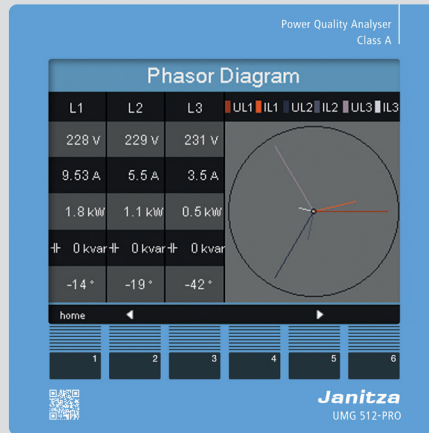


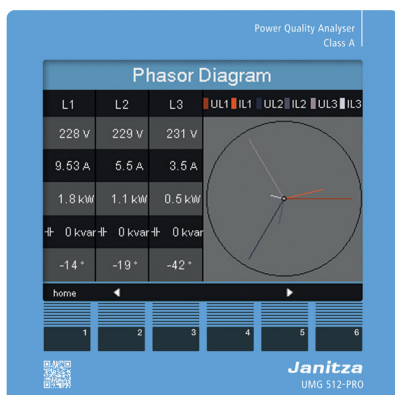


## Power Quality Analyser UMG 512-PRO

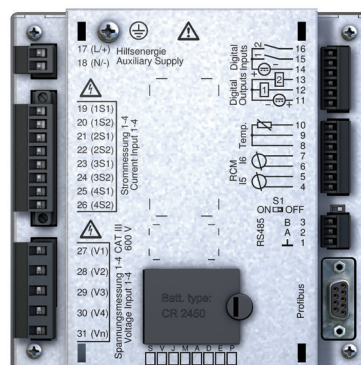
Data sheet

# DEVICE VIEWS

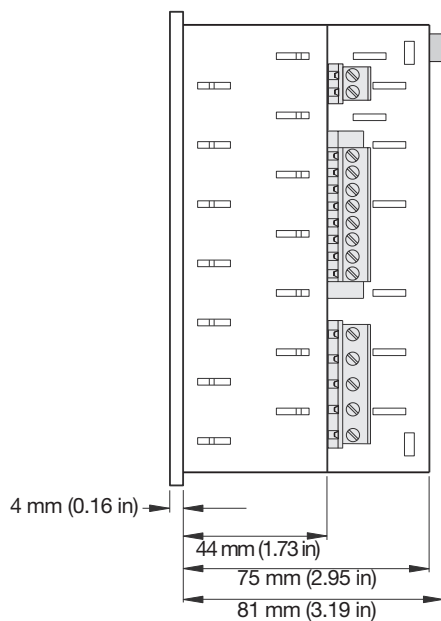
Front view



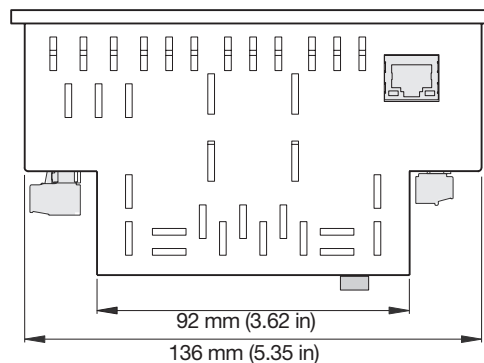
Rear view



Side view



Bottom view



Cut-out size:  
138<sup>+0.8</sup> mm (5.43<sup>+0.03</sup> in) x 138<sup>+0.8</sup> mm (5.43<sup>+0.03</sup> in).

## TECHNICAL DATA

| General                                                      |                                                                         |
|--------------------------------------------------------------|-------------------------------------------------------------------------|
| Net weight (with connectors)                                 | approx. 1080 g (2.38 lb)                                                |
| Device dimensions                                            | Approx. w = 144 mm (5.64 in), h = 144 mm (5.64 in), d = 75 mm (2.95 in) |
| Battery                                                      | Type Li-Mn CR2450, 3 V (approval i.a.w. UL 1642)                        |
| Clock - temperature range -40 °C (-40 °F) to +85 °C (185 °F) | +/-5 ppm (corresponding to approx. 3 minutes per year)                  |
| Impact resistance                                            | IK07 according to IEC 62262                                             |

