TRIAD 2 Range

Programmable digital transducers with 1 to 4 analogue outputs
Programmable accuracy class

Main specifications

Quantities measured: 1, 2, 3, 4 to be chosen from I, V, U, F, P, Q, S, cosϕ, ϕ, ϕU, ϕV, tanϕ
Configuration of TRIAD 2: in factory or by the user with the TRIADJUST 2 software
Accuracy (programmable): Class 0.1 / 0.15 / 0.2 / 0.5 / 1
Current inputs: 1 A, 5 A and 10 A
Voltage inputs: 100 to 480 V (ph-ph) or 100 / √3 to 480 / √3 V (ph-N)
Transfer curves: linear, 2 slopes or quadratic
Output signals: ± 1 mA, ± 5 mA, ± 20 mA, ± 1 V, ± 10 V
Response time in Class 0.2: 200 ms
Operating frequency: 50 or 60 Hz
Auxiliary power supply with wide dynamic range: 80 to 265 V ac/dc or 19 to 58 V dc
Compliance with CE directive
Digital technology

PRODUCT ADVANTAGES

+ Up to 4 PROGRAMMABLE ANALOGUE OUTPUTS
+ 4 kV INSULATION
+ CONFIGURABLE AND MODIFIABLE using the TRIADJUST 2 software
+ ADJUSTABLE accuracy within Class 0.1 as per IEC 60688
+ ADJUSTABLE RESPONSE TIME down to 50 ms
+ DIGITAL OUTPUT available as an OPTION

Multi-function, economical instrument with 4 functions in the same casing
Communication, Ethernet RS 485 or optical head
Accessibility and safety: large-dimension terminals
Insulated circuits
Ergonomic: easy mounting on DIN rail or switchboard

Measurement and instrumentation Programmable digital transducers

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Digital technology
TRIAD 2 Programmable model

**Factory-programmable**
- The transducer delivered is ready to operate and can be connected to the electrical network in order to deliver output signals tailored for your installation.
- To benefit from this, you simply need to know the exact specifications of your electrical installation:
  - Type of network: split-phase, balanced or unbalanced three-phase, 3 or 4 wires.
  - Type of electrical connections.
  - Number of electrical quantities to be measured: 1, 2, 3 or 4.
  - Precise measurement ranges of the input/output quantities to be measured.

Users can modify a factory configuration at any time with the TRIADJUST 2 software if the specifications of the electrical network change.

**Programmable via TRIADJUST 2**
- With the TRIADJUST 2 software and one of the 3 communication modes available (Ethernet, RS485 or optical head) you can program all the parameters characterizing a TRIAD 2 transducer.
- To do so, simply choose a model which suits your electrical installation:
  - Type of network: split-phase, balanced or unbalanced three-phase, 3 or 4 wires.
  - Number of analogue outputs required (1, 2, 3 or 4).
  - Value of the auxiliary source.
- You are then free to configure the TRIAD 2 transducer delivered as you wish and to print out the stickers corresponding to the parameters programmed.

**Environment and standards**

<table>
<thead>
<tr>
<th>EMC IMMUNITY (standard of reference: IEC 60688, IEC 61326-1, IEC 61000-6-5)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Shock voltage as per IEC 61000-4-5</td>
<td>2 kV in differential mode 4 kV in common mode</td>
</tr>
<tr>
<td>Oscillating wave as per IEC 61000-4-12</td>
<td>1 kV in differential mode 2.5 kV in common mode</td>
</tr>
<tr>
<td>Fast electrical transients in bursts as per IEC 61000-4-4</td>
<td>2 kV on power supply 2 kV on inputs/outputs</td>
</tr>
<tr>
<td>Electrostatic discharge as per IEC 61000-4-2</td>
<td>8 kV in the air 6 kV in contact</td>
</tr>
<tr>
<td>EM radiated field as per IEC 61000-4-3</td>
<td>10 V/m (80 MHz to 3 GHz)</td>
</tr>
<tr>
<td>Voltage dips as per IEC 61000-4-11</td>
<td>30% reduction during 20 ms 60% reduction during 1 s</td>
</tr>
<tr>
<td>Voltage interruptions as per IEC 61000-4-11</td>
<td>100% reduction during 100 ms 100% reduction during 100 ms</td>
</tr>
</tbody>
</table>

