Power Quality and Energy Measurement PEM575

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Power Quality and Energy Measurement
PEM575

PEM575

Device features

- Accuracy class according to IEC 62053-22: 0.2 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 °
  - 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 (φ)
  - 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 63rd harmonic
- Minimum and maximum values
- Waveform recording (12.8 kHz)
- Data recorder
- Sag/swell detection
- High-resolution waveform recording
- Detection of transient events

Product description

The digital universal measuring device PEM575 is suited for measuring and displaying electrical quantities of a public electricity network. The PEM575 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 0.2 S in accordance with the reqirements 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 PEM575 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: 12.8 kHz
- Calculation of the total harmonic distortion THD_U/THD_I: harmonics up to the 63rd 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
  - 16 user-programmable setpoints (response values, response delay 0…9999 seconds)
  - System protocol: 512 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)

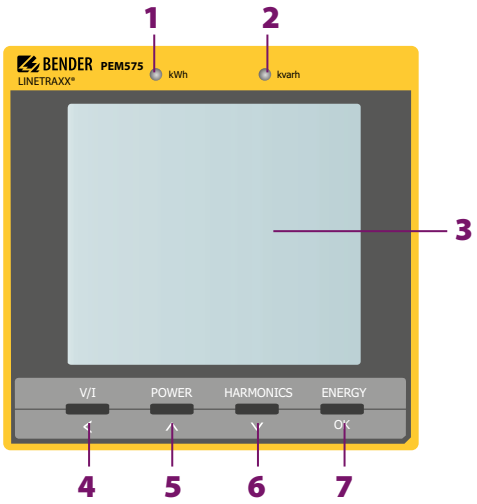
Standards

The universal measuring device for Power Quality and Energy Measurement /PEM575 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

	PEM575
RS-485	■
Modbus TCP	■
Digital inputs	6
Digital outputs	3
Sampling rate	12.8 kHz
THD calculation and harmonics	63.
On-board memory	4 MB
Detection of transients	■

