



**ANALOGUE
PANEL METERS**

GMW – We make your values visible

Basic Series

Analogue Panel Meters

New Safety Standards EN 61010-1:2001, CE Identification

When selling a product within the European Union the CE Identification on the product, the packaging or the instruction manual is compulsory. The CE declaration of conformity confirms compliance with European regulations (low voltage directive, EMC directive).

The CE Identification is not addressed to the consumer primarily; it is addressed to the controlling institution of the market. The requirements of the harmonisation directive are derived by the market controlling institution by using the CE identification.

Standards, that are to be used compulsorily, are mentioned in the low voltage directive 73/23 EWG:

Norm DIN EN 60051

Safety Norm EN 61010-1:2001 (VDE 0411-1:2002, IEC 61010-1:2002)

For protection against dangerous body currents, the clearance and creepage distances at the same operating voltages had to be increased in comparison to earlier standards. Thus the safety of the user is further increased.

By introducing complex changes in the former design of panel meters, in particular of analog panel meters, GMW meets the demands of EN 61010-1:2001. This development is protected by the European Patent EP1 508 786 A2.

All offered analog panel meters comply with this standard.

Category of measurement and operating voltage

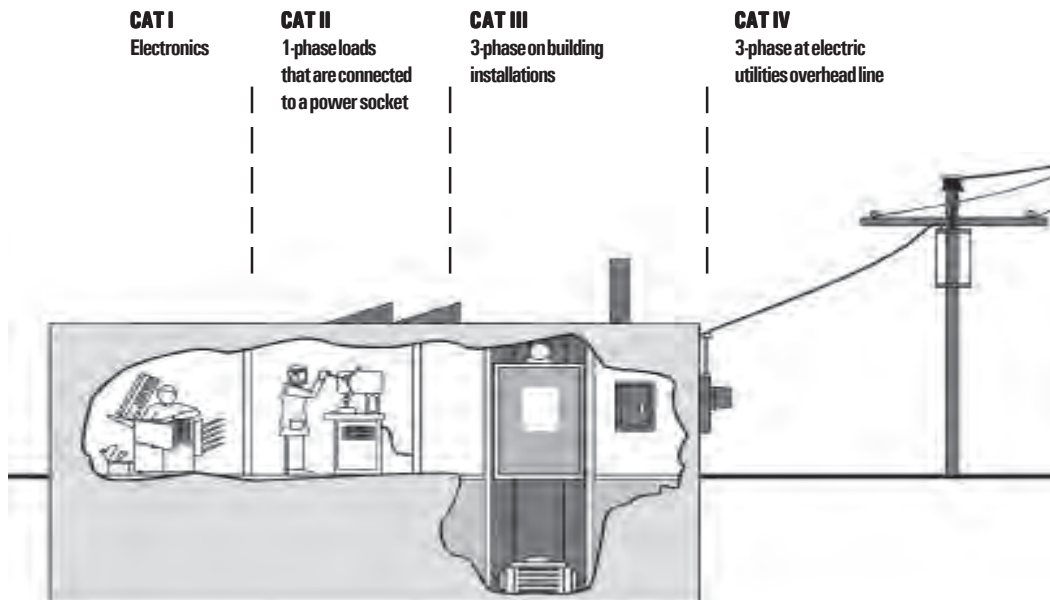
- CAT I** Measurements in circuits that are not connected directly to the mains supply (e.g. secondary site of over voltage-proof power supply units, batteries)
- CAT II** Measurements in circuits that are connected directly to a low voltage mains supply by plugs (e.g. household appliances, office machines)
- CAT III** Measurements on building installations
- CAT IV** Measurement at power sources for low voltage

Panel meters are primarily used in building installation. Therefore they are to be labelled with CAT III and the allowable operating voltage, e.g. CAT III 600V.

The operating voltage between the earth and the terminal connections of the meter is measured. Example:

A panel meter that is labelled with "CAT III 600V" can be used to measure up to 1000 V in a 3-phase system.

The maximal external conductor voltage against earth accounts for 600 V.



Regulations and Standards

Our meters and indicator/controllers comply with the regulations of the European Guidelines 73/23/EEG and 89/336/EEG. This is confirmed by the compliance with the following standards:

IEC/EN 61010-1/A2, VDE 0411-1/A1 (Safety Regulations)

IEC 60 051/EN 60 051/DIN EN 60 051 (Meters with Scale Display)

EN 50 081-2: 1993 EMC (Emitted Interference, Industries)

EN 50 082-2: 1995 EMC (Interference Resistance, Industries)

Given below are the most important regulations for the fabrication and the required properties of electrical meters.

Accuracy

The accuracy of a meter or an accessory is given by the limits of basic errors and influence effects.

An occurring error, when meter and/or accessories is/are operated under reference conditions (Tab. I-1 DIN EN 60 051) is referred to as intrinsic error in contrast to the influence error when the instrument is not operated under reference conditions, but within the limits of its nominal range of use (Tab. II-1 DIN EN 60 051).

Our meters and indicator/controllers correspond to class 1.5 as long as no other class is mentioned for certain types. If possible our meters can be produced for a higher class of accuracy (class 1).

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

1.5 class sign for error in indication, expressed in percent of reference value.

The reference value corresponds to the upper measuring range value with the following exceptions:

- the sum of electrical values, that correspond to both limits of the measuring range. This applies only when both the mechanical and the electrical zero point are located within the scale range

- 90 electrical degrees for power factor meters

The reference value corresponds to:

- the sum of electrical values, that correspond to both limits of the measuring range, independent from the algebraic sign. This applies only when both the mechanical and the electrical zero point are located within the scale range;
- a quadrant with phase meters;
- the difference of resistance values of both limits of the measuring range. This applies for resistance meters with linear scales;
- the scale-length with instruments (e.g. resistance meters) with non-linear scale, that have no separate linear scales;
- the nominal value for accessories.

Scale and Pointer Types

The scales and pointers of our measuring instruments comply with DIN 43 802, part 2 through 4.

Protection per DIN VDE 0470, Part 1 (EN 60 529)

Our measuring instruments and limit transducers comply with the following protection class per DIN VDE 0470, part 1 (EN 60529), if not stated different:

IP 52 for front of housing

IP 00 for clamps

IP 10 for clamps with mounted terminal cover

Safety Regulations

Our measuring instruments comply with DIN EN 61 010-1 (IEC 1010-1) and are designed for:

- Category of Over voltage III (CAT III / CAT II)

- Pollution Degree 2

- Operating Voltage = Maximum value of nominal voltage above earth (effective value of direct voltage or alternating voltage), see table below.

Type	Nominal Voltage			
	3-Phase- 4-Wire-System	3-Phase- 3-Wire-System	Outer to Neut. Cond.	
EQB 72 EQB 72/U6 DQB 72 MQB 72 MEQB 72 DQB 72 MV FQB 72 DLQB 72	EQB 96 EQB 96/U6 DQB 96 MQB 96 MEQB 96 DLMQB 96 DQB 96 MV FQB 96 DLQB 96	600 / 1000 V	1000 V	600 V
V-AQS 72 V-PQS 72 V-MQS 72	V-AQS 96 V-PQS 96 V-MQS 96			
V-PQ 72-250 V-FZQS 72	V-PQ 96-250 V-FZQS 96 V-LM 96			
AQS 144 PQS 144 MQS 144	V-LM 96-250 V-LM 96-250 PQ 144-250			
EQB 48 DQB 48	AQS 48 W PQS 48 W V-LF 96	230 / 400 V	500 V	300 V
MQB 48 DQB 48 MV DLQB 48 FQB 48 FkN 2	V-MQS 48 V-PQ 48-250 FZQS 48 W VMAQS 72 VMAQS 96			
PF 48x24 ¹⁾ PFF 72x24 ¹⁾ PF 72x36 ²⁾ PFFN 96x24 ²⁾	PFF 00 ¹⁾ PFF 0 PFFN 96x24 M ²⁾ PFFN 96x48 M ²⁾ PFFN 96x48 M ²⁾			150 V
DPR 144 F KODPR 144 F	PF 144x72 KODPR 144 SE			

1) Operating Voltage 100 V

2) Operating Voltage 600 V

Meters with dial illumination,
with prot. cur. transformer
and for marine applications } reduced operating voltage!

Analogue Panel Meters

Technical Description - General Overview

Vibration and Mechanical Shock Resistance

Influence factors for vibration and shock have been set forth in DIN EN 60 051. Our measuring instruments comply with these requirements and are available as follows (see respective data sheet for individual availability):

Mechanical Stress	Shock Resistance	Vibration Resistance
Standard model	15 g 11 ms	1.5 g 5 ... 55 Hz
Enhanced requirements. LN56	30 g 11 ms	2.5 g 5 ... 55 Hz
Enhanced requirements. LN55 (Vario-Series only)	50 g 11 ms	5.0 g 5 ... 55 Hz

Effects of Vibration and Shock

Unless otherwise specified, class 1 and higher measuring instruments and Accessories must withstand the following shock and vibration test, to which they are subjected during the course of type testing:

Vibration Test

Vibration testing must be performed with the following specifications:

- Sweep frequency range:
10 Hz – 55 Hz – 10 Hz
- Wave amplitude: 0.15 mm
(corresponds to 1.5 g at 50 Hz)
- Number of sweep cycles: 5
- Sweep velocity:
1 octave per minute

The vibration plane is vertical and the measuring instrument is mounted to the vibration table in its usual operating position.

Shock Test

The shock test must be performed with the following specifications:

- Peak acceleration:
 - a) 147 m/s² (15 g)
 - b) 490 m/s² (50 g)
- No further explanation is required for peak acceleration value a). The manufacturer must indicate a peak acceleration value of 490 m/s² for value b).
- Waveshape: semi-sinusoidal
- Number of shocks: 3 shocks each in both directions for 3 mutually perpendicular axes (a total of 18 shocks)
- Shock duration: 11 ms

The measuring instrument must be secured such that one of the three axes corresponds to the direction of motion of the rotational axis of the measuring mechanism. After completion of this test, an additional measuring error of 100% of the error class rating may not be exceeded.

