PROTECTION MADE SIMPLE.

HighPROTEC

MCDLV4 LINE DIFFERENTIAL PROTECTION

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

The protection functions of the MCDLV4 have been adapted to comply with the requirements of the VDE-AR-N-4110:2018.

New Features – Release 3.7
‣ VDE-AR-N 4110; VDE-AR-N 4120
‣ 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).

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)
‣ Wattmetric Ground Fault Protection
‣ Two elements unbalanced load protection
‣ Voltage protection [2] six elements selectable: V<, V>
‣ Six elements unbalanced voltage supervision
‣ Flexible 4th Voltage measuring input [2] 2 elements VE> or VX (for synchro-check)
‣ 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 Transfomers within the line/cable

Transfer Signals and Transfer Trips
‣ Up to 16 digital signals and 4 trips can be transferred via the inter-device communication. Copper wiring is no longer required this way.

Interconnection Mains Decoupling
‣ 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), options e.g. to switch onto dead bus

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

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

Commissioning Support
‣ Unmanned remote end settings
‣ 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, voltage
‣ Graphical display of tripping characteristics
‣ 8 languages selectable within the relay

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)
‣ Multi-Password-Level

Logic
‣ Up to 80 logic equations for protection, control and monitoring

Time Synchronisation
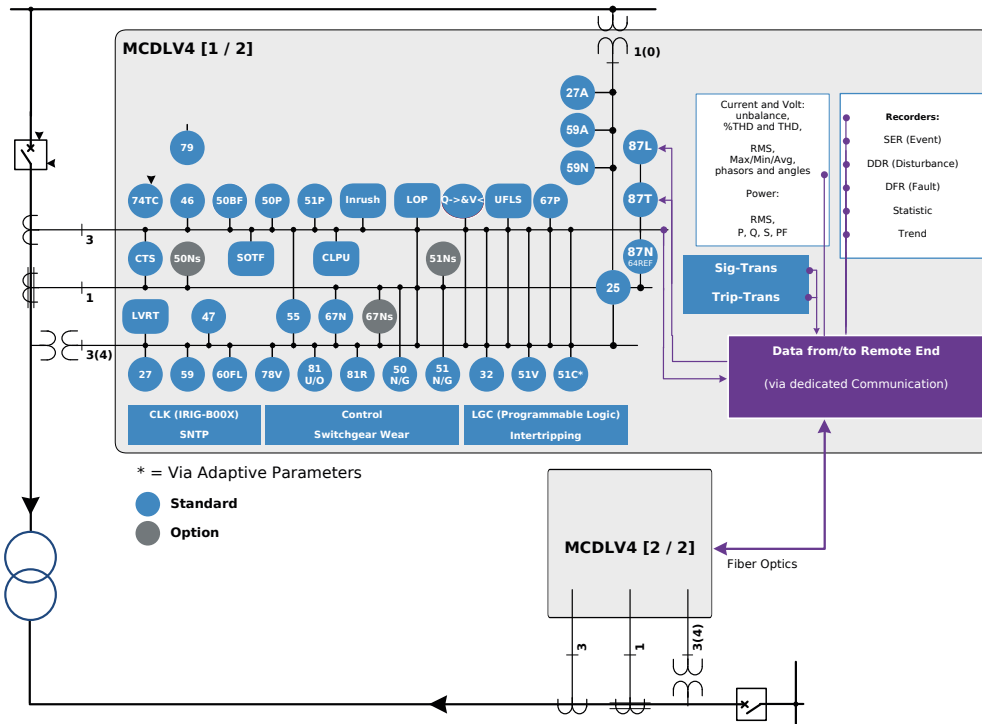‣ SNTP, IRIG-B00X, Modbus, DNP 3.0, IEC 60870-5-103/-104