| Transport and storage                                                                                   |                                       |
|---------------------------------------------------------------------------------------------------------|---------------------------------------|
| The following information applies to devices which are transported or stored in the original packaging. |                                       |
| Free fall                                                                                               | 1 m (39.37 in)                        |
| Temperature                                                                                             | -25 °C (-13 °F) up to +70 °C (158 °F) |

| Ambient conditions during operation                                                                                                                                            |                                                        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| The device is intended for weatherproof, fixed installation and must be connected to the ground wire connection! Protection class I in acc. with IEC 60536 (VDE 0106, Part 1). |                                                        |
| Working temperature range                                                                                                                                                      | -10 °C (14 °F) to +55 °C (131 °F)                      |
| Relative humidity                                                                                                                                                              | 5 to 95% RH at 25°C (77 °F) without condensation       |
| Operating altitude                                                                                                                                                             | 0 to 2000 m (1.24 mi) above sea level                  |
| Pollution degree                                                                                                                                                               | 2                                                      |
| Mounting position                                                                                                                                                              | Upright                                                |
| Ventilation                                                                                                                                                                    | Forced ventilation is not required.                    |
| Protection against ingress of solid foreign bodies and water<br>- Front<br>- Rear                                                                                              | IP40 in acc. with EN60529<br>IP20 in acc. with EN60529 |

| Supply voltage                                                               |                                                                                            |
|------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| Installations of overvoltage category                                        | 300 V CAT III                                                                              |
| Protection of the supply voltage (fuse)                                      | 6 A, type B (approved i.a.w. UL/IEC)                                                       |
| 230 V option:<br>- Nominal range<br>- Operating range<br>- Power consumption | 95 V to 240 V (50/60 Hz) / DC 80 V to 300 V<br>+/-10% of nominal range<br>max. 7 W / 14 VA |
| 24V option:<br>- Nominal range<br>- Operating range<br>- Power consumption   | 48 V to 110 V (50/60 Hz) / DC 24 to 150 V<br>+/-10% of nominal range<br>max. 9 W / 13 VA   |

| Terminal connection capacity (supply voltage)                             |                                       |
|---------------------------------------------------------------------------|---------------------------------------|
| Connectable conductors. Only one conductor can be connected per terminal! |                                       |
| Single core, multi-core, fine-stranded                                    | 0.2 - 4.0 mm <sup>2</sup> , AWG 28-12 |
| Cable end sleeve (not insulated)                                          | 0.2 - 2.5 mm <sup>2</sup> , AWG 26-14 |
| Cable end sleeve (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)     |
| Stripping length                                                          | 7 mm (0.2756 in)                      |

| Current measurement                   |                                                          |
|---------------------------------------|----------------------------------------------------------|
| Rated current                         | 5 A                                                      |
| Resolution                            | 0.1 mA                                                   |
| Metering range                        | 0.005 to 7 Arms                                          |
| Measurement range exceeded (overload) | as of 8.5 Arms                                           |
| Crest factor                          | 1.41                                                     |
| Overvoltage category                  | 230 V option: 300 V CAT III<br>24 V option: 300 V CAT II |
| Measurement surge voltage             | 4 kV                                                     |
| Power consumption                     | approx. 0.2 VA (Ri = 5 mOhm)                             |
| Overload for 1 sec.                   | 120 A (sinusoidal)                                       |
| Sampling rate                         | 25.6 kHz / phase                                         |

| Voltage measurement                                                                                 |                                                   |
|-----------------------------------------------------------------------------------------------------|---------------------------------------------------|
| The voltage measurement inputs are suitable for measurements in the following power supply systems: |                                                   |
| Three-phase 4-conductor systems with rated voltages up to                                           | 417 V / 720 V (+10%)<br>347 V / 600 V (UL listed) |
| Three-phase 3-conductor systems with rated voltages up to                                           | 600 V (+10%)                                      |
| From a safety and reliability perspective, the voltage measurement inputs are designed as follows:  |                                                   |
| Overvoltage category                                                                                | 600 V CAT III                                     |
| Measurement surge voltage                                                                           | 6 kV                                              |
| Protection of voltage measurement                                                                   | 1-10 A                                            |
| Metering range L-N                                                                                  | 0 <sup>1)</sup> to 600 Vrms                       |
| Metering range L-L                                                                                  | 0 <sup>1)</sup> to 1000 Vrms                      |
| Resolution                                                                                          | 0.01 V                                            |
| Crest factor                                                                                        | 1.6 (related to 600 Vrms)                         |
| Impedance                                                                                           | 4 MOhm / phase                                    |
| Power consumption                                                                                   | approx. 0.1 VA                                    |
| Sampling rate                                                                                       | 25.6 kHz / phase                                  |
| Transients                                                                                          | 39 µs                                             |
| Udin <sup>2)</sup> i.a.w. EN61000-4-30                                                              | 100 to 250 V                                      |
| Flicker range (dU/U)                                                                                | 27.5%                                             |
| Frequency range of the fundamental oscillation - Resolution                                         | 15 Hz to 440 Hz<br>0.001 Hz                       |

