Short instructions
PEM330/PEM333

Short instructions

These short instructions do not replace the operating manual. You will find the operating manual on **www.bender-de.com**

Make sure that the personnel has read this manual and understood all instructions relating to safety.

Intended use

The digital universal measuring device PEM330/PEM333 is suitable for measuring and displaying electrical parameters of electricity networks. The device measures current, voltage, energy consumption and power as well as the total harmonic distortion for assessment of the voltage and current quality.

The accuracy of the active energy metering corresponds to class 0.5 S in compliance with the DIN EN 62053-22 (VDE 0418 Part 3-22):2003-11.

Scope of delivery

- one PEM330 or PEM333
- important safety instructions for Bender Products
- these short instructions
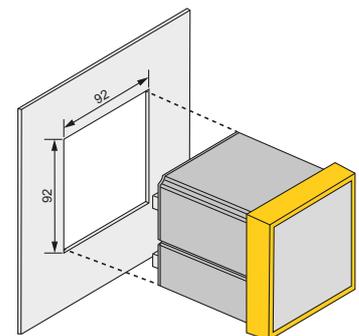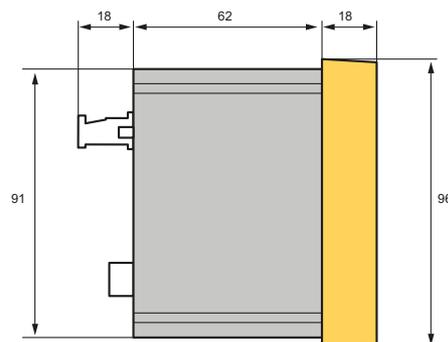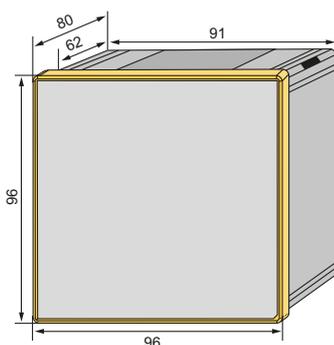- one sealing frame "IP54"

Safety instruction

⚠️ **Danger of electric shock!**
Follow the basic safety rules when working with electricity.
Consider the data on the rated voltage and supply voltage as specified in the technical data!

Installing the device

**Front panel mounting (front view, side view, panel cut-out)**

A front panel cutout of 92 mm x 92 mm is required for the device.

1. Fit the device through the cut-out in the front panel.
2. Put the 4 transparent mounting brackets from behind on the edges of the device.
3. Push the clips tightly against the panel to secure the device.
4. Check the device to ensure that it is firmly installed in the front panel.

Connection of the device

Wiring diagram
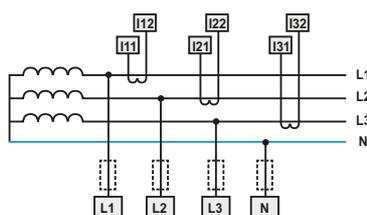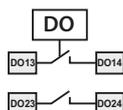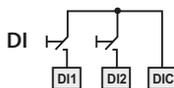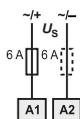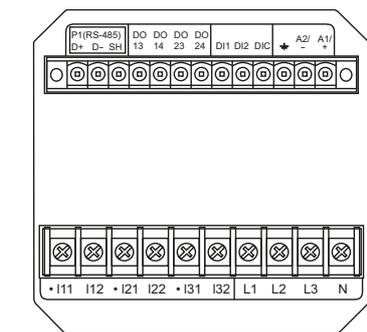
| Terminal	Description
A1, A2, ⏚	Supply voltage. Power protection by a 6 A fuse, quick response. If being supplied from an IT system, both lines have to be protected by a fuse.
DI1, DI2, DIC	Digital inputs (PEM333 only)
DO13, DO14, DO23, DO24	Digital outputs (N/O contacts) (PEM333 only)
I11, I12, I21, I22, I31, I32	Connection to the system to be monitored
D+, D-, SH	Connection RS-485 bus (PEM333 only)
L1, L2, L3, N	Measuring voltage inputs: The measuring leads should be protected with appropriate fuses.

Connection

1. The connecting terminals are located on the rear. Connect the PEM330/PEM333 to the supply voltage (terminals A1 and A2 resp. +/-). Connect terminal " ⏚ " to the protective conductor.

2. 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. Connection to the RS-485-Bus is made via the terminals D+, D- and SH. Up to 32 devices can be connected to the bus. The maximum cable length for the bus connection of all devices is 1200 m.

