

# HighPROTEC-2 | PROTECTION TECHNOLOGY MADE SIMPLE

## MRDT4-2 | TRANSFORMER DIFFERENTIAL PROTECTION RELAY


**New  
Features**

- DNP 3.0
- Multiple Communication with One Device
- ANSI Menu Structure
- Page Editor
- IEC 61850 with LC Interface
- Enhanced Security Features



### 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 ELEMENTS 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, IT, I2T, I4T

#### TWO ELEMENTS UNBALANCED LOAD PROTECTION

- Supervision by definite time or tripping characteristic

#### RECORDERS

- Disturbance recorder: 120 s non volatile
- Fault recorder: 20 faults
- Event recorder: 300 events
- Trend recorder: 4000 non volatile entries

#### ADDITIONAL HIGHLIGHTS

- Inrush
- Thermal replica
- Four elements external protection
- Plausibility checks
- Adaptive parameter sets
- Status display
- Breaker Manager, Breaker 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

- USB connection
- Customizable Display (Single-Line, ...)
- Customizable Inserts
- Copy and compare parameter sets
- Forcing and disarming of output relays
- Fault simulator
- Graphical display of tripping characteristics
- 8 languages selectable within the relay

#### COMMUNICATION OPTIONS

- IEC 61850, IEC 60870-5-103, Profibus DP
- Modbus RTU and/or Modbus TCP
- DNP 3.0 (RTU, TCP, UDP)

#### IT SECURITY

- Menu for the activation of BDEW-Whitepaper-compliant security settings (e.g. hardening of interfaces)

#### CONTROL

- Two breakers (or isolators/grounding switches)
- Breaker wear

#### LOGIC

- Up to 80 logic equations for protection, control and monitoring

#### TIME SYNCHRONISATION

- SNTP, IRIG-B00X, Modbus, DNP 3.0, IEC60870-5-103

#### PC TOOLS

- Setting and analyzing software
- Smart view for free
- Including page editor to design own pages

## FUNCTIONAL OVERVIEW

	Elements	ANSI
<b>Protective Functions</b>		
Transformer differential protection (2 windings), Id:	1	87T
Curve with zero point and three settable slopes and highset element (Id>>), Inrush stabilisation / detection of 2nd, 4th and 5th harmonics		
Restricted earth fault IdG, IdG>>, characteristics similar to 87T	2	87TN
I, time overcurrent and short circuit protection (non-directional)	4	50P, 51P
Multiple reset options (instantaneous, definite time, reset characteristics according to IEC and ANSI)		
I2>, unbalanced load protection with evaluation of the negative phase sequence currents	2	46
ThR, overload protection with thermal replica for transformers IEC60255-8, alarm and trip threshold	1	49T
IH2/In, inrush detection with evaluation of the 2nd harmonic	2	Inrush
IG, earth overcurrent and short circuit protection (non-directional)	4	50N, 51N
Tremendous reset options (instantaneous, definite time, reset characteristics according to IEC and ANSI)		
ExP, External alarm and trip functions	4	
RTD temperature supervision via optional RTD-Box with 12 sensors		26
<b>Control and Logic</b>		
Control: Position indication, supervision time management and interlockings for 2 breakers		
Logic: Up to 80 logic equations, each with 4 inputs, selectable logical gates, timers and memory function		
<b>Supervision Functions</b>		
CBF, circuit breaker failure protection for both circuit breakers	2	50BF
TCS, trip circuit supervision	2	74TC
CTS, current transformer supervision	2	60L
CLPU, cold load pickup	1	
SOTF, switch onto fault	1	
BW, breaker wear	2	
Non volatile event recorder up to 120 s with 32 samples per cycles		
THD supervision		

## APPROVALS



certified regarding UL508 (Industrial Controls)



certified regarding CSA-C22.2 No. 14 (Industrial Controls)



certified by EAC (Eurasian Conformity)