<sup>1)</sup> The device can only determine measured values, if an L-N voltage of greater than 10 Veff or an L-L voltage of greater than 18 Veff is applied to at least one voltage measurement input.

<sup>2)</sup> Udin = arranged input voltage according to DIN EN 61000-4-30

|                                   |         |
|-----------------------------------|---------|
| Measurement precision phase angle | 0,075 ° |
|-----------------------------------|---------|

| <b>Terminal connection capacity (voltage measurement)</b>                 |                                       |
|---------------------------------------------------------------------------|---------------------------------------|
| Connectable conductors. Only one conductor can be connected per terminal! |                                       |
| Single core, multi-core, fine-stranded                                    | 0.2 - 4 mm <sup>2</sup> , AWG 28-12   |
| Cable end sleeve (not insulated)                                          | 0.2 - 2.5 mm <sup>2</sup> , AWG 26-14 |
| Cable end sleeve (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)     |
| Stripping length                                                          | 7 mm (0.2756 in)                      |

| <b>Terminal connection capacity (current measurement)</b>                 |                                       |
|---------------------------------------------------------------------------|---------------------------------------|
| Connectable conductors. Only one conductor can be connected per terminal! |                                       |
| Single core, multi-core, fine-stranded                                    | 0.2 - 4 mm <sup>2</sup> , AWG 28-12   |
| Cable end sleeve (not insulated)                                          | 0.2 - 4 mm <sup>2</sup> , AWG 26-12   |
| Cable end sleeve (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)     |
| Stripping length                                                          | 7 mm (0.2756 in)                      |

| <b>Residual current monitoring (RCM)</b> |                                                                                                                             |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Rated current                            | 30 mArms                                                                                                                    |
| Metering range                           | 0 to 40 mArms                                                                                                               |
| Triggering current                       | 100 µA                                                                                                                      |
| Resolution                               | 1 µA                                                                                                                        |
| Crest factor                             | 1.414 (related to 40 mA)                                                                                                    |
| Burden                                   | 4 Ohm                                                                                                                       |
| Overload for 1 sec.                      | 5 A                                                                                                                         |
| Sustained overload                       | 1 A                                                                                                                         |
| Overload for 20 ms                       | 50 A                                                                                                                        |
| Residual current monitoring              | i.a.w. IEC/TR 60755 (2008-01), type A  |
| Maximum external burden                  | 300 Ohm (for cable break detection)                                                                                         |

| <b>Terminal connection capacity (residual current monitoring)</b>         |                                                                 |
|---------------------------------------------------------------------------|-----------------------------------------------------------------|
| Connectable conductors. Only one conductor can be connected per terminal! |                                                                 |
| Single core, multi-core, fine-stranded                                    | 0.2 - 1.5 mm <sup>2</sup> , AWG 28-16                           |
| Cable end sleeve (not insulated)                                          | 0.2 - 1.5 mm <sup>2</sup> , AWG 26-16                           |
| Cable end sleeve (insulated)                                              | 0.2 - 1.5 mm <sup>2</sup> , AWG 26-16                           |
| Tightening torque                                                         | 0.2 - 0.25 Nm (1.77 - 2.21 lbf in)                              |
| Stripping length                                                          | 7 mm (0.2756 in)                                                |
| Cable length                                                              | up to 30 m (32.81 yd) unshielded, from 30 m (32.81 yd) shielded |

| <b>Thermistor input</b><br>3-wire measurement |                                                                 |
|-----------------------------------------------|-----------------------------------------------------------------|
| Update time                                   | 1 second                                                        |
| Connectable sensors                           | PT100, PT1000, KTY83, KTY84                                     |
| Total burden (sensor + cable)                 | Max. 4 kOhm                                                     |
| Cable length                                  | up to 30 m (32.81 yd) unshielded, from 30 m (32.81 yd) shielded |

