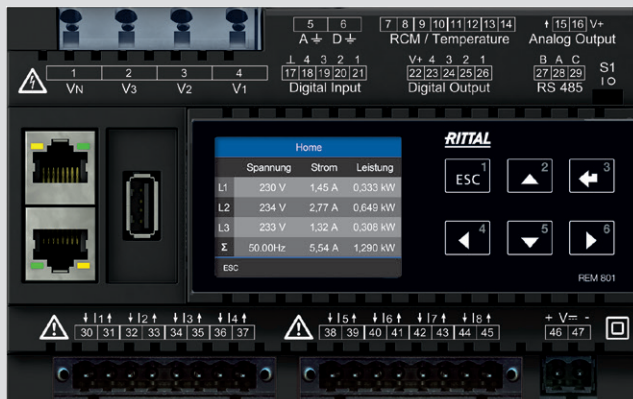




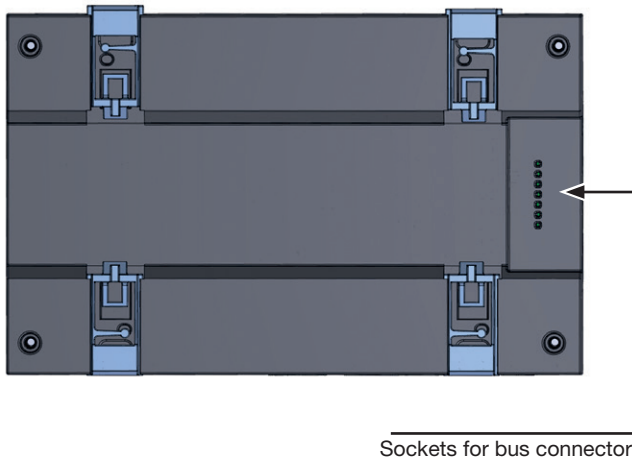
# Power Analyser REM 801

## Data sheet

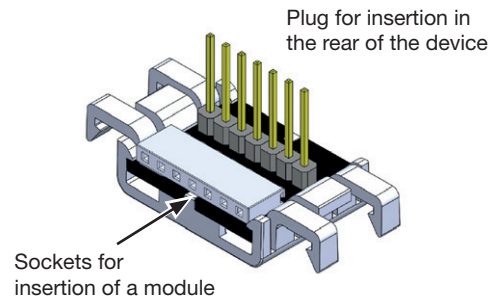
# DEVICE VIEWS

- The figures serve as illustrations and are not true to scale.
- Specifications in mm (in).

