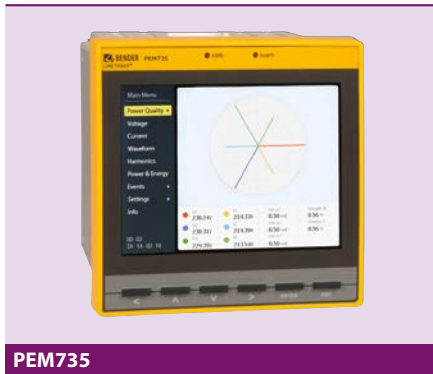
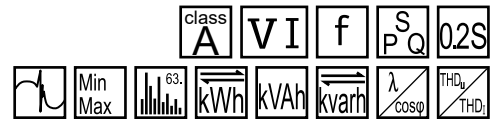


Power Quality and Energy Measurement PEM735



Power Quality and Energy Measurement

PEM735



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
- Flicker measurement
- Detection and recording of transients (40 μ s)
- Sampling rate: 512 samples/cycle
- Freely configurable recorders for waveform, consumption and long-term recording

Certifications



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

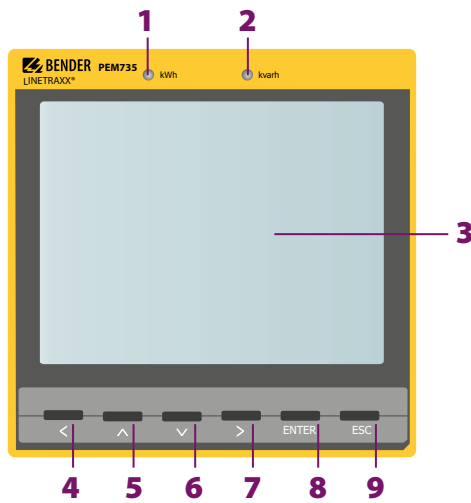
- Sampling rate of the measuring channels: 25.6 kHz
- Calculation of the total harmonic distortion THDU/THDI: harmonics up to the 63rd harmonic
- Individual current/voltage harmonics
- Password protection
- History memory for minimum and maximum values of current, voltage, energy, power rating etc. for 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 38.400 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:

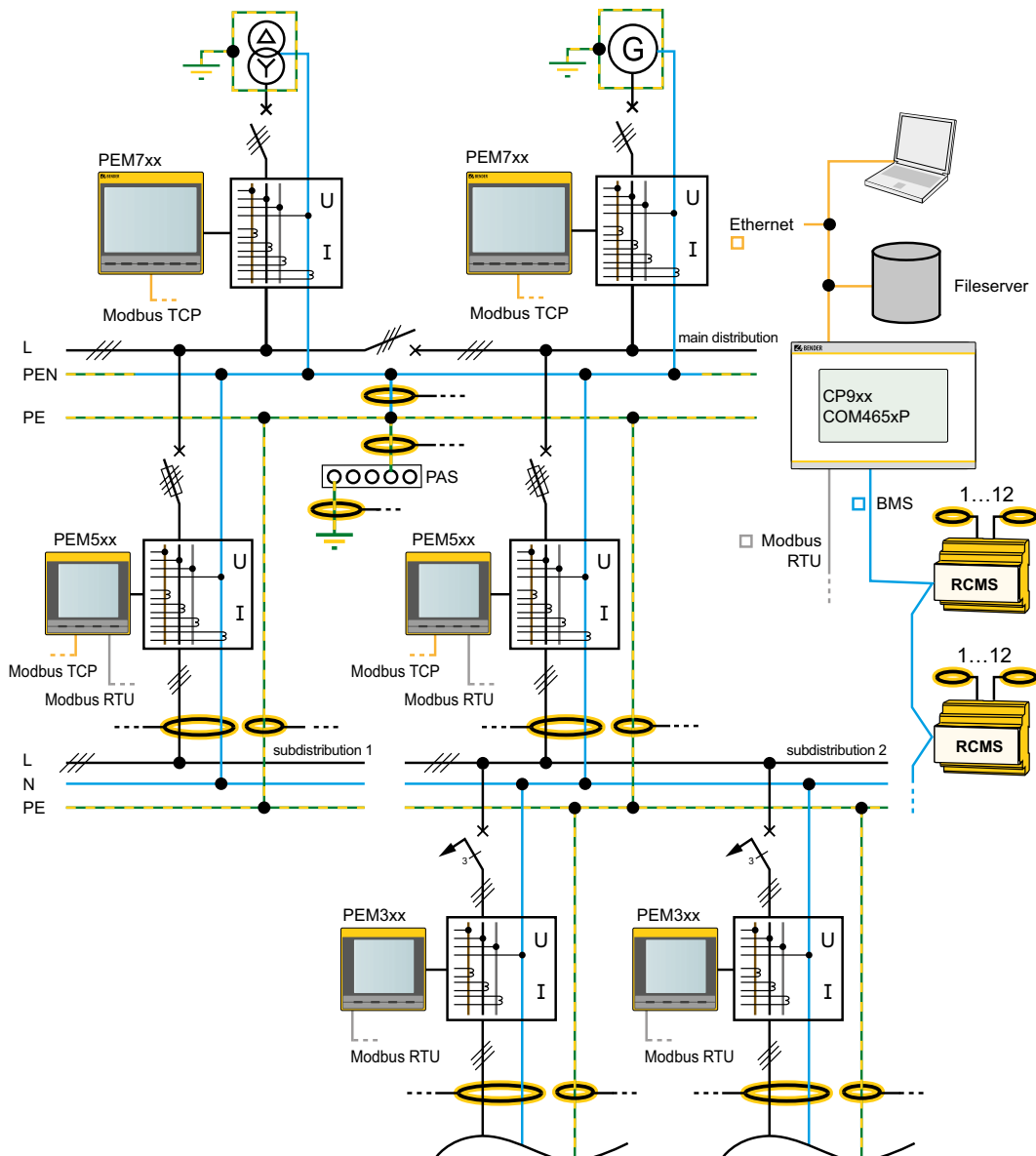
- IEC 62053-22(VDE 0418 Part 3-22)
- DIN EN 61557-12 (VDE 0413-12)
- DIN EN 50160
- DIN EN 61000-4-30 (VDE 0847-4-30)
- DIN EN 61000-4-7 (VDE 0847-4-7)
- DIN EN 61000-4-15 (VDE 0847-4-15)