**EMC emissions**
- Radiated and conducted As per CISPR11

**Climatic specifications**
- Operating temperature: -10°C to +55°C
- Storage temperature: -40°C to +70°C
- Relative humidity: ≤ 95% to 55°C

**Safety specifications**
- Installation category: 3
- Pollution level: 2
- Fire resistance: UL94, severity V0

**Mechanical specifications**
- Protection rating: IP 20
- Mechanical shocks: IEC 60068-2-27
- Vibrations: IEC 60068-2-6
- Drop test with packaging: NF 0042-1

**Mounting accessories**

<table>
<thead>
<tr>
<th>Model</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plate mounting for T1xy</td>
<td>ACCT 1007</td>
</tr>
<tr>
<td>Plate mounting for T3xy</td>
<td>ACCT 1006</td>
</tr>
</tbody>
</table>

**Casing**

<table>
<thead>
<tr>
<th>Weight</th>
<th>320 g (T1xy) / 700 g (T3xy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting</td>
<td>DIN rail 43700 or plate mounting</td>
</tr>
<tr>
<td>Connection</td>
<td>Terminals with mobile stirrup clamp with screw for 4 single-wire 6 mm² conductors or 2 multi-wire 4 mm² conductors</td>
</tr>
</tbody>
</table>

**Hardware identification**

The TRIAD 2 T1xy and T3xy are fully configurable with the TRIADJUST 2 software which allows users to modify the characteristics of their products right up to the last minute.

**Hardware identification**

**Model**
- 1 = small model
- 3 = large model

**Number of analogue outputs**
- 0 = none
- 1 = 1 output

**Communication module**
- 0 = optical head
- 1 = optical head + RS485
- 2 = optical head + Ethernet

**Number of analogue outputs**
- 0 = none
- 1 = 1 output
- 2 = 2 outputs
- 3 = 3 outputs
- 4 = 4 outputs

Example: T314 = Large-model TRIAD 2 with optical head and RS485 + 4 analogue outputs
## TRIAD 2 Range

<table>
<thead>
<tr>
<th>Network</th>
<th>Function</th>
<th>T1xy model</th>
<th>T3xy model</th>
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<tbody>
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<td>TanΦ</td>
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<td></td>
<td>CosΦ</td>
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<tr>
<td>Single-phase</td>
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<td>U12, U23, U31</td>
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<td>I1, I2, I3</td>
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<td>FP1, FP2, FP3, FPt</td>
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<td>TanΦ</td>
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<td>Cos(Φ1, Φ2, Φ3, Φt)</td>
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<td>Balanced 3-phase, 3 wires</td>
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<td>Cos(Φ1, Φ2, Φ3, Φt)</td>
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<td>I1, I2, I3 signed</td>
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<tr>
<td>Unbalanced 3-phase, 3/4 wires</td>
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<td>V1, V2, V3</td>
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<td>Cos(Φ1/Φ2, Φ3/Φ1, Φt)</td>
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<td>sin(Φ1/Φ2)</td>
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<td>Cos(Φ1, Φ2, Φ3, Φt)</td>
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<tr>
<td></td>
<td>I1 signed, I2 signed</td>
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</table>
**TRIAD 2**  
Programmable model

