Power Quality and Energy Measurement
PEM555
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PEM555

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 THDU/THDI: 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

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<td>Modbus TCP</td>
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<td>Digital inputs</td>
<td>6</td>
</tr>
<tr>
<td>Digital outputs</td>
<td>3</td>
</tr>
<tr>
<td>Sampling rate</td>
<td>6.4 kHz</td>
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<tr>
<td>THD calculation and harmonics</td>
<td>31</td>
</tr>
<tr>
<td>On-board memory</td>
<td>2 MB</td>
</tr>
<tr>
<td>Detection of transients</td>
<td>■</td>
</tr>
</tbody>
</table>
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
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).

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
- 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: $\leq 11$ 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$\Omega$

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 % $I_n$

**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
- Rated operational current: 5 A, 6 A
- Minimum contact rating: 1 mA at AC/DC $\leq 10$ 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: 3K5
- Stationary use: 3M4
- Classification of mechanical conditions acc. to DIN EN 60721: 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: $\leq 1100$ g

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Accuracy (of measured value/of full scale value)
- Phase voltage $U_{L1-N}, U_{L2-N}, U_{L3-N}$: $\pm 0.2$ % of measured value.
- Current: $\pm 0.2$ % of measured value + 0.05 % of full scale value.
- Neutral current $I_0$: 0.5 % of full scale value.
- Frequency: $\pm 0.02$ Hz.
- Phase position: $\pm 1$ °
- 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 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
**Ordering information**

<table>
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<tr>
<th>Interface</th>
<th>Nominal system voltage</th>
<th>Current input</th>
<th>Type</th>
<th>Art. No.</th>
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<tr>
<td>3(N)AC</td>
<td></td>
<td>5 A</td>
<td>PEM555</td>
<td>B 9310 0555</td>
</tr>
<tr>
<td></td>
<td>400/230 V</td>
<td>1 A</td>
<td>PEM555-251</td>
<td>B 9310 0556</td>
</tr>
<tr>
<td>RS-485/Ethernet</td>
<td></td>
<td>5 A</td>
<td>PEM555-455</td>
<td>B 9310 0557</td>
</tr>
<tr>
<td></td>
<td>690/400 V</td>
<td>1 A</td>
<td>PEM555-451</td>
<td>B 9310 0558</td>
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<tr>
<td><strong>Panel cut-out</strong></td>
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<tr>
<td>Dimensions in mm</td>
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**Dimension diagram**
Dimensions in mm

**Panel cut-out**
Dimensions in mm