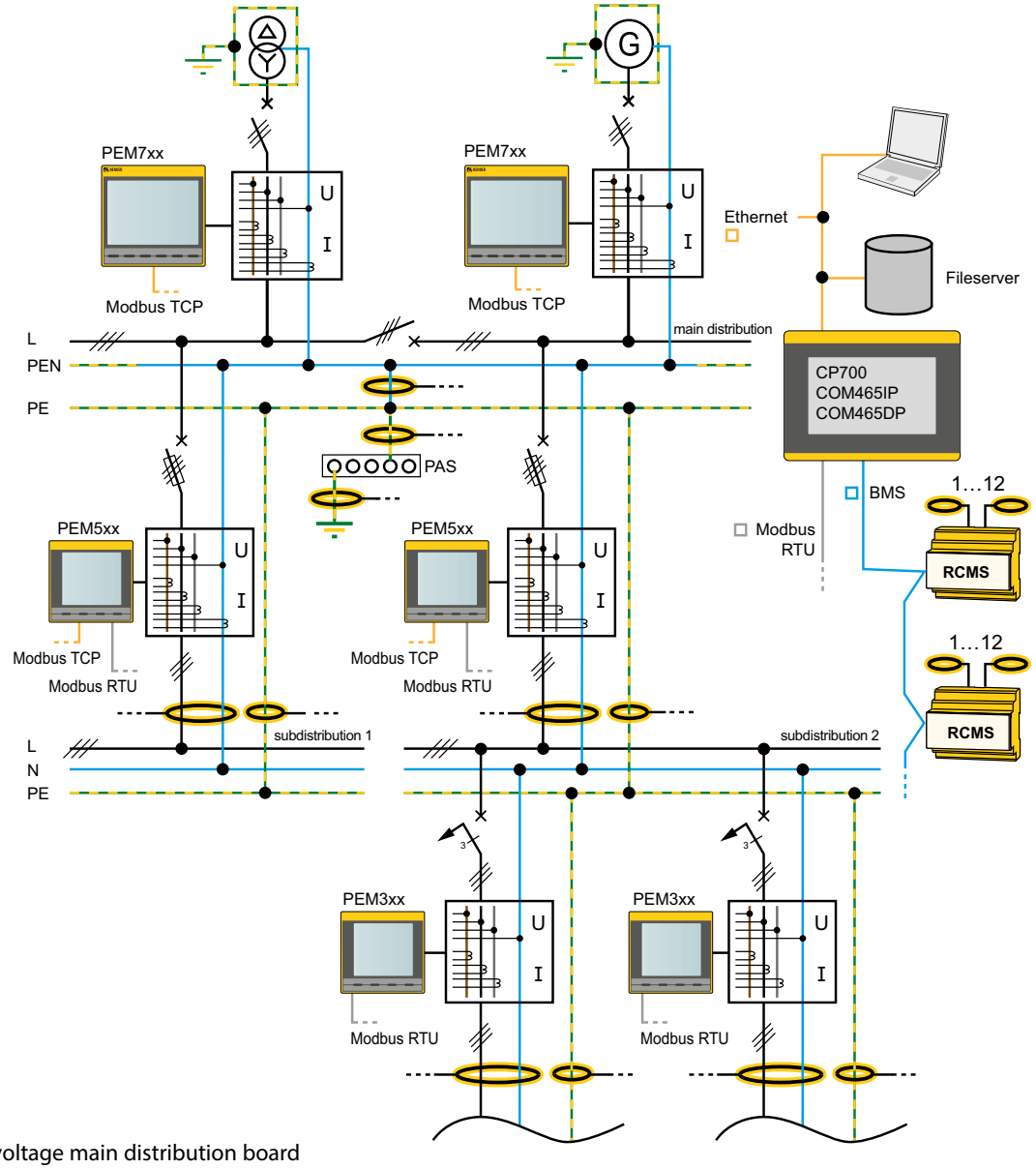
Operating elements



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)

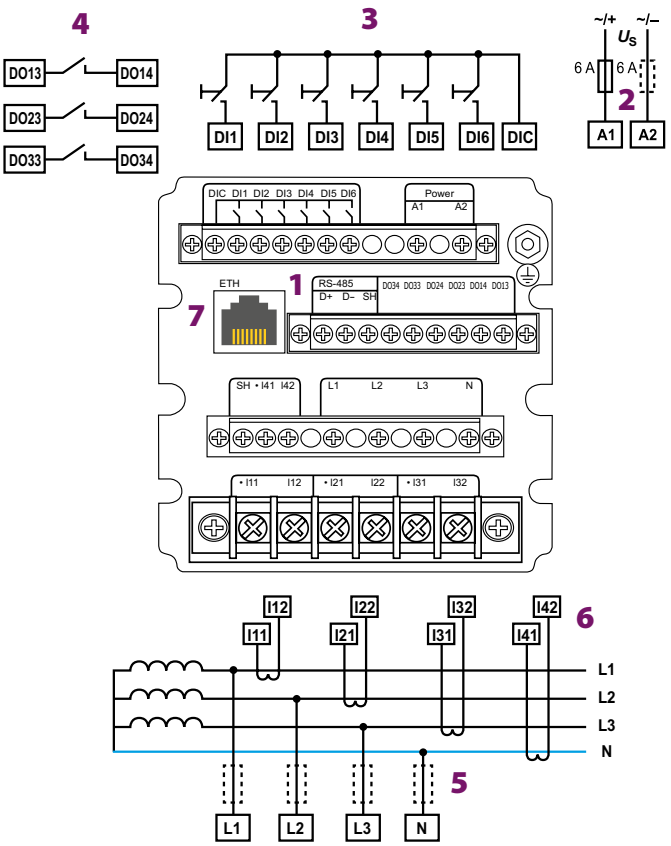
Press the "ENERGY" button > 1.5 s to enter/leave the Setup menu.

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:
The measuring leads should be protected by appropriate fuses

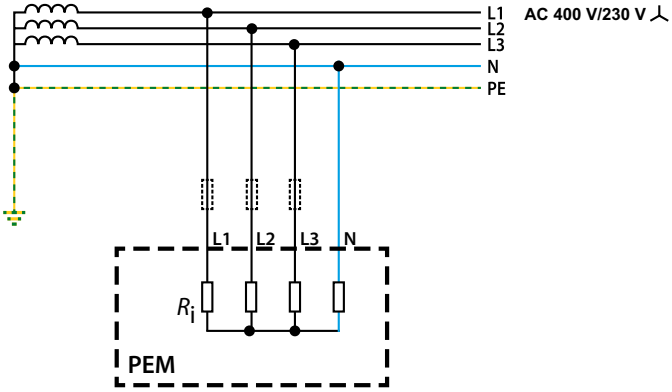
6 - Connection to the system to be monitored

7 - Connection Modbus TCP

Connection diagram voltage inputs

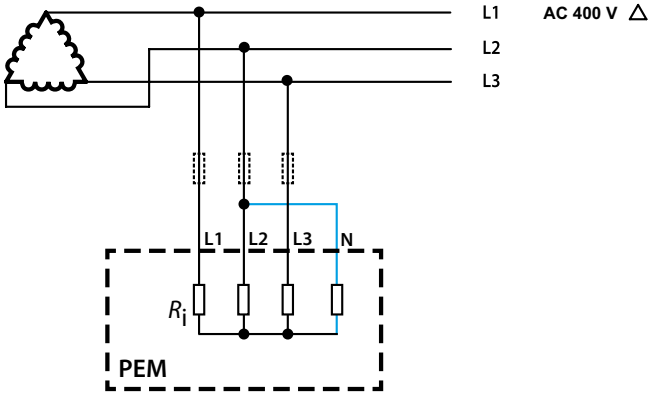
Three-phase 4-wire system (TN, TT, IT systems)

