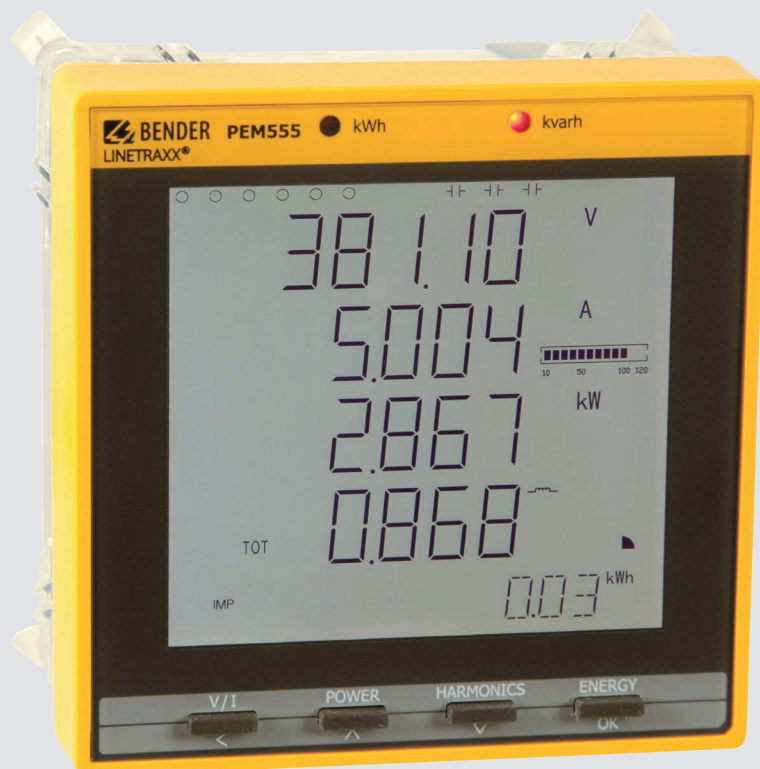
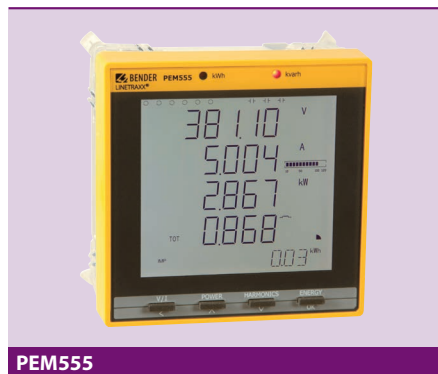


Power Quality and Energy Measurement PEM555



Power Quality and Energy Measurement

PEM555



PEM555

Device features

- Accuracy class according to IEC 62053-22: 0.5 S
- Measured quantities
 - Phase voltages U_{L1}, U_{L2}, U_{L3} in V
 - Line conductor voltages $U_{L1L2}, U_{L2L3}, U_{L3L1}$ in V
 - Phase currents I_1, I_2, I_3 in A
 - Neutral current (calculated) I_0 in A
 - Neutral current (measured) I_4 in A
 - Frequency f in Hz
 - Phase angle for U and I in $^\circ$
 - Power per phase conductor S in kVA, P in kW, Q in kvar
 - Total power S in kVA, P in kW, Q in kvar
 - Displacement factor $\cos(\varphi)$
 - Power factor λ
 - Active and reactive energy import in kWh, kvarh
 - Active and reactive energy export in kWh, kvarh
 - Voltage unbalance in %
 - Current unbalance in %
 - Harmonic distortion (THD) for U and I
 - k-Factor for I
- Programmable setpoint monitoring
- LED pulse outputs for active and reactive energy
- Modbus RTU and Modbus TCP
- 3 digital outputs
- Requirements of energy and current for particular time frames
- Peak demands with timestamps
- Individual, current/voltage harmonics up to the 31st harmonic
- Minimum and maximum values
- Waveform recording (6.4 kHz)
- Data recorder
- High-resolution waveform recording
- Detection of transient events

Product description

The digital universal measuring device PEM555 is suited for measuring and displaying electrical quantities of a public electricity network. The PEM555 is able to perform current, voltage, energy consumption and performance measurements as well as displaying individual current/voltage harmonics for assessment of the power quality. The accuracy of active energy measurements corresponds to class 0.5 S in accordance with the requirements of DIN EN 62053-22 (VDE 0418 Part 3-22). The current inputs are connected via external .../1 A or .../5 A measuring current transformers.

