

HighPROTEC-2 | PROTECTION TECHNOLOGY MADE SIMPLE

MCDLV4-2 | CABLE AND LINE DIFFERENTIAL PROTECTION SYSTEM

**NEW
FEATURES**

- 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 ⁽¹⁾

- Six elements phase overcurrent protection directional and non-directional (ANSI/IEC/51C/51V)
- Four elements earth fault protection ⁽²⁾ non-directional or directional (multi-polarising)
- Two elements unbalanced load protection
- Voltage protection ⁽²⁾ six elements selectable: V<, V>
- Six elements unbalanced voltage supervision
- Flexible Fourth Voltage measuring input ⁽²⁾ 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

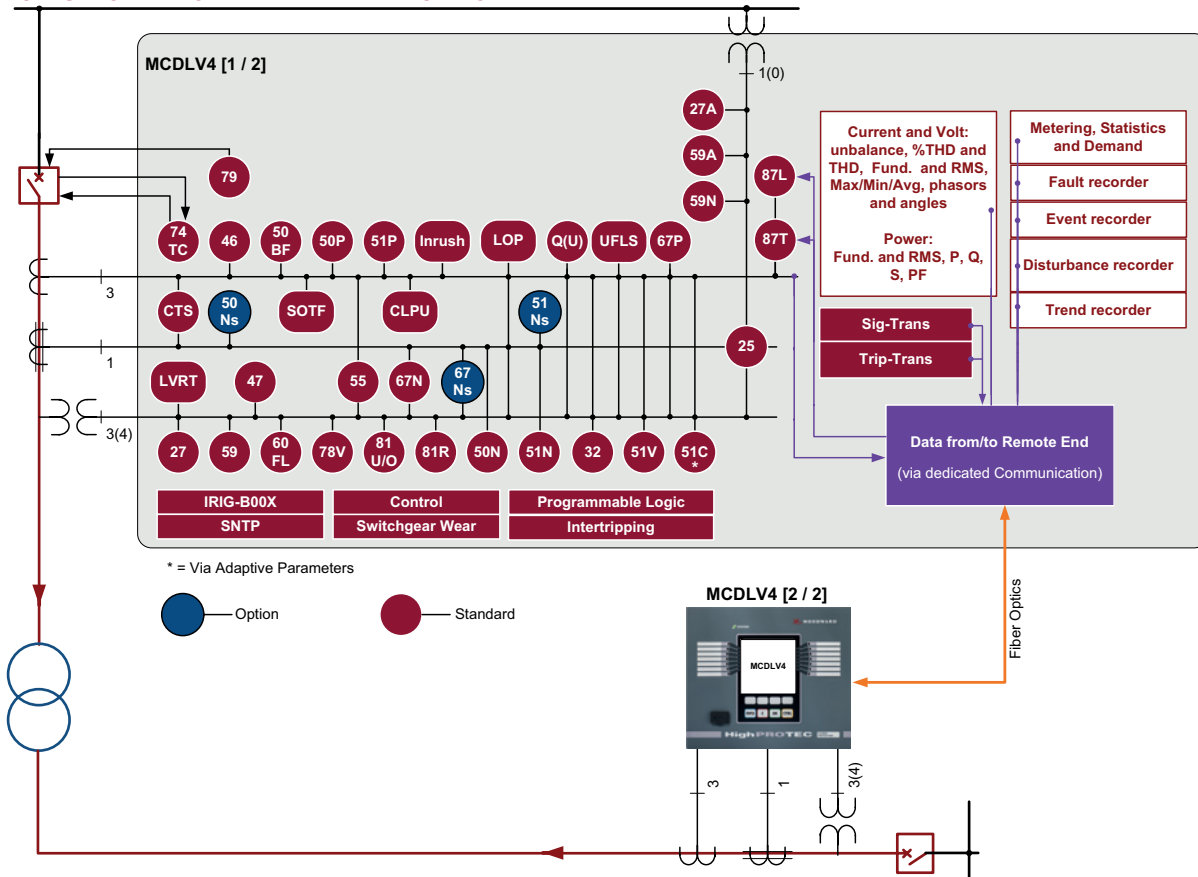
⁽¹⁾ DFT, True RMS or I2 based

⁽²⁾ DFT or True RMS based

FUNCTIONAL OVERVIEW

	Elements	ANSI
Protective Functions		
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 ₂ >, unbalanced load protection with evaluation of the negative phase sequence currents	2	46
IB, overload protection with thermal replica and separate pick-up values for alarm and trip functions	1	49
IH ₂ /I _n , inrush detection with evaluation of the 2nd harmonic	1	Inrush
IG, 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
Control and Logic		
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		
Supervision Functions		
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



