

# HighPROTEC-2 | PROTECTION TECHNOLOGY MADE SIMPLE

## MCDLV4-2 | CABLE AND LINE DIFFERENTIAL PROTECTION SYSTEM



- Line differential
- In-zone transformer differential
- Remote parameter setting
- Remote monitoring
- Transfer signals
- Transfer trips

### APPLICATION

The MCDLV4 protection system protects cables and lines up to 24 km. The system is able to replace up to six protection devices.

- 2 Cable and Line Differential Devices
- + 2 Directional Feeder Backup Devices
- + 1 In-Zone Transformer Differential Device
- + 1 Mains decoupling Device

= 6 Devices combined in one System



### CABLE AND LINE DIFFERENTIAL

- Protection for cables and lines up to 24 km

### DIRECTIONAL FEEDER BACKUP <sup>(1)</sup>

- Six elements phase overcurrent protection directional and non-directional (ANSI/IEC/51C/51V)
- Four elements earth fault protection <sup>(2)</sup> non-directional or directional (multi-polarising)
- Two elements unbalanced load protection
- Voltage protection <sup>(2)</sup> six elements selectable: V<, V>
- Six elements unbalanced voltage supervision
- Flexible Fourth Voltage measuring input <sup>(2)</sup> 2 elements VE> or VX (for synch-check)
- Synchro-check options Generator-to-System or System-to-System
- Each of the six elements frequency protection can be used as: f<, f>, ROCOF, vector surge...
- Six elements power protection each can be used as: P>, P<, Pr, Q>, Q<, Qr, S>, S<
- Two elements power factor (PF)

### IN-ZONE TRANSFORMER DIFFERENTIAL

- Full Differential Protection for Transformers within the line/cable

### INTERCONNECTION/ MAINS DECOUPLING

The comprehensive interconnection package is summarized within one menu:

- 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: Six elements configurable as f<, f>, df/dt (ROCOF), Vector Surge
- CB-Intertripping
- Synch Check (Generator to mains, mains-to-mains), options e.g. to switch onto dead bus

### TRANSFER SIGNALS AND TRANSFER TRIPS

- Up to 16 digital signals and 4 trips can be transferred via the inter-device communication. Copper wiring is not longer required this way.

### RECORDERS

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

### LOCAL AND REMOTE COMMISSIONING SUPPORT

- USB connection
- Unmanned remote end parameter setting
- Unmanned remote end monitoring
- Unmanned remote end failure analysis
- Customizable Display (Single-Line, ...)
- Customizable Inserts
- Copy and compare parameter sets
- Configuration files are convertible
- Forcing and disarming of output relays
- Fault simulator: current and voltage
- Graphical display of tripping characteristics
- 7 languages selectable within the relay

### COMMUNICATION OPTIONS

- IEC61850
- Profibus DP
- Modbus RTU or Modbus TCP
- IEC60870-5-103
- DNP 3.0 (RTU, TCP, UDP)