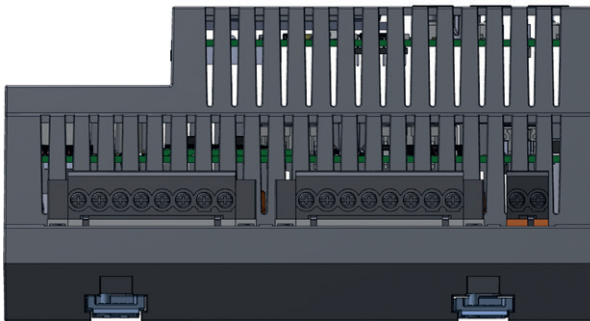
Rear view



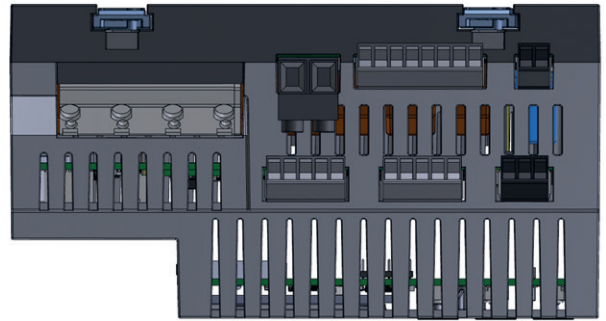
Bus connector



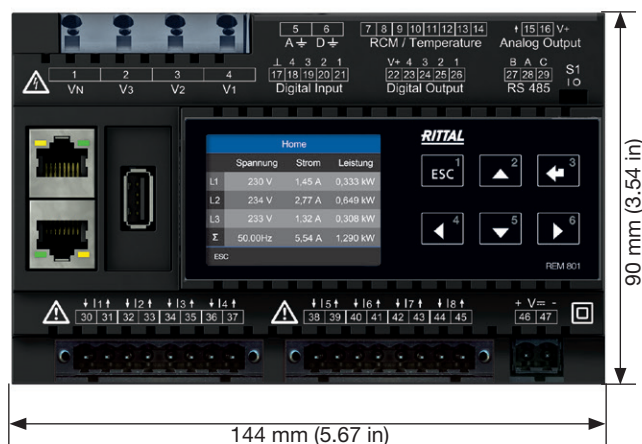
View from below



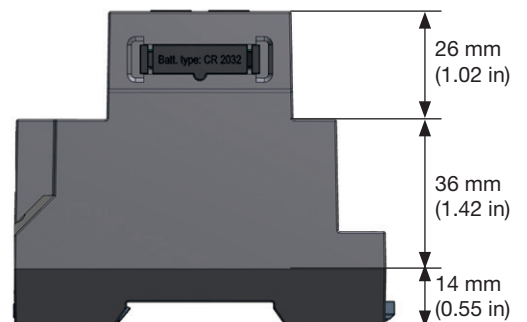
View from above



Front view



View from the left



# TECHNICAL DATA

| General                                                      |                                                                                                                             |
|--------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Net weight                                                   | 420 g (0.93 lb)                                                                                                             |
| Device dimensions                                            | Approx. B = 144 mm (5.67 in), H = 90 mm (3.54 in),<br>D = 76 mm (2.99 in)                                                   |
| Width of the device in horizontal pitches                    | 8 HP (1 HP = 18 mm)                                                                                                         |
| Battery                                                      | Type: Lithium CR2032, 3 V (UL1642 approval)                                                                                 |
| Integrated memory                                            | 4 GB                                                                                                                        |
| Backlight service life                                       | 40000 h (50% of the start brightness)                                                                                       |
| Mounting orientation                                         | As desired                                                                                                                  |
| Fastening/mounting -<br>Suitable DIN rails - 35 mm (1.38 in) | <ul style="list-style-type: none"> <li>TS 35/7.5 according to EN 60715</li> <li>TS 35/10</li> <li>TS 35/15 x 1.5</li> </ul> |
| Impact resistance                                            | IK07 according to IEC 62262                                                                                                 |

| Transport and storage                                                                            |                                               |
|--------------------------------------------------------------------------------------------------|-----------------------------------------------|
| The following specifications apply for devices transported and stored in the original packaging. |                                               |
| Free fall                                                                                        | 1 m (39.37 in)                                |
| Temperature                                                                                      | -25° C (-13 °F) to +70° C (158 °F)            |
| Relative humidity                                                                                | 5 to 95% RH at 25 °C (77 °F), no condensation |

| Environmental conditions during operation                                                                                                                                                                                                                                                              |                                            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
| The device <ul style="list-style-type: none"> <li>Is for weather-protected and stationary use.</li> <li>Fulfills operating conditions according to DIN IEC 60721-3-3.</li> <li>Has protection class II according to IEC 60536 (VDE 0106, part 1), a ground wire connection is not required!</li> </ul> |                                            |
| Rated temperature range                                                                                                                                                                                                                                                                                | -10 °C (14 °F) to +55 °C (131 °F)          |
| Relative humidity                                                                                                                                                                                                                                                                                      | 5 to 95% at 25 °C (77 °F), no condensation |
| Operating elevation/overvoltage category                                                                                                                                                                                                                                                               | 2000 m (6562 ft) above sea level           |
|                                                                                                                                                                                                                                                                                                        | 4000 m (6562 ft) above sea level           |
| Pollution degree                                                                                                                                                                                                                                                                                       | 2                                          |
| Ventilation                                                                                                                                                                                                                                                                                            | No forced ventilation required.            |
| Protection against foreign matter and water                                                                                                                                                                                                                                                            | IP20 according to EN60529                  |

| Supply voltage                                                   |                                                |
|------------------------------------------------------------------|------------------------------------------------|
| Nominal range                                                    | DC: 24 V, PELV                                 |
| Operating range                                                  | +/-10% of nominal range                        |
| Power consumption                                                | max. 4 W                                       |
| Maximum power consumption with modules                           | 14 W<br>(REM 801: 4 W plus modules: max. 10 W) |
| Recommended overcurrent<br>protective device for line protection | 2-6 A, (Char. B), IEC/UL approval              |

| Voltage measurement                                                  |                                                                                                                                           |
|----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Three-phase 4-conductor systems with rated voltages up to            | 480 V <sub>LN</sub> / 830 V <sub>LL</sub> (+/-10%) according to IEC<br>347 V <sub>LN</sub> / 600 V <sub>LL</sub> (+/-10%) according to UL |
| 3-phase 3-conductor systems (grounded) with rated voltages up to     | 830 V <sub>L-L</sub> (+/-10%) according to IEC<br>600 V <sub>L-L</sub> (+/-10%) according to UL                                           |
| 3-phase 3-conductor systems (non-grounded) with rated voltages up to | 690 V <sub>L-L</sub> (+/-10%) according to IEC<br>600 V <sub>L-L</sub> (+/-10%) according to UL                                           |
| Overvoltage category up to 2000 m                                    | · 1000 V CAT III according to IEC<br>· 600 V CAT III according to UL<br>· 600 V CAT IV according to IEC                                   |
| Overvoltage category up to 4000 m                                    | · 600 V CAT III according to IEC                                                                                                          |
| Rated surge voltage                                                  | 8 kV                                                                                                                                      |
| Protection of the voltage measurement                                | 1 - 10 A tripping characteristic B (with IEC/UL approval)                                                                                 |
| Measuring range L-N                                                  | 0 <sup>1)</sup> .. 720 V <sub>eff</sub> (max. overvoltage 1000 V <sub>eff</sub> )                                                         |
| Measuring range L-L                                                  | 0 <sup>1)</sup> .. 1000 V <sub>eff</sub> (max. overvoltage 1000 V <sub>eff</sub> )                                                        |
| Measuring range N-PE                                                 | up to 100 V                                                                                                                               |
| Resolution                                                           | 16 bit                                                                                                                                    |
| Crest factor                                                         | 1.6 (referred to measuring range 600 V L-N)                                                                                               |
| Impedance                                                            | 4 MΩ/phase                                                                                                                                |
| Power consumption                                                    | approx. 0.1 VA                                                                                                                            |
| Sampling frequency                                                   | 51.2 kHz                                                                                                                                  |
| Frequency of fundamental oscillation<br>- Resolution                 | 40 Hz .. 70 Hz<br>0.01 Hz                                                                                                                 |
| Harmonics                                                            | 1 .. 127.                                                                                                                                 |

1) ... The device only measures if at least one voltage measurement input has an L-N voltage of > 10 V<sub>eff</sub> or an L-L voltage of > 18 V<sub>eff</sub> present.

| Current measurement (../1 A) (../5 A)      |                                                                  |
|--------------------------------------------|------------------------------------------------------------------|
| Nominal current                            | 5 A                                                              |
| Channels                                   | 8<br>· 2 systems - L1, L2, L3, N (optional)<br>· Single channels |
| Measuring range                            | 0.005 .. 6 A <sub>eff</sub>                                      |
| Crest factor (relative to nominal current) | 1.98                                                             |
| Overload for 1 s                           | 120 A (sinusoidal)                                               |
| Resolution                                 | 0.1 mA (color graphic display 0.01 A)                            |
| Overvoltage category                       | 300 V CATII                                                      |
| Rated surge voltage                        | 2.5 kV                                                           |
| Power consumption                          | approx. 0.2 VA (R <sub>i</sub> = 5 mΩ)                           |
| Sampling frequency                         | 25.6 kHz                                                         |
| Harmonics                                  | 1 .. 63rd                                                        |

The device has, optionally, 4 multifunction channels, for use as

- Residual current measurement inputs and/or temperature measurement inputs (mixed),
- Additional system inputs (L1, L2, L3; N)

| Residual current measurement (RCM) |                                                                                           |
|------------------------------------|-------------------------------------------------------------------------------------------|
| Nominal current                    | 30 mA <sub>eff</sub>                                                                      |
| Measuring range                    | 0 .. 40 mA <sub>eff</sub>                                                                 |
| Operating current                  | 50 µA                                                                                     |
| Resolution                         | 1 µA (color graphic display 0.01 A)                                                       |
| Crest factor                       | 1.414 (relative to 40 mA)                                                                 |
| Load                               | 4 Ω                                                                                       |
| Overload for 20 ms                 | 50 A                                                                                      |
| Overload for 1 s                   | 5 A                                                                                       |
| Permanent overload                 | 1 A                                                                                       |
| Norm                               | IEC/TR 60755 (2008-01), Type A, Type B and B+<br>(via corresponding current transformers) |

| Temperature measurement           |                                                                             |                                             |                  |                         |
|-----------------------------------|-----------------------------------------------------------------------------|---------------------------------------------|------------------|-------------------------|
| Update time                       | 1 s                                                                         |                                             |                  |                         |
| Total load (sensor and cable)     | max. 4 kΩ                                                                   |                                             |                  |                         |
| Cable                             | Up to 30 m (32.81 yd) not shielded<br>Greater than 30 m (32.81 yd) shielded |                                             |                  |                         |
| Suitable temperature sensor types | KTY83, KTY84, PT100, PT1000                                                 |                                             |                  |                         |
| Measuring accuracy                | Temperature sensor type                                                     | Temp. range                                 | Resistance range | Measurement uncertainty |
|                                   | KTY83                                                                       | -55 °C ... +175 °C<br>(-67 °F ... +347 °F)  | 500 Ω ... 2.6 kΩ | ±1.5% rng               |
|                                   | KTY84                                                                       | -40 °C ... +300 °C<br>(-40 °F ... +572 °F)  | 350 Ω ... 2.6 kΩ | ±1.5% rng               |
|                                   | PT100                                                                       | -99 °C ... +500 °C<br>(-146 °F ... +932 °F) | 60 Ω ... 180 Ω   | ±1.5% rng               |
|                                   | PT1000                                                                      | -99 °C ... +500 °C<br>(-146 °F ... +932 °F) | 600 Ω ... 1.8 kΩ | ±1.5% rng               |

| Digital inputs                                                 |                                       |
|----------------------------------------------------------------|---------------------------------------|
| 4 digital inputs, solid state relays, not short-circuit proof. |                                       |
| Maximum counter frequency                                      | 20 Hz                                 |
| Input signal applied                                           | 18 .. 28 V DC (typically 4 mA)        |
| Input signal not applied                                       | 0 .. 5 V DC, current less than 0.5 mA |

| Digital outputs                                                 |                              |
|-----------------------------------------------------------------|------------------------------|
| 4 digital outputs, solid state relays, not short-circuit proof. |                              |
| Switching voltage                                               | Max. 60 V DC                 |
| Switching current                                               | max. 50 mA <sub>eff</sub> DC |
| Response time                                                   | approx. 500 ms               |
| Digital output (energy pulses)                                  | max. 20 Hz                   |

| Cable length (digital inputs/outputs) |            |
|---------------------------------------|------------|
| Up to 30 m (32.81 yd)                 | Unshielded |
| Greater than 30 m (32.81 yd)          | Shielded   |

| Analog outputs<br>1 channel |                   |
|-----------------------------|-------------------|
| External supply             | max. 33 V DC      |
| Current                     | 0/4...20 mA DC    |
| Update time                 | 0.2 s             |
| Load                        | max. 300 $\Omega$ |
| Resolution                  | 10 bit            |

| RS-485 interface<br>3-conductor connection with A, B, GND |                                                          |
|-----------------------------------------------------------|----------------------------------------------------------|
| Protocol                                                  | Modbus RTU/Server (formerly slave)<br>Modbus RTU/Gateway |
| Transmission rate                                         | 9.6 kbps, 19.2 kbps, 38.4 kbps, 57.6 kbps, 115.2 kbps    |
| Termination                                               | DIP switches                                             |

