

Analog Panel Meters • Preference Program

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

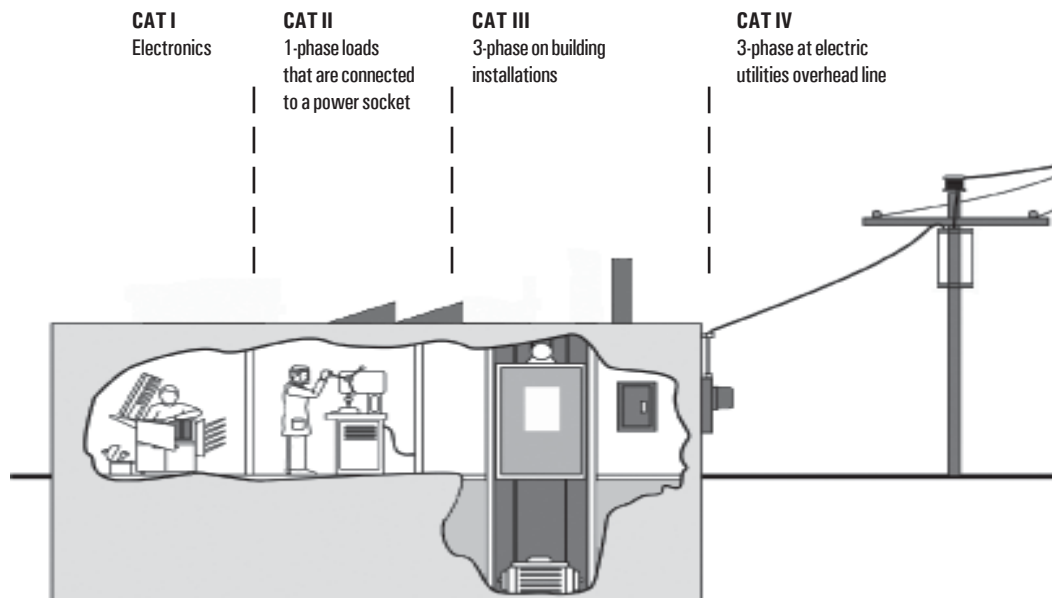
- CAT I Measurements in circuits that are not connected directly to the mains supply (e.g. secondary site of over voltage-proof power supply units, batteries)
- CAT II Measurements in circuits that are connected directly to a low voltage mains supply by plugs (e.g. household appliances, office machines)
- 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.



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IEC-, EN-, DIN-, VDE-Standards and Regulations for Electrical Meters

Regulations and Standards

Our meters and indicator/controllers comply with the regulations of the European Guidelines 73/23/EWG and 89/336/EWG. 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 V-AQS 72 V-PQS 72 V-MQS 72 V-MAQS 72 V-PQ 72-250 V-FZQS 72 AQS 144 PQS 144 MQS 144 AMQS 144 PQ 144-250 | EQB 96 EQB 96/U6 DQB 96 MQB 96 MEQB 96 DLMQB 96 DQB 96 MV FQB 96 DLQB 96 V-AQS 96 V-PQS 96 V-MQS 96 V-MAQS 96 V-PQ 96-250 V-FZQS 96 V-LM 96 V-LM 96-250 V-LF 96 | 600 / 1000 V | 1000 V | 600 V |
| EQB 48 DQB 48 MQB 48 DQB 48 MV DLQB 48 FQB 48 FkN 2 | AQS 48 W PQS 48 W V-MQS 48 V-PQ 48-250 FZQS 48 W | 230 / 400 V | 500 V | 300 V |
| PF 48x24 ¹⁾ PFF 72x24 ¹⁾ PF 72x36 ²⁾ PFFN 96x24 ²⁾ PFFN 96x48 ²⁾ PFN 96x24 ²⁾ DPR 144 F KODPR 144 F | PFF 00 ¹⁾ PFF 0 PFFN 96x24 M ²⁾ PFFN 96x48 M ²⁾ PFN 96x48 M ²⁾ PF 144x72 KODPR 144 SE | | | 150 V |

- 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!

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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

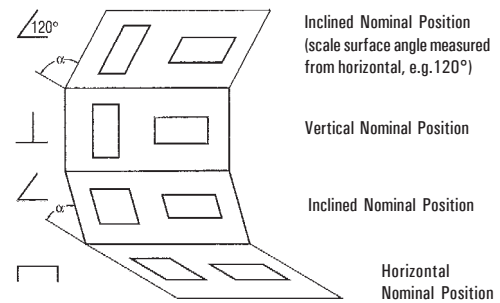
Scale and pointer types for quadrant and circular scales are defined in DIN 43 802, parts 2 through 4 (as of size 48 x 48 mm), as well as for horizontal and vertical scales (as of size 48 x 24 mm).

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 | |