| Sensor type | Temperature range                    | Resistor range      | Measurement uncertainty |
|-------------|--------------------------------------|---------------------|-------------------------|
| KTY83       | -55 °C (-67 °F) to +175 °C (347 °F)  | 500 Ohm to 2.6 kOhm | ± 1.5% rng              |
| KTY84       | -40 °C (-40 °F) to +300 °C (572 °F)  | 350 Ohm to 2.6 kOhm | ± 1.5% rng              |
| PT100       | -99 °C (-146 °F) to +500 °C (932 °F) | 60 Ohm to 180 Ohm   | ± 1.5% rng              |
| PT1000      | -99 °C (-146 °F) to +500 °C (932 °F) | 600 Ohm to 1.8 kOhm | ± 1.5% rng              |

| <b>Terminal connection capacity (thermistor input)</b><br>Connectable conductors. Only one conductor can be connected per terminal! |                                       |
|-------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| Single core, multi-core, fine-stranded                                                                                              | 0,2 - 1,5 mm <sup>2</sup> , AWG 28-16 |
| Cable end sleeve (not insulated)                                                                                                    | 0,2 - 1,5 mm <sup>2</sup> , AWG 26-16 |
| Cable end sleeve (insulated)                                                                                                        | 0,2 - 1,5 mm <sup>2</sup> , AWG 26-16 |
| Tightening torque                                                                                                                   | 0,2 - 0,25 Nm (1.77 - 2.21 lbf in)    |
| Stripping length                                                                                                                    | 7 mm (0.2756 in)                      |

| <b>Digital inputs</b><br>2 Digital inputs with a joint earth |                                                                 |
|--------------------------------------------------------------|-----------------------------------------------------------------|
| Maximum counter frequency                                    | 20 Hz                                                           |
| Response time (Jasic program)                                | 200 ms                                                          |
| Input signal present                                         | 18 V to 28 V (typically 4 mA) (SELV or PELV supply)             |
| Input signal not present                                     | 0 to 5 V DC, current less than 0.5 mA                           |
| Cable length                                                 | up to 30 m (32.81 yd) unshielded, from 30 m (32.81 yd) shielded |

| <b>Digital outputs</b><br>2 digital outputs with a joint earth; opto coupler, not short-circuit proof |                                                                 |
|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| Supply voltage                                                                                        | 20 V - 30 V DC (SELV or PELV supply)                            |
| Switching voltage                                                                                     | max. 60 V DC                                                    |
| Switching current                                                                                     | max. 50 mAeff AC/DC                                             |
| Response time (Jasic program)                                                                         | 200 ms                                                          |
| Switching frequency                                                                                   | Max. 20 Hz                                                      |
| Cable length                                                                                          | up to 30 m (32.81 yd) unshielded, from 30 m (32.81 yd) shielded |

| <b>Terminal connection capacity (digital inputs and outputs)</b><br>Connectable conductors. Only one conductor can be connected per terminal! |                                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| Single core, multi-core, fine-stranded                                                                                                        | 0.2 - 1.5 mm <sup>2</sup> , AWG 28-16 |
| Cable end sleeve (not insulated)                                                                                                              | 0.2 - 1.5 mm <sup>2</sup> , AWG 26-16 |
| Cable end sleeve (insulated)                                                                                                                  | 0.2 - 1.5 mm <sup>2</sup> , AWG 26-16 |
| Tightening torque                                                                                                                             | 0.2 - 0.25 Nm (1.77 - 2.21 lbf in)    |
| Stripping length                                                                                                                              | 7 mm (0.2756 in)                      |

| <b>RS485 interface</b><br>3-wire connection with GND, A, B |                                                                   |
|------------------------------------------------------------|-------------------------------------------------------------------|
| Protocol                                                   | Modbus RTU/slave, Modbus RTU/master, Modbus RTU /Gateway          |
| Transmission rate                                          | 9.6 kbps, 19.2 kbps, 38.4 kbps, 57.6 kbps, 115.2 kbps, 921.6 kbps |
| Termination resistor                                       | Can be activated by micro switch                                  |

| <b>Terminal connection capacity (serial interface - RS485)</b><br>Connectable conductors. Only one conductor can be connected per terminal! |                                       |
|---------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| Single core, multi-core, fine-stranded                                                                                                      | 0.2 - 1.5 mm <sup>2</sup> , AWG 28-16 |
| Cable end sleeve (not insulated)                                                                                                            | 0.2 - 1.5 mm <sup>2</sup> , AWG 26-16 |
| Cable end sleeve (insulated)                                                                                                                | 0.2 - 1.5 mm <sup>2</sup> , AWG 26-16 |
| Tightening torque                                                                                                                           | 0.2 - 0.25 Nm (1.77 - 2.21 lbf in)    |
| Stripping length                                                                                                                            | 7 mm (0.2756 in)                      |

| <b>Profibus interface</b> |                                |
|---------------------------|--------------------------------|
| Connection                | SUB D 9-pole                   |
| Protocol                  | Profibus DP/V0 as per EN 50170 |
| Transmission rate         | 9.6 kBaud to 12 MBaud          |

| <b>Ethernet interface</b> |                                                                                                                                      |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Connection                | RJ45                                                                                                                                 |
| Function                  | Modbus gateway, embedded web server (HTTP)                                                                                           |
| Protocols                 | CP/IP, EMAIL (SMTP), DHCP client (BootP), Modbus/TCP, Modbus RTU over Ethernet, FTP, ICMP (Ping), NTP, TFTP, BACnet (optional), SNMP |

# FUNCTION PERFORMANCE CHARACTERISTICS

## Measurements with 50/60 Hz

The measurements are carried out via current transformer ..5A.

| Function                                      | Symbol                                | Precision class                                                                          | Metering range                      | Display range          |
|-----------------------------------------------|---------------------------------------|------------------------------------------------------------------------------------------|-------------------------------------|------------------------|
| Total active power                            | P                                     | 0.2 <sup>5)</sup> (IEC61557-12)                                                          | 0 to 15.3 kW                        | 0 W to 9999 GW *       |
| Total reactive power                          | QA <sup>6)</sup> , Qv <sup>6)</sup>   | 1 (IEC61557-12)                                                                          | 0 to 15.3 kvar                      | 0 varh .. 9999 Gvar *  |
| Total apparent power                          | SA, Sv <sup>6)</sup>                  | 0.2 <sup>5)</sup> (IEC61557-12)                                                          | 0 to 15.3 kVA                       | 0 VA to 9999 GVA *     |
| Total active energy                           | Ea                                    | 0.2 <sup>5)</sup> (IEC61557-12)<br>0.2S <sup>5)</sup> (IEC62053-22)<br>0.2 (ANSI C12.20) | 0 to 15.3 kWh                       | 0 Wh to 9999 GWh *     |
| Total reactive energy                         | ErA <sup>6)</sup> , ErV <sup>6)</sup> | 1 (IEC61557-12)                                                                          | 0 to 15.3 kvarh                     | 0 varh .. 9999 Gvarh * |
| Total apparent energy                         | EapA, EapV <sup>6)</sup>              | 0.2 <sup>5)</sup> (IEC61557-12)                                                          | 0 to 15.3 kVAh                      | 0 VAh to 9999 GVAh *   |
| Frequency                                     | f                                     | 0.02 (IEC61557-12)                                                                       | 40 to 70 Hz                         | 40 Hz to 70 Hz         |
| Phase current                                 | I                                     | 0.1 (IEC61557-12)                                                                        | 0.005 to 7 Arms                     | 0 A to 9999 kA         |
| Measured neutral conductor current            | IN                                    | 0.1 (IEC61557-12)                                                                        | 0.005 to 7 Arms                     | 0 A to 9999 kA         |
| Residual currents I5, I6                      | IDIFF                                 | 1 (IEC61557-12)                                                                          | 0 to 40 mArms                       | 0 A to 9999 kA         |
| Computed neutral conductor current            | INc                                   | 0.5 (IEC61557-12)                                                                        | 0.005 to 21 A                       | 0 A to 9999 kA         |
| Voltage                                       | U L-N                                 | 0.1 (IEC61557-12)                                                                        | 10 to 600 Vrms                      | 0 V to 9999 kV         |
| Voltage                                       | U L-L                                 | 0.1 (IEC61557-12)                                                                        | 18 to 1000 Vrms                     | 0 V to 9999 kV         |
| Power factor                                  | PFA, PFV                              | 0.5 (IEC61557-12)                                                                        | 0.00 to 1.00                        | 0 to 1                 |
| Short-term flicker, long-term flicker         | Pst, Plt                              | Cl. A (IEC61000-4-15)                                                                    | 0.4 Pst to 10.0 Pst                 | 0 to 10                |
| Voltage dips                                  | Udip                                  | 0.2 (IEC61557-12)                                                                        | 10 to 600 Vrms                      | 0 V to 9999 kV         |
| Voltage increases                             | Uswl                                  | 0.2 (IEC61557-12)                                                                        | 10 to 600 Vrms                      | 0 V to 9999 kV         |
| Transient overvoltages                        | Utr                                   | 0.2 (IEC61557-12)                                                                        | 10 to 600 Vrms                      | 0 V to 9999 kV         |
| Voltage interruptions                         | Uint                                  | Duration +- 1 cycle                                                                      | -                                   | -                      |
| Voltage unbalance <sup>1)</sup>               | Unba                                  | 0.2 (IEC61557-12)                                                                        | 10 to 600 Vrms                      | 0 V to 9999 kV         |
| Voltage unbalance <sup>2)</sup>               | Unb                                   | 0.2 (IEC61557-12)                                                                        | 10 to 600 Vrms                      | 0 V to 9999 kV         |
| Voltage harmonics <sup>7)</sup>               | Uh                                    | Cl. 1 (IEC61000-4-7)                                                                     | Up to 3 kHz                         | 0 V to 9999 kV         |
| THD of the voltage <sup>3) 7)</sup>           | THDu                                  | 1.0 (IEC61557-12)                                                                        | Up to 3 kHz                         | 0% to 999 %            |
| THD of the voltage <sup>4) 7)</sup>           | THD-Ru                                | 1.0 (IEC61557-12)                                                                        | Up to 3 kHz                         | 0% to 999 %            |
| Current harmonics <sup>7)</sup>               | Ih                                    | Cl. 1 (IEC61000-4-7)                                                                     | Up to 3 kHz                         | 0 A to 9999 kA         |
| THD of the current <sup>3) 7)</sup>           | THDi                                  | 1.0 (IEC61557-12)                                                                        | Up to 3 kHz                         | 0% to 999 %            |
| THD of the current <sup>4) 7)</sup>           | THD-Ri                                | 1.0 (IEC61557-12)                                                                        | Up to 3 kHz                         | 0% to 999 %            |
| Mains signal voltage (interharmonics voltage) | MSV                                   | IEC 61000-4-7 class 1                                                                    | 10% – 200% of IEC 61000-2-4 class 3 | 0 V to 9999 kV         |