| Ethernet interfaces                                  |                                                                                                                                                                                                            |
|------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connection                                           | 2 x RJ45 (can be used separately)                                                                                                                                                                          |
| Function                                             | Modbus gateway                                                                                                                                                                                             |
| Time synchronization                                 | NTP                                                                                                                                                                                                        |
| Protocols, services                                  | Ports                                                                                                                                                                                                      |
| Modbus/TCP - Modbus/UDP                              | 502 (UDP / TCP), modifiable                                                                                                                                                                                |
| DNS (client)                                         | 53 (UDP)                                                                                                                                                                                                   |
| DHCP (client)                                        | 67 / 68 (UDP)                                                                                                                                                                                              |
| HTTP                                                 | 80 (TCP)                                                                                                                                                                                                   |
| NTP                                                  | 123 (UDP)                                                                                                                                                                                                  |
| SFTP                                                 | 22 (TCP)                                                                                                                                                                                                   |
| OPC-UA (binary)                                      | 4840 (TCP)                                                                                                                                                                                                 |
| Device identification (since version 1.3.0)          | 1111 (UDP)                                                                                                                                                                                                 |
| Error message for events and transients according to | <ul style="list-style-type: none"> <li>· PQDIF (IEEE 1159.3-2019) - file format: pqd.</li> <li>· COMTRADE (IEC 60255-24 Edition 2.0 2013-04 and IEEE Std C37.111-2013) - file format: dat, cfg.</li> </ul> |

| <b>Connection capacity of the terminals - supply voltage</b>           |                                                                                                                                                                                                     |
|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connectible conductors. Only connect one conductor per terminal point! |                                                                                                                                                                                                     |
| Single core, multi-core, fine-stranded                                 | 0.2 - 2.5 mm <sup>2</sup> , AWG 26-12                                                                                                                                                               |
| Wire ferrules (non-insulated)<br>- Recommended strip length            | 0.2 - 2.5 mm <sup>2</sup> , AWG 26-12<br>- 10 mm (0.39 in)                                                                                                                                          |
| Wire ferrules (insulated) *<br>- Recommended strip length **           | 0.2 - 2.5 mm <sup>2</sup> , AWG 26-12<br>- 12 mm ( $\leq 1.5$ mm <sup>2</sup> ), 10 mm ( $> 1.5$ mm <sup>2</sup> ) /<br>0.47 in ( $\leq 1.5$ mm <sup>2</sup> ), 0.39 in ( $> 1.5$ mm <sup>2</sup> ) |
| Wire ferrules: Contact sleeve length **                                | 8 - 12 mm (0.31 - 0.47 in)                                                                                                                                                                          |

\* ... Applies to wire ferrules with a maximum plastic collar outer diameter of up to 4.5 mm (0.18 in).

\*\*.. Depending on the type of wire ferrules used (wire ferrules manufacturer).

| <b>Connection capacity of the terminals - Current measurement</b>      |                                                                                                                                                                                                     |
|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connectible conductors. Only connect one conductor per terminal point! |                                                                                                                                                                                                     |
| Single core, multi-core, fine-stranded                                 | 0.2 - 2.5 mm <sup>2</sup> , AWG 26-12                                                                                                                                                               |
| Wire ferrules (non-insulated)<br>- Recommended strip length            | 0.2 - 2.5 mm <sup>2</sup> , AWG 26-12<br>- 10 mm (0.39 in)                                                                                                                                          |
| Wire ferrules (insulated) *<br>- Recommended strip length **           | 0.2 - 2.5 mm <sup>2</sup> , AWG 26-12<br>- 12 mm ( $\leq 1.5$ mm <sup>2</sup> ), 10 mm ( $> 1.5$ mm <sup>2</sup> ) /<br>0.47 in ( $\leq 1.5$ mm <sup>2</sup> ), 0.39 in ( $> 1.5$ mm <sup>2</sup> ) |
| Screw flange tightening torque                                         | 0.2 Nm (1.77 lbf in)                                                                                                                                                                                |
| Wire ferrules: Contact sleeve length **                                | 8 - 12 mm (0.31 - 0.47 in)                                                                                                                                                                          |

\* ... Applies to wire ferrules with a maximum plastic collar outer diameter of up to 4.5 mm (0.18 in).

