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Power Quality and Energy Measurement PEM735

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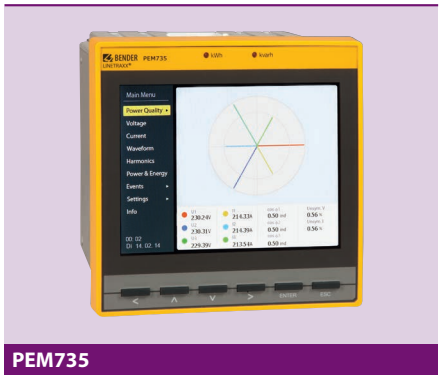


PEM735

Device features

- Class A power analyser, certified according to DIN EN 61000-4-30
- Monitoring the quality of the voltage in accordance with DIN EN 50160
- Accuracy class according to IEC 62053-22: 0.2 S
- TFT colour display (640x480) 5.7“
- Modbus RTU and Modbus TCP
- 4 current inputs
- 5 voltage inputs
- 1 GB internal memory
- Panel mounting 144x144
- Integrated web server
- Data export via FTP: comtrade, PQDIF
- Flicker measurement
- Detection and recording of transients (40 µs)
- Sampling rate: 512 samples/cycle
- Freely configurable recorders for waveform, consumption and long-term recording
- IEC 61850

Product description

The digital universal measuring device PEM735 is suited for measuring and displaying electrical quantities of electricity networks. The device measures currents and voltages, energy consumption and power, and displays the individual current/voltage harmonics for assessment of the power quality in accordance with DIN EN 50160. The accuracy of active energy measurements corresponds to class 0.2 S in accordance with 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

- Continuous monitoring of the voltage quality in accordance with DIN EN 50160
- Collection of relevant data for energy management systems
- High-resolution waveform recording allows analysis of power quality phenomena

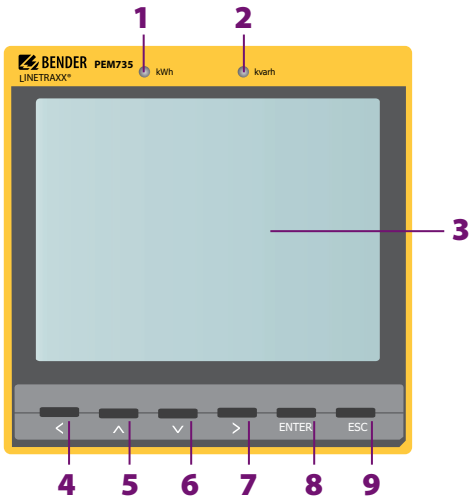
Description of function

- Sampling rate of the measuring channels: 25.6 kHz
- Calculation of the total harmonic distortion THDU/THDI: harmonics up to the 63rd harmonic
- Individual current/voltage harmonics
- Password protection
- History memory for minimum and maximum values of current, voltage, energy, power rating etc. for each month.
- Inputs and outputs:
  - 6 digital outputs, 8 digital inputs (1 kHz sampling rate)
  - 24 adjustable parameter setpoints
  - System protocol: 1024 events, setup changes, setpoint alarming, DI status changes, DO switching operations
- Communication:
  - Galvanically isolated RS-485 interface (1.200 to 19.200 bit/s)
  - Modbus RTU protocol
  - Modbus TCP (10/100 MBit/s)

Standards

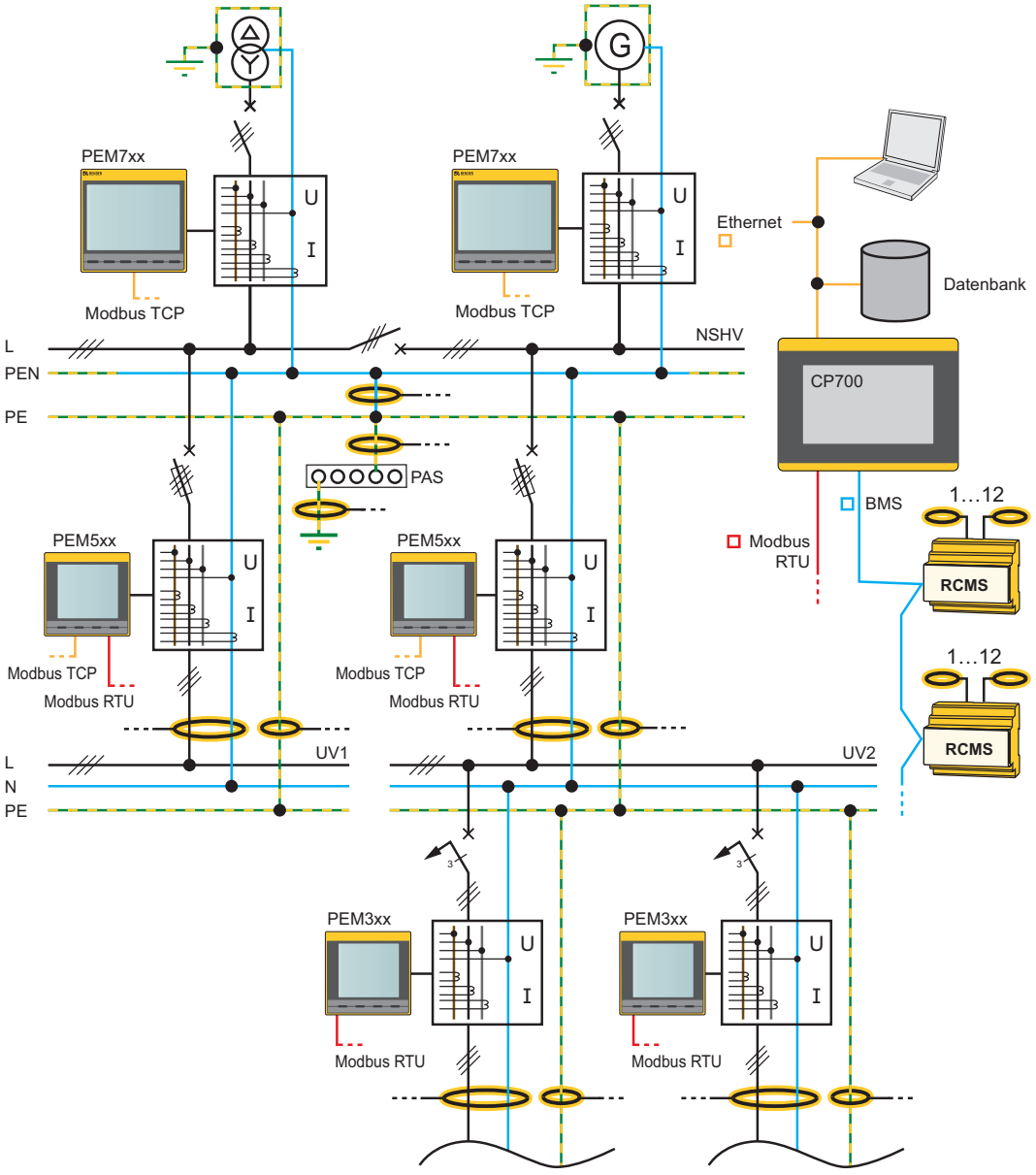
The universal measuring device for Power Quality and Energy Measurement/PEM735 was developed in accordance with the following standards: IEC 62053-22(VDE 0418 Part 3-22), DIN EN 61557-12 (VDE 0413-12), DIN EN 50160, DIN EN 61000-4-30 (VDE 0847-4-30), DIN EN 61000-4-7 (VDE 0847-4-7), DIN EN 61000-4-15 (VDE 0847-4-15)

