

High**PROTEC**

MRDT4 **TRANSFORMER DIFFERENTIAL PROTECTION**

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

Comprehensive Measured Values and Statistics

- ▶ THD (total harmonic distortion)
- ▶ Current phasors and angles
- ▶ RMS and fundamental
- ▶ Sequence currents
- ▶ Differential currents

Temperature Protection

- ▶ Thermal replica
- ▶ 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

Recorders

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

PC Tools

- ▶ Setting and analyzing software
Smart view for free
- ▶ Including page editor to design own Control pages
- ▶ SCADApter to re-assign datapoints for Retrofit projects: Modbus, Profibus, IEC 60870-5-103/ -104

Logic

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

Control

- ▶ 2 breakers (or isolators / grounding switches)
- ▶ Breaker wear



New Features – Release 3.7

- ▶ Improved CT Saturation Stabilization
- ▶ Improved design of the PC tools
- ▶ Configurable SCADA protocols:
Modbus, Profibus, IEC 60870-5-103/-104, DNP3

All HighPROTEC devices have been type tested and fully certified by KEMA Laboratories (IEC 60255-1:2009).

Commissioning Support

- ▶ USB connection
- ▶ Customizable Display (Single-Line)
- ▶ Customizable Inserts
- ▶ Copy and compare parameter sets
- ▶ Configuration files are convertible
- ▶ Forcing and disarming of output relays
- ▶ Fault simulator: current, voltage
- ▶ Graphical display of tripping characteristics
- ▶ 8 languages selectable within the relay

Communication Options

- ▶ IEC 61850
- ▶ Profibus DP
- ▶ Modbus RTU and/or Modbus TCP
- ▶ IEC 60870-5-103
- ▶ IEC 60870-5-104
- ▶ DNP 3.0 (RTU, TCP, UDP)
- ▶ SCADApter

Cyber Security

- ▶ Menu for the activation of security settings (e. g. hardening of interfaces)
- ▶ Security Logger
- ▶ Centralized Security Logs (Syslog)
- ▶ Encrypted Connection Smart view – Device
- ▶ Device specific certificates (No man in the middle attacks)

