

# HighPROTEC

## MCDTV4 TRANSFORMER DIFFERENTIAL PROTECTION

The MCDTV4 offers an all-in-one solution for HV, MV and LV transformers and it offers much more than just a differential protection package. Furthermore it can detect critical operation states based on voltage measurement (e.g. Overexcitation). The MCDTV4 provides in addition to that an Interconnection package. This can be used for mains protection at the point of common coupling (e.g. for directional reactive power undervoltage protection). The integrated backup protection package enables the MCDTV4 to act as backup protection (e.g. for downstream breakers). Additional features like demand management are available without extra charge. The protection functions of the MCDTV4 have been adapted to comply with the requirements of the VDE-AR-N-4110:2018.

### Comprehensive Transformer Protection Package

- ▶ The Phase and Ground Differential protection package detects electrical faults within the transformer.
- ▶ Two elements overexcitation protection (overfluxing)
- ▶ Overload / Thermal replica for detection of long lasting minor overcurrents  
Six elements (voltage dependent) time overcurrent protection (ANSI/IEC/51C/51V)
- ▶ Frequency measurement improved (5mHz from 45-55 Hz)
- ▶ Multiple power elements (Pr, P, Q, S, PF...)
- ▶ Negative phase sequence protection
- ▶ Multi level overvoltage protection with settable reset ratio
- ▶ Multi level undervoltage protection with settable reset ratio
- ▶ Buchholz supervision via digital input
- ▶ Unbalanced voltage protection
- ▶ Optional temperature supervision via external URTD-box with 12 sensors
- ▶ Wattmetric Ground Fault Protection

### Interconnection Package

- ▶ Non-discriminating active power direction depending load shedding
- ▶ FRT (LVRT): Settable FRT-Profiles, optional AR coordinated
- ▶ QV-Protection: Undervoltage-Reactive
- ▶ Power protection
- ▶ Automatic Reconnection
- ▶ Frequency protection:  
6 elements configurable as  $f<$ ,  $f>$ ,  $df/dt$  (ROCOF), vector surge
- ▶ CB-Intertripping
- ▶ Synchro-check (Generator to mains, mains-to-mains)

### 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 free of charge
- ▶ Including page editor to design own Control pages
- ▶ SCADApter to re-assign datapoints for Retrofit projects: Modbus, Profibus, IEC 60870-5-103/ -104

### Control

- ▶ up to six breakers (or isolators/grounding switches)
- ▶ Breaker wear

### Commissioning Support

- ▶ 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/-104
- ▶ DNP 3.0 (RTU, TCP, UDP)
- ▶ SCADApter for Retrofit



### New Features - Release 3.7

- ▶ G99 Issue 1 Amendment 6
- ▶ Improved frequency and ROCOF precision
- ▶ 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).*

### Cyber Security

- ▶ Menu for the activation of BDEW-White-paper-compliant 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)
- ▶ Multi-Password-Level

### Logic

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

### Time Synchronisation

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

## MCDTV4 TRANSFORMER DIFFERENTIAL PROTECTION

### Functional Overview

Protective Functions		ANSI	IEC 61850
Transformator differential protection, Id>, Id>>	2	87T	PDIF
Restricted earth fault IdE>, IdE>>	4	87TN / 64REF	PDIF
I, time overcurrent and short circuit protection	6	50P, 51P, 67P	PTOC
Various reset options (instantaneous, definite time, reset characteristics acc. to IEC and ANSI)			
Voltage controlled overcurrent protection by means of adaptive parameters		51C	
Voltage dependent overcurrent protection		51V	
Negative phase sequence overcurrent protection		51Q	
I2>, unbalanced load protection with evaluation of the negative phase sequence currents	2	46	PTOC
ThR, overload protection with thermal replica and separate pick-up values for alarm and trip functions	1	49	PTTR
IH2/In, inrush detection with evaluation of the 2nd harmonic	2	Inrush	PHAR
IG, earth overcurrent and short circuit protection, all elements can be configured for directional (multi-polarising) or non-directional supervision. Multiple reset options (instantaneous, definite time, reset characteristics according to IEC and ANSI)	4	50N/G, 51N/G, 67N/G	PTOC
IG, sensitive wattmetric earth overcurrent- and short circuit trip, all steps directional or non-directional	4	50Ns, 51Ns, 67Ns	PTOC
V<, V>, V(t)<, under- and overvoltage protection, time dependent undervoltage protection	6	27, 59	PTOV, PTUV
Voltage asymmetry supervision (V0I2)			
V1, under and overvoltage in positive phase sequence system	6	47	PTOV, PTUV
V2, overvoltage in negative phase sequence system			
Each of the six frequency protection elements can be used as: f<, f>, df, dt, ROCOF, DF/DT, vector surge, ...	6	81U/O, 81R, 78	PTOF, PTUF, PFRC, PPAM
VX, residual voltage protection or bus bar voltage for Synch Check	2	27A, 59A, 59N	PTOV, PTUV
ExP, External alarm and trip functions	4		GAPC
Ext Sudd Press: Embedding sudden pressure via Digital Input	1		GAPC
Ext Temp Superv: Embedding external temperature supervision via Digital Input	3		GAPC
Ext Oil Temp: Embedding external oil temperature via Digital Input	1		GAPC
PQS, Power protection	6	32, 37	PDOP, PDUP
PF, Power factor	2	55	PUPF
LVRT (FRT- Low Voltage Ride Through including optional controlled by AR-feature)	27 (t)	27 (t, AR)	
Q(V) Protection (undervolt. dep. directional reactive power protection with reclosing disengaging)			PTUV
UFLS (non-discriminating active power direction depending load shedding)			PFRC
10-Minutes-Mean-Square-Sliding Supervision: adjustable according to VDE-AR 4105			
Synch Check		25	RSYN
Volts / Hertz	2	24	PVPH
RTD temperature supervision via optional RTD-Box with 12 sensors		26	PTTR

### Control and Logic

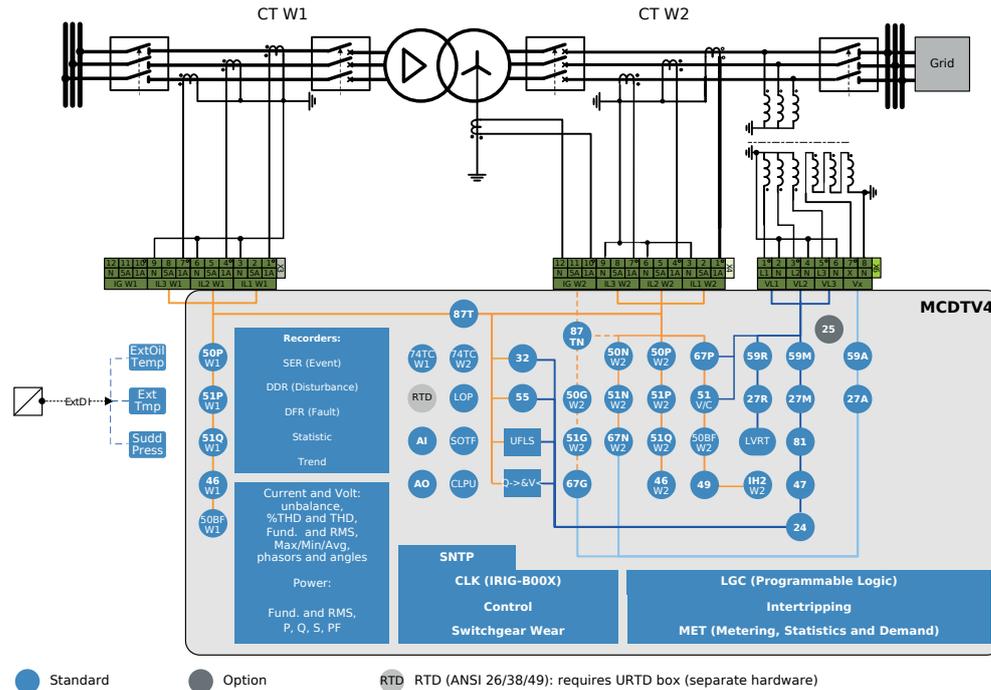
Control: Position indication, supervision time management and interlockings for up to 6 breakers			CILO, CSWI, XCBR, XSWI
Logic: Up to 80 logic equations, each with 4 inputs, selectable logical gates, timers- and memory- function			

### Supervision Functions

CBF, circuit breaker failure protection	2	50BF / 62BF	RBRF
TCS, trip circuit supervision	2	74TC	SCBR
LOP, loss of potential	1	60FL	
FF, fuse failure protection via digital input	1	60FL	
CTS, current transformer supervision	2	60L	
CLPU, cold load pickup	1		
SOTF, switch onto fault	1		PSOF
THD supervision			
Breaker wear with programmable wear curves			
Recorders: Disturbance recorder, fault recorder, event recorder, trend recorder			RDRE

The protective functions of the MCDTV4 have been extended to meet the requirements of VDE-AR-N-4110:2018.

## Functional Overview in ANSI / IEEE C37.2 Form



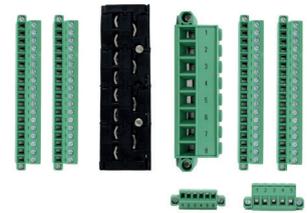
19 " Variants Available!

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



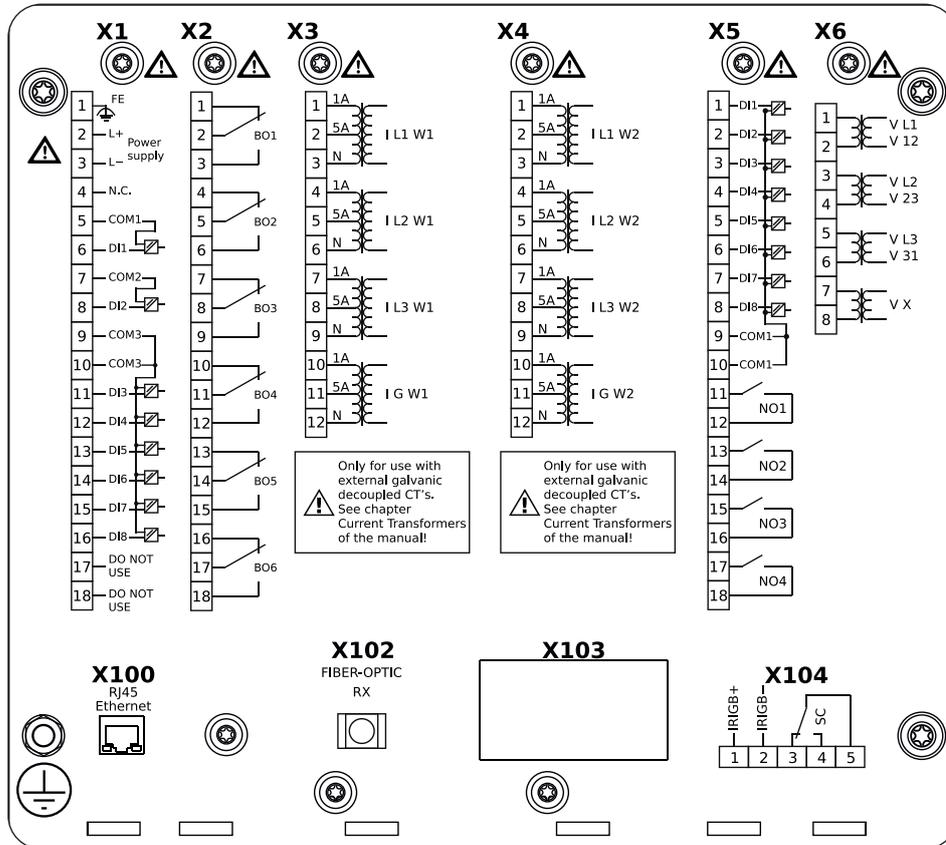
<https://docs.SEGelectronics.de/hpt-2>

Terminals Available Separately!



Order codes HPTTERMKIT-1 ... -5  
For MCDTV4: HPTTERMKIT-5  
The terminal kits allow for making all required wirings in advance, thus speeding up the installation and commissioning work.

## Connections (Example)



## 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 accordance 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 G99 Issue 1 Am. 6.

Complies with IEEE 1547-2003.

Amended by IEEE 1547a-2014.

Complies with ANSI C37.90-2005.

PROTECTION MADE SIMPLE.

## Order Form MCDTV4

Transformer Differential Protection					MCDTV4	-2				
Version 2 with USB, enhanced communication and user options										
Digital Inputs	Binary output relays	Analog Inputs/Outputs	Housing	Large Display						
16	11	0/0	B2	X	A					
8	11	2/2	B2	X	B					
Hardware variant 2										
Phase Current 5 A/1 A, 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					J*					
IEC61850, Modb. TCP, DNP3.0 TCP/UDP, IEC 60870-5-104   Opt. Eth. 100MB/LC duplex conn.					K*					
Modbus TCP, DNP3.0 TCP/UDP, IEC 60870-5-104   Opt. Ethernet 100MB/LC duplex connector					L*					
IEC60870-5-103, Modbus RTU, DNP3.0 RTU   RS485/terminals					M*					
IEC61850, Modbus TCP, DNP3.0 TCP/UDP, IEC60870-5-104   Ethernet 100 MB/RJ45					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 can be used without extra costs.

<b>Current inputs</b>	4 (1 A and 5 A) with automatic CT Disconnect
<b>Voltage inputs</b>	4 (0 ... 800 V)
<b>Digital Inputs</b>	Switching thresholds adjustable via software
<b>Analog Inputs (Type B)</b>	0 ... 20mA / 4 ... 20mA / 0 ... 10V
<b>Analog outputs (Type B)</b>	0 ... 20mA / 4 ... 20mA / 0 ... 10V
<b>Power supply</b>	Wide range power supply 24 V <sub>DC</sub> - 270 V <sub>DC</sub> / 48 V <sub>AC</sub> - 230 V <sub>AC</sub> (-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. 4.7 kg / 10.36 lb

## Contact:

### SEG Electronics GmbH

Krefelder Weg 47  
47906 Kempen  
Germany

### Sales

Phone: +49 (0) 21 52 145 331  
Fax: +49 (0) 21 52 145 354  
E-Mail: sales@SEGelectronics.de

### Service & Support

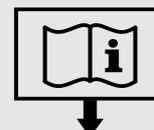
Phone: +49 (0) 21 52 145 600  
Fax: +49 (0) 21 52 145 354  
E-Mail: support@SEGelectronics.de

### Find Your Local Distributor on

<http://www.SEGelectronics.de>

### Technical Documents:

<https://docs.SEGelectronics.de/mcdtv4-2>



For more information please contact:

© SEG Electronics GmbH  
www.SEGelectronics.de  
All Rights Reserved | 03/2022