Operating elements

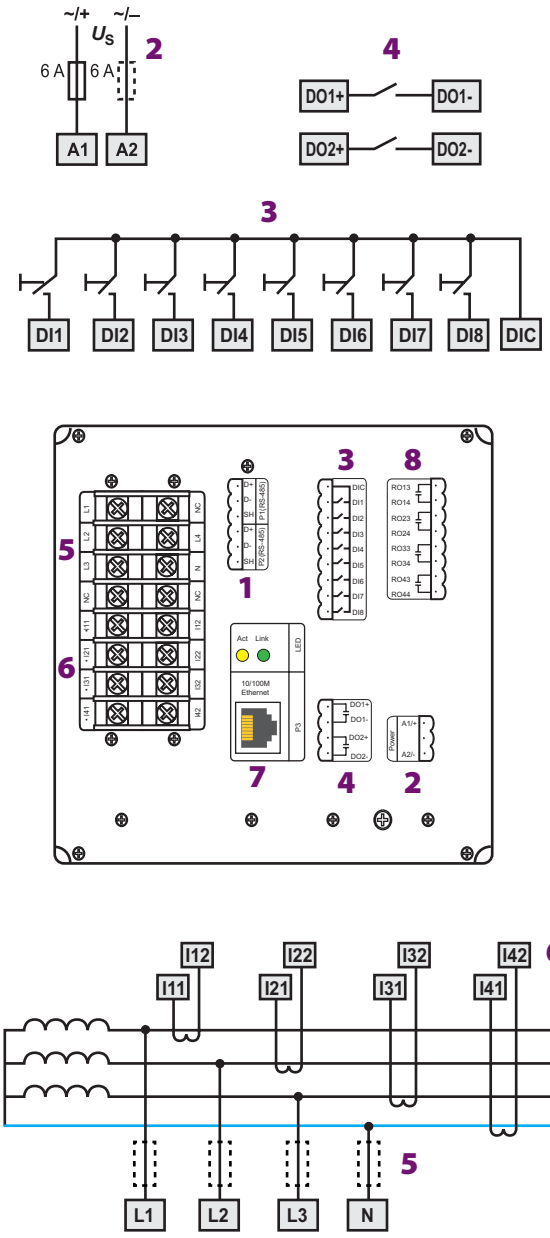


1 - Pulse LED: kWh
2 - Pulse LED: kvarh
3 - Display
4 - "<" button: Selection (in the menu)
5 - "∧" button: Up (in the menu)
6 - "∨" button: Down (in the menu)
7 - ">" button: Selection (in the menu)
8 - "ENTER" button: OK
9 - "ESC" button:

Example for system set-up



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 with appropriate fuses.

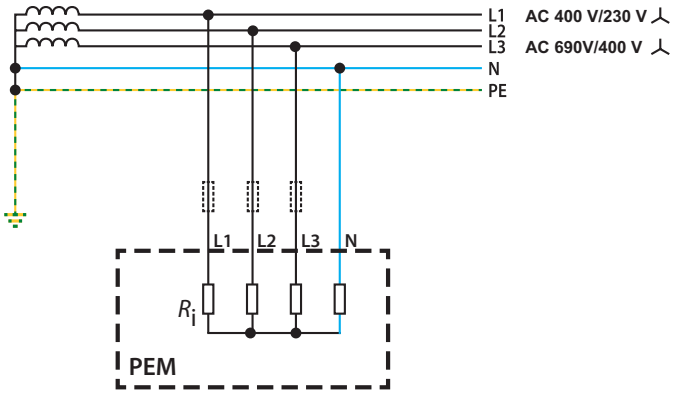
7 - Connection Ethernet

8 - Relay output

Connection diagram voltage inputs

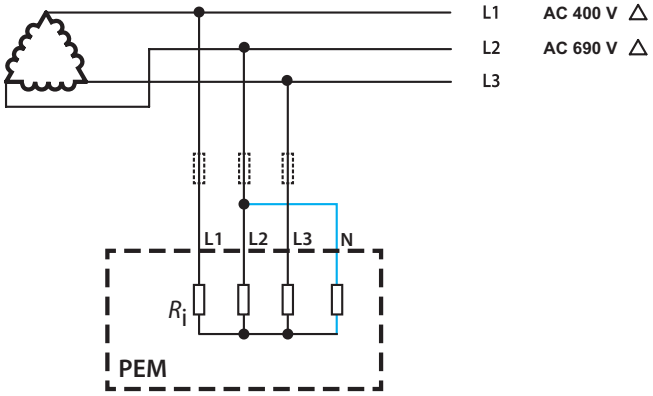
Three-phase 4-wire system (TN, TT, IT systems)

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



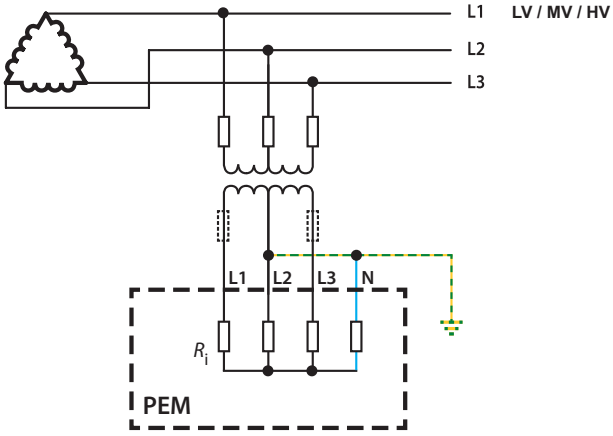
Three-phase 3-wire system

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



Connection via voltage transformers

The coupling via measuring current transformers allows the use of the measuring device in medium and high voltage systems.
The transformation ration can be adjusted in the PEM735.



Technical data

Insulation co-ordination

Measuring circuit

Rated insulation voltage	600 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	95…250 V
Frequency range of U_S	DC, 44…440 Hz
Power consumption	≤ 11 VA

Measuring circuit

Measuring voltage inputs

$U_{L1\text{-}N,L2\text{-}N,L3\text{-}N}$	400 V
$U_{L1\text{-}L2,L2\text{-}L3,L3\text{-}L1}$	690 V
Measuring range	10… 120 % U_n
Rated frequency	42…58 Hz
Internal resistance (L-N)	> 500 kΩ

Measuring current inputs

External measuring current transformer, should at least comply with accuracy class 0.2 S	
Burden	n.A., internal current transformers
Measuring range	0.1… 120 % I_N
CT transformation ratio, secondary	1…5 A
CT transformation ratio, primary	1…30000 A

Accuracies (of measured value/of full scale value)

Phase voltage $U_{L1\text{-}N}$, $U_{L2\text{-}N}$, $U_{L3\text{-}N}$	± 0.1 % of the measured value.
Current	± 0.1 % of measured value + 0.05 % of full scale value.
Frequency	± 0.005 Hz
Phase position	± 1 °
Active energy measurement acc. to	DIN EN 62053-22 (VDE 0418 Part 3-22)
R.m.s. voltage measurements acc. to	DIN EN 61557-12 (VDE 0413-12), chapter 4.7.6
R.ms. phase current measurements acc. to	DIN EN 61557-12 (VDE 0413-12), chapter 4.7.5
Frequency measurements acc. to	DIN EN 61557-12 (VDE 0413-12), chapter. 4.7.4
Measurement of the harmonics acc. to	DIN EN 61000-4-7 class A

Interface

Interface/protocol	2 x RS-485, Modbus RTU
Baud rate	1.2…19.2 kbits / s
Cable length	0…1200 m
Shielded cable ((shield connected to PE on one side)	recommended: J-Y(St)Y min. 2x0.8
Interface	Ethernet
Protocol	FTP, Modbus TCP, IEC 61850
Baud rate	100 MBit/s

Switching elements

Outputs (RO)				4 x 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				8 electrically separated digital inputs
I_{min}				2.4 mA
U_{DI}				DC 24 V
2 electronic outputs (DO)				max. 80 V
				I_{max} 50 mA

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 IEC 60721 stationary use	3M4
Height	to 4000 m

Connection

Connection	screw-type terminals

Other

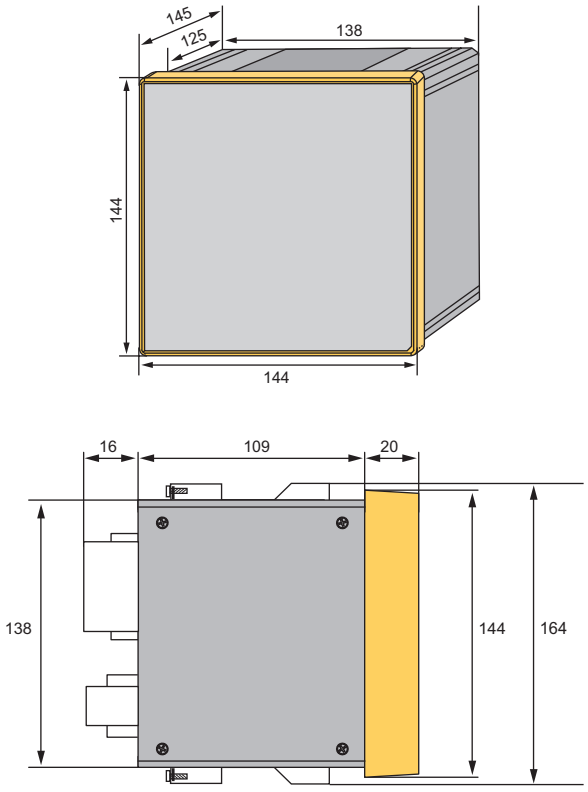
Degree of protection, installation	IP20
Degree of protection, front	IP52
Documentation number	D00084
Weight	≤ 2000 g

Ordering information

Nominal system voltage	Current input	Type	Art. No.
3(N)AC			
100…690 V	5 A	PEM735	B 9310 0735

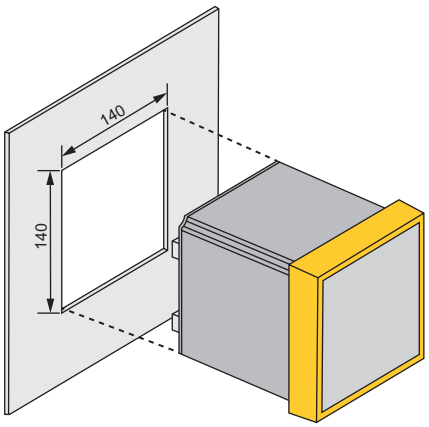
Dimension diagram

Dimensions in mm



Panel cut-out

Dimensions in mm



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