Time Synchronisation

- ▶ SNTP, IRIG-B00X, Modbus, DNP 3.0, IEC 60870-5-103/-104

High**PROTEC**

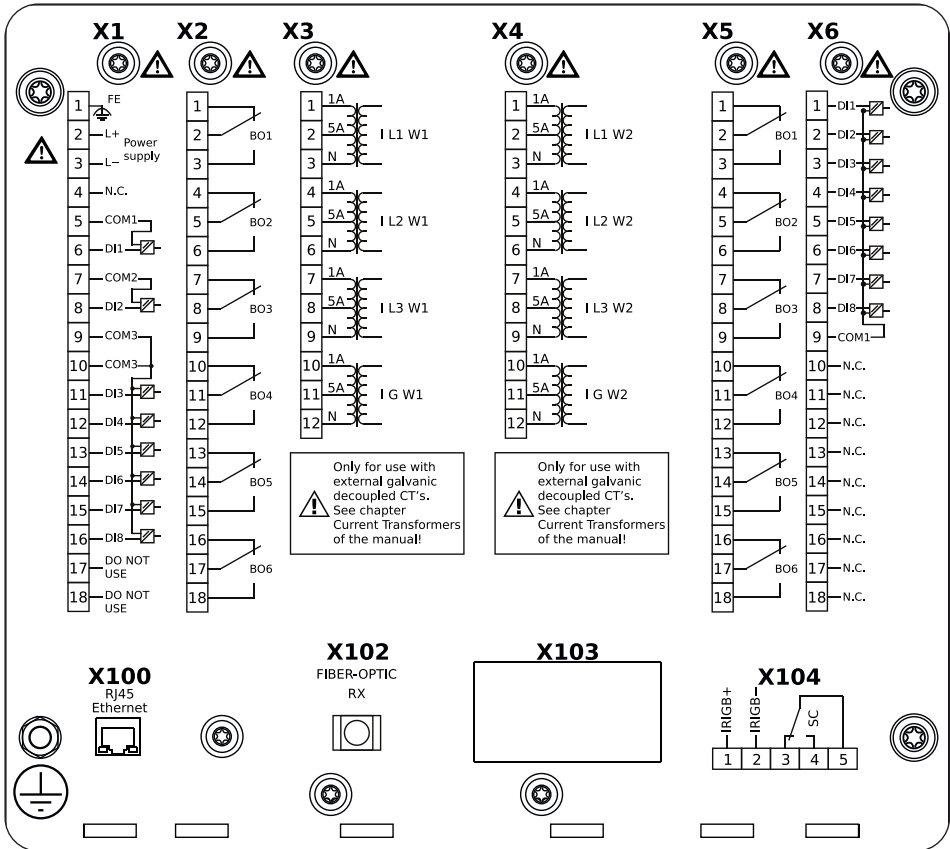
MRDT4

TRANSFORMER DIFFERENTIAL PROTECTION

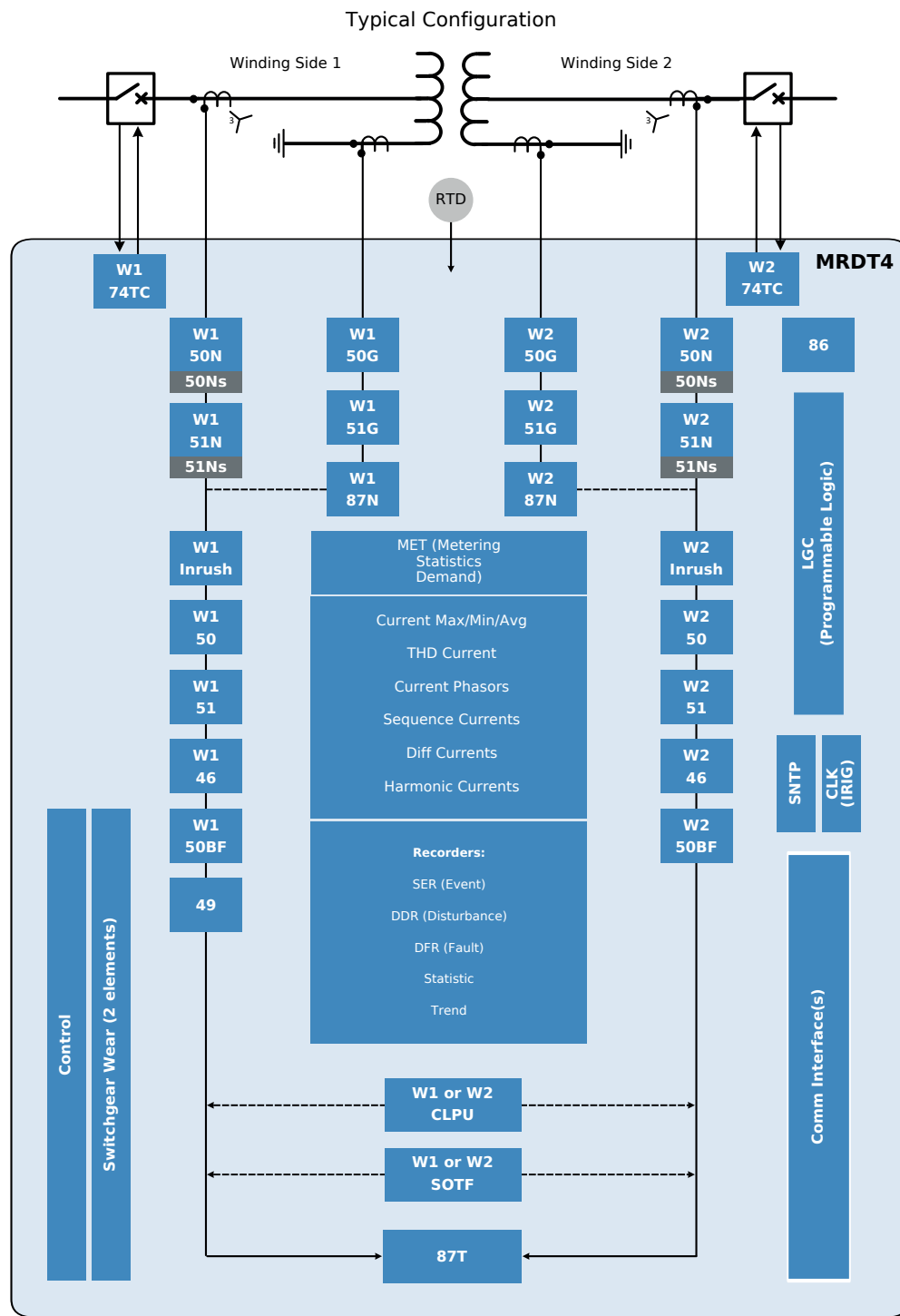
Functional Overview

Protective Functions	ANSI	IEC 61850
Transformer differential protection (2 windings), Id:	1	87T
Curve with zero point and three settable slopes and highset element (Id>>),		PDIF
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)		
Multiple reset options (instantaneous, definite time, reset characteristics according to IEC and ANSI)	4	50P, 51P
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	GAPC
RTD temperature supervision via optional RTD-Box with 12 sensors	26	PTTR
Control and Logic		
Control: Position indication, supervision time management and interlockings for 2 breakers		CILO, CSWI, XCBR, XSWI
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	PSOF
BW, breaker wear	2	
Non volatile event recorder up to 120 s with 32 samples per cycles		
THD supervision		

Connections (Example)



Functional Overview in ANSI / IEEE C37.2 Form



● Standard ● Option

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

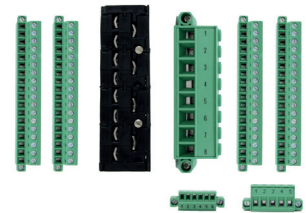
19 " Variants Available!

See Order Form on page 4,
housing type "rack mounting"



<https://docs.SEGelectronics.de/hpt-2>

Terminals Available Separately!



Order codes HPTTERMKIT-1 ... -5
For MRD4: HPTTERMKIT-4
The terminal kits allow for making
all required wirings in advance,
thus speeding up the installation
and commissioning work.

Approvals / Standards



certified regarding UL508
(Industrial Controls)



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



certified by EAC
(Eurasian Conformity)



Type tested and certified by
KEMA Laboratories in ac-
cording with the complete