Scale and Pointer Types

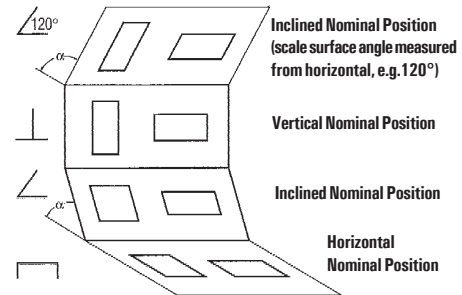
Scale and pointer types for quadrant and circular scales are defined in DIN 43 802, parts 2 through 4 (as of size 48 x 48 mm), as well as for horizontal and vertical scales (as of size 48 x 24 mm).

Our square and rectangular panel meters with edgewise scale are in compliance with these standards.

Reference Values and Influence Error

Position of Use

The nominal position of use is generally indicated with a positioning mark. The reference range includes every position between the horizontal and vertical for instruments which do not include a positioning mark. The nominal range of use includes all positions within 5° in any direction from the reference position and influence error (in addition to indication error) may not exceed 50% of the corresponding class rating.



Specification of a Nominal Position
Range also possible, e.g. Horizontal to Vertical Nominal Position

Operating Temperature Range

Unless otherwise specified, class 0.5 through class 5 instruments must be operated at an ambient temperature within a range of -25 to +40 °C in order to prevent permanent damage during continuous operation.

Range for storage temperature: -25 ... +55 °C

Ambient Temperature Sensitivity

Unless otherwise specified, the reference temperature for class 0.5 through class 5 instruments is 23 °C ± 2 °C.

The nominal range of use is equal to reference temperature ± 10 °C. Additional error within this temperature range may not be exceed the error class rating.

Climate-Proof Measuring Instruments

In their "tropic resistant" versions, our measuring instruments are specially well suited for:

- Moisture endangered areas in the temperate zones
- Indoor use in dry tropics
- Indoor use in the wet tropics, during which condensation or seepage water, which may be caused by air-conditioning, must be avoided

Range of Application (Climatic Demands)

Climatic Demands	standard	tropic resistant
Operating Temperature	-25 °C ... +40 °C	-25 °C ... +55 °C
Relative Humidity: annual mean 30 days per year remaining days	≤ 65% (at 21 °C) ≤ 85% (at 25 °C) ≤ 75% (at 23 °C)	≤ 75% (at 21 °C) ≤ 95% (at 25 °C) ≤ 85% (at 23 °C)
Condensation	none	none

- **Worldwide sales and service**

- **All panel meters can be supplied ex stock¹⁾**
Shunt resistors without protective cover (nominal current up to 1.5 kA)
ASK 31.3 / ASK 412.4 current transformers (Class 1. 50-60 Hz)
¹⁾ "Conditions of delivery for manufactures and performances of electrical industry" are applied

- **Moving-iron panel meters: lower measuring range value equal to 20% of upper measuring range value**

- **Power meters, power factor meters and frequency meters include built in electronic converters**
Allows for precise power measurement even for 3-phase four-wire systems with unbalanced load

- **Interchangeable scales for all panel meters**
Scale replacement is quick and simple with no loss of accuracy

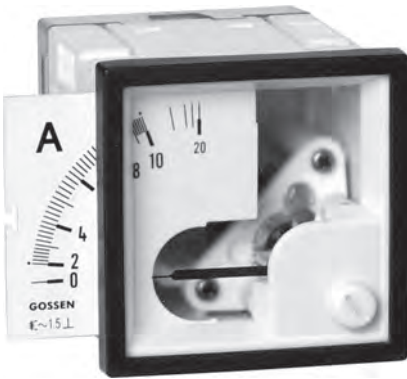
- **Interchangeable front frame and windows for all panel meters**

- **Anti-glare glass and terminal cover is included as standard equipment with all panel meters**
Back of hand and finger contact safety in accordance with BGV A3

- **Screw terminals with self-lifting terminal clips for all panel meters –**
Screws can be turned with cross-head or standard screw drivers

Basic Series • Square Panel Meters

Technical Description



Square panel meters per DIN 43 700 with quadrant scale, matt black or matt gray (RAL 7037) front frame per DIN 43 718

Available Models:

Front Dimensions	48 x 48	72 x 72	96 x 96
		see page	
Moving-iron panel meters	10	10	10
Bimetal-ammeters	12	12	12
Moving-iron bimetal ammeters	–	14	14
Moving coil panel meters for DC	16	16	16
Power meters	20	20	18
Power factor meters	–	–	22
Pointer-type frequency meters	–	24	24

Interchangeable Scale

Scale replacement is quick and simple with no loss of accuracy. The permanently affixed closure flap need to be opened, and the scale can be pulled out and removed.

Terminal Connection

M4 screw terminals with self-lifting terminal clips simplify clamping of connector wires. Terminal screws can be turned with cross-head or with standard screw drivers.

Housing

The rugged polycarbonate housing is self-extinguishing and drip-proof per UL94V-0.

Window material: anti-glare silicate glass.

Front frame and window can be easily replaced.

Mounting

All mounting fasteners are resistant to excessive vibration and shock.

Safety Precautions

- ⇒ Instruments with damaged front frame or window must be disconnected from the mains.
- ⇒ Adequate safety clearance must be maintained to control panel fasteners and to sheet metal housings if non-insulated (stripped) connector wires are used.
- ⇒ The terminal block cover must be snapped into place after the connector wires have been clamped in order to assure back of hand and finger contact safety in accordance with BGV A3.
- ⇒ Scale may only be replaced under voltage-free conditions.
- ⇒ Front frames and windows may only be replaced under voltage-free conditions.

Basic Series • Square Panel Meters

Technical Description - Measuring Systems

	Moving-Coil Movement	Moving-Iron Movement	Bimetal Movement
Application	Measurement of direct current or direct voltage Precision measurement of average value Power and power factor $\cos \phi$	Measurement of alternating current or alternating voltage True RMS measurement	Measurement of alternating current and direct current True RMS measurement The integrated slave pointer indicates the highest attained value
Bearings	Rugged pivot bearings with spring-loaded jewels	Rugged pivot bearings with spring-loaded jewels	Rugged bronze bearings
Damping • Overshoot • Response Time	Eddy-current damping $\leq 15\%$ of scale length ≤ 1 s per DIN EN 60 051-1	Viscous damping $\leq 15\%$ of scale length ≤ 2 s per DIN EN 60 051-1	Thermal, time-delayed, for display of mean effective value 15 min.. alternatively 8 min.
Reference Conditions • Frequency	45 Hz ... 65 Hz	45 Hz ... 65 Hz	45 Hz ... 65 Hz
Nominal Range of Use • Frequency		Ammeter: 45 Hz ... 65 Hz Voltmeter: 45 Hz ... 65 Hz	≤ 400 Hz
Scale Characteristics	nearly linear	Lower measuring range value is approx. 20% of upper measuring range value. Ammeters with double overload scale	
Measuring Range	see technical data	see technical data	see technical data
Overload Capacity • Continuous • Short Term: Current Measurement Voltage Measurement	1.2 x rated value 10 x rated value, 1 s $2 \times U_N, 5$ s	1.2 x rated value $10 \times I_N, 1$ s ($I_{max} = 50$ A) $2 \times U_N, 5$ s	1.2 x rated value $10 \times I_N, 1$ s ($I_{max} = 50$ A)
Connection	Screws M5 ¹⁾ Bolt M6 if measuring input > 15 A and ≤ 40 A	Screws M5 ¹⁾ Bolt M6 if measuring input > 15 A and ≤ 40 A Bolt M8 if measuring input > 40 A and ≤ 60 A	Screws M5 ¹⁾
Power Consumption	see technical data	Ammeters: approx. 0.65 VA (5 A) Voltmeters: approx. 2.5 VA (250 V)	1 A : ≤ 1.5 VA 5 A : ≤ 2.5 VA

1) M4 at casing 48x48 mm

See individual technical data for technical description of frequency meters, active and reactive power meters and power factor meters

Basic Series • Square Panel Meters

For Alternating Current or Voltage 45 ... 50 ... 60 ... 65 Hz



EQB 72

Description

Analog Panel Meter with Moving-Iron Movement and Spring-Loaded Pivot Bearings

Display

Scale Division Coarse-fine

Pointer Knife-edge pointer per DIN

Mechanical Design

Housing Material Polycarbonate, self-extinguishing and drip-proof per UL94V-0

Mounting Fasteners Screw Clamp

Scale Interchangeable scales
⇒ Scales may only be replaced under voltage-free conditions!

Replaceable Front frames and glass windows
⇒ Scales may only be replaced under voltage-free conditions!

Terminals M4 screw terminals with self-lifting terminal clips. Screws can be turned with cross-head or standard screw drivers.
Bolt M6 if measuring input > 15 A and ≤ 40 A
Bolt M8 if measuring input > 40 A and ≤ 60 A

Contact Protection Finger-safe terminal cover included

Moving-Iron Movement, 90° scale white, imprint black
Narrow front frame matt black per DIN 43 718, anti-glare glass

Front Dimensions mm Type	48 x 48 EQB 48	72 x 72 EQB 72	96 x 96 EQB 96
Scale length mm	42	63	97
Accuracy Class	1.5	1.5	1.5
Max. Weight (Standard Model)	0.1 kg	0.2 kg	0.25 kg
Max. Operating Voltage	300 V	600 V	600 V
Test Voltage	3.5 kV	5.8 kV	5.8 kV
Front Housing-Panel Protection	IP 52	IP 52	IP 52

Power Consumption

Connection	Measuring Input	Power Consumption
direct	Current	approx. 0.6 VA
direct	Current	≥ 15 A
to transformer	Current	sec.: 1 A or 5 A
		approx. 0.8 VA
		approx. 0.6 VA
direct	Voltage	approx. 2.5 VA
to transformer	Voltage	10 V ... 600 V
		sec.: 100 V or 110 V
		approx. 2.5 VA

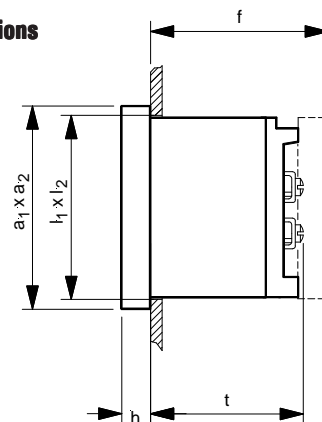
Reference Conditions

Reference Quantities	Reference Conditions
Ambient Temperature	23°C ± 2°C
Position of Use	control panel vertical ± 1°
Frequency	45 ... 65 Hz
Other	DIN EN 60051

Nominal Range of Use Limits

Frequency	for alternating Current 45 ... 65 Hz for alternating Voltage 45 ... 65 Hz
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Basic Dimensions



Front in mm	Nominal Dimensions		Cutout Dimensions, mm l ₁ x l ₂	Installation Depth Including Terminals (t), mm M4	Installation Depth Including Full Cover (f), mm
	a ₁ x a ₂	h			
48 x 48	48 x 48	5.5	45 ^{+0.6} x 45 ^{+0.6}	53	66
72 x 72	72 x 72	5.5	68 ^{+0.7} x 68 ^{+0.7}	53	66
96 x 96	96 x 96	5.5	92 ^{+0.8} x 92 ^{+0.8}	53	66

Basic Series • Square Panel Meters

For Alternating Current or Voltage 45 ... 50 ... 60 ... 65 Hz



Moving-iron movement, 90° scale white, imprint black
Narrow front frame matt black per DIN 43 718, anti-glare glass

Range	Scale ¹⁾	Type Order No.	EQB 48 ↓	EQB 72 ↓	EQB 96 ↓
1.5 / 3 A	1.5 / 3 A		48015 30000 B	72015 30000 B	96015 30000 B
2.5 / 5 A	2.5 / 5 A		48025 50000 B	72025 50000 B	—
4 / 8 A	4 / 8 A		48048 00000 B	72048 00000 B	—
6 / 12 A	6 / 12 A		48612 00000 B	72612 00000 B	96612 00000 B
10 / 20 A	10 / 20 A		48102 00000 B	72102 00000 B	96102 00000 B
15 / 30 A	15 / 30 A		48153 00000 B	72153 00000 B	96153 00000 B
20 / 40 A	20 / 40 A		—	72204 00000 B	—
25 / 50 A	25 / 50 A		48255 00000 B	72255 00000 B	96255 00000 B
30 / 60 A	30 / 60 A		—	72306 00000 B	—
40 / 80 A	40 / 80 A		—	72408 00000 B	96408 00000 B
50 / 100 A	50 / 100 A		—	72501 00000 B	—
60 / 120 A	60 / 120 A		—	72601 20000 B	96601 20000 B
1 / 2 A	0 – 50 / 100 A		48125 01000 B	72120 50100 B	96120 50100 B
1 / 2 A	0 – 60 / 120 A		48126 01200 B	72120 60120 B	96120 60120 B
1 / 2 A	0 – 100 / 200 A		48121 00200 B	72120 10020 B	96120 10020 B
1 / 2 A	0 – 150 / 300 A		48121 50300 B	72120 15030 B	96120 15030 B
1 / 2 A	0 – 200 / 400 A		48122 00400 B	72120 20040 B	96120 20040 B
1 / 2 A	0 – 250 / 500 A		48122 50500 B	72120 25050 B	96120 25050 B
1 / 2 A	0 – 400 / 800 A		48124 00800 B	72120 40080 B	96120 40080 B
1 / 2 A	0 – 600 / 1200 A		48126 00120 B	72120 60012 B	96120 60012 B
1 / 2 A	0 – 800 / 1600 A		48128 00160 B	72120 80016 B	96120 80016 B
1 / 2 A	0 – 1000 / 2000 A		48121 00020 B	72120 10002 B	96120 10002 B
1 / 2 A	0 – 1200 / 2400 A		48121 20024 B	72120 12002 B	96120 12002 B
1 / 2 A	0 – 1500 / 3000 A		48121 50030 B	72120 15003 B	96120 15003 B
1 / 2 A	0 – 2000 / 4000 A		48122 00040 B	72120 20004 B	96120 20004 B
5 / 10 A	0 – 50 / 100 A		48510 50100 B	72510 50100 B	96510 50100 B
5 / 10 A	0 – 60 / 120 A		48510 60120 B	72510 60120 B	96510 60120 B
5 / 10 A	0 – 100 / 200 A		48510 10020 B	72510 10020 B	96510 10020 B
5 / 10 A	0 – 150 / 300 A		48510 15030 B	72510 15030 B	96510 15030 B
5 / 10 A	0 – 200 / 400 A		48510 20040 B	72510 20040 B	96510 20040 B
5 / 10 A	0 – 250 / 500 A		48510 25050 B	72510 25050 B	96510 25050 B
5 / 10 A	0 – 400 / 800 A		48510 40080 B	72510 40080 B	96510 40080 B
5 / 10 A	0 – 600 / 1200 A		48510 60012 B	72510 60012 B	96510 60012 B
5 / 10 A	0 – 800 / 1600 A		48510 80016 B	72510 80016 B	96510 80016 B
5 / 10 A	0 – 1000 / 2000 A		48510 10002 B	72510 10002 B	96510 10002 B
5 / 10 A	0 – 1200 / 2400 A		48510 12002 B	72510 12002 B	96510 12002 B
5 / 10 A	0 – 1500 / 3000 A		48510 15003 B	72510 15003 B	96510 15003 B
5 / 10 A	0 – 2000 / 4000 A		48510 20004 B	72510 20004 B	96510 20004 B
10 V	10 V		—	72000 00010 B	96000 00010 B
60 V	60 V		—	72000 00060 B	96000 00060 B
100 V	100 V		48000 00100 B	72000 00100 B	96100 00000 B
120 V	120 V		—	72120 00000 B	96120 00000 B
150 V	150 V		48150 00000 B	—	—
250 V	250 V		48250 00000 B	72250 00000 B	96250 00000 B
300 V	300 V		—	—	96300 00000 B
500 V	500 V		48500 00000 B	72500 00000 B	96500 00000 B
600 V	600 V		—	72600 00000 B	96600 00000 B
750 V	750 V		—	—	96750 00000 B

1) Specify unlisted scales in clear text

2) max. operating voltage to earth fault 300 V without charges available:

EQB 72 range 5 / 30 A (6-fold overload)

EQB 96 range 5 / 6 A (1,2-fold overload)

EQB 96 range 1 / 1,2 A (1,2-fold overload)

EQB 96 range 5 / 15 A (3-fold overload)

EQB 96 range 5 A (no overload)

EQB 96 range 5 / 30 A (6-fold overload)

Basic Series • Square Panel Meters

For Alternating Current



MQB 72

Bimetal-movement, 90° scale white, imprint black
Narrow front frame matt black per DIN 43 718, anti-glare glass

Front Dimensions mm Type	48 x 48 MQB 48	72 x 72 MQB 72	96 x 96 MQB 96
Scale Length mm	42	63	97
Accuracy Class	3	3	3
Max. Weight (standrad model)	0.1 kg	0.2 kg	0.25 kg
Max. Operating Voltage	300 V	600 V	600 V
Test Voltage	3.5 kV	5.8 kV	5.8 kV
Front Housing Panel Protection	IP 52	IP 52	IP 52

Description

Analog Panel Meter with Bimetal Movement

Display

Scale Division Coarse-fine

Pointer Beam pointer with knife-edge
 Red slave pointer for display of maximum value
 Reset button for slave pointer can be locked

Mechanical Design

Housing Material Polycarbonate, self extinguishing and drip-proof per UL94V-0

Mounting Fasteners Screw Clamp

Scale Interchangeable Scales
 ⇒ Scales may only be replaced under voltage-free conditions!

Replaceable Front frames and glass windows
 ⇒ May only be replaced under voltage-free conditions!

Terminals M5 screw terminals with self-lifting terminal clips.
 Screws can be turned with cross-head or standard screw drivers.

Contact Protection Finger-safe terminal cover included

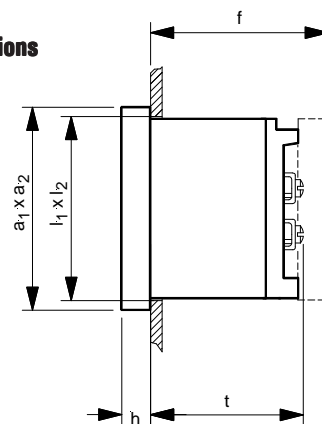
Power Consumption

Connection	Measuring Input		Power Consumption
to transformer	Current	sec.: 1 A or 5 A	approx. 2.2 VA

Reference Conditions

Reference Quantities	Reference Conditions
Ambient Temperature	23°C ± 2°C
Position of Use	control panel vertical ± 1°
Other	DIN EN 60051

Basic Dimensions



Front in mm	Nominal Dimensions		Cutout Dimensions, mm l ₁ x l ₂	Installation Depth Including Terminals (t), mm M4	Installation Depth Including Full Cover (f), mm
	a ₁ x a ₂	h			
48 x 48	48 x 48	5.5	45 ^{+0.6} x 45 ^{+0.6}	53	66
72 x 72	72 x 72	5.5	68 ^{+0.7} x 68 ^{+0.7}	53	66
96 x 96	96 x 96	5.5	92 ^{+0.8} x 92 ^{+0.8}	53	66

Basic Series • Square Panel Meters

For Alternating Current



Bimetal-movement, 90° scale white, imprint black
Narrow front frame matt black per DIN 43 718, anti-glare glass