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



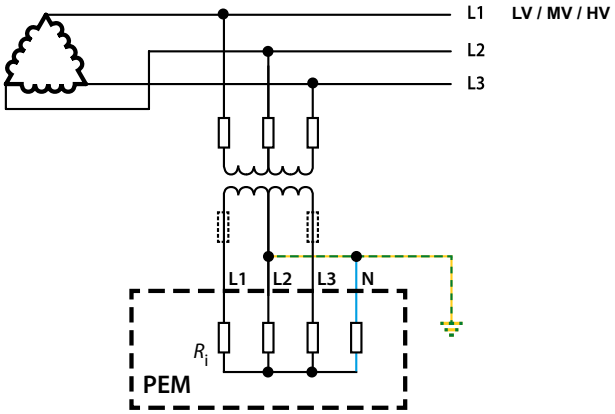
Three-phase 3-wire system

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 PEM575 can be adjusted (1…10000).



Technical data

Insulation co-ordination

Measuring circuit

Rated insulation voltage	300 V
Overvoltage category	III
Pollution degree	2

Supply circuit

Rated insulation voltage	300 V
Overvoltage category	II
Pollution degree	2

Supply voltage

Rated supply voltage U_S	AC/DC 95…415 V
Frequency range of U_S	DC, 44…440 Hz
Power consumption	≤ 11 VA

Measuring circuit

Measuring voltage inputs

$U_{L1\text{-}N,L2\text{-}N,L3\text{-}N}$	230 V 69 V (only -151, -155)
$U_{L1\text{-}L2,L2\text{-}L3,L3\text{-}L1}$	400 V 120 V (only -151, -155)
Measuring range	10… 120 % U_n
Rated frequency	45…65 Hz
Internal resistance (L-N)	> 500 kΩ

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
PEM575/PEM575-155	
I_n	5 A
Measuring current transformer ratio	1…6000
Accuracy class according with 5 A measuring current transformer	0.2
Accuracy class according with 1 A measuring current transformer	0.5
PEM575-251/PEM575-151	
I_n	1 A
Measuring current transformer ratio	1…30000
Accuracy class according with 1 A measuring current transformer	0.2

Accuracies (of measured value/of full scale value)

Phase voltage $U_{L1\text{-}N}$, $U_{L2\text{-}N}$, $U_{L3\text{-}N}$	± 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	± 0.01 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 230 V	DC 24 V	AC 110 V	DC 12 V
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

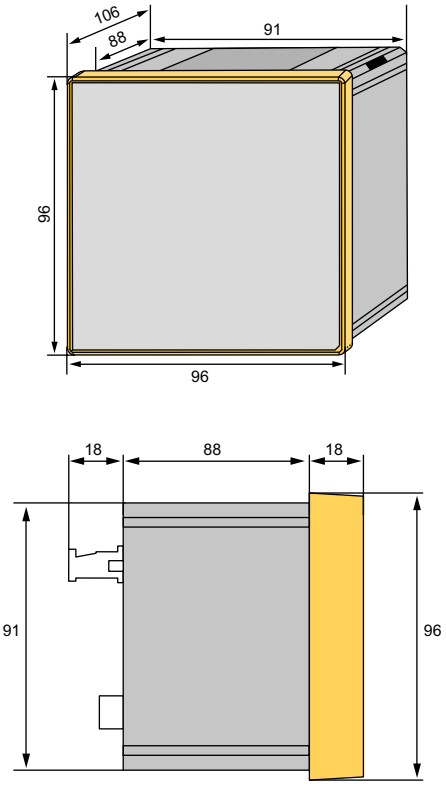
Degree of protection, installation	IP20
Degree of protection, front	IP52
Documentation number	D00016
Weight	≤ 1100 g

Ordering information

Interface	Nominal system voltage	Current input	Type	Art. No.
	3(N)AC			
RS-485/Ethernet	400/230 V	5 A	PEM575	B93100575
		1 A	PEM575-251	B93100576
	69/120 V	5 A	PEM575-155	B93100579
		1 A	PEM575-151	B93100580

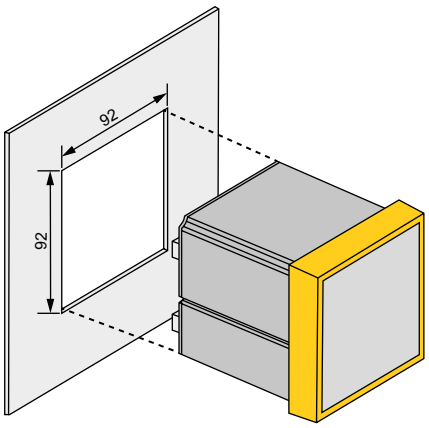
Dimension diagram

Dimensions in mm



Panel cut-out

Dimensions in mm



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