[1] DFT, True RMS or I2 based
[2] DFT or True RMS based

HighPROTEC

MCDLV4 LINE DIFFERENTIAL PROTECTION

Functional Overview

Protective Functions		ANSI	IEC 61850
Cable and Line differential protection	1	87L	PDIF
In-Zone Transformer differential protection	1	87T	PDIF
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	PTOC
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
IB, 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	1	Inrush	PHAR
IG, earth overcurrent and short circuit protection, all elements can be configured for directional (multi-polarising) or non-directional supervision. Various reset options (instantaneous, definite time, reset characteristics according to IEC and ANSI).	4	50N/G, 51N/G, 67N/G	PTOC
V<, V>, V(t)<, under- and overvoltage protection, time dependent undervoltage protection	6	27, 59	PTOV, PTUV
Voltage asymmetry supervision (V012) V1, under and overvoltage in positive phase sequence system V2, overvoltage in negative phase sequence system	6	47	PTOV, PTUV
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	PTOF, PTUF, PFRC, PPAM
VX, residual voltage protection or bus bar voltage for Synch Check	2	27A/N, 59A/N	PTOV, PTUV
AR, automatic reclosing	1	79	RREC
ExP, External alarm and trip functions	4		GAPC
PQS, Power protection	6	32, 37	PDOP, PDUP
PF, Power factor	2	55	PUPF
FRT (optional coordination with AR-feature)	27(t)	27 (t, AR)	
Q(V) Protection (undervolt. dep. directional reactive power protection)	1		PTUV
Reconnection Module	2		
UFLS (non-discriminating active power direction depending load shedding)	1		PFRC
10-Minutes-Mean-Square-Sliding Supervision: adjustable according to VDE-AR 4105	1		
Synch Check	1	25	RSYN
V/f (Overexitation)	2	24	PVPH

Control and Logic

	IEC 61850
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

|		ANSI	IEC 61850
CBF, circuit breaker failure protection	1	50BF	RBRF
TCS, trip circuit supervision	1	74TC	SCBR
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		PSOF
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		RDRE

Functional Overview in ANSI / IEEE C37.2 Form

MCDLV4 [1 / 2]

1(0)

27A
59A
59N
87L
87T

79

74TC · 46 · 50BF · 50P · 51P · Inrush · LOP · Q->&V-> · UFLS · 67P

CTS · 50Ns · SOTF · CLPU · 51Ns · 87N 64REF

25

LVRT · 47 · 55 · 67N · 67Ns

27 · 59 · 60FL · 78V · 81 U/O · 81R · 50 N/G · 51 N/G · 32 · 51V · 51C*

| Current and Volt: unbalance, %THD and THD, RMS, Max/Min/Avg, phasors and angles | Recorders: |
| Power: RMS, P, Q, S, PF | SER (Event) · DDR (Disturbance) · DFR (Fault) · Statistic · Trend |

Sig-Trans
Trip-Trans

Data from/to Remote End
(via dedicated Communication)

| CLK (IRIG-B00X) | Control | LGC (Programmable Logic) |
| SNTP | Switchgear Wear | Intertripping |

* = Via Adaptive Parameters

● Standard
● Option

MCDLV4 [2 / 2]

Fiber Optics

3 · 1 · 3(4)

19 " Variants Available!
See Order Form on page 4, housing type "rack mounting"