Range	Scale ¹⁾	Type Order No.	MQB 48 ↓	MQB 72 ↓	MQB 96 ↓
5 / 6 A, 8 or 15 min.	0 – 50 / 60 A				
5 / 6 A, 8 or 15 min.	0 – 60 / 72 A				
5 / 6 A, 8 or 15 min.	0 – 100 / 120 A				
5 / 6 A, 8 or 15 min.	0 – 150 / 180 A				
5 / 6 A, 8 or 15 min.	0 – 200 / 240 A				
5 / 6 A, 8 or 15 min.	0 – 250 / 300 A				
5 / 6 A, 8 or 15 min.	0 – 400 / 480 A				
5 / 6 A, 8 or 15 min.	0 – 600 / 720 A				
5 / 6 A, 8 or 15 min.	0 – 800 / 960 A				
5 / 6 A, 8 or 15 min.	0 – 1000 / 1200 A				
5 / 6 A, 8 or 15 min.	0 – 1200 / 1440 A				
5 / 6 A, 8 or 15 min.	0 – 1500 / 1800 A				
<p>All panel meters available with the following configurations: Front Dimensions: 48 x 48, 72 x 72, 96 x 96 Connected to 1 / 1.2 A or 5 / 6 A transformer Response Time: 8 min. or 15 min. Scale as requested</p> <p>Please note ordering example below:</p>					
1 / 1.2 A, 8 or 15 min.	0 – 50 / 60 A				
1 / 1.2 A, 8 or 15 min.	0 – 60 / 72 A				
1 / 1.2 A, 8 or 15 min.	0 – 100 / 120 A				
1 / 1.2 A, 8 or 15 min.	0 – 150 / 180 A				
1 / 1.2 A, 8 or 15 min.	0 – 200 / 240 A				
1 / 1.2 A, 8 or 15 min.	0 – 250 / 300 A				
1 / 1.2 A, 8 or 15 min.	0 – 400 / 480 A				
1 / 1.2 A, 8 or 15 min.	0 – 600 / 720 A				
1 / 1.2 A, 8 or 15 min.	0 – 800 / 960 A				
1 / 1.2 A, 8 or 15 min.	0 – 1000 / 1200 A				
1 / 1.2 A, 8 or 15 min.	0 – 1200 / 1440 A				
1 / 1.2 A, 8 or 15 min.	0 – 1500 / 1800 A				

1) Specify unlisted scales in clear text

Ordering Example:

Type MQB 96	Text for purchase order: Range 5 / 6 A, Scale 0 – 100 / 120 A, 15 min.
------------------------------	---

Basic Series • Square Panel Meters

For Alternating Current



MEQB 96

Moving-iron bimetal movement, 90° scale white, imprint black
Narrow front frame matt black per DIN 43 718, anti-glare glass

Front Dimensions mm		72 x 72	96 x 96
Type		MEQB 72	MEQB 96
Scale Length mm	Moving-Iron Movement	63	97
	Bimetal-Movement	42	72
Accuracy Class	Moving-Iron / Bimetal Movement	1.5 / 3	1.5 / 3
Max. Weight (standard model)		0.2 kg	0.29 kg
Max. Operating Voltage		600 V	600 V
Test Voltage		5.8 kV	5.8 kV
Front Housing-Panel Protection		IP 52	IP 52

Description

Analog Panel Meter with Moving-Iron and Bimetal Movements

Display

Scale Division Coarse-fine

Pointer Beam pointer with knife-edge
 Red slave pointer for display of maximum value
 Reset button for slave pointer can be locked

Mechanical Design

Housing Material Polycarbonate, self-extinguishing and drip-proof per UL94V-0

Mounting Fasteners Screw Clamp

Scale Interchangeable scales
 ⇒ Scales may only be replaced under voltage-free conditions!

Replaceable Front frames and glass windows
 ⇒ May only be replaced under voltage-free conditions!

Terminals M4 screw terminals with self lifting terminal clips.
 Screws can be turned with cross-head or standard screw drivers.

Contact Protection Finger-safe terminal cover included

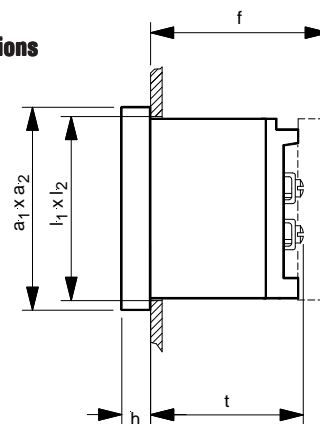
Power Consumption

Connection	Measuring input		Power Consumption
to transformer	Current	sec.: 1 A or 5 A	approx. 2.6 VA

Reference Conditions

Reference Quantities	Reference Conditions
Ambient Temperature	23°C ± 2°C
Position of Use	control panel vertical ± 1°
Other	DIN EN 60051

Basic Dimensions



Front in mm	Nominal Dimensions		Cutout Dimensions, mm l ₁ x l ₂	Installation Depth Including Terminals (t), mmM4	Installation Depth Including Full Cover (f), mm
	a ₁ x a ₂	h			
72 x 72	72 x 72	5.5	68 ^{+0.7} x 68 ^{+0.7}	53	66
96 x 96	96 x 96	5.5	92 ^{+0.8} x 92 ^{+0.8}	53	66

Basic Series • Square Panel Meters

For Alternating Current



Moving-iron bimetal movement, 90° scale white, imprint black
Narrow front frame matt black per DIN 43 718, anti-glare glass

Range	Scale ¹⁾	Type Order No.	MEQB 72 ↓	MEQB 96 ↓
5 / 6 A, 8 or 15 min.	0 – 50 / 60 A			
5 / 6 A, 8 or 15 min.	0 – 60 / 72 A			
5 / 6 A, 8 or 15 min.	0 – 100 / 120 A			
5 / 6 A, 8 or 15 min.	0 – 150 / 180 A			
5 / 6 A, 8 or 15 min.	0 – 200 / 240 A			
5 / 6 A, 8 or 15 min.	0 – 250 / 300 A			
5 / 6 A, 8 or 15 min.	0 – 400 / 480 A			
5 / 6 A, 8 or 15 min.	0 – 600 / 720 A			
5 / 6 A, 8 or 15 min.	0 – 800 / 960 A			
5 / 6 A, 8 or 15 min.	0 – 1000 / 1200 A			
5 / 6 A, 8 or 15 min.	0 – 1200 / 1440 A			
5 / 6 A, 8 or 15 min.	0 – 1500 / 1800 A			
1 / 1.2 A, 8 or 15 min.	0 – 100 / 120 A			
1 / 1.2 A, 8 or 15 min.	0 – 150 / 180 A			
1 / 1.2 A, 8 or 15 min.	0 – 200 / 240 A			
1 / 1.2 A, 8 or 15 min.	0 – 250 / 300 A			
1 / 1.2 A, 8 or 15 min.	0 – 400 / 480 A			
1 / 1.2 A, 8 or 15 min.	0 – 600 / 720 A			
1 / 1.2 A, 8 or 15 min.	0 – 1000 / 1200 A			

All panel meters available with the following configurations:
Front Dimensions: 72 x 72, 96 x 96
Connected to 1 / 1.2 A or 5 / 6 A transformer
Response Time: 8 min. or 15 min.
Scale as requested

Please note ordering example below:

1) Specify unlied scales in clear text

Ordering Example:

Type MEQB 72	Text for purchase order Range 5 / 6 A, Scale 0 – 800 / 960 A, 15 min.
-------------------------------	--

Basic Series • Square Panel Meters

For Direct Current or Direct Voltage



DQB 96

Description

Analog Panel Meter with Core-Magnet Moving-Coil Movement and Spring-Loaded Pivot Bearings

Display

Scale Division Coarse-fine

Pointer Beam pointer with knife-edge

Mechanical Design

Housing Material Polycarbonate, self-extinguishing and drip-proof per UL94V-0

Mounting Fasteners Screw Clamp

Scale Interchangeable Scales
⇒ Scales may only be replaced under voltage-free conditions!

Replaceable Front frames and glass windows
⇒ May only be replaced under voltage-free conditions!

Terminals M4 screw terminals with self-lifting terminal clips.
Screws can be turned with a cross-head or standard screw drivers.
Bolt M6 if Measuring input > 15 A and ≤ 40 A

Contact Protection Finger-safe terminal cover included

Moving-coil movement, 90° scale white, imprint black
Narrow front frame per DIN 43 718, anti-glare glass

Front Dimensions mm Type	48 x 48 DQB 48	72 x 72 DQB 72	96 x 96 DQB 96
Scale Length mm	42	63	97
Accuracy Class	1.5	1.5	1.5
Max. Weight (standard model)	0.1 kg	0.2 kg	0.25 kg
Max. Operating Voltage	300 V	600 V	600 V
Test Voltage	3.5 kV	5.8 kV	5.8 kV
Front Housing-Panel Protection	IP 52	IP 52	IP 52

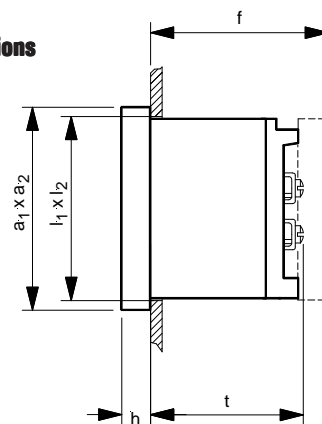
Internal Resistance / Voltage Drop / Power Consumption

Measuring Input	Ri			Tolerance
	DQB 48	DQB 72	DQB 96	
1 mA	250 Ω	150 Ω	150 Ω	± 10 %
20 mA	2 Ω	1.5 Ω	1.5 Ω	± 10 %
4 ... 20 mA	180 Ω ... 60 Ω			
Connection to shunt	Power consumption approx. 7 mA Lead resistance 0.06 Ω (calibrated)			± 10 % ± 10 %
1 A ... 60 A	Voltage Drop approx. 60 mV			± 10 %
≥ 1 V	approx. 1000 Ω/V			± 10 %

Reference Conditions

Reference Quantities	Reference Conditions
Ambient Temperature	23°C ± 2°C
Position of Use	control panel vertical ± 1°
Other	DIN EN 60051