Typical application

- As a compact device for front panel mounting, the PEM555 is a replacement for analogue indicating instruments
- Typical application in low and medium-voltage networks (via measuring voltage transformer)
- Power quality monitoring
- Collection of relevant data for energy management
- Cost allocation of energy consumption
- High-resolution waveform recording allow analysis of power quality phenomena

Description of function

- Sampling rate of the measuring channels: 6.4 kHz
- Calculation of the total harmonic distortion THD_U/THD_I: harmonics up to the 31st harmonic
- Individual current/voltage harmonics
- Password protection
- Clamp mechanism, no tools required
- History memory for minimum and maximum values of current, voltage, energy, power rating etc. for each month
- Inputs and outputs:
 - 3 digital outputs, 6 digital inputs
 - 9 user-programmable setpoints (response values, response delay 0...9999 seconds)
 - System protocol: 64 events, setup changes, setpoint alarming, DI status changes, DO switching operations
- Communication:
 - Galvanically isolated RS-485 interface (1,200 bis 19,200 bit/s)
 - Modbus-RTU protocol
 - Modbus TCP (10/100 Mbit/s)

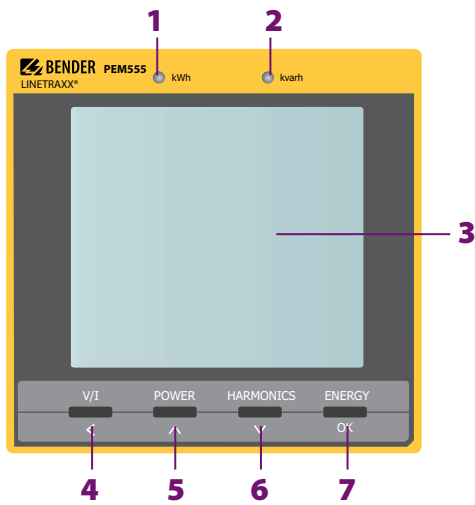
Standards

The universal measuring device for Power Quality and Energy Measurement PEM555 was developed in accordance with the following standards: DIN EN 62053-22 (VDE 0418 Part 3-22), DIN EN 61557-12 (VDE 0413-12)

Features

| | PEM555 |
|-------------------------------|---------|
| RS-485 | ■ |
| Modbus TCP | ■ |
| Digital inputs | 6 |
| Digital outputs | 3 |
| Sampling rate | 6.4 kHz |
| THD calculation and harmonics | 31. |
| On-board memory | 2 MB |
| Detection of transients | ■ |