Type tested (and certified) regarding IEC60255-1

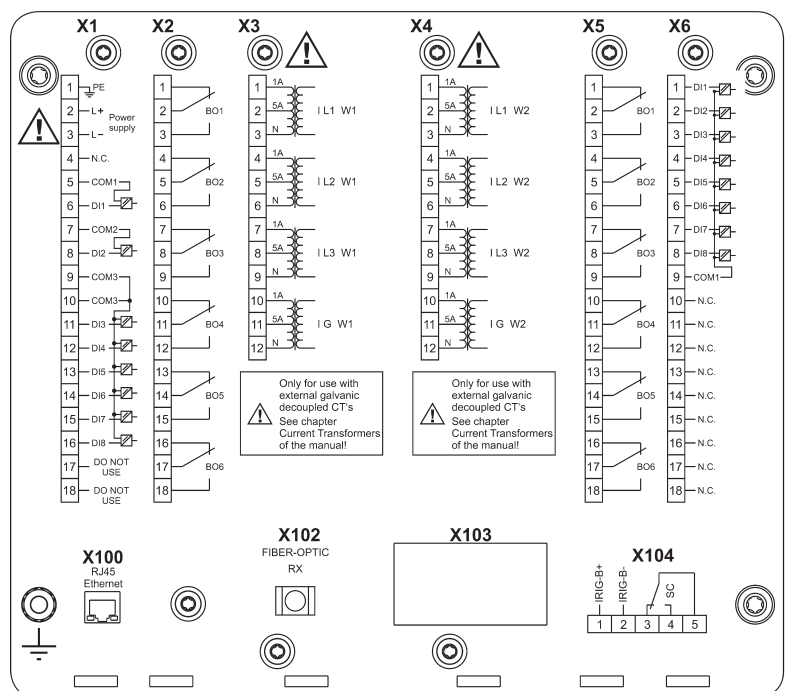


Lloyd's Register Type Approval Certificate

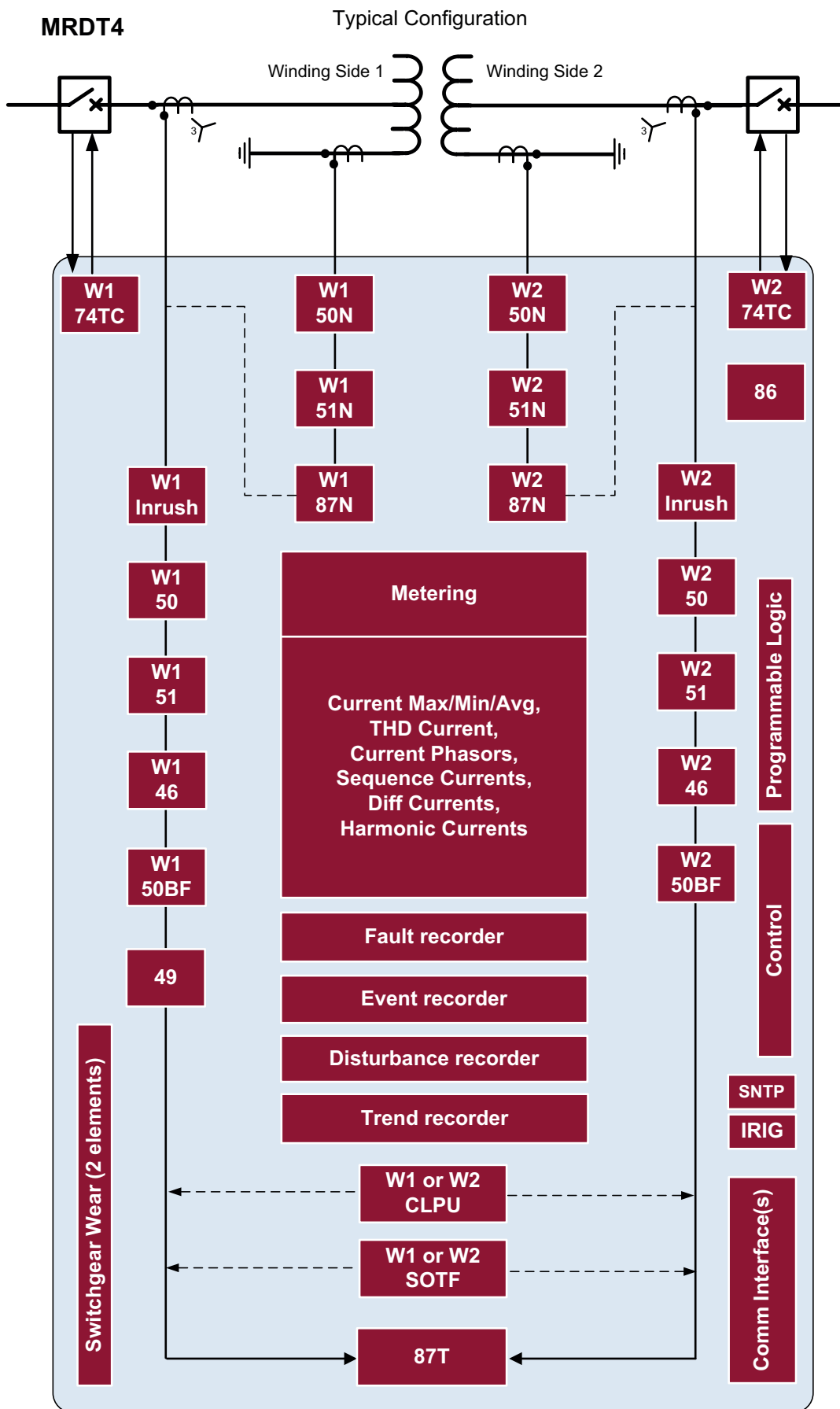
complies with IEEE 1547-2003 amended by IEEE 1547a-2014

complies with ANSI C37.90-2005

## CONNECTIONS (EXAMPLE)



### FUNCTIONAL OVERVIEW IN ANSI FORM



## ORDER FORM MRDT4-2

Non-directional Transformer Differential Protection				MRDT4	-2				
Version 2 with USB, enhanced communication and user options									
Digital Inputs	Binary output relays	Housing	Large display						
8	7	B2	-					A	
16	13	B2	-					D	
Hardware variants									
Phase Current 5 A/1 A, W1/W2 Ground Current 5 A/1 A									0
Phase Current 5 A/1 A, W1 Sen. Gr. Curr. 5 A/1 A, W2 Gr. Curr. 5 A/1 A									1
Phase Current 5 A/1 A, W1 Gr. Curr. 5 A/1 A, W2 Sen. Gr. Curr. 5 A/1 A									2
Phase Current 5 A/1 A, W1/W2 Sen. Gr. Curr. 5 A/1 A									3
Housing and mounting									
Door mounting									A
Door mounting 19" (flush mounting)									B
Communication protocol									
Without protocol									A
Modbus RTU, IEC60870-5-103, DNP3.0 RTU   <i>RS485/terminals</i>									B*
Modbus TCP, DNP3.0 TCP/UDP   <i>Ethernet 100 MB/RJ45</i>									C*
Profibus-DP   <i>optic fiber/ST-connector</i>									D*
Profibus-DP   <i>RS485/D-SUB</i>									E*
Modbus RTU, IEC60870-5-103, DNP3.0 RTU   <i>optic fiber/ST-connector</i>									F*
Modbus RTU, IEC60870-5-103, DNP3.0 RTU   <i>RS485/D-SUB</i>									G*
IEC61850, Modbus TCP, DNP3.0 TCP/UDP   <i>Ethernet 100MB/RJ45</i>									H*
IEC60870-5-103, Modbus RTU, DNP3.0 RTU   <i>RS485/terminals</i>									I*
Modbus TCP, DNP3.0 TCP/UDP   <i>Ethernet 100 MB/RJ45</i>									J*
IEC61850, Modbus TCP, DNP3.0 TCP/UDP   <i>Optical Ethernet 100MB/LC duplex connector</i>									K*
Modbus TCP, DNP3.0 TCP/UDP   <i>Optical Ethernet 100MB/LC duplex connector</i>									L*
IEC60870-5-103, Modbus RTU, DNP3.0 RTU   <i>RS485/terminals</i>									M*
IEC61850, Modbus TCP, DNP3.0 TCP/UDP   <i>Ethernet 100 MB/RJ45</i>									T*
Harsh Environment Option									
None									A
Conformal Coating									B
Available menu languages (in every device)									
English / German / Spanish / Russian / Polish / Portuguese / French / Romanian									

\* Within every communication option only one communication protocol is usable.  
*Smart view* can be used in parallel via the Ethernet interface (RJ45).

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

<b>Current inputs</b>	8 (1 A and 5 A) with automatic CT Disconnect
<b>Digital Inputs</b>	Switching thresholds adjustable via software
<b>Power supply</b>	Wide range power supply $24 V_{DC} - 270 V_{DC} / 48 V_{AC} - 230 V_{AC} (-20/+10\%)$
<b>Terminals</b>	All terminals plug type
<b>Type of enclosure</b>	IP54
<b>Dimensions of housing (W x H x D)</b>	19" flush mounting: 212.7 mm x 173 mm x 208 mm 8.374 in. x 6.811 in. x 8.189 in. Door mounting: 212.7 mm x 183 mm x 208 mm 8.374 in. x 7.205 in. x 8.189 in.
<b>Weight (max. components)</b>	approx. 4 kg

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