Operating elements

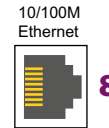
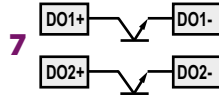
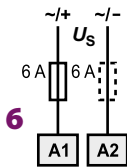
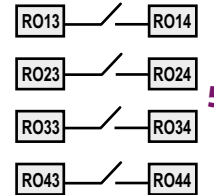
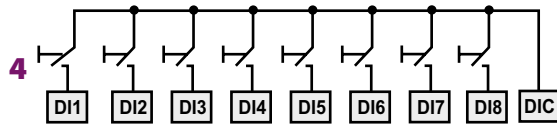
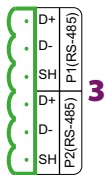
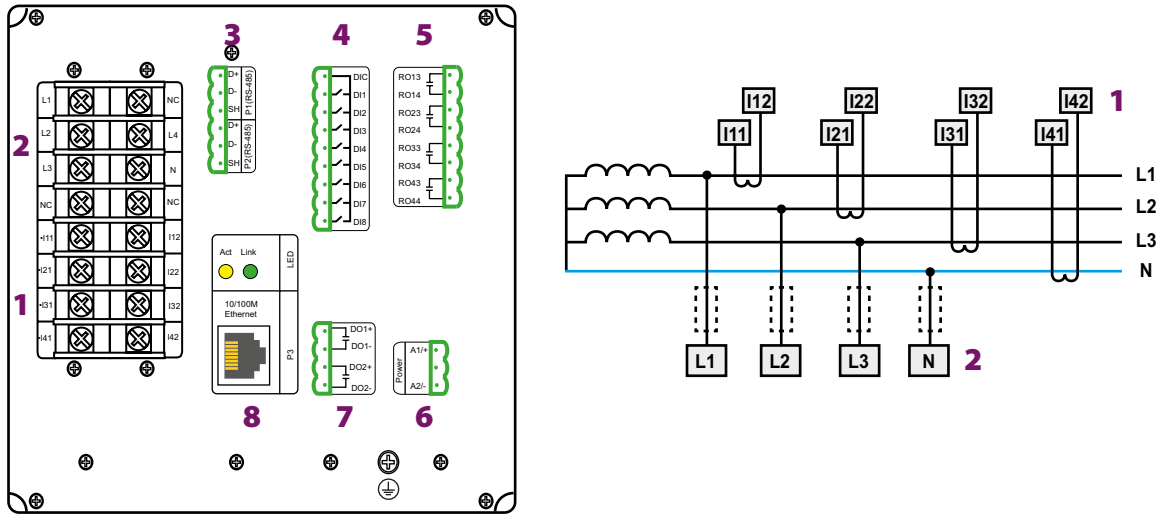