Basic Dimensions



Front in mm	Nominal Dimensions		Cutout Dimensions, mm l ₁ x l ₂	Installation Depth Including Terminals (t), mmM4	Installation Depth Including Full Covers (f), mm
	a ₁ x a ₂	h			
48 x 48	48 x 48	5.5	45 ^{+0.6} x 45 ^{+0.6}	53	66
72 x 72	72 x 72	5.5	68 ^{+0.7} x 68 ^{+0.7}	53	66
96 x 96	96 x 96	5.5	92 ^{+0.8} x 92 ^{+0.8}	53	66

Basic Series • Square Panel Meters

For Direct Current or Direct Voltage



Moving-coil movement, 90° scale white, imprint black
Narrow front frame per DIN 43 718, anti-glare glass

Range	Scale ¹⁾	Type Order No.	DQB 48 ↓	DQB 72 ↓	DQB 96 ↓
1 mA	0 – 100 % ²⁾		48010 00000 B	72010 00000 B	96010 00000 B
1 – 0 – 1 mA	100 – 0 – 100 % ²⁾		48101 00000 B	72101 00000 B	96101 00000 B
20 mA	0 – 100 % ²⁾		48200 00000 B	72002 00100 B	96002 00100 B
0/4 – 20 mA	0 – 100 % ²⁾		48420 00000 B	72420 00000 B	96420 00000 B
15 A	15 A		–	72015 00000 B	96015 00000 B
25 A	25 A		–	72025 00000 B	96025 00000 B
40 A	40 A		–	72040 00000 B	96040 00000 B
Connection to shunt ... A/60 mV ³⁾					
60 mV	0 – 10 A		48006 00010 B	72006 00010 B	96006 00010 B
60 mV	0 – 15 A		48006 00015 B	72006 00015 B	96006 00015 B
60 mV	0 – 25 A		48006 00025 B	72006 00025 B	96006 00025 B
60 mV	0 – 40 A		48006 00040 B	72006 00040 B	96006 00040 B
60 mV	0 – 60 A		48006 00060 B	72006 00060 B	96006 00060 B
60 mV	0 – 100 A		48006 00100 B	72006 00100 B	96006 00100 B
60 mV	0 – 150 A		48006 00150 B	72006 00150 B	96006 00150 B
60 mV	0 – 200 A		48006 00200 B	72006 00200 B	96006 00200 B
60 mV	0 – 250 A		48006 00250 B	72006 00250 B	96006 00250 B
60 mV	0 – 400 A		48006 00400 B	72006 00400 B	96006 00400 B
60 mV	0 – 600 A		48006 00600 B	72006 00600 B	96006 00600 B
60 mV	0 – 1000 A		48006 01000 B	72006 01000 B	96006 01000 B
60 mV	0 – 1200 A		48006 01200 B	72006 01200 B	96006 01200 B
60 – 0 – 60 mV	60 – 0 – 60 A		48600 60600 B	72600 60600 B	96600 60600 B
60 – 0 – 60 mV	100 – 0 – 100 A		48600 60100 B	72600 60100 B	96600 60100 B
10 V	10 V		48101 01010 B	72001 00000 B	96001 00000 B
25 V	25 V		48252 52525 B	72002 50000 B	96002 50000 B
40 V	40 V		48404 04040 B	72004 00000 B	96004 00000 B
60 V	60 V		48606 06060 B	72006 00000 B	96006 00000 B
500 V	500 V		–	72050 00000 B	96050 00000 B

1) Specify unlisted scales in clear text

2) Scales with special design available for an extra charge

3) Connection to shunt ... A/150 mV with measuring range 150 mV or 150 - 0 - 150 mV also available (plus extra charge for special measuring range);
Specify in clear text in order designation

Basic Series • Square Panel Meters

For Direct Current or Direct Voltage



DQB 96-250

Description

Analog Panel Meter with Core-Magnet Moving-Coil Movement and Spring-Loaded Pivot Bearings

Display

Scale Division Coarse-fine

Pointer Beam pointer with knife-edge

Mechanical Design

Housing Material Polycarbonate, self-extinguishing and drip-proof per UL94V-0

Mounting Fasteners Screw Clamp

Scale Interchangeable Scales
⇒ Scales may only be replaced under voltage-free conditions!

Replaceable Front frames and glass windows
⇒ May only be replaced under voltage-free conditions!

Terminals M4 screw terminals with self-lifting terminal clips. Screws can be turned with a cross-head or standard screw drivers.

Contact Protection Finger-safe terminal cover included

Moving-coil movement, 250° scale white, imprint black
Narrow front frame per DIN 43 718, anti-glare glass

Front Dimensions mm	72 x 72	96 x 96
Type	DQB 72-250	DQB 96-250
Scale Length mm	107	153
Accuracy Class	1.5	1.5
Max. Weight (standard model)	0.2 kg	0.25 kg
Max. Operating Voltage	600 V	600 V
Test Voltage	5.8 kV	5.8 kV
Front Housing-Panel Protection	IP 52	IP 52

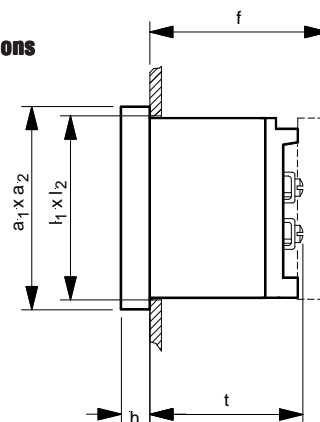
Internal Resistance / Voltage Drop / Power Consumption

Measuring Input	R _i		Tolerance
	DQB 72-250	DQB 96-250	
1 mA	550 Ω	550 Ω	± 20 %
20 mA	3.25 Ω	3.25 Ω	± 20 %
4 ... 20 mA	180 Ω ... 60 Ω		± 20 %
Connection to shunt ≥ 10 A, 60mV	Power consumption approx. 10 mA Lead resistance 0.06 Ω (calibrated)		± 10 %
≥ 4 V	approx. 1000 Ω/V		± 10 %

Reference Conditions

Reference Quantities	Reference Conditions
Ambient Temperature	23°C ± 2°C
Position of Use	control panel vertical ± 1°
Other	DIN EN 60051

Basic Dimensions



Front in mm	Nominal Dimensions		Cutout Dimensions, mm l ₁ x l ₂	Installation Depth Including Terminals (t), mmM4	Installation Depth Including Full Covers (f), mm
	a ₁ x a ₂	h			
72 x 72	72 x 72	5.5	68 ^{+0.7} x 68 ^{+0.7}	53	66
96 x 96	96 x 96	5.5	92 ^{+0.8} x 92 ^{+0.8}	53	66

Basic Series • Square Panel Meters

For Direct Current or Direct Voltage



Moving-coil movement, 250° scale white, imprint black
Narrow front frame per DIN 43 718, anti-glare glass

Range	Scale ¹⁾	Type Order No.	DQB 72-250 ↓	DQB 96-250 ↓
1 mA	0 – 100 % ²⁾		72250 11007 B	96250 11009 B
1 – 0 – 1 mA	100 – 0 – 100 % ²⁾		72250 10110 B	96250 10110 B
20 mA	0 – 100 % ²⁾		72250 20100 B	96250 20100 B
0/4 – 20 mA	0 – 100 % ²⁾		72250 42010 B	96250 42010 B
Connection to shunt ... A/60 mV ¹⁾				
60 mV	0 – 100 A		72250 60100 B	96250 60100 B
10 V ³⁾	10 V		72250 10107 B	96250 10109 B
10 - 0 - 10 V ³⁾	10 - 0 - 10 V		72250 10010 B	96250 10010 B

1) Specify unlisted scales in clear text

2) Scales with special design available for an extra charge

3) Voltmeters also deliverable:

- With range from 0 - 4 V up to 0 - 600 V (additional charge)

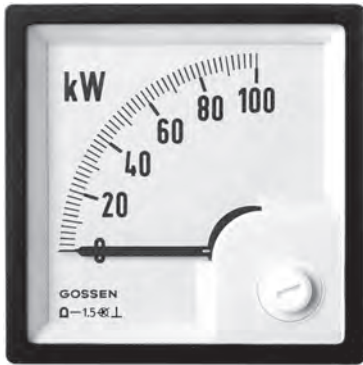
- Zero point at center (additional charge)

- Scale with special design (additional charge)

Specify in clear text in order designation

Basic Series • Square Panel Meters

For Active Power or Reactive Power



DLMQB 96

Moving-coil movement, 90° scale white, imprint black
Narrow front frame matt black per DIN 43718, anti-glare glass

Front Dimensions mm Type	96 x 96 DLMQB 96
Scale Length mm Accuracy Class Max. Weight (standard model) Max. Operating Voltage Test Voltage Front Housing-Panel Protection Input Meter	97 1.5 0.56 kg 600 V 5.8 kV IP 52 1 mA

Description

Analog panel meter with core-magnet moving-coil movement and built in power converter for active and reactive power. Depending upon type of system and power, the power converter consists of one, two or three multipliers. The multipliers function in accordance with the TDM process (time division multiplier). The output signals from the multipliers are added and fed to the moving coil mechanism.

Display

Scale Division Coarse-fine

Pointer Beam pointer with edge-knife

Mechanical Design

Housing Material Polycarbonate, self-extinguishing and drip-proof per UL94V-0

Mounting Fasteners Screw Clamp

Scale Interchangeable Scales
 ⇒ Scales may only be replaced under voltage-free conditions!

Replaceable Front frames and glass windows
 ⇒ May only be replaced under voltage-free conditions

Terminals M4 screw terminals with self-lifting terminal clips. Screws can be turned with a cross-head or standard screw drivers.