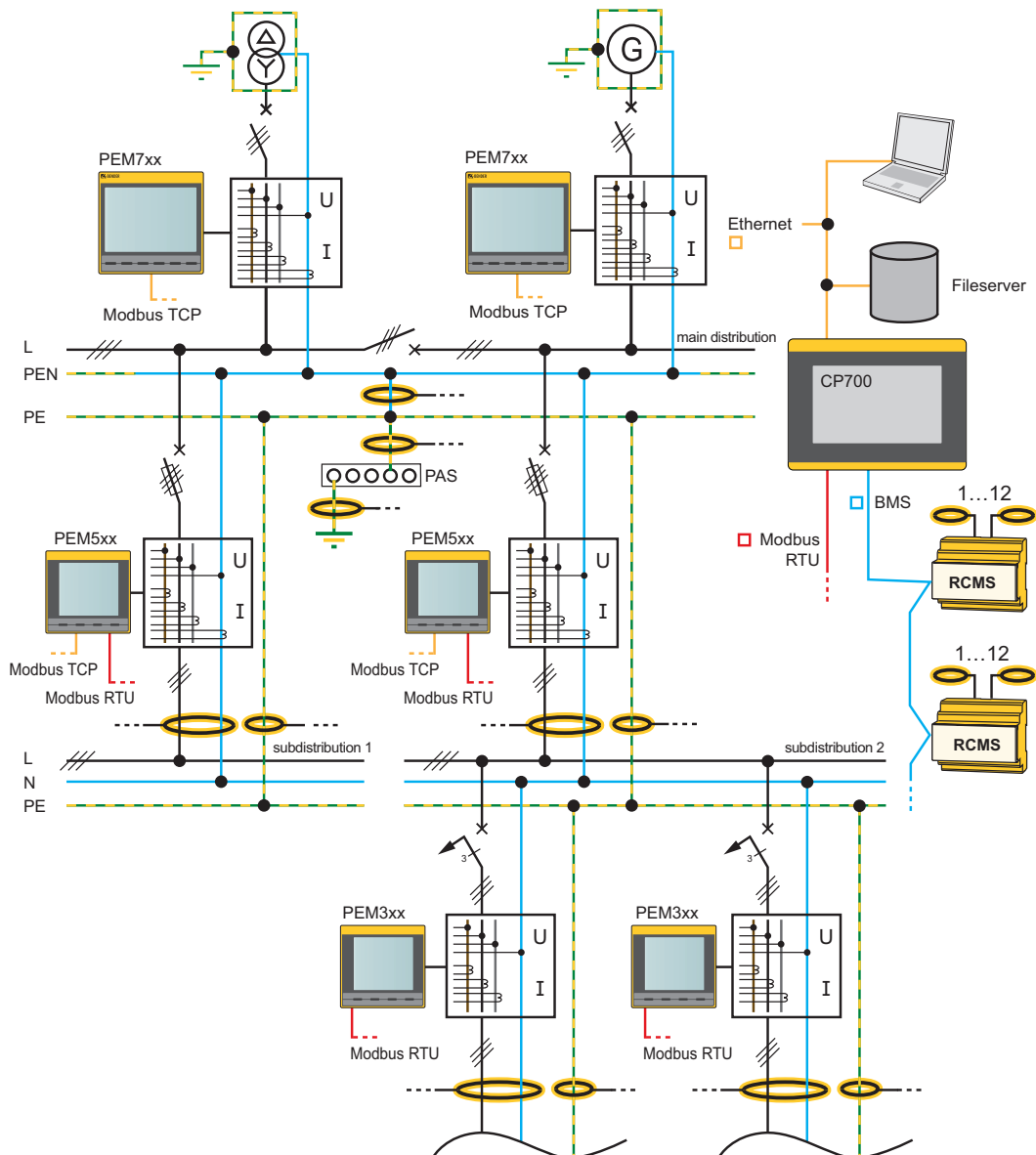
Operating elements



- 1 - Pulse LED: kWh
- 2 - Pulse LED: kvarh
- 3 - Display
- 4 - "V/I" button: Selection (in the menu)
- 5 - "POWER" button: Up (in the menu)
- 6 - "HARMONICS" button: Down (in the menu)
- 7 - "ENERGY" button: OK (in the menu)