- 1 - Pulse LED: kWh
- 2 - Pulse LED: kvarh
- 3 - Display
- 4 - “<” button: Selection (in the menu)
- 5 - “^” button: Up (in the menu)
- 6 - “v” button: Down (in the menu)
- 7 - “>” button: Selection (in the menu)
- 8 - “ENTER” button: OK
- 9 - “ESC” button:

Example for system set-up



Wiring diagram

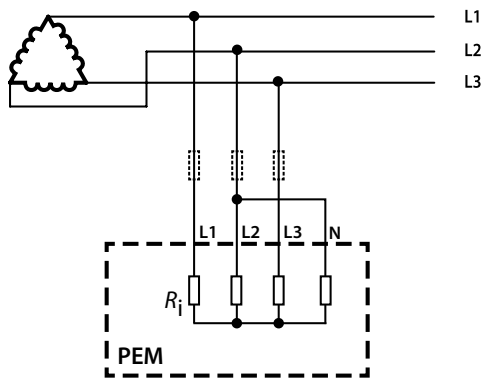


- 1 - Connection to the system to be monitored
- 2 - Measuring voltage inputs: The measuring leads should be protected with appropriate back-up fuses.
- 3 - RS-485 bus connection
- 4 - Digital inputs
- 5 - Relay outputs
- 6 - Supply voltage. Power protection by a 6 A fuse, quick response. If being supplied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

Connection diagram voltage inputs

Three-phase 3-wire system

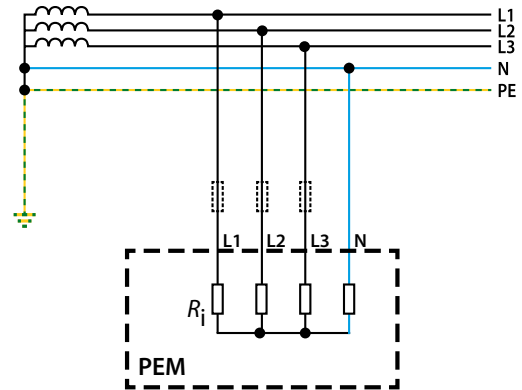
The PEM735 can be used in three-phase 3-wire systems.



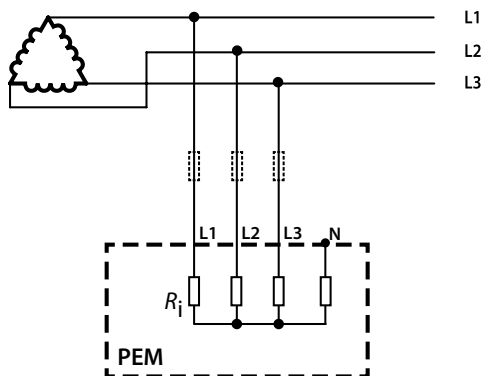
Connection diagram three-phase-3-wire system ($U_{LL} = 400\text{ V}$)

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

The PEM735 can be used in three-phase 4-wire systems, independent of the type of distribution system (TN, TT, IT system).



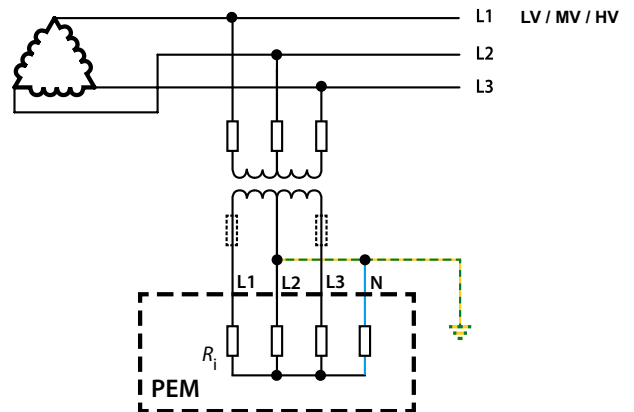
Connection diagram three-phase 4-wire system (e.g. TN-S system)



Connection diagram three-phase-3-wire system ($U_{LL} = 690\text{ V}$)

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.