### LOGIC

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

### TIME SYNCHRONISATION

- SNTP, IRIG-B00X, Modbus, IEC60870-5-103
- Protection Communication

### PC TOOLS

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

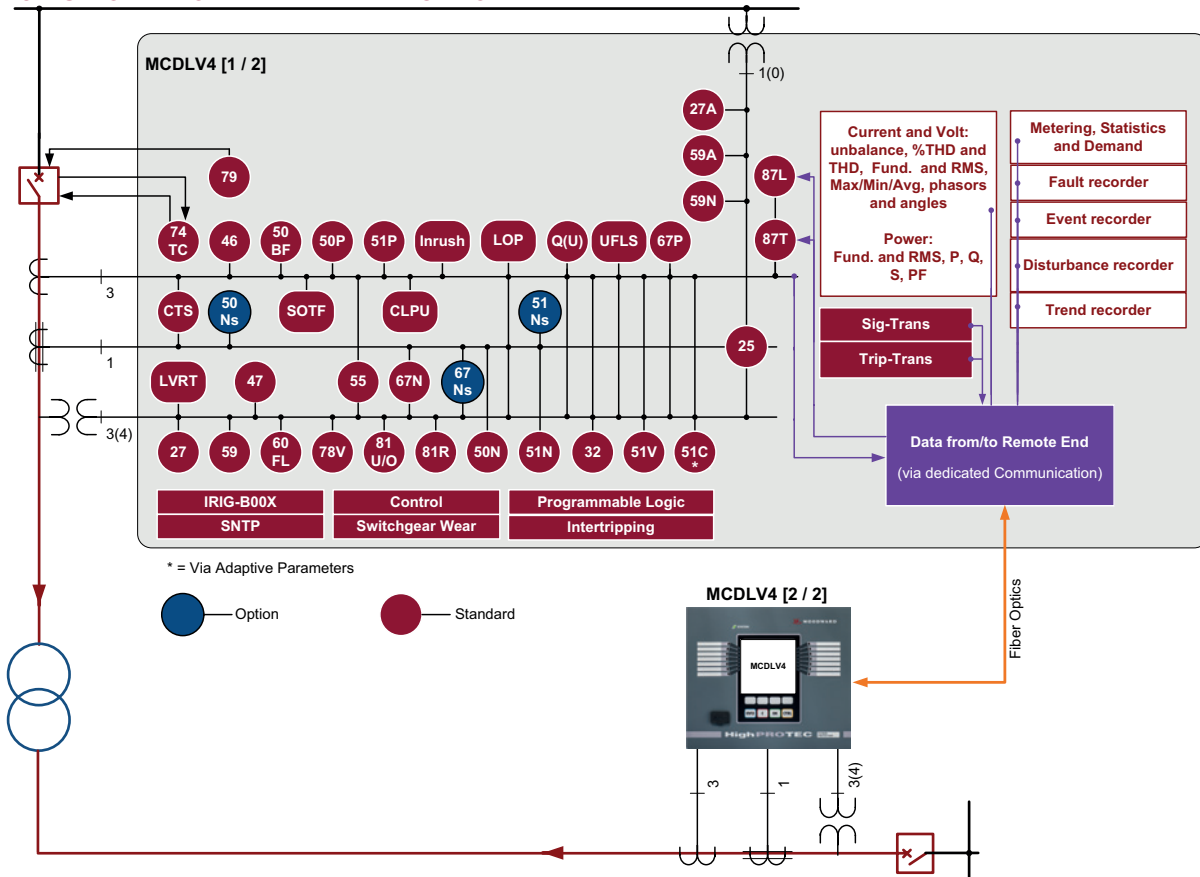
<sup>(1)</sup> DFT, True RMS or I2 based

<sup>(2)</sup> DFT or True RMS based

**FUNCTIONAL OVERVIEW**

	Elements	ANSI
<b>Protective Functions</b>		
Cable and Line differential protection	1	87L
In-Zone Transformer differential protection	1	87T
I, time overcurrent and short circuit protection, all elements can be configured for directional or non-directional supervision. Multiple reset options (instantaneous, definite time, reset characteristics according to IEC and ANSI).	6	50P, 51P, 67P
Voltage controlled overcurrent protection by means of adaptive parameters		51C
Voltage dependent overcurrent protection		51V
Negative phase sequence overcurrent protection		51Q
I <sub>2</sub> >, unbalanced load protection with evaluation of the negative phase sequence currents	2	46
I <sub>B</sub> , overload protection with thermal replica and separate pick-up values for alarm and trip functions	1	49
I <sub>H2</sub> /I <sub>n</sub> , inrush detection with evaluation of the 2nd harmonic	1	Inrush
I <sub>G</sub> , earth overcurrent and short circuit protection, all elements can be configured for directional (multi-polarising) or non-directional supervision. Tremendous reset options (instantaneous, definite time, reset characteristics according to IEC and ANSI).	4	50N, 51N, 67N
V<, V>, V(t)<, under- and overvoltage protection, time dependent undervoltage protection	6	27, 59
Voltage asymmetry supervision (V012)		
V1, under and overvoltage in positive phase sequence system	6	47
V2, overvoltage in negative phase sequence system		
Each of the six frequency protection elements can be used as: f< fs, df, dt, ROCOF, DF/DT, vector surge, ...	6	81U/O, 81R, 78
VX, residual voltage protection or bus bar voltage for Synch Check	2	25 or 59N
AR, automatic reclosing	1	79
ExP, External alarm and trip functions	4	
PQS, Power protection	6	32, 37
PF, Power factor	2	55
FRT (optional coordination with AR-feature)	27 (t)	27 (t, AR)
Q(V) Protection (undervolt. dep. directional reactive power protection)	1	
Reconnection Module	2	
UFLS (non-discriminating active power direction depending load shedding)	1	
10-Minutes-Mean-Square-Sliding Supervision: adjustable according to VDE-AR 4105	1	
Synch Check	1	25
V/f (Overexcitation)	2	24
<b>Control and Logic</b>		
Control: Position indication, supervision time management and interlockings for up to 6 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	1	50BF
TCS, trip circuit supervision	1	74TC
LOP, loss of potential	1	60FL
FF, fuse failure protection via digital input	1	60FL
CTS, current transformer supervision	1	60L
CLPU, cold load pickup	1	
SOTF, switch onto fault	1	
Demand management and peak value supervision (current and power)	1	
THD supervision	1	
Breaker wear with programmable wear curves	1 / Bkr	
Recorders: Disturbance recorder, fault recorder, event recorder, trend recorder	1	

