 4 - 5 - 6 - 8
and their decimal multiples, with any dimension

Ordering information

Moving Coil Indicator		Variant digit No.	1 - 8	Code			
Edgewise, for direct and alternating currents/voltages		Catalog No.					
S48-24	48 x 24 mm	max. 1 A		V30271A-			
S72-24W	72 x 24 mm	max. 1 A		V30272A-			
S96-24W	96 x 24 mm	max. 1 A		V30273A-			
H72-PW	72 x 36 mm (metal housing)	max. 25 A		V30351A-			
S96-PW	96 x 48 mm (metal housing)	max. 40 A		V30275A-			
H144-PW	144 x 72 mm	max. 60 A		V30476A-			
Measuring Range							
0...20 mA DC				634			
4...20 mA DC				601			
0...10 V DC				514			
Via shunt ...A/60 mV	Indicate ZWU code No.			501			
Via shunt ...A/150 mV	Indicate ZWU code No.			502			
100 µA...60 A DC	Measuring range according to table, indicate code No.	1)	6__				
250 µA...5 A AC	Measuring range according to table, indicate code No.	1)	8__				
60 mV...600 V DC	Measuring range according to table, indicate code No.	1)	5__				
2.5 V...600 V AC	Measuring range according to table, indicate code No.	1)	7__				
As specified	(in clear text)			ZAM			
Scale							
Same as measuring range				ZSA			
According to table		Indicate code number, see scale table		ZSD			
Linear scale acc. to stand. dimensions				ZEJ			
0...100 %				ZSP			
Without graduation of start/end, marked with symbol strip and company logo				ZSN			
As specified		(in clear text)		ZEM			
Mounting Orientation							
Transverse format				ZFQ			
Upright format				ZFH			
Special Features							
Connection to shunt xA/...mV		(in clear text, e.g. 100 A/60 mV)		ZWU			

See also table "special features"

1) See measuring range table for moving coil indicators with/without rectifier/contacts

Standard dim.: 1 - 1.2 - 1.5 - 2 - 2.5 - 3 - 4 - 5 - 6 - 8
and their decimal multiples, with any dimension

Ordering information

Moving Coil Indicator		Variant digit No.	1 - 8	9	10	11	Code			
HO96		Catalog No.	V30489A-							
Square, 90° scale, with alarm signaling for direct and alternating currents/voltages										
Measurement Type										
Direct current				1						
Direct voltage				2						
Alternating voltage (40...50...1000 Hz)				4						
Alarm Contacts (for DC input only)										
1 min. relay				1						
1 max. relay				2						
1 min. relay, 1 max. relay				3						
2 min. relays				4						
2 max. relays				5						
Power Supply (for model with alarm contacts only)										
230 V AC				1						
115 V AC				2						
24 V DC				3						
Measuring Range										
0...20 mA DC							634			
4...20 mA DC							601			
0...10 V DC							514			
Via shunt ...A/60 mV	Indicate ZWU code No.						501			
Via shunt ...A/150 mV	Indicate ZWU code No.						502			
100 µA...1 A DC	Measuring range according to table, indicate code No.			1)			6__			
60 mV...600 V DC	Measuring range according to table, indicate code No.			1)			5__			
1.5 V...600 V AC	Measuring range according to table, indicate code No.			1)			7__			
As specified (in clear text)							ZAM			
Scale										
Same as measuring range							ZSA			
According to table	Indicate code number, see scale table						ZSD			
Linear scale acc. to standard dimensions							ZEJ			
0...100 %							ZSP			
Without graduation of start/end, marked with symbol strip and company logo							ZSN			
As specified (in clear text)							ZEM			
Special Features										
Connection to shunt xA/...mV (in clear text, e.g. 100 A/60 mV)							ZWU			

See also table "special features"

1) See measuring range table for moving coil indicators with/without rectifier/contacts

Standard dim: 1 - 1.2 - 1.5 - 2 - 2.5 - 3 - 4 - 5 - 6 - 8

and their decimal multiples, with any dimension

Ordering information

Moving Coil Indicator		Variant digit No.	1 - 9	10	11	12	Code			
Edgewise, rectangular, with alarm signaling for direct and alternating currents/voltages		Catalog No.								
SO96-24W	DC measuring range	96 x 24 mm	V30274AG-							
SO96-PW	DC measuring range	96 x 48 mm	V30276AG-							
SO96-24W	AC measuring range	96 x 24 mm (40...50...1000 Hz)	V30274AW-							
SO96-PW	AC measuring range	96 x 48 mm (40...50...1000 Hz)	V30276AW-							
Alarm Contacts										
1 min. relay			1							
1 max. relay			2							
1 min. relay, 1 max. relay			3							
1 min. transistor output			4							
1 max. transistor output			5							
1 min. / 1 max. transistor output			6							
2 min. relays			7							
2 max. relays			8							
Power Supply		(for model with alarm contacts only)								
24 V DC with electrical isolation				3						
24 V AC		(not with 96 x 24)		4						
115 V AC		(not with 96 x 24)		5						
230 V AC		(not with 96 x 24)		6						
Mounting Orientation										
Transverse format		(working orientation 90°)		1						
Upright format		(working orientation 90°)		2						
Measuring Range										
0...20 mA DC							634			
4...20 mA DC							601			
0...10 V DC							514			
Via shunt ...A/60 mV DC		Indicate ZWU code No.					501			
Via shunt ...A/150 mV DC		Indicate ZWU code No.					502			
Via current transformer x A/1 A AC		Indicate ZWU code No.					801			
Via current transformer x A/5 A AC		Indicate ZWU code No.					800			
Via voltage transformer x V/100 V AC		Indicate ZWU code No.					703			
Via voltage transformer x V/110 V AC		Indicate ZWU code No.					704			
100 µA...6 A DC		Measuring range according to table, indicate code No.	1)				6__			
100 µA...6 A AC		Measuring range according to table, indicate code No.	1)				8__			
60 mV...600 V DC		Measuring range according to table, indicate code No.	1)				5__			
6 V...600 V AC		Measuring range according to table, indicate code No.	1)				7__			
As specified		(in clear text)					ZAM			
Scale										
Same as measuring range							ZSA			
According to table		Indicate code number, see scale table					ZSD			
Linear scale acc. to standard dimensions			2)				ZEJ			
0...100 %							ZSP			
Without graduation of start/end, marked with symbol strip and company logo							ZSN			
As specified		(in clear text)					ZEM			
Special Features										
Connection to transformer/shunt xA/...mV		(in clear text, e.g. 100 A/60 mV)					ZWU			

See also table "special features"

1) See measuring range table for moving coil indicators with/without rectifier/contacts

2) not for AC measuring ranges

Standard dimensions: 1 - 1.2 - 1.5 - 2 - 2.5 - 3 - 4 - 5 - 6 - 8

and their decimal multiples, with any dimension

Measuring range table for moving coil indicators with/without rectifier/contacts

Grad.	Code	Code	Square indicators, 90° scale				Rectangular indicators					Contact indicators			
			48 x 48	72 x 72 96 x 96 144x144	48 x 48 72 x 72 96 x 96	144x144	48 x 24 72 x 24 96 x 24	72 x 36	96 x 48 144x72	48 x 24 72 x 24 96 x 24	72 x 36 96 x 48 144x72	96 x 96	96 x 96	96 x 24 96 x 48	96 x 24 96 x 48
	DC	AC	DC	DC	AC	AC	DC	DC	DC	AC	AC	DC	AC	DC	AC
µA	µA	µA													
100	612	812								x	x				
150	622	822								x	x				
250	642	842													
400	662	862													
600	682	882													
mA	mA	mA													
1	613	813													
1.5	623	823													
2.5	643	843													
4	663	863													
5	673	873													
6	683	883													
10	614	814													
15	624	824													
20	634	834													
25	644	844													
40	664	864													
60	684	884													
100	615	815													
150	625	825													
250	645	845													
400	665	865													
600	685	885													
A	A	A													
1	616	816													
1.5	626	826										x			
2.5	646	846										x			
4	666	866										x			
5	x	876					x			x		x			
6	686	886			x		x			x	x	x			
10	617	x			x	x	x			x	x	x		x	x
15	627	x			x	x	x			x	x	x		x	x
25	647	x			x	x	x			x	x	x		x	x
40	667	x	x		x	x	x	x		x	x	x		x	x
60	687	x	x		x	x	x	x		x	x	x		x	x
mV	mV	mV													
60	581	x			x	x				x	x		x		x
100	512	x			x	x				x	x		x		x
150	522	x			x	x				x	x		x		x
250	542	x			x	x				x	x		x		x
400	562	x			x	x				x	x		x		x
600	582	x			x	x				x	x		x		x

x = not possible

Continued on next page

Measuring range table for moving coil indicators with/without rectifier/contacts (continued)

Grad.	Code	Code	Square indicators, 90° scale				Rectangular indicators					Contact indicators			
			48 x 48	72 x 72 96 x 96 144x144	48 x 48 72 x 72 96 x 96	144x144	48 x 24 72 x 24 96 x 24	72 x 36	96 x 48 144x72	48 x 24 72 x 24 96 x 24	72 x 36 96 x 48 144x72	96 x 96	96 x 96	96 x 24 96 x 48	96 x 24 96 x 48
	DC	AC	DC	DC	AC	AC	DC	DC	DC	AC	AC	DC	AC	DC	AC
V	V	V													
1	513	x			x	x				x	x		x		x
1.5	523	x			x	x				x	x				x
2.5	543	743													x
4	563	763													x
6	583	783													
10	514	714													
15	524	724													
25	544	744													
40	564	754													
60	584	784													
100	515	715													
150	525	725													
250	545	745													
400	565	765	x	x 1)	x 2)				on request					on request	
500	575	775	x	x 1)	x 2)				on request					on request	
600	585	785	x	x 1)	x 2)				on request					on request	