Connection diagram 3-wire system via voltage transformers

Technical data

Insulation co-ordination

Measuring circuit

Rated insulation voltage	600 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	AC/DC 95...250 V
Frequency range of U_s	DC, 47...440 Hz
Power consumption	≤ 14 VA

Measuring circuit

Measuring voltage inputs

$U_{L1-N, L2-N, L3-N}$	400 V
$U_{L1-L2, L2-L3, L3-L1}$	690 V
Measuring range	10...120 % U_N
CT transformation ratio	
Primary	1...1,000,000 V
Secondary	1...690 V ($U_{L1...3}$)
Secondary	1...400 V (U_4)
Internal resistance (L-N)	> 6 M Ω

Measuring current inputs

External measuring current transformers	should at least comply with accuracy 0.2 S
Burden	–, due to internal current transformers
Measuring range	1...200 % I_n
Overload range, current	
$2 \times I_n$	permanently
$10 \times I_n$	max. 1 s

Measured values < 0.1 % of I_n are indicated as 0 A.

Transformation ratio of the measuring current transformer, secondary	1...5 A
Transformation ratio of the measuring current transformer, primary	1...30,000 A

Accuracies

Phase voltage $U_{L1-N}, U_{L2-N}, U_{L3-N}$	± 0.1 %
Current	± 0.1 %
Neutral current I_4	± 0.1 %
Frequency	± 0.005 Hz
Phasing	$\pm 1^\circ$
Reactive power	± 0.2 %
Power factor λ	± 0.5 %
$\cos \varphi$	± 0.2 %
Voltage underdeviation and overdeviation	± 0.1 %
Voltage unbalance	± 0.1 %
Current unbalance	± 0.5 %
Time accuracy of the internal RTC	< 6 ppm (< 0.5 s per day)
Measurement of the active energy 0.2 S	acc. to DIN EN 62053-22 (VDE 0418 Part 3-22)
Measurement of the voltage r.m.s. values	acc. to DIN EN 61557-12 (VDE 0413-12), chapter 4.7.6
Measurement of the phase current r.m.s. values	according to DIN EN 61557-12 (VDE 0413-12), chapter 4.7.5
Frequency measurement	according 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
Harmonic voltages and currents	IEC 61000-4-7 Class I
Flicker P_{st}	IEC 61000-4-15:2010 Class A
Flicker P_{It}	IEC 61000-4-15:2010 Class A

Interface

Interface	2 x RS-485
Protocol	Modbus RTU
Baud rate	1.2...38.4 kbit/s
Cable length	0...1200 m
Shielded cable (shield connected to SH terminal on one side)	
	recommended: J-Y(St)Y min. 2 x 0.8
Interface	Ethernet
Protocol	Modbus TCP
FTP	
Baud rate	100 Mbit/s

Switching elements

2 electronic outputs (DO)	max. 30 V
I_{max}	50 mA
4 relay outputs (RO)	4 x N/O contacts
Operating principle	N/O operation
Rated operational voltage	AC 250 V, DC 30 V
Rated operational current	3 A
Minimum contact rating	1 mA at AC/DC ≥ 10 V
Inputs	8 galv. separated digital inputs
I_{min}	2.4 mA
U_{DI}	DC 24 V

Environment/EMC

EMC	IEC 61326-1
Operating temperature	$-25...+55$ °C
Classification of climatic conditions acc. to IEC 60721 (stationary use)	3K23
Classification of mechanical conditions acc. to IEC 60721 (stationary use)	3M11

Connection

Connection	screw-type terminals
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Other

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

Ordering information

Nominal system voltage	Current input	Nominal frequency	Type ¹⁾	Art. No.
3(N)AC				
100...690 V	5 A	50 Hz	PEM735	B93100735
		60 Hz ²⁾	PEM735-465	B93100740

¹⁾ Variants: The consideration of different nominal frequencies is necessary to compliance the accuracy classes.

²⁾ Frequency: availability and delivery time on request.

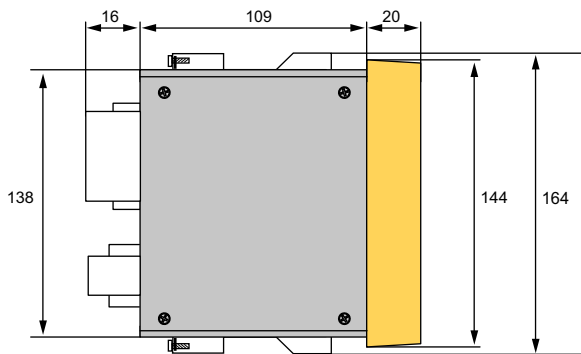
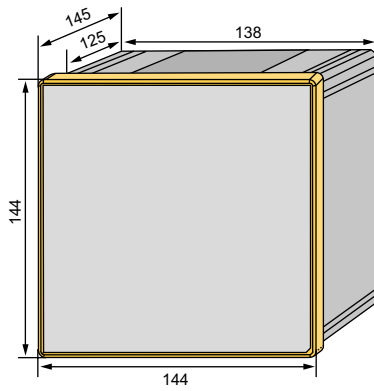
Suitable system components