# FUNCTIONAL OVERVIEW IN ANSI FORM



## APPROVALS

## CONNECTIONS (EXAMPLE)



certified regarding UL508 (Industrial Controls)



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



certified by EAC (Eurasian Conformity)

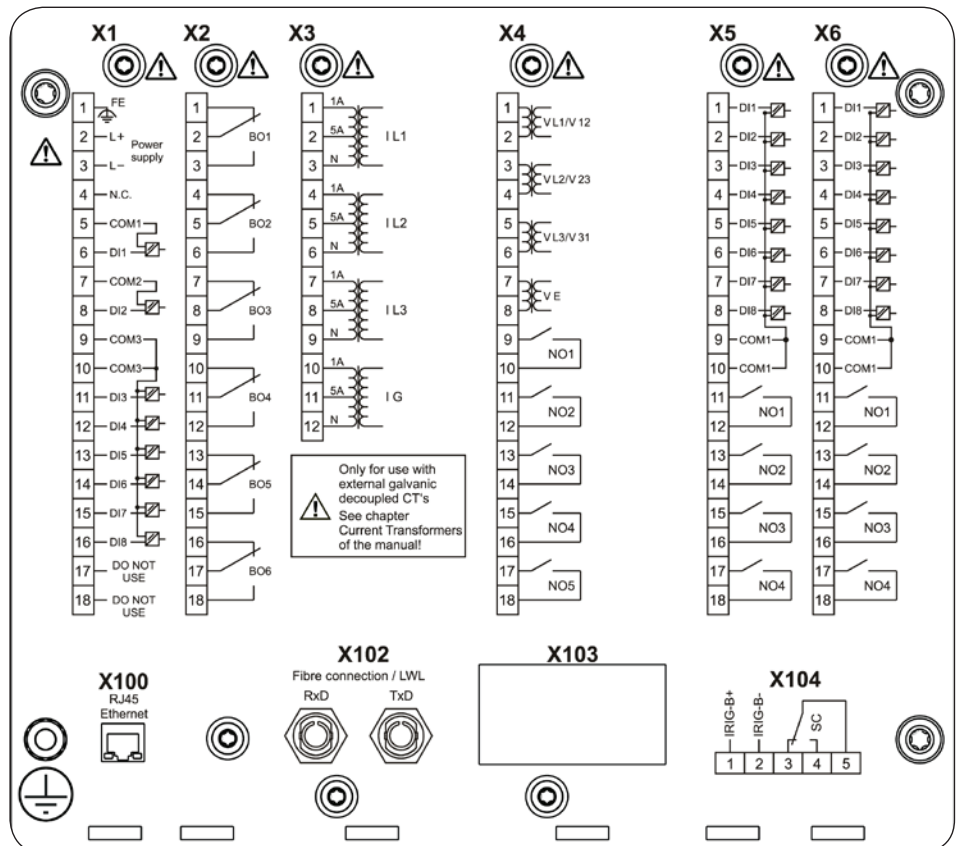
Type tested regarding IEC60255-1 and regarding IEC61850

certified regarding "BDEW-Richtlinie für Erzeugungsanlagen am Mittelspannungsnetz, Ausgabe Juni 2008"

complies with IEEE 1547-2003 amended by IEEE 1547a-2014 (German grid code standard)

complies with ANSI C37.90-2005

complies with „Engineering Recommendation G59, Issue 3, Amendment 2, September 2015“



**ORDER FORM MCDLV4-2**

Line differential protection					MCDLV4	-2
Version 2 with USB, enhanced communication and user options						
Voltage measuring	Digital Inputs	Binary output relays	Housing	Large display		
X	8	7	B2	X	A	
X	16	13	B2	X	D	
X	24	20	B2	X	E	
Hardware variant 2						
Phase Current 5 A/1 A, Ground Current 5 A/1 A					0	
Phase Current 5 A/1 A, Sensitive Ground Current 5 A/1 A					1	
Housing and mounting						
Door mounting					A	
Door mounting 19" (flush mounting)					B	
Interdevice Communication						
LC duplex connector, mono mode (up to 24 km), multi mode (up to 4 km)					0	
ST connector, BFOC2.5, multi mode (up to 2 km)					1	
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>						
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*	
Harsh Environment Option						
None					A	
Conformal Coating					B	
Available menu languages (in every device)						
Standard English/German/Spanish/Russian/Polish/Portuguese/French						

\* 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>	4 (1 A and 5 A) with automatic CT Disconnect
<b>Voltage inputs</b>	4 (0–800 V, or 0–300 V for Type "E" with enhanced digital inputs and outputs)
<b>Digital Inputs</b>	Switching thresholds adjustable via software
<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. 4.2 kg / 9.259 lb

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