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

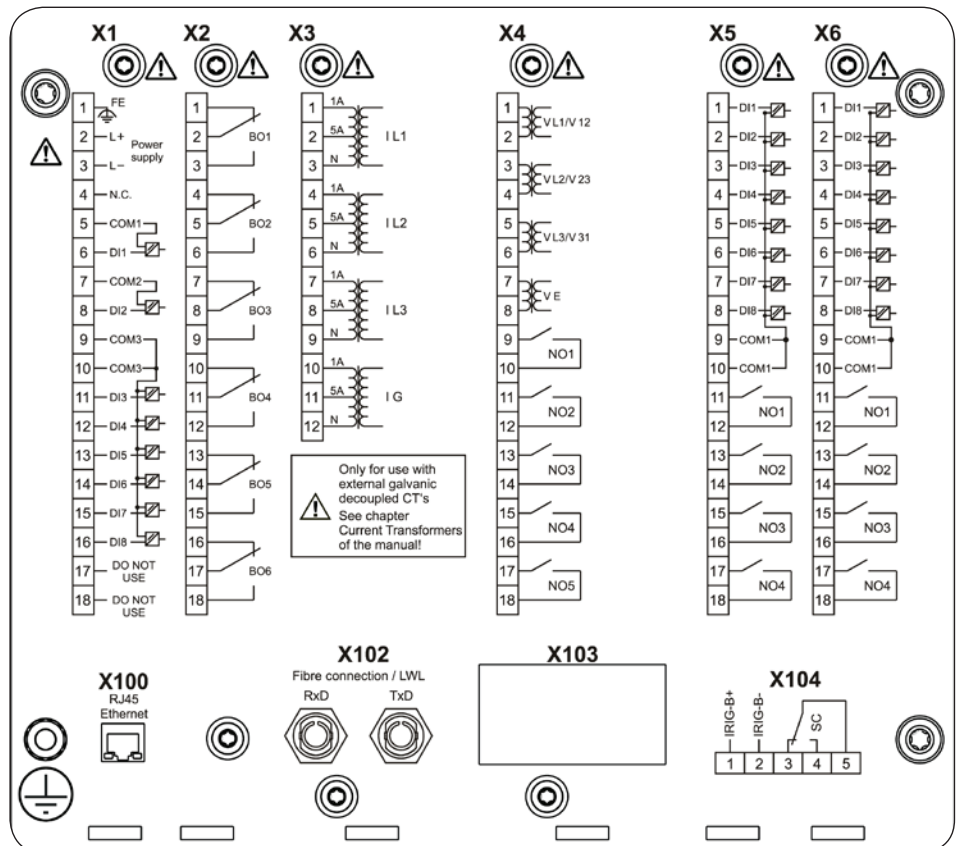
certified regarding "BDEW-Richtlinie für
Erzeugungsanlagen am Mittel-
spannungsnetz, Ausgabe Juni 2008"

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"

CONNECTIONS (EXAMPLE)



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 RS485/terminals						B*						
Modbus TCP, DNP3.0 TCP/UDP 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 Ethernet 100MB/RJ45						H*						
IEC60870-5-103, Modbus RTU, DNP3.0 RTU RS485/terminals						I*						
Modbus TCP, DNP3.0 TCP/UDP Ethernet 100 MB/RJ45												
IEC61850, Modbus TCP, DNP3.0 TCP/UDP Optical Ethernet 100MB/LC duplex connector						K*						
Modbus TCP, DNP3.0 TCP/UDP Optical Ethernet 100MB/LC duplex connector						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.

Current inputs	4 (1 A and 5 A) with automatic CT Disconnect
Voltage inputs	4 (0–800 V, or 0–300 V for Type "E" with enhanced digital inputs and outputs)
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. 4.2 kg / 9.259 lb

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