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).
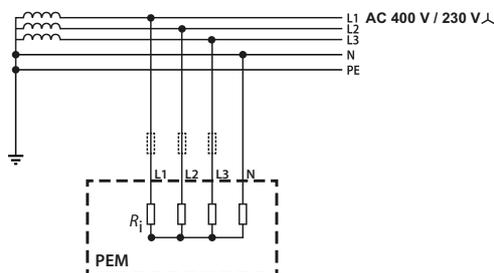
Three-phase 3-wire system

The PEM can be used in three-phase 3-wire systems.
The line-to-line voltage must not exceed AC 400 V.

🛈 *For usage in three-wire systems, the connection type (**TYPE**) has to be set to delta (**DELTA**).*
*For this purpose, the measurement inputs **L2 and N are to be bridged**.*
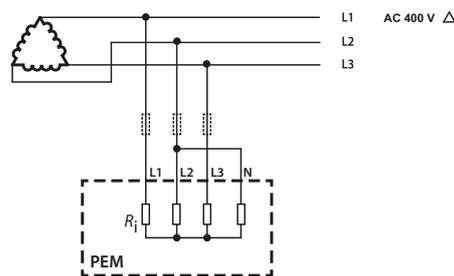
Connection via voltage transformers

The coupling via measuring voltage transformers allows the use of a measuring device in medium and high voltage systems. The transformation ratio in PEM330/PEM333 can be adjusted (1…2200).

Commissioning

Check proper connection
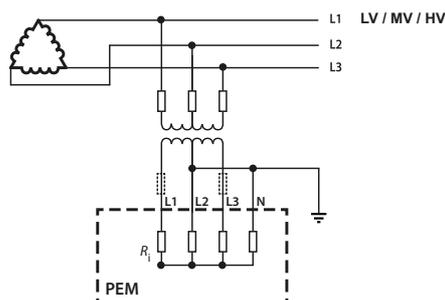During installation and connection, abide by the relevant standards and regulations and follow the operating manuals for the device.

Before switching on

1. Before switching on think carefully about these questions:
2. Does the connected supply voltage US correspond to the nameplates information?
3. Is the nominal system voltage of the measuring current transformer not exceeded?
4. Does the measuring current transformer's maximum current correspond to the nameplate information of the connected device?

Switching on
After switching on, proceed as follows:

1. Connect the supply voltage.
2. Set the bus address/IP address.
3. Set the CT transformer ratio (for each channel).
4. Change the measuring current transformer's counting direction, if required.
5. Set the nominal voltage.
6. Select wye connection or delta connection.

Getting to know the operating elements

Legend
LED "**kWh**" and LED "**kvarh**": Pulse output
"SYSTEM" button: Display mean value and total value (current, voltage); **in the menu**: in case of numerical values: move the cursor one position to the left
"**PHASE**" button: Display line-conductor related measured quantities; **in the menu**: go up one entry;in case of numerical values: increasing the value
"**ENERGY**" button: Display measured values: Active and reactive energy import/active and reactive energy export (line 4); **in the menu**: move down one entry; in case of numerical values: reduce the value
"**SETUP**" button: Press > 3 s: switching between setup menu and standard display; **in the menu**: selection of the parameter to be edited; confirm entry

Data display

"SYSTEM" button

Column left	Column right	First line	Second line	Third line
	A W PF	Ø I	P_{ges}	Power factor λ
LL	V kvar Hz	Ø U_{LL}	Q_{ges}	F
	kW kvar kVA	P_{ges}	Q_{ges}	S_{ges}
Ln	V A kW	Wye connection: Ø U_{LN} Delta connection: Ø U_{LL}	Ø I	P_{ges}
I 4	A	I4		
U I	% %	Unbalance U	Unbalance I	
D M D	A A A	Demand I_1	Demand I_2	Demand I_3
D M D	kW kvar kVA	Demand P	Demand Q	Demand S

Button "ENERGY"

Parameters in the fourth line:

Column left	Column right	Value
	kWh	Active energy import
--	kWh	Active energy export
	kvarh	Reactive energy import
--	kvarh	Reactive energy export
S		Apparent energy