### Electrical specifications

<table>
<thead>
<tr>
<th><strong>Voltage input</strong></th>
<th><strong>T1:</strong> from 57.7 Vac to 276 Vac max.</th>
<th><strong>T3:</strong> from 57.7 Vac to 480 Vac max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated value</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td>50 Hz: 42.5...57.5 Hz</td>
<td>60 Hz: 51...69 Hz</td>
</tr>
<tr>
<td>Max. measured voltage on primary</td>
<td>1,000 kV (ph-ph)</td>
<td></td>
</tr>
<tr>
<td>Acceptable overloads</td>
<td>T1: 300 Vac permanent - 460 Vac / 10s</td>
<td>T3: 520 Vac permanent - 800 Vac / 10s</td>
</tr>
<tr>
<td>Consumption</td>
<td>&lt; 0.2 A</td>
<td></td>
</tr>
<tr>
<td>Input impedance</td>
<td>400 kΩ</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Current inputs</strong></th>
<th><strong>T1:</strong> 0 to 10 A max.</th>
<th><strong>T3:</strong> 40,000 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated value</td>
<td>0 to 10 A max.</td>
<td>40,000 A</td>
</tr>
<tr>
<td>Max. measured current on primary</td>
<td>0.15 VA / 1 s</td>
<td></td>
</tr>
<tr>
<td>Acceptable overload</td>
<td>50 In / 1 s</td>
<td></td>
</tr>
<tr>
<td>Consumption</td>
<td>&lt; 0.15 VA</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Auxiliary power supply</strong></th>
<th><strong>High level</strong></th>
<th><strong>Low level</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated value</td>
<td>80 / 265 Vac (50/60 Hz) - 110 to 375 Vdc</td>
<td>19 / 58 Vdc</td>
</tr>
<tr>
<td>Max. measured current</td>
<td>40,000 A</td>
<td>20 VA max.</td>
</tr>
<tr>
<td>Acceptable resistive load</td>
<td>± 0.2% of Io (1)</td>
<td>± 0.2% of Vo (2)</td>
</tr>
<tr>
<td>Acceptable capacitive load</td>
<td>0.1 μF</td>
<td>0.1 μF</td>
</tr>
<tr>
<td>Overrun</td>
<td>1.2 Io (1)</td>
<td>1.2 Vo (2)</td>
</tr>
<tr>
<td>Programmable response time</td>
<td>50 ms – 100 ms – 200 ms – 500 ms – 1 s</td>
<td>Linear, 2 slopes or quadratic</td>
</tr>
<tr>
<td>Transfer curve</td>
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### Analogue outputs

<table>
<thead>
<tr>
<th><strong>Rated values</strong></th>
<th><strong>Current</strong></th>
<th><strong>Voltage</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>± 1 mA</td>
<td>± 1 V, ± 10 V</td>
<td></td>
</tr>
<tr>
<td>± 5 mA</td>
<td>± 5 mA, ± 30 mA</td>
<td></td>
</tr>
<tr>
<td>± 20 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acceptable resistive load</td>
<td>15 V / Io (1)</td>
<td>1 kΩ</td>
</tr>
<tr>
<td>Acceptable capacitive load</td>
<td>0.1 μF (1)</td>
<td>1 kΩ</td>
</tr>
<tr>
<td>Overrun</td>
<td>1.2 Io (1)</td>
<td>1.2 Vo (2)</td>
</tr>
<tr>
<td>Peak-peak residual wave</td>
<td>± 0.2% of Io (1)</td>
<td>± 0.2% of Vo (2)</td>
</tr>
<tr>
<td>Programmable response time</td>
<td>50 ms – 100 ms – 200 ms – 500 ms – 1 s</td>
<td>Linear, 2 slopes or quadratic</td>
</tr>
</tbody>
</table>

### Communication

<table>
<thead>
<tr>
<th><strong>Optical head</strong></th>
<th><strong>Ethernet</strong></th>
<th><strong>RS485</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection</td>
<td>USB (PC)</td>
<td>RJ45</td>
</tr>
<tr>
<td>Optical (product)</td>
<td>RJ45</td>
<td>RJ45</td>
</tr>
<tr>
<td>Protocol</td>
<td>MODBUS</td>
<td>MODBUS / TCP</td>
</tr>
<tr>
<td>Speed</td>
<td>38,400 baud</td>
<td>10 base T</td>
</tr>
<tr>
<td>Parity</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bus addresses</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Transmission length</td>
<td>2 m</td>
<td>100 m</td>
</tr>
</tbody>
</table>

### Metrological specifications

<table>
<thead>
<tr>
<th><strong>Measurements</strong></th>
<th><strong>Accuracy class over measurement range (as per IEC 60668)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>V, U, I, F, P, Q, S, TP, F, Q, PF, Q, Qf, Qf, Qf, Qf, Qf</td>
<td>± 1% ± 0.5% ± 0.2% ± 0.15% ± 0.1%</td>
</tr>
</tbody>
</table>

* RT: Response time for F = 50 Hz
** Phase angle between voltages
TRIAD 2 Range

- Electrical connections
  Single-phase network

II, F:

V1, F:

V1, II, I1 signed, P1, Q1, S1, FP1, F, TANq1, Cosq1, ϕ1:

Programmable digital transducers

Measurement and instrumentation

Programmable digital transducers
Balanced 3-phase, 3-wire network

U12, U23, U31, F:

I1, I2, I3, F:

U12, U23, U31, I1, I2, I3, signed (I1, I2, I3), Pt, St, Qt, FPt, F, TAN ϕ, Cos ϕ t,

Phase rotation authorized
TRIAD 2 Range

Balanced 3-phase, 4-wire network

V1, V2, V3, U12, U23, U31 F:

I1, I2, I3, F:

Measurement and instrumentation Programmable digital transducers

Phase rotation authorized
Balanced 3-phase, 4-wire network (continued)

V1, V2, V3, U12, U23, U31, I1, I2, I3, signed (I1, I2, I3), P1, P2, P3, P, S, S1, S2, S3, S, Q1, Q2, Q3, Q, FP1, FP2, FP3, Fp, F, TANϕ1, Cosϕ1, Cosϕ2, Cosϕ3, Cosϕt, ϕ1, ϕ2, ϕ3, ϕt:

Unbalanced 3-phase, 3-wire network

TRIAD 2 Range

Unbalanced 3-phase, 3-wire network (continued)

I1, I2, I3, f:

U12, U23, U31, I1, I2, I3, signed (I1, I2, I3), P1, S1, Q1, F1, TANϕ, Cosϕ, Angle (U12/U23, U23/U31, U31/U12):

V1, V2, V3, U12, U23, U31, I1, I2, I3, signed (I1, I2, I3), P1, P2, P3, Pt, S1, S2, S3, Sc, Q1, Q2, Q3, Qc, FP1, FP2, FP3, Fp, F, TANϕ, Cosϕ1, Cosϕ2, Cosϕ3, Cosϕt, ϕ1, ϕ2, ϕ3, ϕt, Angle (V1/V2, V2/V3, V3/V1), Angle (U12/U23, U23/U31, U31/U12):
Unbalanced 3-phase, 4-wire network

I₁, I₂, I₃, F:


V₁, V₂, V₃, U₁₂, U₂₃, U₃₁, I₁, I₂, I₃, signed (I₁, I₂, I₃), P₁, P₂, P₃, S₁, S₂, S₃, S, Q₁, Q₂, Q₃, Qc, FP₁, FP₂, FP₃, F, TANϕ₁, Cosϕ₁, Cosϕ₂, Cosϕ₃, ϕ₁, ϕ₂, ϕ₃, ϕt

Angle (V₁/V₂, V₂/V₃, V₃/V₁), Angle (U₁₂/U₂₃, U₂₃/U₃₁, U₃₁/U₁₂):

V₁, V₂, U₁₂, U₂₃, I₁, I₂, I₃, signed (I₁, I₂, I₃), P₁, P₂, P₃, S₁, S₂, S₃, S, Q₁, Q₂, Q₃, Qc, FP₁, FP₂, FP₃, F, TANϕ₁, Cosϕ₁, Cosϕ₂, Cosϕ₃, ϕ₁, ϕ₂, ϕ₃, ϕt

Angle (V₁/V₂, V₂/V₃, V₃/V₁), Angle (U₁₂/U₂₃, U₂₃/U₃₁, U₃₁/U₁₂):
**TRIAD 2 Range**

Split-phase

Measurement and instrumentation Programmable digital transducers

V1, V2, U12, P1, P2, Pt; Q1, Q2, Qc, S1, S2, Sc, FP1, FP2, FPc, F, tan ϕ, Angle (V1/V2) rad, Angle (V1/V2) deg, cos ϕ1, cos ϕ2, cos ϕt, cos ϕ1 Fonda rad, cos ϕ2 Fonda rad, cos ϕt Fonda rad, cos ϕ1 Fonda deg, cos ϕ2 Fonda deg, cos ϕt Fonda deg, Angle V1/V2 Fonda deg, I1 (signed), I2 (signed):
Dimensions (in mm)

Panel drilling diagram for plate mounting

Accessory for plate mounting with screw (option)

Weight: 320 g
Weight: 700 g
TRIAD 2 Range

TRIAD 2 programmable via TRIADJUST 2

TO ORDER

➤ T1 — SMALL MODEL (60 x 81 x 120.5 mm)

<table>
<thead>
<tr>
<th>Link</th>
<th>Output</th>
<th>Supply</th>
<th>Without tropicalization</th>
<th>With tropicalization</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Number of output(s)</td>
<td>Number of output(s)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>± 20 mA 80-265 V AC/DC</td>
<td>P0138001</td>
<td>P0138002</td>
</tr>
<tr>
<td></td>
<td></td>
<td>19-58 V DC</td>
<td>P0138003</td>
<td>P0138004</td>
</tr>
<tr>
<td></td>
<td></td>
<td>± 10 V 80-265 V AC/DC</td>
<td>P0138005</td>
<td>P0138006</td>
</tr>
<tr>
<td></td>
<td></td>
<td>19-58 V DC</td>
<td>P0138007</td>
<td>P0138008</td>
</tr>
</tbody>
</table>

➤ T3 — LARGE MODEL (120 x 81 x 120.5 mm)

<table>
<thead>
<tr>
<th>Link</th>
<th>Output</th>
<th>Supply</th>
<th>Without tropicalization</th>
<th>With tropicalization</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Number of output(s)</td>
<td>Number of output(s)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>± 20 mA 80-265 V AC/DC</td>
<td>P01380101</td>
<td>P01380102</td>
</tr>
<tr>
<td></td>
<td></td>
<td>19-58 V DC</td>
<td>P01380109</td>
<td>P01380110</td>
</tr>
<tr>
<td></td>
<td></td>
<td>± 10 V 80-265 V AC/DC</td>
<td>P01380117</td>
<td>P01380118</td>
</tr>
<tr>
<td></td>
<td></td>
<td>19-58 V DC</td>
<td>P01380125</td>
<td>P01380126</td>
</tr>
</tbody>
</table>

➤ TRIAD 2 factory-programmable

1 Model - Frequency
T1: small model — 1 analogue output
T3: large model — 1 to 4 analogue output(s)
0: 50 Hz
1: 60 Hz

2 Network
0: Single-phase
1: Balanced 3-phase, 3 wires
2: Balanced 3-phase, 4 wires
3: Unbalanced 3-phase, 3 wires
4: Unbalanced 3-phase, 4 wires
5: Split-phase

3 Communication - Connection
0: Without
1: RS485
2: Ethernet
Indicate the diagram number. E.g. TD204

4 Supply
0: 80-265 V AC/DC
1: 19-58 V DC

5 Tropicalization
0: Without
1: With

6 Inputs
Indicate direct voltage to be measured or the VT ratio
Indicate direct current to be measured or the CT ratio

7 Number of analogue outputs
0: Without (Choice of a minimum communication)
1: 1 output
2: 2 outputs (T3 model only)
3: 3 outputs (T3 model only)
4: 4 outputs (T3 model only)

8 Analogue outputs
Indicate for each output:
a- Quantity to be measured
b- Transfer curve
c- Input signal: Min — Breaking point - Max
d- Input unity
e- Output signal: Min — Breaking point - Max