## Measurements in the range 15 to 45 / 65 to 440 Hz

| Function                              | Symbol                                | Precision class      | Metering range  | Display range          |
|---------------------------------------|---------------------------------------|----------------------|-----------------|------------------------|
| Total active power                    | P                                     | 2 (IEC61557-12)      | 0 to 15.3kW     | 0 W to 9999 GW *       |
| Total reactive power                  | QA <sup>6)</sup> , Qv <sup>6)</sup>   | 2 (IEC61557-12)      | 0 to 15.3 kvar  | 0 varh .. 9999 Gvar *  |
| Total apparent power                  | SA, Sv <sup>6)</sup>                  | 1 (IEC61557-12)      | 0 to 15.3 kVA   | 0 VA to 9999 GVA *     |
| Total active energy                   | Ea                                    | 2 (IEC61557-12)      | 0 to 15.3 kWh   | 0 Wh to 9999 GWh *     |
| Total reactive energy                 | ErA <sup>6)</sup> , ErV <sup>6)</sup> | 2 (IEC61557-12)      | 0 to 15.3 kvarh | 0 varh .. 9999 Gvarh * |
| Total apparent energy                 | EapA, EapV <sup>6)</sup>              | 1 (IEC61557-12)      | 0 to 15.3 kVAh  | 0 VAh to 9999 GVAh *   |
| Frequency                             | f                                     | 0.02 (IEC61557-12)   | 15 to 440 Hz    | 15 Hz to 440 Hz        |
| Phase current                         | I                                     | 0.5 (IEC61557-12)    | 0.005 to 7 Arms | 0 A to 9999 kA         |
| Measured neutral conductor current    | IN                                    | 0.5 (IEC61557-12)    | 0.005 to 7 Arms | 0 A to 9999 kA         |
| Residual currents I5, I6              | IDIFF                                 | 1 (IEC61557-12)      | 0 to 40 mArms   | 0 A to 9999 kA         |
| Computed neutral conductor current    | INc                                   | 1.5 (IEC61557-12)    | 0.005 to 21 A   | 0 A to 9999 kA         |
| Voltage                               | U L-N                                 | 0.5 (IEC61557-12)    | 10 to 600 Vrms  | 0 V to 9999 kV         |
| Voltage                               | U L-L                                 | 0.5 (IEC61557-12)    | 18 to 1000 Vrms | 0 V to 9999 kV         |
| Power factor                          | PFA, PFV                              | 2 (IEC61557-12)      | 0.00 to 1.00    | 0 to 1                 |
| Short-term flicker, long-term flicker | Pst, PIt                              | -                    | -               | -                      |
| Voltage dips                          | Udip                                  | 0.5 (IEC61557-12)    | 10 to 600 Vrms  | 0 V to 9999 kV         |
| Voltage increases                     | Uswl                                  | 0.5 (IEC61557-12)    | 10 to 600 Vrms  | 0 V to 9999 kV         |
| Transient overvoltages                | Utr                                   | 0.5 (IEC61557-12)    | 10 to 600 Vrms  | 0 V to 9999 kV         |
| Voltage interruptions                 | Uint                                  | Duration +- 1 cycle  | -               | -                      |
| Voltage unbalance <sup>1)</sup>       | Unba                                  | 0.5 (IEC61557-12)    | 10 to 600 Vrms  | 0 V to 9999 kV         |
| Voltage unbalance <sup>2)</sup>       | Unb                                   | 0.5 (IEC61557-12)    | 10 to 600 Vrms  | 0 V to 9999 kV         |
| Voltage harmonics <sup>7)</sup>       | Uh                                    | Cl. 2 (IEC61000-4-7) | Up to 3 kHz     | 0 V to 9999 kV         |
| THD of the voltage <sup>7)</sup>      | THDu                                  | 2.0 (IEC61557-12)    | Up to 3 kHz     | 0% to 999 %            |

1) In relation to the amplitude.

2) In relation to phase and amplitude.

3) In relation to fundamental oscillation.

4) In relation to effective value.

5) Precision class 0.2/0.2S with.../ 5A converter.

Precision class 0.5/0.5S with.../ 1A converter.

6) Calculation from fundamental oscillation.

7) measuring range: up to 50. harmonic, but maximum 3 KHz

\* When the max. total working value s have been reached, the display returns to 0 W.

**Specifications as per IEC 61000-4-30**

| Characteristic                   | Uncertainty                                                                                                                                                                                             | Metering range                         |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| 5.1 Frequency                    | $\pm 10$ mHz                                                                                                                                                                                            | 42.5 Hz – 57.5 Hz,<br>51 Hz – 69 Hz    |
| 5.2 Supply voltage level         | $\pm 0.1\%$ of $U_{din}$                                                                                                                                                                                | 10% – 150% of $U_{din}$                |
| 5.3 Flicker                      | $\pm 5\%$ of measured value                                                                                                                                                                             | 0.2 – 10 Pst                           |
| 5.4 Dips and excessive increases | Amplitude: $\pm 0.2\%$ of $U_{din}$<br>Duration: $\pm 1$ period                                                                                                                                         | N/A                                    |
| 5.5 Voltage interruptions        | Duration: $\pm 1$ period                                                                                                                                                                                | N/A                                    |
| 5.7 Unbalance                    | $\pm 0.15\%$                                                                                                                                                                                            | 0.5% – 5% $u_2$<br>0.5% – 5% $u_0$     |
| 5.8 Harmonics                    | IEC 61000-4-7 class 1                                                                                                                                                                                   | 10% – 200% of Class 3 of IEC 61000-2-4 |
| 5.9 Interharmonics               | IEC 61000-4-7 class 1                                                                                                                                                                                   | 10% – 200% of Class 3 of IEC 61000-2-4 |
| 5.10 Mains signal voltage        | In the range 3%-15% of $U_{din}$ , $\pm 5\%$ of $U_{din}$ .<br>In the range 1%-3% of $U_{din}$ , $\pm 0.15\%$ of $U_{din}$ .<br>There are no uncertainty requirements for values $< 1\%$ of $U_{din}$ . | 0% – 15% of $U_{din}$                  |
| 5.12 Downward/upward deviation   | $\pm 0.1\%$ of $U_{din}$                                                                                                                                                                                | 10% – 150% of $U_{din}$                |

The device meets the requirements according to IEC 61000-4-30 class A for:

- compensation
- time uncertainty
- marking concept
- transient influence quantities

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