"PHASE" button

Column left	Column right	First line	Second line	Third line
	A A A	$I1$	$I2$	$I3$
Ln Ln Ln	V V V	$U_{L1}{}^*$	$U_{L2}{}^*$	$U_{L3}{}^*$
LL LL LL	V V V	U_{L1L2}	U_{L2L3}	U_{L3L1}
	kW kW kW	$P_{L1}{}^*$	$P_{L2}{}^*$	$P_{L3}{}^*$
	var var var	$Q_{L1}{}^*$	$Q_{L2}{}^*$	$Q_{L3}{}^*$
	kVA kVA kVA	$S_{L1}{}^*$	$S_{L2}{}^*$	$S_{L3}{}^*$
	PF PF PF	$\lambda_{L1}{}^*$	$\lambda_{L2}{}^*$	$\lambda_{L3}{}^*$
D P F	PF PF PF	Displacement factor $\cos(\varphi)_{L1}{}^*$	Displacement factor $\cos(\varphi)_{L2}{}^*$	Displacement factor $\cos(\varphi)_{L3}{}^*$
U t	% % %	THD U_{L1}	THD U_{L2}	THD U_{L3}
I t	% % %	THD I_1	THD I_2	THD I_3
K F		k-factor I_1	k-factor I_2	k-factor I_3
U ∠		Phase angle U_{L1}	Phase angle U_{L2}	Phase angle U_{L3}
I ∠		Phase angle I_1	Phase angle I_2	Phase angle I_3

Note:
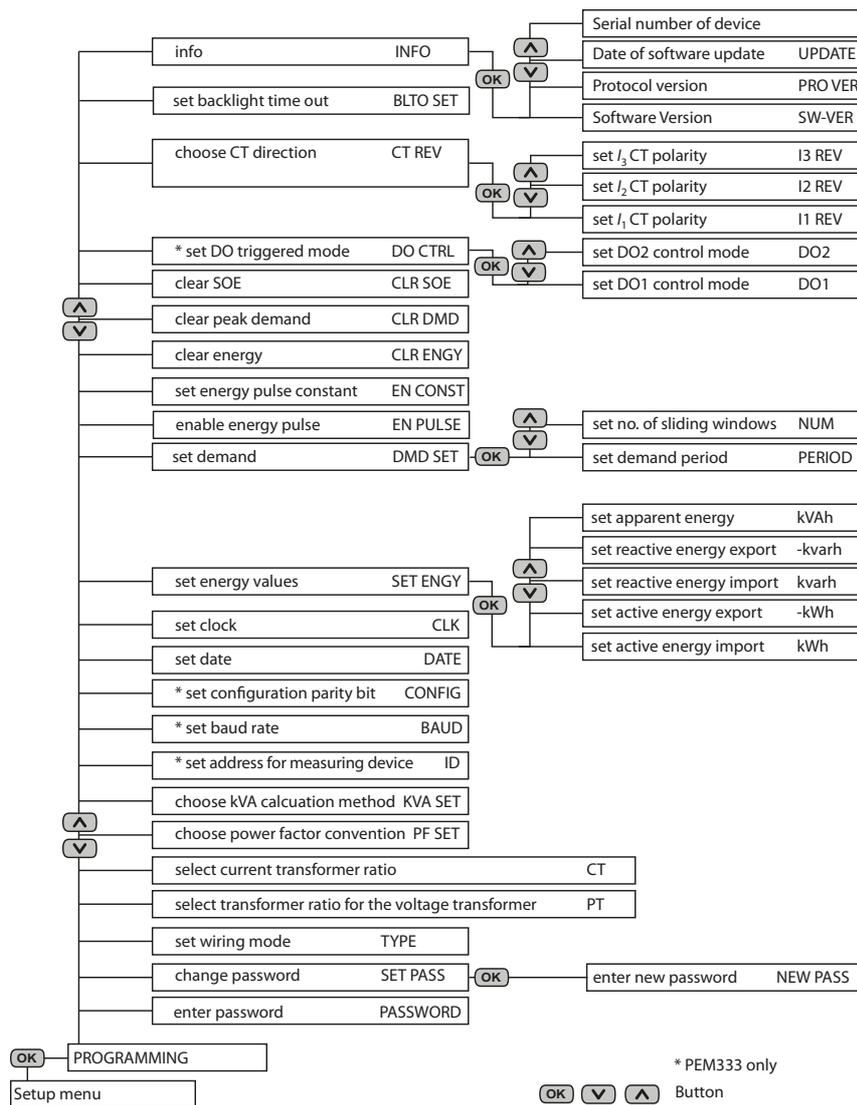* In "delta connection" mode the display shows "– ".

"SETUP" button
Press the "SETUP" button for more than 3 s to access the setup mode.
Press the "SETUP" button again to return to the default display screen.

> ℹ To be able to change parameters, you must first enter the password. (factory setting: 0)

The following diagram will help you to familiarise yourself with the menu:

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