9 Analogue output calibres
0: -20 mA to +20 mA
1: -5 mA to +5 mA
2: -1 mA to +1 mA
3: -10 V to +10 V
4: -1 V to +1 V

To simplify the procedure when ordering you can send us the form on page 237.
Factory-programmed TRIAD 2: order form

1 - Model / Hz
- 50 Hz or 60 Hz

2 - Network
- Single-phase
- 3-wire balanced three-phase
- 6-wire balanced three-phase
- 3-wire unbalanced three-phase
- 6-wire unbalanced three-phase
- Split-phase

3 - Communication / Connection
- Ethernet or RS485
- Connection diagram:
  - TP
  - cf p162 to p168

4 - Power supply
- 80 to 365 Vac (50/60 Hz) / 110 to 375 Vac or 19 to 58 Vac

5 - Tropicalization
- With
- Without

6 - Inputs
- Current:
  - With current transformer or Direct
  - Primary
  - Secondary
  - A

- Voltage:
  - With voltage transformer or Direct
  - Primary
  - Secondary
  - V

- Available quantities
  - V1 V2 V3
  - U12 U23 U31
  - I1 I2 I3
  - F
  - P1 P2 P3 Pr
  - Q1 Q2 Q3 Pr
  - St
  - FP1 FP2 FP3 FPt
  - TAN
  - COS
  - 1 COS
  - 2 COS
  - 3 COS
  - t
  - U12/23
  - U23/31
  - U31/12
  - V1/2
  - V2/3
  - V3/1

7 - Number of analogue outputs
- 0: Without (Choice of a minimum communication)
- 1: 1 output
- 2: 2 outputs (T3 model only)
- 3: 3 outputs (T3 model only)
- 4: 4 outputs (T3 model only)

8 - Analogue outputs calibres

Output 1
- Quantity and measurement range (x)
- Min
- breaking point
- Max
- Unit
- Linear
- 2 slopes
- Quadratic
- Output signal (y)
- Min
- Breaking point
- Max
- Unit
- Accuracy class
- 50 Hz
- 60 Hz
- 0.1%: 1 s
- 0.8 s
- 0.15%: 0.5 s
- 0.4 s
- 0.2%: 0.2 s
- 0.16 s
- 0.3%: 100 ms
- 80 ms
- 1%: 50 ms
- 40 ms

Output 2
- Quantity and measurement range (x)
- Min
- breaking point
- Max
- Unit
- Linear
- 2 slopes
- Quadratic
- Output signal (y)
- Min
- Breaking point
- Max
- Unit
- Accuracy class
- 50 Hz
- 60 Hz
- 0.1%: 1 s
- 0.8 s
- 0.15%: 0.5 s
- 0.4 s
- 0.2%: 0.2 s
- 0.16 s
- 0.3%: 100 ms
- 80 ms
- 1%: 50 ms
- 40 ms

Output 3
- Quantity and measurement range (x)
- Min
- breaking point
- Max
- Unit
- Linear
- 2 slopes
- Quadratic
- Output signal (y)
- Min
- Breaking point
- Max
- Unit
- Accuracy class
- 50 Hz
- 60 Hz
- 0.1%: 1 s
- 0.8 s
- 0.15%: 0.5 s
- 0.4 s
- 0.2%: 0.2 s
- 0.16 s
- 0.3%: 100 ms
- 80 ms
- 1%: 50 ms
- 40 ms

Output 4
- Quantity and measurement range (x)
- Min
- breaking point
- Max
- Unit
- Linear
- 2 slopes
- Quadratic
- Output signal (y)
- Min
- Breaking point
- Max
- Unit
- Accuracy class
- 50 Hz
- 60 Hz
- 0.1%: 1 s
- 0.8 s
- 0.15%: 0.5 s
- 0.4 s
- 0.2%: 0.2 s
- 0.16 s
- 0.3%: 100 ms
- 80 ms
- 1%: 50 ms
- 40 ms

(1) Please indicate the unit of the measurement range, e.g. W, kW or MW

171