x = not possible

1) not possible at 72 x 72

2) not possible at 48 x 48 und 72 x 72

Scale for connection to

Current transformer via rectifier		Shunt	
Grad.	Code	Scale	Code
A	A	A	A
10	414	1	616
15	424	1.5	626
20	434	2.5	646
25	444	4	666
30	454	6	686
40	464	10	617
50	474	15	627
60	484	25	647
75	458	40	667
100	415	60	687
150	425	100	618
200	435	150	628
250	445	250	648
300	455	400	668
400	465	500	678
500	475	600	688
600	485		
750	468		
800	495		
kA	kA	kA	kA
1	416	1	619
1.5	426	1.5	629
		2.5	649

Additional ordering information

						Code			
	48 x 48 72 x 72 96 x 96 144x144	48 x 24 72 x 24 96 x 24	72 x 36 96 x 48 144 x 72	Contact 96 x 96	96 x 24 96 x 48				
Scale sector (color) (clear text)						ZPF			
Red mark at: (clear text)						ZPR			
Additional numerals (clear text)						ZZB			
Additional inscriptions (clear text)						ZZA			
2nd. grad. as main grad. (without calibr.) (clear text)				x		ZZD			
Front panel RAL 7032 (pebble gray)				x	x	ZGH			
Front panel RAL 7037 (dust gray)						ZGG			
Mounting orientation (clear text)						ZGE			
Low-reflection pane						ZGB			
Terminal cover IP 20						ZOK			
Metal case (max. 60 A DC; max. 25 A AC) 3)		x	4)		x	ZGD			
Case identification (clear text)						ZGJ			
Measuring range with shifted zero (clear text)					x	ZHN			
Relay with NO contact operation (clear text)	x	x	x			380			
Category 2/3 (vibration-proof)						ZAA			
Climate group 2 (relatively tropicalized)						ZAK			
Design acc. to GL certificate		x	x	x	x	ZOM			
Installation in H&B Uniblock rack				x	x	ZGT			
Installation in Mauell rack				x	x	ZGY			
Installation in Siemens rack				x	x	ZHH			

x = not possible

3) Format 72 x 72 mm = 1 A...25 A AC

Format 96 x 96 mm and 144 x 144 mm with built-in low current transformer

4) 144 x 72 mm in plastic housing, only

Ordering information

Moving Coil Indicator				Variant digit No.	1 - 8	Code				
Square, 240° scale				Catalog No.						
for direct current/voltage		Case								
H48-NX240	48 x 48 mm	Plastic	max. 4 A		V31744A-					
H72-NX240	72 x 72 mm	Plastic			V31745A-					
H96-NX240	96 x 96 mm	Plastic			V31746A-					
				Variant digit No.	1 - 9					
H48-X240	48 x 48 mm	Metal	for DC only	max. 25 mA	Catalog No.	V31744AB-				
H72-X240	72 x 72 mm	Metal				V31745AB-				
H96-X240	96 x 96 mm	Metal				V31746AB-				
H144-X240	144 x 144 mm	Metal				V31747AB-				
Measuring Range										
0...20 mA DC							634			
4...20 mA DC							601			
0...10 V DC							514			
Via shunt ...A/60 mV		Indicate ZWU code No.				501				
Via shunt ...A/150 mV		Indicate ZWU code No.				502				
100 µA...40 A DC		Measuring range according to table, indicate code No.				5)	6__			
250 µA...4 A AC		Measuring range according to table, indicate code No.				5)	8__			
60 mV...600 V DC		Measuring range according to table, indicate code No.				5)	5__			
2.5 V...600 V AC		Measuring range according to table, indicate code No.				5)	7__			
As specified		(in clear text)					ZAM			
Scale										
Same as measuring range							ZSA			
According to table		Indicate code number, see scale table				ZSD				
Linear scale acc. to stand. dimensions							ZEJ			
0...100 %							ZSP			
Without graduation of start/end, marked with symbol strip and company logo							ZSN			
As specified		(in clear text)					ZEM			
Scale Version										
Bar-type scale; black background; bars, pointers, numerals yellow							ZOF			
Bar-type scale; white background; bars, pointers, numerals black							ZOG			
Bar-type scale, black background; bars, pointers, numerals white							ZOY			
Scale; white background; pointers, numerals black (standard)							-			
Special Features										
Connection to shunt (in clear text, e.g. 100 A/60 mV)							ZWU			

See also table "Special features for square indicators, 240° scale"

5) see "Measuring range table for 240° indicators"

Standard dim: 1 - 1.2 - 1.5 - 2 - 2.5 - 3 - 4 - 5 - 6 - 8
and their decimal multiples, with any dimension

Measuring range table for 240° indicators

Grad.	Code	Code	Format			Format			Grad.	Code	Code	Format	
			48 x 48	72 x 72 96 x 96 144x144		48 x 48	72 x 72 96 x 96 144x144					48 x 48 72 x 72 96 x 96 144 x 144	48 x 48 72 x 72 96 x 96 144 x 144
	DC	AC	DC	DC	DC	AC	AC	AC		DC	AC	DC	AC
µA	µA	µA	Plastic	Metal		Plastic	Metal		mV	mV	mV		
100	612	x				x	x	x	60	581	x		x
150	622	x				x	x	x	100	512	x		x
250	642	842					x		150	522	x		x
400	662	862					x		250	542	x		x
600	682	882					x		400	562	x		x
									600	582	x		x
mA	mA	mA							V	V	V		
1	613	813					x		1	513	x		x
1.5	623	823					x		1.5	523	x		x
2.5	643	843					x		2.5	543	743		
4	663	863					x		4	563	763		
5	673	873					x		6	583	783		
6	683	883					x		10	514	714		
10	614	814					x		15	524	724		
15	624	824					x		25	544	744		
20	634	834					x		40	564	754		
25	644	844					x		60	584	784		
40	664	864		x		x	x		100	515	715		
60	684	884		x		x	x		150	525	725		
100	615	815		x		x	x		250	545	745		
150	625	825		x		x	x		400	565	765		
250	645	845		x		x	x		500	575	775		
400	665	865		x		x	x		600	585	785		
600	685	885		x		x	x						
A	A	A							Scale for connection to Current transformer via rectifier				
1	616	816		x		x	x						
1.5	626	826		x		x	x		Shunt				
2.5	646	846		x		x	x		Grad.	Code	Scale	Code	
4	666	866		x		x	x		A	A	A	A	
6	686	x	x	x		x	x	x	10	414	1	616	
10	617	x	x	x		x	x	x	15	424	1.5	626	
15	627	x	x	x		x	x	x	20	434	2.5	646	
25	647	x	x	x		x	x	x	25	444	4	666	
40	667	x	x	x		x	x	x	30	454	6	686	
									40	464	10	617	
									50	474	15	627	
									60	484	25	647	
									75	458	40	667	
									100	415	60	687	
									150	425	100	618	
									200	435	150	628	
									250	445	250	648	
									300	455	400	668	
									400	465	500	678	
									500	475	600	688	
									600	485			
									750	468			
									800	495			
									kA	kA	kA	kA	
									1	416	1	619	
									1.5	426	1.5	629	
											2.5	649	

x = not possible or only upon request

Ordering information

	48 x 48	72 x 72	96 x 96	144x144	Code			
Special Features for Square Indicators, 240° scale								
Black scale background, pointers and numerals yellow					ZSS			
Black scale background, pointers and numerals white					ZSX			
Scale sector (color) (in clear text)					ZPF			
Red mark at: (in clear text)					ZPR			
Additional numerals (in clear text)					ZZB			
Additional inscriptions (in clear text)					ZZA			
Direct scale illumination; floodlight 24 V / 3 W	x				ZOR			
Indirect scale illumination; with light guide 6)	x				ZOS			
2nd. grad. as main grad. (without calib.) (in clear text)					ZZD			
Front panel RAL 7032 (pebble gray)					ZGH			
Front panel RAL 7037 (dust gray)					ZGG			
Mounting orientation (in clear text)					ZGE			
Low-reflection pane					ZGB			
Terminal cover IP 20					ZOK			
Fastening with 2 screw clamps					ZGI			
Case identification (in clear text)					ZGJ			
Measuring range with shifted zero (in clear text)					ZHN			
Measuring range suppressed mechanically (in clear text)					ZHM			
Balancing potentiometer for voltmeter, e.g. $\pm 10\%$ (in clear text)					ZOP			
Supply line impedance at shunt changed to: (in clear text)					ZGM			
Connection to intrinsically safe current circuits (in metal case, only)					375			
Category 2/3 (vibration-proof)					ZAA			
Category 3/3 (shock-proof)					ZAB			
Climate group 2 (relatively tropicalized)					ZAK			
Design according to GL certificate					ZOM			
Marine version to BV 0591					ZPM			
Marine version to BV 0591 with EMC					ZPN			
Railway version	7)			x	ZPL			
Type test for operation in nuclear power plants (only in plastic case)				x	ZAD			
Installation in H&B Uniblock rack					ZGT			
Installation in Mauell rack					ZGY			
Installation in Siemens rack					ZHH			

x = not possible

6) in metal case, only

7) only plastic case and DC version

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