APPLICATION
The various protective functions of the MRDT4 are specifically tailored to the protection of two winding transformers. The device offers in addition to the differential protection various communication and backup protection functions. Furthermore, the MRDT4 can be used for generator differential protection.

ALL INCLUSIVE:
- All protection features without extra charge
- Parameter setting and evaluation software
- Disturbance record analysis software

TRANSFORMER PHASE DIFFERENTIAL PROTECTION
- Stabilized phase differential protection with transients and C.T. saturation detection
- Various selectable transformer groups
- Zero sequence removal
- Three point slope characteristic
- High set element (non-restraint)

TWO STAGES GROUND DIFFERENTIAL PROTECTION
- Three point slope characteristic
- High set element (non-restraint)

BACKUP PROTECTION
- 4 Elements Overcurrent/short-circuit protection (non-directional)
- 4 Elements Earth fault protection (non-directional)
- Tripping characteristics: DEFT
  ANSI: NINV, VINV, EINV
  IEC: NINV, VINV, LINV, EINV, RXIDG
  Thermal Flat, I2T, I4T

TWO STAGES UNBALANCED LOAD PROTECTION
- Supervision by definite time or tripping characteristic

RECORDERS
- Disturbance recorder, 120 s non volatile
- Fault recorder
- Event recorder
- Trend recorder: 4000 non volatile entries

ADDITIONAL HIGHLIGHTS
- Inrush
- Thermal replica
- Four stages external protection
- Plausibility checks
- Adaptive parameter sets
- Status display
- Masking of unused functions
- Switchgear Manager and Switchgear wear

COMPREHENSIVE MEASURED VALUES AND STATISTICS
- THD (total harmonic distortion)
- Current phasors and angles
- RMS and fundamental
- Sequence currents
- Differential currents

TEMPERATURE PROTECTION
- Buchholz (sudden pressure), ext. oil temperature, and aux. temperature protection via digital input
- Temperature measurement via external RTD-box (option)

SUPERVISION
- Current transformer supervision
- Circuit breaker failure protection
- Trip circuit supervision
- Cold load pickup
- Switch onto fault

COMMISSIONING SUPPORT
- Copy and compare parameter sets
- Configuration files are convertible
- Forcing and disarming of output relays
- Fault simulator

COMMUNICATION OPTIONS
- IEC61850
- Profibus DP
- Modbus RTU or Modbus TCP
- IEC60870-5-103

CONTROL
- Two Switchgears
- Switchgear wear

LOGIC
- Up to 80 logic equations

TIME SYNCHRONISATION
- SNTP or IRIG-B00X
**FUNCTIONAL OVERVIEW**

### Protective Functions

<table>
<thead>
<tr>
<th>Description</th>
<th>Elements</th>
<th>ANSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transformer differential protection (2 windings), ld:</td>
<td>1</td>
<td>87T</td>
</tr>
<tr>
<td>Curve with zero point and three settable slopes and highset element (ld&gt;&gt;), Inrush stabilisation / detection of 2nd, 4th and 5th harmonics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restricted earth fault ldG, ldG&gt;&gt;, characteristics similar to 87T</td>
<td>2</td>
<td>87TN</td>
</tr>
<tr>
<td>I, time overcurrent and short circuit protection (non-directional)</td>
<td>4</td>
<td>50P</td>
</tr>
<tr>
<td>Tremendous reset options (instantaneous, definite time, reset characteristics according to IEC and ANSI)</td>
<td></td>
<td>51P</td>
</tr>
<tr>
<td>Id&gt;&gt;, unbalanced load protection with evaluation of the negative phase sequence currents</td>
<td>2</td>
<td>46</td>
</tr>
<tr>
<td>ThR, overload protection with thermal replica for transformers IEC60255-8, alarm and trip threshold</td>
<td>1</td>
<td>49T</td>
</tr>
<tr>
<td>IH2/In, inrush detection with evaluation of the 2nd harmonic</td>
<td>2</td>
<td>Inrush</td>
</tr>
<tr>
<td>IG, earth overcurrent and short circuit protection (non-directional)</td>
<td>4</td>
<td>50N</td>
</tr>
<tr>
<td>Tremendous reset options (instantaneous, definite time, reset characteristics according to IEC and ANSI)</td>
<td></td>
<td>51N</td>
</tr>
<tr>
<td>ExP, External alarm and trip functions</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

### Control and Logic

**Control**: Position indication, supervision time management and interlockings for 2 switchgears

**Logic**: Up to 80 logic equations, each with 4 inputs, selectable logical gates, timers and memory function

### Supervision Functions

<table>
<thead>
<tr>
<th>Description</th>
<th>Elements</th>
<th>ANSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBF, circuit breaker failure protection for both circuit breakers</td>
<td>2</td>
<td>50BF</td>
</tr>
<tr>
<td>TCS, trip circuit supervision</td>
<td>2</td>
<td>74TC</td>
</tr>
<tr>
<td>CTS, current transformer supervision</td>
<td>2</td>
<td>60L</td>
</tr>
<tr>
<td>CLPU, cold load pickup</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>SOTF, switch onto fault</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SGW, switchgear wear</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Non volatile event recorder up to 120 s with 32 samples per cycles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>THD supervision</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### APPROVALS

- CE certified regarding UL508 (Industrial Controls)
- UL certified regarding CSA-C22.2 No. 14 (Industrial Controls)
- EAC certified by EAC (Eurasian Conformity)
- Type tested (and certified) regarding IEC60255-1

### CONNECTIONS

[Diagram of connections]

[Caption: Only for use with external generic decapitated CT’s. See chapter Current Transformers of the manual]
FUNCTIONAL OVERVIEW IN ANSI FORM

MRDT4

Typical Configuration

Winding Side 1

Winding Side 2

W1 74TC

W1 50N

W1 51N

W1 87N

W1 Inrush

W1 50

W1 51

W1 46

W1 50BF

W2 50N

W2 51N

W2 87N

W2 Inrush

W2 50

W2 51

W2 46

W2 50BF

Metering

Current Max/Min/Avg, THD Current, Current Phasors, Sequence Currents, Diff Currents, Harmonic Currents

Fault recorder

Event recorder

Disturbance recorder

Trend recorder

W1 or W2 CLPU

W1 or W2 SOTF

87T

Switchgear Wear (2 elements)

Switchgear Wear (2 elements)

Programmable Logic

Control

Comm Interface(s)

SNTP

IRIG

IRIG

Comm Interface(s)
**ORDER FORM MRDT4**

<table>
<thead>
<tr>
<th>Non-directional Transformer Differential Protection</th>
<th>MRDT4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Inputs</td>
<td>Binary output relays</td>
</tr>
<tr>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>16</td>
<td>13</td>
</tr>
</tbody>
</table>

**Hardware variant**
- Phase Current S A/1 A, W1/W2 Ground Current 5 A/1 A
- Phase Current S A/1 A, W1 Sen. Gr. Curr. 5 A/1 A, W2 Gr. Curr. 5 A/1 A
- Phase Current S A/1 A, W1 Gr. Curr. 5 A/1 A, W2 Sen. Gr. Curr. 5 A/1 A
- Phase Current S A/1 A, W1/W2 Sen. Gr. Curr. 5 A/1 A

**Communication protocol**
- Without protocol
- Modbus RTU, IEC60870-5-103, RS485/terminals
- Modbus TCP, Ethernet 100 MB/ RJ45
- Profibus-DP, optic fiber
- Profibus-DP, RS485/D-SUB
- Modbus RTU, IEC60870-5-103, optic fiber
- Modbus RTU, IEC60870-5-103, RS485/D-SUB
- IEC61850, Ethernet 100 MB/ RJ45

**Presetting of available menu languages**
- Standard English/German/Russian/Polish/Portuguese/French

- The parameterizing- and disturbance analyzing software Smart View is included in the delivery of HighPROTEC devices.

**Current inputs**
- 8 (1 A and 5 A) with automatic short-circuiters

**Digital Inputs**
- Switching thresholds adjustable via software

**Power supply**
- Wide range power supply
- 24 V _dc_ - 270 V _dc_ / 48 V _ac_ - 230 V _ac_ (-20/+10%)

**Terminals**
- All terminals plug type

**Type of enclosure**
- IP54

**Dimensions of housing**
- 19” flush mounting: 212.7 mm x 173 mm x 208 mm
- Door mounting: 212.7 mm x 183 mm x 208 mm
- 8.374 in. x 6.810 in. x 8.189 in.
- 8.374 in. x 7.200 in. x 8.189 in.

**Weight (max. components)**
- approx. 4 kg

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