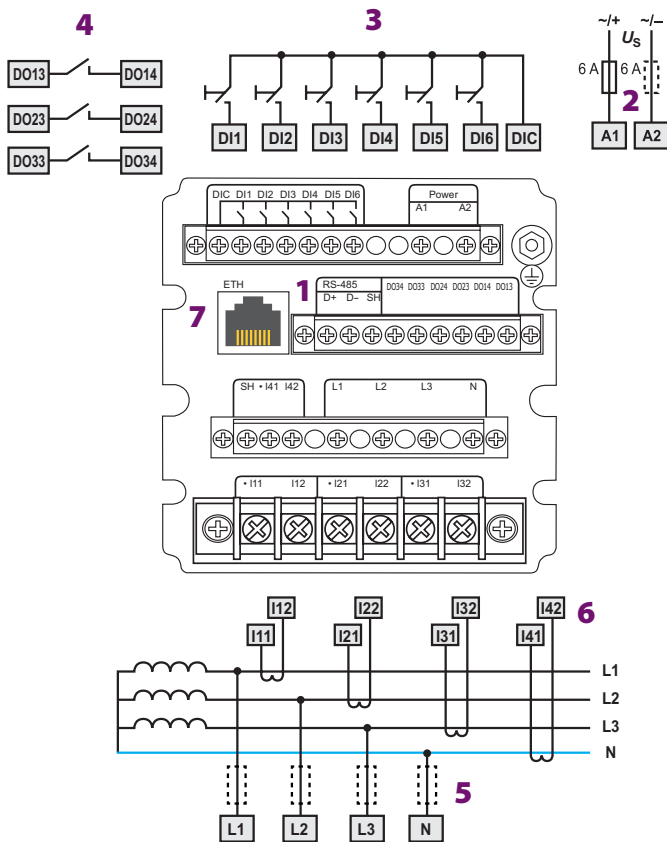
Press the "ENERGY" button > 1.5 s to enter/leave the Setup menu.

Example for system set-up



NSHV = Low-voltage main distribution board

Wiring diagram

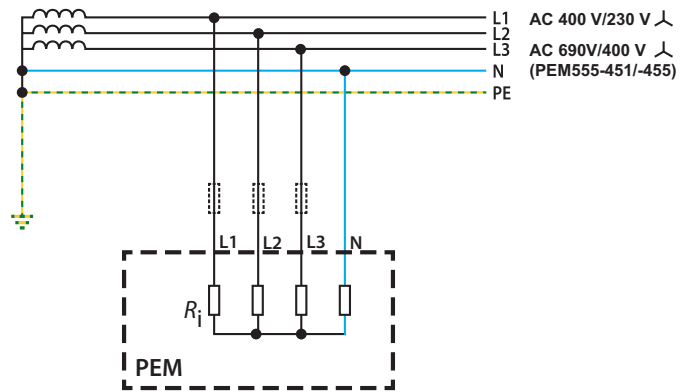


- 1 - Connection RS-485 bus
- 2 - Supply voltage. Power protection by a 6 A fuse, quick response. If being supplied from an IT system, both lines have to be protected by a fuse.
- 3 - Digital inputs
- 4 - Digital outputs (N/O contacts)
- 5 - Measuring voltage inputs
- 6 - Connection to the system to be monitored: The measuring leads should be protected by appropriate fuses.
- 7 - Connection Modbus TCP

Connection diagram voltage inputs

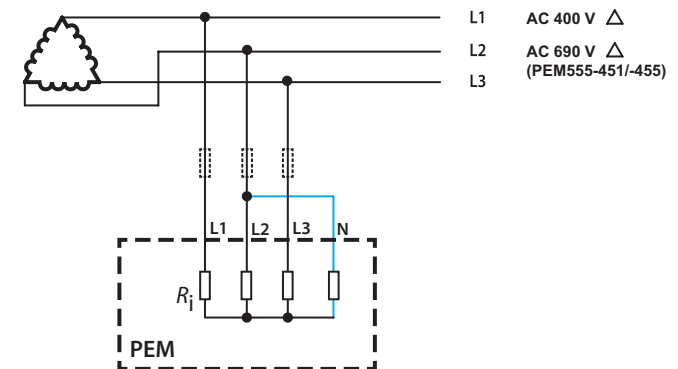
Three-phase 4-wire system (TN, TT, IT systems)

The PEM can be used in three-phase 4-wire systems, independent of the type of distribution system (TN, TT, IT system).