Contact Protection Finger-safe terminal cover included

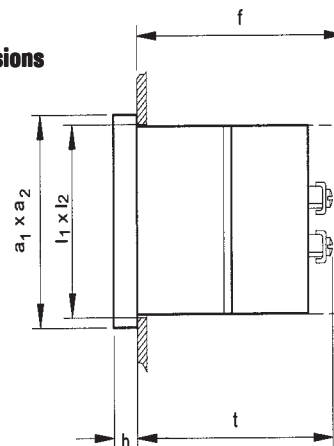
Power Consumption

Connection	Power Consumption
Current Path Voltage Path	approx. 0.2 VA ≤ 4.3 VA

Reference Conditions

Reference Quantities	Reference Conditions
Ambient Temperature Position of Use Frequency Current Components Voltage Components Warm-Up Time Other	23°C ± 2°C control panel vertical ± 1° 50 Hz ± 2 % 20 ... 120% of rated value 98 ... 102% of rated value ≥ 5 min. DIN EN 60051

Basic Dimensions



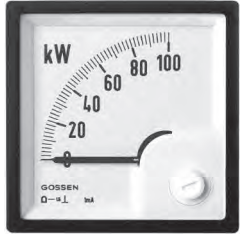
Front in mm	Nominal Dimensions a ₁ x a ₂	h	Cutout Dimensions, mm l ₁ x l ₂	Installation Depth Including Terminals (t), mm M4	Installation Depth Including Full Covers (f), mm
96 x 96	96 x 96	5.5	92 ^{+0.8} x 92 ^{+0.8}	117	126

Basic Series • Square Panel Meters

For Active Power or Reactive Power



Moving-coil movement, 90° scale white, imprint black
Narrow front frame matt black per DIN 43 718, anti-glare glass

Type	Oder No.	Front Dimensions 96 x 96 mm
DLMQB 96 – P1 W	55004 73100 B	 <p style="text-align: right;">DLMQB 96</p>
DLMQB 96 – P3 Wg	55004 73110 B	
DLMQB 96 – P3 Wu	55004 73120 B	
DLMQB 96 – P4 Wg	55004 73130 B	
DLMQB 96 – P4 Wu	55004 73140 B	
DLMQB 96 – P1 B	55004 73150 B	
DLMQB 96 – P3 Bg	55004 73160 B	
DLMQB 96 – P3 Bu	55004 73170 B	
DLMQB 96 – P4 Bg	55004 73180 B	
DLMQB 96 – P4 Bu	55004 73190 B	

Ordering Example:

DLMQB 96 P4 Wu 0–60 kW 400 V 100/5 A

Type ————
Power 4-Wire ————
Unbalanced Load Active Power
(Unbalanced Load Reactive Power) ————
Range ————
Nominal Voltage ————
Transformer ————

Notes concerning the Determination of Measuring Ranges

The upper measuring range should be a standard value per DIN 43 701: 1 – 1.2 – 1.5 – 2 – 2.5 – 3 – 4 – 5 – 6 – 7.5 – 8 and corresponding powers of ten. The upper measuring range value must lie within a range of 0.5 to 1.2 times apparent power.

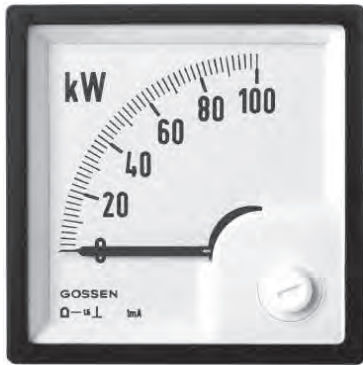
Apparent power P_s is calculated from the primary values from the current and voltage transformers:

- Single-Phase AC $P_s = U \times I$
- Three Phase $P_s = U \times I \times \sqrt{3}$

where U equals phase-to-phase voltage.

Basic Series • Square Panel Meter

For Active Power or Reactive Power



DQB 72

Description

Analog panel meter with 1 mA core-magnet moving-coil movement and **separate measuring converter** for active and reactive power in a separate housing. Depending upon type of system and power the measuring converter consists of one, two or three multipliers. The multipliers function in accordance with the TDM process (time division multiplier). The output signals from the multipliers are added and fed to the moving coil mechanism.

Display

Scale Division Coarse-fine

Pointer Beam pointer with edge-knife

Mechanical Design

Housing Material Polycarbonate, self-extinguishing and drip-proof per UL94V-0

Mounting Fasteners Screw clamp

Scale Interchangeable scales
⇒ Scales may only be replaced under voltage-free conditions!

Replaceable Front frames and glass windows
⇒ May only be replaced under voltage-free conditions!

Terminals M4 screw terminals with self-lifting terminal clips. Screws can be turned with a cross-head or standard screw drivers

Contact Protection Finger-safe terminal cover included

Moving-coil movement, 90° scale white, imprint black
Narrow front frame matt black per DIN 43718, anti-glare glass

Front Dimensions mm Type	48 x 48 DQB 48	72 x 72 DQB 72	96 x 96 DQB 96
Scale Length mm	42	63	97
Accuracy Class	1.5	1.5	1.5
Max. Weight (standard model)	0.1 kg	0.2 kg	0.25 kg
Max. Operating Voltage	300 V	600 V	600 V
Test Voltage	3.5 kV	5.8 kV	5.8 kV
Front Housing-Panel Protection	IP 52	IP 52	IP 52
Input Meter	1 mA	1 mA	1 mA

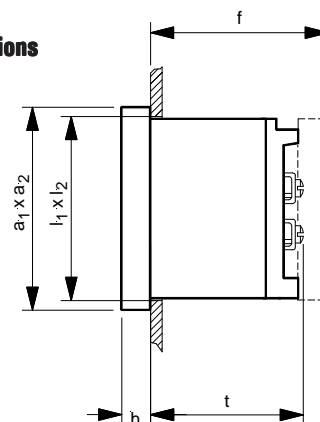
Power Consumption

Connection	Power Consumption
Current Path Voltage Path	approx. 0.2 VA ≤ 4.3 VA

Reference Conditions

Reference Quantities	Reference Conditions
Ambient Temperature	23°C ± 2°C
Position of Use	control panel vertical ± 1°
Frequency	50 Hz ± 2 %
Current Components	20 ... 120% of rated value
Voltage Components	98 ... 102% of rated value
Warm-Up Time	≥ 5 min.
Other	DIN EN 60051

Basic Dimensions



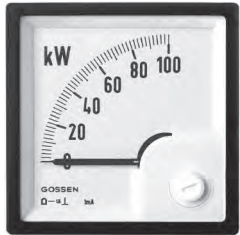
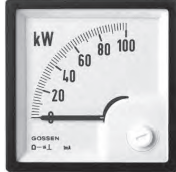
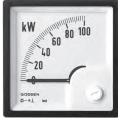
Front in mm	Nominal Dimensions		Cutout Dimensions, mm l ₁ x l ₂	Installation Depth Including Terminals (t), mm M4	Installation Depth Including Full Covers (f)mm
	a ₁ x a ₂	h			
48 x 48	48 x 48	5.5	45 ^{+0.6} x 45 ^{+0.6}	53	66
72 x 72	72 x 72	5.5	68 ^{+0.7} x 68 ^{+0.7}	53	66
96 x 96	96 x 96	5.5	92 ^{+0.8} x 92 ^{+0.8}	53	66

Basic Series • Square Panel Meters

For Active Power or Reactive Power



Moving-coil movement, 90° Scale white, imprint black
Narrow front frame matt black per DIN 43718, anti-glare glass

Type	Order No. for separate measuring converter	Front Dimensions
DQB. . . . MV-P1 W	41004 73100 B	 <p>DQB 96 96 x 96 mm</p>  <p>DQB 72 72 x 72 mm</p>  <p>DQB 48 48 x 48 mm</p>
DQB. . . . MV-P3 Wg	41004 73110 B	
DQB. . . . MV-P3 Wu	41004 73120 B	
DQB. . . . MV-P4 Wg	41004 73130 B	
DQB. . . . MV-P4 Wu	41004 73140 B	
DQB. . . . MV-P1 B	41004 73150 B	
DQB. . . . MV-P3 Bg	41004 73160 B	
DQB. . . . MV-P3 Bu	41004 73170 B	
DQB. . . . MV-P4 Bg	41004 73180 B	
DQB. . . . MV-P4 Bu	41004 73190 B	

Ordering Example:						
DQB 72	MV	P4	Wu	0-60 kW	400 V	100/5 A
Type	Measuring Converter	Power 4-Wire	Unbalanced Load Active Power (Unbalanced Load Reactive Power)	Range	Nominal Voltage	Transformer

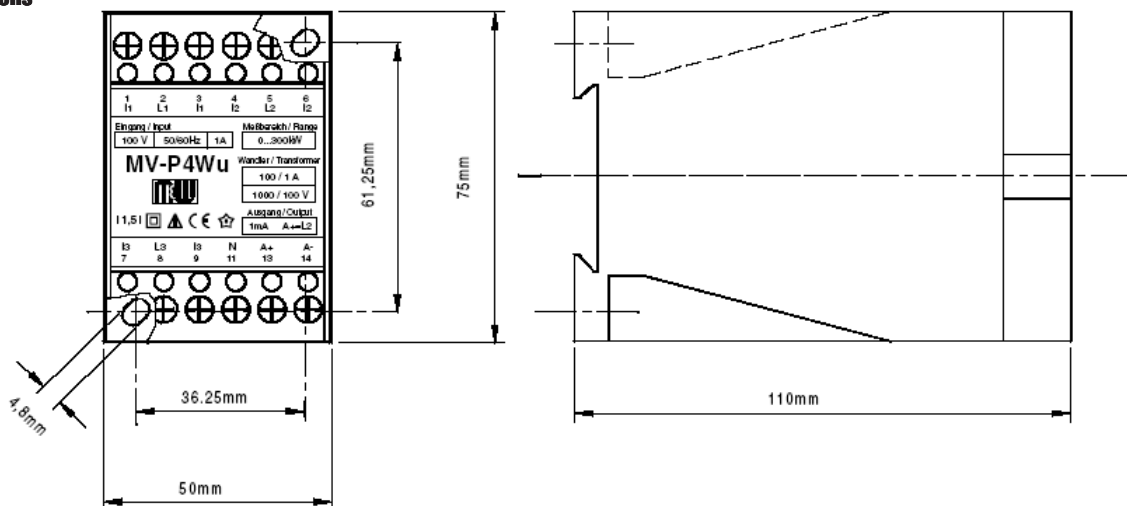
Notes concerning the Determination of Measuring Ranges

The upper measuring range should be a standard value per DIN 43 701: 1 – 1.2 – 1.5 – 2 – 2.5 – 3 – 4 – 5 – 6 – 7.5 – 8 and corresponding powers of ten. The upper measuring range value must lie within a range of 0.5 to 1.2 times apparent power. Apparent power P_s is calculated from the primary values from the current and voltage transformers:

- Single-Phase AC $P_s = U \times I$
- Three Phase $P_s = U \times I \times \sqrt{3}$

where U equals phase-to-phase voltage.