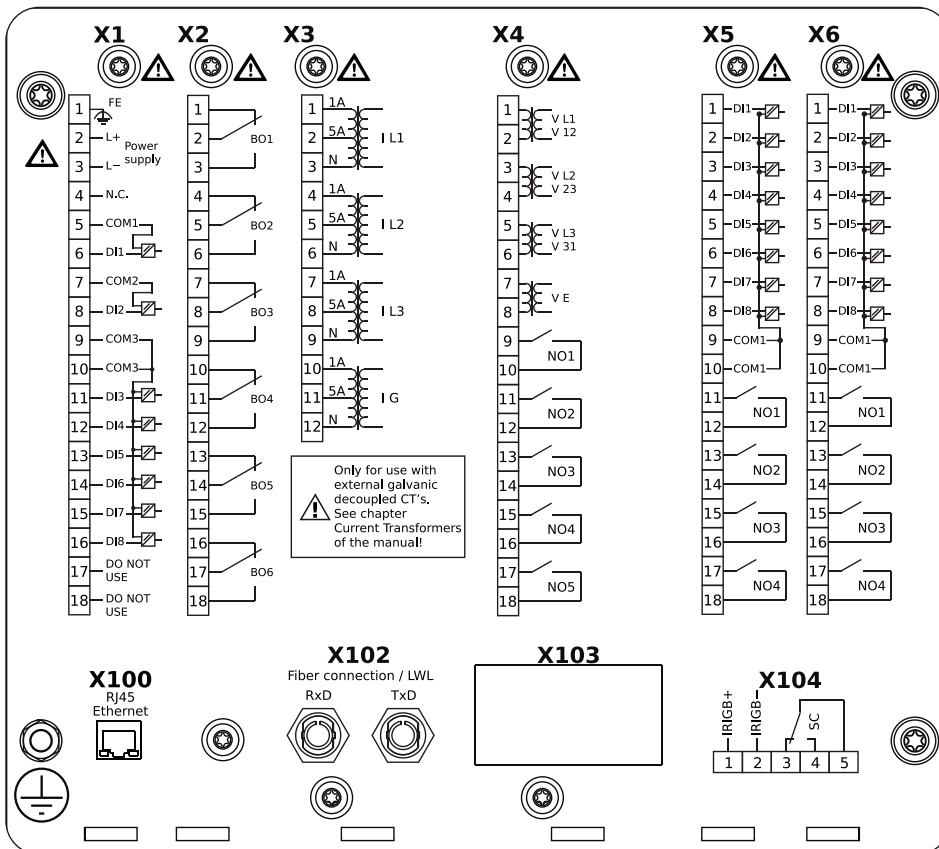
https://docs.SEGelectronics.de/hpt-2

Terminals Available Separately!
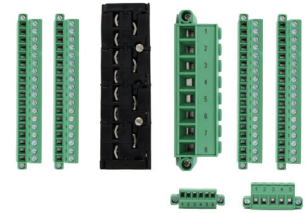
Order codes HPTTERMKIT-1 ... -5
For MCDLV4-2A/D: HPTTERMKIT-3
The terminal kits allow for making all required wirings in advance, thus speeding up the installation and commissioning work.

Connections (Example)

X1

1 FE
2 L+ Power supply
3 L−
4 N.C.
5 COM1
6 DI1
7 COM2
8 DI2
9 COM3
10 COM3
11 DI3
12 DI4
13 DI5
14 DI6
15 DI7
16 DI8
17 DO NOT USE
18 DO NOT USE

X2

1
2 BO1
3
4
5 BO2
6
7
8 BO3
9
10
11 BO4
12
13
14 BO5
15
16
17 BO6
18

X3

1 1A
2 5A I L1
3 N
4 1A
5 5A I L2
6 N
7 1A
8 5A I L3
9 N
10 1A
11 5A I G
12 N

Only for use with external galvanic decoupled CT's. See chapter Current Transformers of the manual!

X4

1 V L1
2 V 12
3 V L2
4 V 23
5 V L3
6 V 31
7 V E
8
9 NO1
10
11 NO2
12
13 NO3
14
15 NO4
16
17 NO5
18

X5

1 DI1
2 DI2
3 DI3
4 DI4
5 DI5
6 DI6
7 DI7
8 DI8
9 COM1
10 COM1
11 NO1
12
13 NO2
14
15 NO3
16
17 NO4
18

X6

1 DI1
2 DI2
3 DI3
4 DI4
5 DI5
6 DI6
7 DI7
8 DI8
9 COM1
10 COM1
11 NO1
12
13 NO2
14
15 NO3
16
17 NO4
18

X100
RJ45 Ethernet

X102
Fiber connection / LWL
RxD   TxD

X103

X104
IRIGB+ · IRIGB− · SC
1 2 3 4 5

Approvals / Standards

CE

certified regarding UL508 (Industrial Controls)

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

certified by EAC (Eurasian Conformity)

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

Component certificate regarding 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.

SEG electronics

Order Form MCDLV4

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

Housing suitable for door mounting	A
Housing suitable for 19" rack 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, 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 Modbus TCP, DNP3.0 TCP/UDP, IEC60870-5-104 | Ethernet 100 MB/RJ45	I*
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 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.

Current inputs	4 (1 A and 5 A) with automatic CT Disconnect
Voltage inputs	4 (0 … 800 V*, for variants MCDLV4-2**A** and MCDLV4-2**D**)
	or 4 (0 … 300 V, for variant MCDLV4-2**E**)
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	19" flush mounting: 212.7 mm × 173 mm × 208 mm
(W x H x D)	8.374 in. × 6.811 in. × 8.189 in.
	Door mounting: 212.7 mm × 183 mm × 208 mm
	8.374 in. × 7.205 in. × 8.189 in.
Weight (max. components)	approx. 4.2 kg / 9.259 lb

* *under UL: max. 600 V*

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/mcdlv4-2

For more information please contact:

Subject to alterations, errors excepted. | DOK-FLY-MCDLV4-2E_Rev. Q