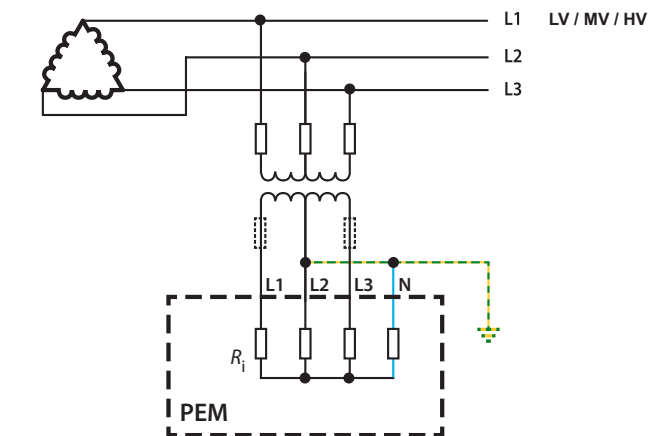
Three-phase 3-wire system

The PEM can be used in three-phase 3-wire systems.



Connection via voltage transformers

The coupling via measuring voltage transformers allows the use of a measuring device in medium and high voltage systems. The transformation ratio in PEM555 can be adjusted (1...10000).



Technical data
Insulation co-ordination
Measuring circuit

| | |
|--------------------------|-------|
| Rated insulation voltage | 300 V |
| Overtoltage category | III |
| Pollution degree | 2 |

Supply circuit

| | |
|--------------------------|-------|
| Rated insulation voltage | 300 V |
| Overtoltage category | II |
| Pollution degree | 2 |

Supply voltage

| | |
|----------------------------|-----------------|
| Rated supply voltage U_S | 95...250 V |
| Frequency range of U_S | DC, 44...440 Hz |
| Power consumption | ≤ 11 VA |

Measuring circuit
Measuring voltage inputs

| | |
|---------------------------|-------------------------|
| $U_{L1-N, L2-N, L3-N}$ | 230 V |
| | 400 V (only -451, -455) |
| $U_{L1-L2, L2-L3, L3-L1}$ | 400 V |
| | 690 V (only -451, -455) |
| Measuring range | 10... 120 % U_n |
| Rated frequency | 45...65 Hz |
| Internal resistance (L-N) | > 500 k Ω |

Measuring current inputs

External measuring current transformer should at least comply with accuracy class 0.5 S

| | |
|---|-------------------------------------|
| Burden | n.A., internal current transformers |
| Measuring range | 0.1... 120 % I_n |
| PEM555/PEM555-455 | |
| I_n | 5 A |
| Measuring current transformer ratio | 1...6000 |
| Accuracy class according with 5 A measuring current transformer | 0.5 |
| Accuracy class according with 1 A measuring current transformer | 1 |
| PEM555-251/PEM555-451 | |
| I_n | 1 A |
| Measuring current transformer ratio | 1...30000 |
| Accuracy class according with 1 A measuring current transformer | 0.5 |

Accuracies (of measured value/of full scale value)

| | |
|---|---|
| Phase voltage $U_{L1-N}, U_{L2-N}, U_{L3-N}$ | ± 0.2 % of measured value. |
| Current | ± 0.2 % of measured value + 0.05 % of full scale value. |
| Neutral current I_4 | 0.5 % of full scale value |
| Frequency | ± 0.02 Hz |
| Phase position | ± 1° |
| Active energy measurement according to | DIN EN 62053-22 (VDE 0418 Part 3-22) |
| r.m.s. voltage measurement according to | DIN EN 61557-12 (VDE 0413-12), chapter 4.7.6 |
| r.m.s. phase current measurement according to | DIN 61557-12 (VDE 0413-12), chapter 4.7.5 |
| Frequency measurement according to | DIN EN 61557-12 (VDE 0413-12), chapter 4.7.4 |