Separate Measuring Converter Basic Dimensions



Basic Series • Square Panel Meter

For Power Factor



DLQB 96

Description

Analog panel meter with core-magnet moving-coil movement and built in power factor converter. The power factor converter determines the phase angle between current and voltage. $\cos \phi$ is displayed at the moving-coil movement.

Display

Measuring Range CAP 0.5 ... 1 ... 0.5 IND

Scale Division Coarse-fine

Pointer Beam pointer with edge-knife

Mechanical Design

Housing Material Polycarbonate, self-extinguishing and drip-proof per UL94V-0

Mounting Fasteners Screw clamp

Scale Interchangeable scales
⇒ Scales may only be replaced under voltage-free conditions!

Replaceable Front frames and glass windows
⇒ May only be replaced under voltage-free conditions!

Terminals M4 screw terminals with self-lifting terminal clips. Screws can be turned with a cross-head or standard screw drivers

Contact Protection Finger-safe terminal cover included

Moving-coil movement, 90° scale white, imprint black
Narrow front frame matt black per DIN 43 718, anti-glare glass

Front Dimensions mm Type	96 x 96 DLQB 96
Scale Length mm	97
Accuracy Class*	2.5
Ma.Weight (standard model).	0.32 kg
Max. Operating Voltage	600 V
Test Voltage	3.5 kV
Front Housing-Panel Protection	IP 52

*referred to measuring range

Power Consumption

Connection	Power Consumption
Current Path	≤ 0.5 VA
Voltage Path	≤ 2.5 VA

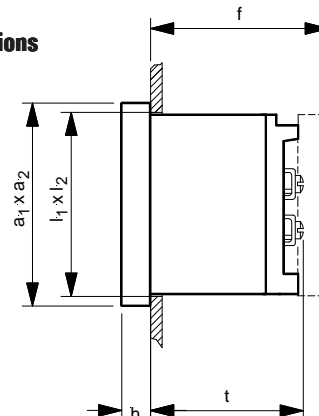
Reference Conditions

Reference Quantities	Reference Conditions
Ambient Temperature	23 °C ± 2 °C
Position of Use	control panel vertical ± 1°
Frequency	50 Hz ± 0.1 Hz
Current Components	95 ... 100 % of rated value
Voltage Components	98 ... 102 % of rated value
Waveshape	sine. distortion factor ≤ 1%
Warm-Up Time	≥ 5 min.
Other	DIN EN 60051

Nominal Range of Use Limits

Frequency	single phase AC 3-wire system	49 Hz ... 51 Hz 45 Hz ... 65 Hz

Basic Dimensions



Front in mm	Nominal Dimensions		Cutout Dimensions, mm $l_1 \times l_2$	Installation Depth Including Terminals (t), mm M4	Installation Depth Including Full Covers (f), mm
	$a_1 \times a_2$	h			
96 x 96	96 x 96	5.5	$92^{+0.8} \times 92^{+0.8}$	53	66

Basic Series • Square Panel Meter

For Power Factor

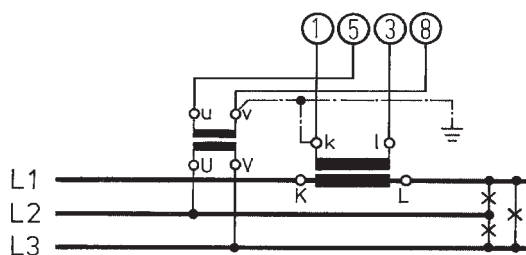


Moving-coil movement, 90° scale white, imprint black
Narrow front frame matt black per DIN 43 718, anti-glare glass

Range	Scale	Type Order No.	DLQB 96 ↓
400 V, 1 A	0.5 ... 1 ... 0.5 cos ϕ		96051 05300 B
400 V, 5 A	0.5 ... 1 ... 0.5 cos ϕ		96051 05400 B

Schematic Diagram

3-Phase 3-Wire, Balanced Load



Basic Series • Square Panel Meter

For Frequency (Pointer-Type Frequency Meters)



FQB 96

Description

Analog panel meter with core-magnet moving-coil movement and built in frequency converter.

Anzeige

Scale Division Coarse-fine

Pointer Beam pointer with edge-knife

Mechanical Design

Housing Material Polycarbonate, self-extinguishing and drip-proof per UL94V-0

Mounting Fasteners Screw clamp

Scale Interchangeable scales
 ⇒ Scales may only be replaced under voltage-free conditions!

Replaceable Front frames and glass windows
 ⇒ May only be replaced under voltage-free conditions!

Terminals M4 screw terminals with self-lifting terminal clips. Screws can be turned with a cross-head or standard screw drivers

Contact Protection Finger-safe terminal cover included

Moving-coil movement, 90° scale white, imprint black
Narrow front frame matt black per DIN 43 718, anti-glare glass

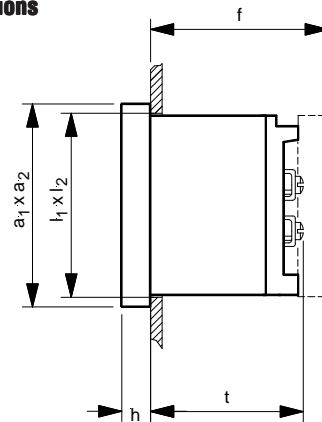
Front Dimensions mm	72 x 72	96 x 96
Type	FQB 72	FQB 96
Scale Length mm	63	97
Accuracy Class*	1	1
Max. Weight (standard model)	0.20 kg	0.28 kg
Power Consumption approx.	5 mA	5 mA
Max. Operating Voltage	600 V	600 V
Test Voltage	5.8 kV	5.8 kV
Front Housing-Panel Protection	IP 52	IP 52

*referred to upper measuring range

Reference Conditions

Reference Quantities	Reference Conditions
Ambient Temperature	23°C ± 2°C
Position of Use	control panel vertical ± 1°
Input Voltage	rated value of voltage
Waveshape	sine
Warm-Up Time	≥ 5 min.
Other	DIN EN 60051

Basic Dimensions



Front in mm	Nominal Dimensions		Cutout Dimensions, mm l ₁ x l ₂	Installation Depth Including Terminals (t), mm M4	Installation Depth Including Full Covers (f), mm
	a ₁ x a ₂	h			
72 x 72	72 x 72	5.5	68 ^{+0.7} x 68 ^{+0.7}	53	66
96 x 96	96 x 96	5.5	92 ^{+0.8} x 92 ^{+0.8}	53	66

Range	Scale	Type Order No.	FQB 72 ↓	FQB 96 ↓
47 ... 50 ... 53 Hz	47 ... 50 ... 53 Hz (230 V)		72475 05313 B	96475 05312 B
57 ... 60 ... 63 Hz	57 ... 60 ... 63 Hz (230 V)		72576 35763 B	96576 35763 B
45 ... 50 ... 55 Hz	45 ... 50 ... 55 Hz (230 V)		72455 05523 B	96455 54555 B
55 ... 60 ... 65 Hz	55 ... 60 ... 65 Hz (230 V)		72556 06523 B	96556 55565 B
45 ... 50 ... 55 Hz	45 ... 50 ... 55 Hz (415 V)		72455 05541 B	96455 05541 B
55 ... 60 ... 65 Hz	55 ... 60 ... 65 Hz (450 V)		72556 06545 B	96556 06545 B

Basic Series • Special Panel Meters

For Alternating Voltage 45 ... 50 ... 60 ... 65 Hz



EQB 96/U6

Description

Voltmeter with selector switch

6 Positions without zero position

L1-L3, L2-L3, L1-L2

L1-N, L2-N, L3-N

Analog panel meter with moving-iron movement and spring-loaded pivot bearing

Display

Scale Division Coarse-fine

Pointer Knife-edge pointer per DIN

Mechanical Design

Housing Material Polycarbonate, self-extinguishing and drip-proof per UL94V-0

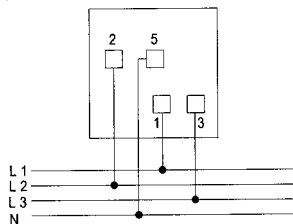
Mounting Fasteners Screw clamp

Replaceable Front frames and glass windows
⇒ May only be replaced under voltage-free conditions!