type test requirements of
IEC 60255-1:2009.

Fulfills the requirements of the German grid
code standard VDE-AR-N 4110 (2018-11)

Complies with "Engineering Recommenda-
tion G99 Issue 1
Amendment 6 - March 2020".

Complies with IEEE 1547-2003.

Amended by IEEE 1547a-2014.

Complies with ANSI C37.90-2005.

PROTECTION MADE SIMPLE.

Order Form MRDT4

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 RS485/terminals				B*						
Modbus TCP, DNP3.0 TCP/UDP, IEC 60870-5-104 Ethernet 100 MB/RJ45				C*						
Profibus-DP optic fiber/ST-connector				D*						
Profibus-DP RS485/D-SUB				E*						
Modbus RTU, IEC60870-5-103, DNP3.0 RTU optic fiber/ST-connector				F*						
Modbus RTU, IEC60870-5-103, DNP3.0 RTU RS485/D-SUB				G*						
IEC61850, Modbus TCP, DNP3.0 TCP/UDP, IEC 60870-5-104 Ethernet 100MB/RJ45				H*						
IEC60870-5-103, Modbus RTU, DNP3.0 RTU RS485/terminals				I*						
Modbus TCP, DNP3.0 TCP/UDP, IEC60870-5-104 Ethernet 100 MB/RJ45				K*						
IEC61850, Mod. TCP, DNP3.0 TCP/UDP, IEC 60870-5-104 Opt. Eth. 100MB/LC duplex conn.				L*						
Modbus TCP, DNP3.0 TCP/UDP, IEC 60870-5-104 Opt. Ethernet 100MB/LC duplex connector				T*						
IEC60870-5-103, Modbus RTU, DNP3.0 RTU RS485/terminals										
IEC61850, Modbus TCP, DNP3.0 TCP/UDP, IEC60870-5-104 Ethernet 100 MB/RJ45										
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 can be used without extra costs.

Current inputs	4 (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

Contact:

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Service & Support

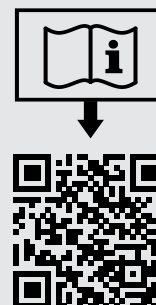
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Find Your Local Distributor on

<http://www.SEGelectronics.de>

Technical Documents:

<https://docs.SEGelectronics.de/mrdt4-2>



For more information please contact: