

HighPROTEC I

PROTECTION TECHNOLOGY
MADE SIMPLE

MRDT4 I

TRANSFORMER DIFFERENTIAL
PROTECTION RELAY

NEW FEATURES - Release 3.6

- VDE-AR-N 4110; VDE-AR-N 4120
- Wattmetric Ground Fault Protection
- IEC 60870-5-104
- SCADApter for Retrofit
- Usability improvements
- IT Security

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 also be used as a cost-optimized generator differential protection device, where it is even possible to have a step-up transformer integrated into the protection zone. The protection functions of the MRDT4 have been adapted to comply with the requirements of the VDE-AR-N-4110:2018.



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)
- Wattmetric Ground Fault Protection

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
- IEC 60870-5-104
- DNP 3.0 (RTU, TCP, UDP)
- SCADApter for Retrofit

IT SECURITY

- Menu for the activation of BDEW-Whitepaper-compliant security settings
- Security Logger
- Self-monitoring; Syslog
- Encrypted connection with Smart view

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
Protective Functions		
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/G, 51N/G
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
Control and Logic		
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		
Supervision Functions		
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

CE

UL certified regarding UL508 (Industrial Controls)

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

EAC certified by EAC (Eurasian Conformity)

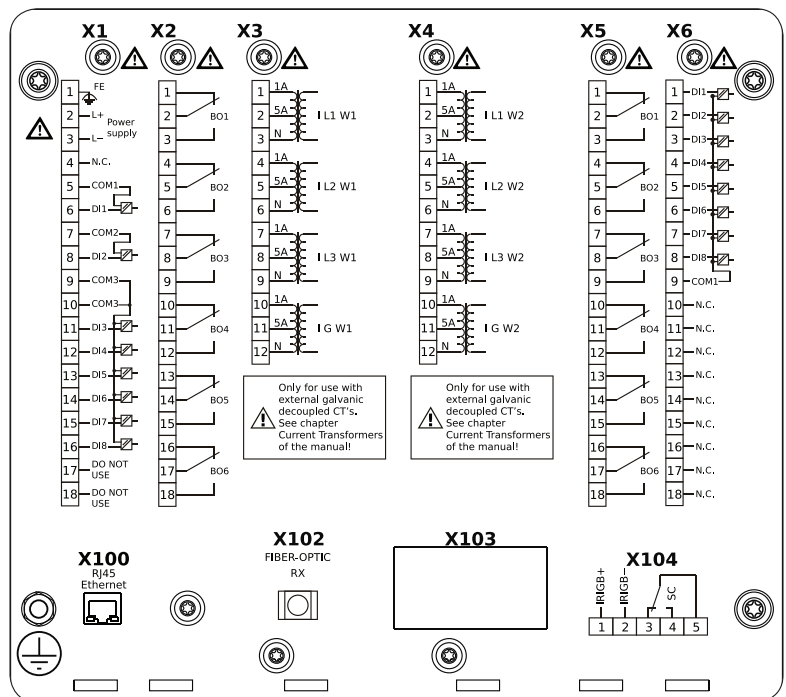
KEMA Type tested (and certified) regarding IEC60255-1

Lloyd's Register Lloyd's Register Type Approval Certificate

KESCO 통일성 선언서 (Declaration of Identity)

CCC Type Approval Certificate from CQC China

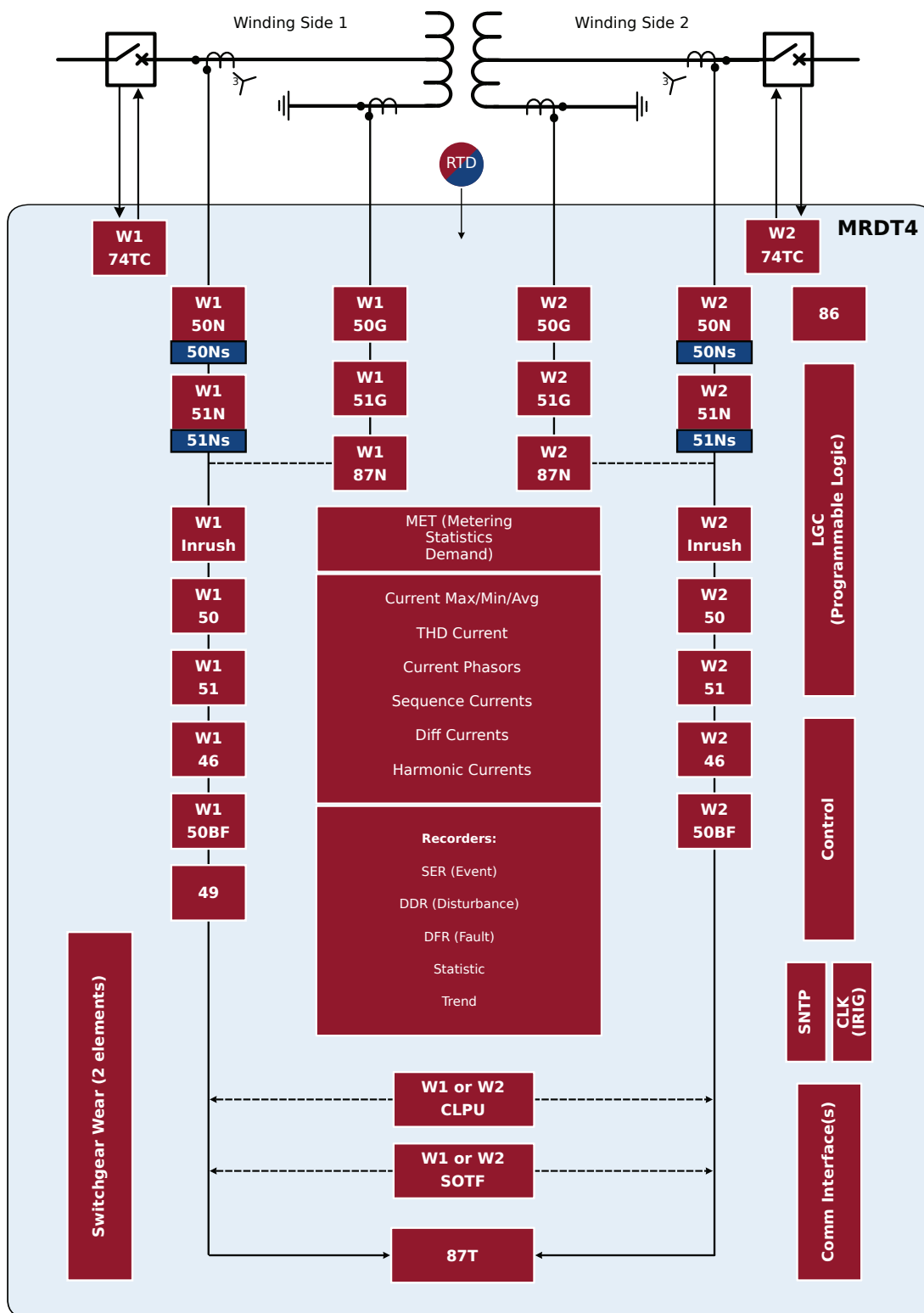
CONNECTIONS (EXAMPLE)



Complies with IEEE 1547-2003
 Amended by IEEE 1547a-2014
 Complies with ANSI C37.90-2005

FUNCTIONAL OVERVIEW IN ANSI FORM

Typical Configuration



Option

Standard

RTD (ANSI 26/38/49): requires URTD box (separate hardware)

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									
Housing suitable for door mounting									A
Housing suitable for 19" rack 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, IEC 60870-5-104 <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, IEC 60870-5-104 <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, IEC60870-5-104 <i>Ethernet 100 MB/RJ45</i>									K*
IEC61850, Modbus TCP, DNP3.0 TCP/UDP, IEC 60870-5-104 <i>Optical Ethernet 100MB/LC duplex connector</i>									L*
Modbus TCP, DNP3.0 TCP/UDP, IEC 60870-5-104 <i>Optical Ethernet 100MB/LC duplex connector</i>									T*
IEC60870-5-103, Modbus RTU, DNP3.0 RTU <i>RS485/terminals</i>									
IEC61850, Modbus TCP, DNP3.0 TCP/UDP, IEC60870-5-104 <i>Ethernet 100 MB/RJ45</i>									
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.

Current inputs	8 (1 A and 5 A) with automatic CT Disconnect
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 (W x H x D)	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.
Weight (max. components)	approx. 4 kg

19" Variants Available! **



<http://wwdmanuals.com/hpt-2>

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