\*\*.. Depending on the type of wire ferrules used (wire ferrules manufacturer).

| <b>Connection capacity of the terminals - voltage measurement</b>      |                                        |
|------------------------------------------------------------------------|----------------------------------------|
| Connectible conductors. Only connect one conductor per terminal point! |                                        |
| Single core, multi-core, fine-stranded                                 | 0.08 - 4 mm <sup>2</sup> , AWG 28-12   |
| Wire ferrules (insulated/non-insulated)                                | 0.25 - 2.5 mm <sup>2</sup> , AWG 24-14 |
| Strip length                                                           | 8 - 9 mm (0.31 - 0.35 in)              |

| <b>Connection capacity of the terminals - functional earth A/D</b>     |                                       |
|------------------------------------------------------------------------|---------------------------------------|
| Connectible conductors. Only connect one conductor per terminal point! |                                       |
| Single core, multi-core, fine-stranded                                 | 0.2 - 4 mm <sup>2</sup> , AWG 24-12   |
| Wire ferrules (non-insulated)                                          | 0.2 - 4 mm <sup>2</sup> , AWG 24-12   |
| Wire ferrules (insulated)                                              | 0.2 - 2.5 mm <sup>2</sup> , AWG 26-14 |
| Tightening torque                                                      | 0.4 - 0.5 Nm (3.54 - 4.43 lbf in)     |
| Strip length                                                           | 7 mm (0.28 in)                        |

| <b>Connection capacity of the terminals - Multifunction channels (RCM, Temp., mA current measurement)</b> |                                       |
|-----------------------------------------------------------------------------------------------------------|---------------------------------------|
| Connectible conductors. Only connect one conductor per terminal point!                                    |                                       |
| Single core, multi-core, fine-stranded                                                                    | 0.2 - 1.5 mm <sup>2</sup> , AWG 24-16 |
| Wire ferrules (non-insulated)                                                                             | 0.2 - 1.5 mm <sup>2</sup> , AWG 26-16 |
| Wire ferrules (insulated)                                                                                 | 0.2 - 1 mm <sup>2</sup> , AWG 26-18   |
| Tightening torque                                                                                         | 0.2 - 0.25 Nm (1.77 - 2.21 lbf in)    |
| Strip length                                                                                              | 7 mm (0.28 in)                        |

| Connection capacity of the terminals - Digital inputs/outputs, analog output |                                       |
|------------------------------------------------------------------------------|---------------------------------------|
| Single core, multi-core, fine-stranded                                       | 0.2 - 1.5 mm <sup>2</sup> , AWG 24-16 |
| Wire ferrules (non-insulated)                                                | 0.2 - 1.5 mm <sup>2</sup> , AWG 26-16 |
| Wire ferrules (insulated)                                                    | 0.2 - 1 mm <sup>2</sup> , AWG 26-18   |
| Tightening torque                                                            | 0.2 - 0.25 Nm (1.77 - 2.21 lbf in)    |
| Strip length                                                                 | 7 mm (0.28 in)                        |

| Connection capacity of the terminals - RS-485 |                                       |
|-----------------------------------------------|---------------------------------------|
| Single core, multi-core, fine-stranded        | 0.2 - 1.5 mm <sup>2</sup> , AWG 24-16 |
| Wire ferrules (non-insulated)                 | 0.2 - 1.5 mm <sup>2</sup> , AWG 26-16 |
| Wire ferrules (insulated)                     | 0.2 - 1 mm <sup>2</sup> , AWG 26-18   |
| Tightening torque                             | 0.2 - 0.25 Nm (1.77 - 2.21 lbf in)    |
| Strip length                                  | 7 mm (0.28 in)                        |

# FUNCTION PERFORMANCE CHARACTERISTICS

| Function                   | Symbol    | Accuracy class       | Measuring range             | Display range     |
|----------------------------|-----------|----------------------|-----------------------------|-------------------|
| Frequency                  | f         | 0.05 (IEC61557-12)   | 40 .. 70 Hz                 | 40.00 .. 70.00 Hz |
| Voltage                    | $U_{L-N}$ | 0.2 (IEC61557-12)    | 10 .. 720 V <sub>eff</sub>  | 0 .. 999 kV       |
| Voltage                    | $U_{L-L}$ | 0.2 (IEC61557-12)    | 18 .. 1000 V <sub>eff</sub> | 0 .. 999 kV       |
| Voltage harmonics currents | Uh        | Cl. 1 (IEC61000-4-7) | 1 .. 127                    | 0 .. 999 kV       |
| THD of the voltage         | THDu      | 1.0 (IEC61557-12)    | 0 .. 999%                   | 0 .. 999%         |

| Function                             | Symbol     | Accuracy class -<br>5 A nominal current                      | Measuring range             | Display range  |
|--------------------------------------|------------|--------------------------------------------------------------|-----------------------------|----------------|
| Total active power                   | P          | 0.2 (IEC61557-12)                                            | 0 .. 12.6 kW                | 0 .. 999 GW    |
| Total reactive power                 | QA, Qv     | 1 (IEC61557-12)                                              | 0..16.6 kvar                | 0 .. 999 Gvar  |
| Total apparent power                 | SA, Sv     | 0.5 (IEC61557-12)                                            | 0 .. 12.6 kVA               | 0 .. 999 GVA   |
| Total active energy                  | Ea         | 0.2 (IEC61557-12)<br>0.2S (IEC62053-22)<br>0.5 (ANSI C12.20) | 0 .. 999 GWh                | 0 .. 999 GWh   |
| Total reactive energy                | ErA, ErV   | 1 (IEC61557-12)                                              | 0 .. 999 Gvarh              | 0 .. 999 Gvarh |
| Total apparent energy                | EapA, EapV | 0.5 (IEC61557-12)                                            | 0 .. 999 GVAh               | 0 .. 999 GVAh  |
| Phase current                        | I          | 0.2 (IEC61557-12)                                            | 0.005 .. 6 A <sub>eff</sub> | 0 .. 999 kA    |
| Neutral conductor current calculated | INc        | 1.0 (IEC61557-12)                                            | 0.03 .. 25 A                | 0.03 .. 999 kA |
| Power factor                         | PFA, PFV   | 0.5 (IEC61557-12)                                            | 0.00 .. 1.00                | 0.00 .. 1.00   |
| Current harmonics                    | Ih         | Cl. 1 (IEC61000-4-7)                                         | 1 ... 63rd                  | 0 .. 999 kA    |
| THD of the current                   | THDi       | 1.0 (IEC61557-12)                                            | 0 .. 999%                   | 0 .. 999%      |

| Function                             | Symbol     | Accuracy class -<br>1 A nominal current | Measuring range             | Display range  |
|--------------------------------------|------------|-----------------------------------------|-----------------------------|----------------|
| Total active power                   | P          | 0.5 (IEC61557-12)                       | 0 .. 12.6 kW                | 0 .. 999 GW    |
| Total reactive power                 | QA, Qv     | 1 (IEC61557-12)                         | 0 .. 16.6 kvar              | 0 .. 999 Gvar  |
| Total apparent power                 | SA, Sv     | 0.5 (IEC61557-12)                       | 0 .. 12.6 kVA               | 0 .. 999 GVA   |
| Total active energy                  | Ea         | 0.5 (IEC61557-12)<br>0.5S (IEC62053-22) | 0 .. 999 GWh                | 0 .. 999 GWh   |
| Total reactive energy                | ErA, ErV   | 1 (IEC61557-12)                         | 0 .. 999 Gvarh              | 0 .. 999 Gvarh |
| Total apparent energy                | EapA, EapV | 0.5 (IEC61557-12)                       | 0 .. 999 GVAh               | 0 .. 999 GVAh  |
| Phase current                        | I          | 0.5 (IEC61557-12)                       | 0.005 .. 6 A <sub>eff</sub> | 0 .. 999 kA    |
| Neutral conductor current calculated | INc        | 1.0 (IEC61557-12)                       | 0.03 .. 25 A                | 0.03 .. 999 kA |
| Power factor                         | PFA, PFV   | 1 (IEC61557-12)                         | 0.00 .. 1.00                | 0.00 .. 1.00   |
| Current harmonics                    | Ih         | Cl. 1 (IEC61000-4-7)                    | 1 ... 63rd                  | 0 .. 999 kA    |
| THD of the current                   | THDi       | 1.0 (IEC61557-12)                       | 0 .. 999%                   | 0 .. 999%      |

RITTAL GmbH & Co. KG  
Auf dem Stuetzelberg  
35745 Herborn · Germany  
Phone +49 (0)2772 505-0  
E-Mail: [info@rittal.de](mailto:info@rittal.de)  
[www.rittal.com](http://www.rittal.com)

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