Terminals M4 screw terminals with self-lifting terminal clips. Screws can be turned with a cross-head or standard screw drivers

Contact Protection Finger-safe terminal cover included

Schematic Diagram



Moving-iron movement, 90° scale white, imprint black
Narrow front frame per DIN 43 718, anti-glare glass

Dimensions mm	72 x 72	96 x 96
Type	EQB 72/U6	EQB 96/U6
Scale Length mm	63	97
Accuracy Class	1.5	1.5
Max. Weight	0.22 kg	0.27 kg
Max. Operating Voltage	300 V	300 V
Test Voltage	3.5 kV	3.5 kV
Front Housing-Panel Protection	IP 52	IP 52

Power Consumption

Connection	Measuring Input	Power Consumption
direct	Voltage Phase-Phase 120 V ... 500 V	approx. 2.5 VA

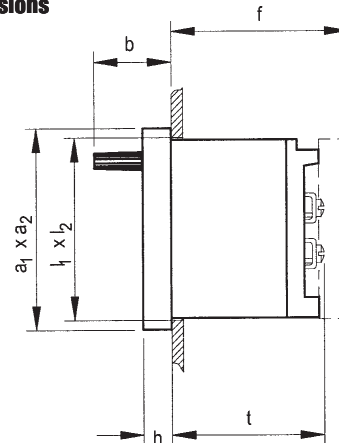
Reference Conditions

Reference Quantities	Reference Conditions
Ambient Temperature	23°C ± 2°C
Position of Use	control panel vertical ± 1°
Frequency	45 ... 65 Hz
Other	DIN EN 60051

Nominal Range of Use Limits

Frequency	for alternating current 45 ... 65 Hz
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Basic Dimensions

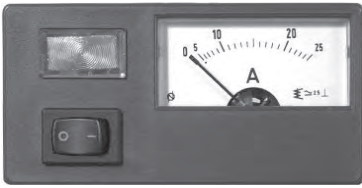


Front in mm	Nominal Dimensions		Cutout Dimensions, mm l ₁ x l ₂	Installation Depth Including Terminals (t), mm M4	Installation Depth Including Full Covers (f), mm	Selector Switch (b)
	a ₁ x a ₂	h				
72 x 72	72 x 72	5.5	68 ^{+0.7} x 68 ^{+0.7}	53	66	20
96 x 96	96 x 96	5.5	92 ^{+0.8} x 92 ^{+0.8}	53	66	20

Range	Scale	Type Order No.	EQB 72/U6 ↓	EQB 96/U6 ↓
500 V	500 V		72500 67250	96500 69650

Basic Series • Special Panel Meters

For Direct or Alternating Current or Voltage 15 ... 45 ... 65 ... 100 Hz



FkN 2

Moving-iron movement, 105° vertical or horizontal scale white, imprint black with grey flange, similar to RAL 7024, Switch 2 A / 250 V and lamp 230 V white

Front Dimensions mm Type	96 x 48 FkN2 vertical scale*	48 x 96 FkN2 horizontal scale*
Scale Length mm	32	32
Accuracy Class	2.5	2.5
Max. Weight(standard model)	0.15 kg	0.15 kg
Max. Operating Voltage	300 V	300 V
Test Voltage	5.8 kV	5.8 kV
Front Housing-Panel Protection	IP 52	IP 52

* Specify in clear text

Description

Analog panel meter with moving-iron movement

Display

Scale Division WN-division

Pointer Tube pointer

Mechanical Design

Housing Material Thermoplast, white (ABS)

Mounting Fasteners Clamp bolt with milled nut

Scale permanently mounted

Window Plexiglas 7 N, antistatic coating (PMMA)

Terminals Terminal board 2.5 mm² and M4 - M6 screw terminals

Contact Protection Finger-safe terminal cover included

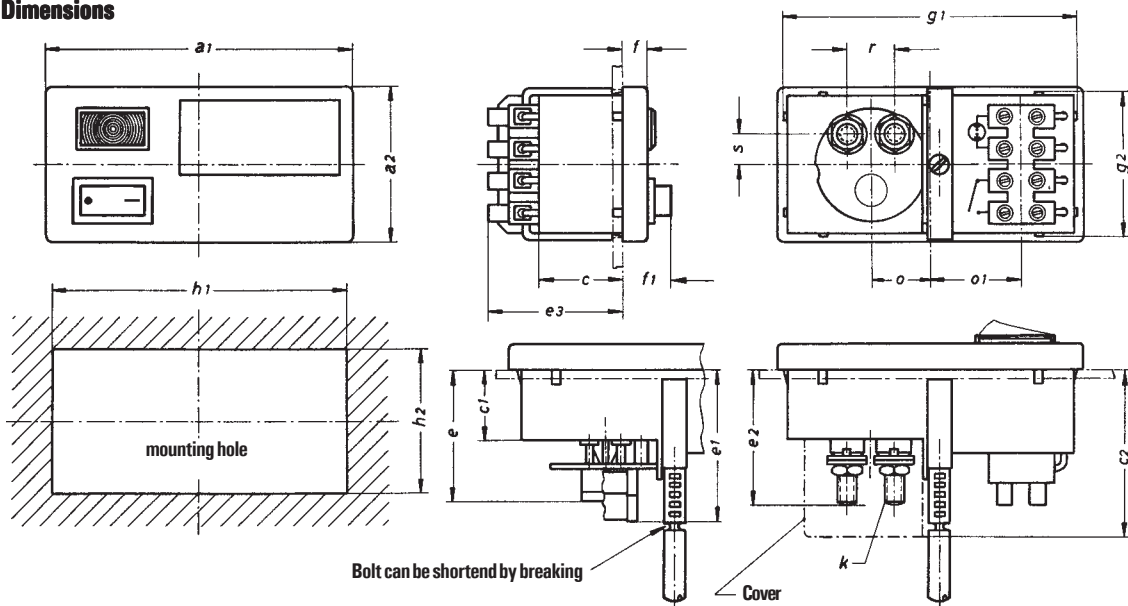
Power Consumption

Measuring Input	Power Consumption
Direct or Alternating Voltage	approx. 3.5 VA

Reference Conditions

Reference Quantities	Reference Conditions
Ambient Temperature Position of Use Other	23°C ± 2°C control panel vertical ± 1° DIN EN 60051

Basic Dimensions



Type	a1	a2	c	c1	c2	e		e2		e3	f	f1	g1	g2	h1	h2	k			o	o1	r		s
						4 - 300V	400 - 600V	15 - 25 A	26 - 40 A								upto 14 A	15 - 25 A	26 - 40 A			upto 25 A	26 - 40 A	
FkN 2	96	48	26.3	21.7	51.7	41	46	31	36.5	42.5	8	15	91.5	45	92±0,3	45+0,3	M 4	M 5	M 6	18.7	28.5	13	15	9.5

Basic Series • Special Panel Meters

For Direct or Alternating Current or Voltage 15 ... 45 ... 65 ... 100 Hz



Moving-iron movement, 105° vertical or horizontal scale white,
 imprint black with grey flange, similar to RAL 7024,
 Switch 2 A / 250 V and lamp 230 V white

	Scale ¹⁾	Type Order No.	FkN 2 Horizontal Scale ¹⁾ ↓	FkN 2 Vertical Scale ¹⁾ ↓
Direct or Alternating Current				
Range:				
0 – 100 ... 600 mA ¹⁾	in accordance with measuring range		N59999	N59999
1 ... 10 A ¹⁾	in accordance with measuring range		N59999	N59999
15 A	15 A		N51301	N51300
25 A	25 A		N51303	N51302
40 A	40 A		N51305	N51304
Alternating Current				
Connection to Current Transformer				
sec. .../1 A	... ¹⁾		N51287	N51286
Connection to Current Transformer				
sec. .../5 A	... ¹⁾		N51295	N51294
Direct or Alternating Voltage				
Range:				
4 ... 150 V ¹⁾	in accordance with measuring range		N52555	N52555
250 V	250 V		N51329	N51328
Alternating Voltage				
Connection to Voltage Transformer				
sec. .../100 V	... ¹⁾		N51325	N51324
Connection to Voltage Transformer				
sec. .../110 V	... ¹⁾		N52555	N52555

1) Specify in clear text

Accessories / Spare parts	Order No.
Snap-lock cover for FkN 2	N24656
Lamp for FkN 2	220 V AC 110 V AC
	N07346 N10816
Switch for FkN 2	48343 86110

VARIANTS AND SPECIAL DESIGNS

	Identification / Order No.
GENERAL VARIANTS	+ ↓
Heightened Requirements	
Resistance to Vibration above 2.5 g to 5 g (only for measuring range ≥ 1 mA and ≥ 400 mV)	LN58
Tropic resistant	LB4
Frontpanel: IP 54, terminals: IP 00	LH21
Special Measuring Range	
Unlisted Measuring Range	DC...

Basic Series • Square Panel Meters

Special Designs and Spare Parts

VARIANTS AND SPECIAL DESIGNS		
Housing Variants		
Front Frame Colour matt grey (similar to RAL 7037)		MA 11
Adjustable red index pointer (EQB 72/96, DQB 72/96)		PM 001
Adjustable deflection factor dial (MQB 72/96, DQB 72/96)		PK 006
Scale Variants		
Scale Version 0-100 %		GL310 / GMP02
Standard Scale with other measured quantities (1-1.2-1.5-2-2.5-3-4-5-6-7.5 and corresponding powers of ten)		GM999
Special Scale / Special Calibration		
Special Scale (non standard range or calibration to chart or calibration curve)		SD999
One-off charge for special scale printing plate		09000 00004
Marking		
Red marker at: ...		ST991
Coloured Sectors in red, green or blue (other colours on request)		SU991
Additional Scale Inscription (15 characters max.)		SM991
Additional Numbering		SK992
MOVING-COIL VARIANTS		
Zero Point		
Zero point in the middle (except 60 mV meters for shunt connection)		BC2
Resistor Adjustment		
Built in potentiometer for adjustment for voltmeters 1000 Ω /V range from 6 V up to 500 V. Types DQB 72 and DQB 96		MP1
SPARE PARTS		
Interchangeable Scales with Standard Ranges	QB 48	22098 86034 B
	QB 72	22098 86035 B
	QB 96	22098 86055 B
	MEQB 72	22098 86036 B
	MEQB 96	22098 86056 B
Glass Window	QB 48	00480 00000 B
	QB 72	00720 00000 B
	QB 96	00960 00000 B
	MEQB 72	00072 00000 B
	MEQB 96	00096 00000 B
	MQB 48	00004 80001 B
	MQB 72	00007 20001 B
	MQB 96	00009 60001 B
	QB 72 U6	00007 25007 B
	QB 96 U6	00009 65009 B
Mounting Fasteners	Pushing tight type	inclusive
	Screw clip (2 times)	MN 073
	Screw clip (4 times)	MN 074
	leaf spring (2 times)	
	leaf spring (4 times)	
Terminal Cover	QB 48	48000 00000 B
	QB 72	72000 00000 B
	QB 96	96000 00000 B