Measuring current transformer					
Primary current	Accuracy	Secondary current	Type	Design	Art. No.
60	1	5	WL605 KL.1	CTB41	B98086001
		1	WL60-1 KL.1	CTB41	B98086002
75	1	5	WL755 KL.1	CTB41	B98086003
		1	WL75-1 KL.1	CTB41	B98086004
125	0.5	5	WL1255 KL.0,5	CTB41	B98086005
		1	WL125-1 KL.0,5	CTB41	B98086006
	1	5	WL125-5 KL.1	CTB41	B98086007
		1	WL125-1 KL.1	CTB41	B98086008
150	0.5	5	WL1505 KL.0,5	CTB41	B98086009
		1	WL150-1 KL.0,5	CTB41	B98086010
	1	5	WL150-5 KL.1	CTB41	B98086011
		1	WL150-1 KL.1	CTB41	B98086012
200	0.5	5	WL2005 KL.0,5	CTB41	B98086013
		1	WL200-1 KL.0,5	CTB41	B98086014
	1	5	WL200-5 KL.1	CTB41	B98086015
		1	WL200-1 KL.1	CTB41	B98086016
250	0.5	5	WL2505 KL.0,5	CTB41	B98086017
		1	WL250-1 KL.0,5	CTB41	B98086018
	1	5	WL250-5 KL.1	CTB41	B98086019
		1	WL250-1 KL.1	CTB41	B98086020
300	0.5	5	WL3005 KL.0,5	CTB41	B98086021
		1	WL300-1 KL.0,5	CTB41	B98086022
	1	5	WL300-5 KL.1	CTB41	B98086023
		1	WL300-1 KL.1	CTB41	B98086024

Measuring current transformer					
Primary current	Accuracy	Secondary current	Type	Design	Art. No.
400	0.5	1	WL400-1 KL.0,5	CTB41	B98086025
		5	WL400-5 KL.1	CTB41	B98086026
	1	5	WL400-5 KL.0,5	CTB41	B98086027
		1	WL400-1 KL.1	CTB41	B98086028
500	1	5	WL500-5 KL.1	CTB41	B98086029
		5	WL500-5 KL.0,5	CTB41	B98086031
	1	1	WL500-1 KL.1	CTB41	B98086032
		0.5	1	WL500-1 KL.0,5	CTB41
600	1	5	WL600-5 KL.1	CTB51	B98086034
		5	WL600-5 KL.0,5	CTB51	B98086035
	1	1	WL600-1 KL.1	CTB51	B98086036
		0.5	1	WL600-1 KL.0,5	CTB51
800	1	5	WL800-5 KL.1	CTB51	B98086038
		5	WL800-5 KL.0,5	CTB51	B98086039
	1	1	WL800-1 KL.1	CTB51	B98086040
		0.5	1	WL800-1 KL.0,5	CTB51
1000	1	5	WL1000-5 KL.1	CTB51	B98086042
		5	WL1000-5 KL.0,5	CTB51	B98086043
	1	1	WL1000-1 KL.1	CTB51	B98086044
		0.5	1	WL1000-1 KL.0,5	CTB51
50	3F55	1	WLS501 KL.3F55	KBR18	B98086046
100	3F55	1	WLS1001 KL.3F55	KBR18	B98086047
150	3F55	1	WLS1501 KL.3F55	KBR18	B98086048
250	3F55	1	WLS2501 KL.3F55	KBR32	B98086049
500	3F55	1	WLS5001 KL.1F55	KBR32	B98086050

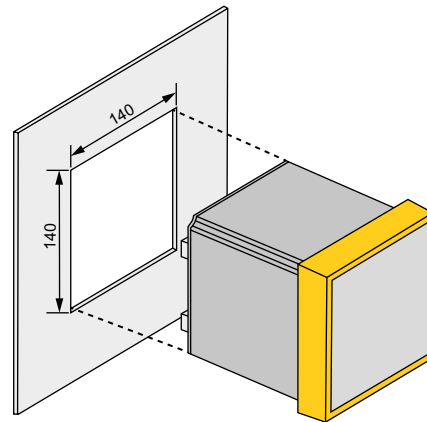
Dimension diagram

Dimensions in mm



Panel cut-out

Dimensions in mm



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