Interface

| | |
|--|----------------------------------|
| Interface/protocol | RS-485, Modbus RTU |
| Baud rate | 1.2...19.2 kbits/s |
| Cable length | 0...1200 m |
| Shielded cable (shield connected to terminal SH on one side) | recommended: J-Y(St)Y min. 2x0.8 |

| | |
|--------------------|----------------------|
| Interface/protocol | Ethernet, Modbus TCP |
| Baud rate | 100 Mbits/s |

Switching elements

| | |
|---------------------------|---|
| Outputs | 3 N/O contacts |
| Operating principle | N/O operation |
| Rated operational voltage | AC 230V DC 24V AC 110V DC 12V |
| Rated operational current | 5 A 5 A 6 A 5 A |
| Minimum contact rating | 1 mA at AC/DC ≥ 10 V |
| Inputs | 6 electrically separated digital inputs |
| I_{min} | 2.4 mA |
| U_{DI} | DC 24 V |

Environment/EMC

| | |
|--|----------------|
| EMC | DIN EN 61326-1 |
| Operating temperature | -25...+55 °C |
| Climatic class acc. to DIN EN 60721 | |
| Stationary use | 3K5 |
| Classification of mechanical conditions acc. to DIN EN 60721 | |
| Stationary use | 3M4 |
| Height | to 4000 m |

Connection

| | |
|------------|----------------------|
| Connection | screw-type terminals |
|------------|----------------------|

Other

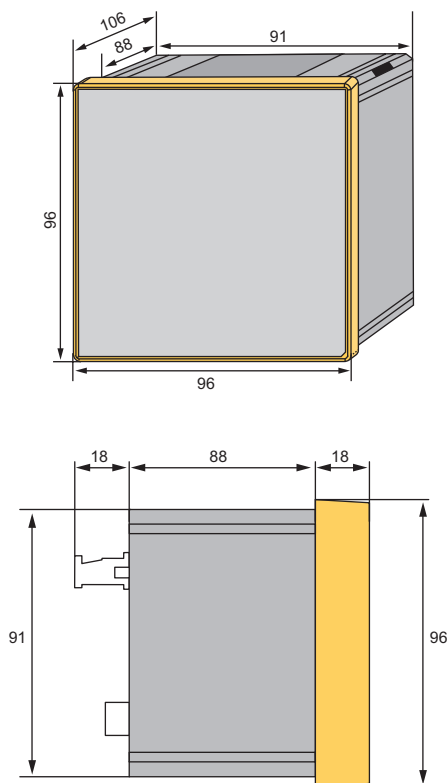
| | |
|------------------------------------|----------|
| Degree of protection, installation | IP20 |
| Degree of protection, front | IP52 |
| Documentation number | D00016 |
| Weight | ≤ 1100 g |

Ordering information

| Interface | Nominal system voltage | Current input | Type | Art. No. |
|-----------------|------------------------|---------------|------------|-------------|
| | 3(N)AC | | | |
| RS-485/Ethernet | 400/230 V | 5 A | PEM555 | B 9310 0555 |
| | | 1 A | PEM555-251 | B 9310 0556 |
| | 690/400 V | 5 A | PEM555-455 | B 9310 0557 |
| | | 1 A | PEM555-451 | B 9310 0558 |

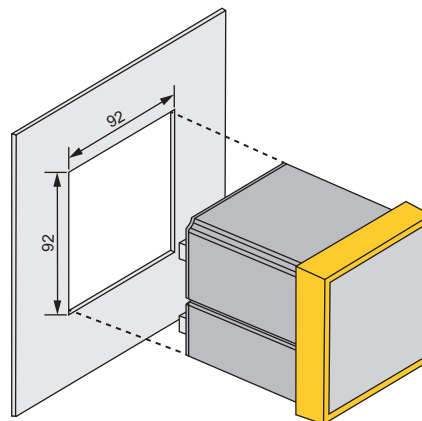
Dimension diagram

Dimensions in mm



Panel cut-out

Dimensions in mm



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