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

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

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 Fourth Voltage measuring input (2) 2 elements VE> or VX (for synch-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<, P, Q>, Q<, Q, 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 * 5 mHz from 45-55 Hz
- 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

IT SECURITY

- Menu for the activation of BDEW-Whitepaper-compliant security settings (e.g. hardening of interfaces)
- Security Logger
- Self-monitoring, Syslog
- Encrypted connection with Smart view

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
- 8 languages selectable within the relay

COMMUNICATION OPTIONS

- IEC 61850
- Profinet
- Modbus RTU and/or Modbus TCP
- IEC 60870-5-103
- IEC 60870-5-104
- DNP 3.0 (RTU, TCP, UDP)
- SCADApter for Retrofit

LOGIC

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

TIME SYNCHRONISATION

- SNTP, IRIG-800X, Modbus, DNP 3.0, IEC 60870-5-103/-104
- Protection Communication

PC TOOLS

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

NEW FEATURES – Release 3.6

- VDE-AR-N 4110
- G99 Issue 1 Amendment 3
- Wattmetric Ground Fault Protection
- IEC 60870-5-104
- SCADApter for Retrofit
- Usability improvements
- IT Security
- Improved Frequency and ROCOF precision

(1) DFT, True RMS or I< based
(2) DFT or True RMS based
### FUNCTIONAL OVERVIEW

#### Protective Functions

<table>
<thead>
<tr>
<th>Elements</th>
<th>ANSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable and Line differential protection</td>
<td>87L</td>
</tr>
<tr>
<td>In-Zone Transformer differential protection</td>
<td>87T</td>
</tr>
<tr>
<td>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).</td>
<td>50P, 51P, 67P</td>
</tr>
<tr>
<td>Voltage controlled overcurrent protection by means of adaptive parameters</td>
<td>51C</td>
</tr>
<tr>
<td>Voltage dependent overcurrent protection</td>
<td>51V</td>
</tr>
<tr>
<td>Negative phase sequence overcurrent protection</td>
<td>51Q</td>
</tr>
<tr>
<td>Voltage, unbalanced load protection with evaluation of the negative phase sequence currents</td>
<td>46</td>
</tr>
<tr>
<td>I0, overcurrent protection with thermal replica and separate pick-up values for alarm and trip functions</td>
<td>49</td>
</tr>
<tr>
<td>IHz/In, inrush detection with evaluation of the 2nd harmonic</td>
<td>Inrush</td>
</tr>
<tr>
<td>Voltage, 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).</td>
<td>50N/G, 51N/G, 67N/G</td>
</tr>
<tr>
<td>V&lt;, V&gt;, V(t)&lt;, under- and overvoltage protection, time dependent undervoltage protection</td>
<td>27, 59</td>
</tr>
<tr>
<td>Voltage asymmetry supervision (V012)</td>
<td>47</td>
</tr>
<tr>
<td>V1, under and overvoltage in positive phase sequence system</td>
<td>6</td>
</tr>
<tr>
<td>V2, overvoltage in negative phase sequence system</td>
<td>78</td>
</tr>
<tr>
<td>Each of the six frequency protection elements can be used as: f&lt;, f&gt;, df, dt, ROCOF, DF/DT, vector surge, ...</td>
<td>81U/O, 81R, 78</td>
</tr>
<tr>
<td>VX, residual voltage protection or bus bar voltage for Synch Check</td>
<td>25 or 59N</td>
</tr>
<tr>
<td>AR, automatic reclosing</td>
<td>79</td>
</tr>
<tr>
<td>Exp, External alarm and trip functions</td>
<td>4</td>
</tr>
<tr>
<td>PQS, Power protection</td>
<td>32, 37</td>
</tr>
<tr>
<td>PF, Power factor</td>
<td>55</td>
</tr>
<tr>
<td>FRT (optional coordination with AR-feature)</td>
<td>27 (t)</td>
</tr>
<tr>
<td>Q(V) Protection (undervolt. dep. directional reactive power protection)</td>
<td>27 (t, AR)</td>
</tr>
<tr>
<td>Reconnection Module</td>
<td>1</td>
</tr>
<tr>
<td>UFLS (non-discriminating active power direction depending load shedding)</td>
<td>1</td>
</tr>
<tr>
<td>10-Minutes-Mean-Square-Sliding Supervision: adjustable according to VDE-AR 4105</td>
<td>1</td>
</tr>
<tr>
<td>Synch Check</td>
<td>25</td>
</tr>
<tr>
<td>V/F (Overexitation)</td>
<td>24</td>
</tr>
</tbody>
</table>

#### 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

<table>
<thead>
<tr>
<th>Elements</th>
<th>ANSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBF, circuit breaker failure protection</td>
<td>50BF</td>
</tr>
<tr>
<td>TCS, trip circuit supervision</td>
<td>74TC</td>
</tr>
<tr>
<td>LOP, loss of potential</td>
<td>60FL</td>
</tr>
<tr>
<td>FF, fuse failure protection via digital input</td>
<td>60FL</td>
</tr>
<tr>
<td>CTS, current transformer supervision</td>
<td>60L</td>
</tr>
<tr>
<td>CLPU, cold load pickup</td>
<td>1</td>
</tr>
<tr>
<td>SWF, switch onto fault</td>
<td>1</td>
</tr>
<tr>
<td>Demand management and peak value supervision (current and power)</td>
<td>1</td>
</tr>
<tr>
<td>THD supervision</td>
<td>1</td>
</tr>
<tr>
<td>Breaker wear with programmable wear curves</td>
<td>1 / Bkr</td>
</tr>
<tr>
<td>Recorders: Disturbance recorder, fault recorder, event recorder, trend recorder</td>
<td>1</td>
</tr>
</tbody>
</table>
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
- complies with IEEE 1547-2003
- amended by IEEE 1547a-2014
- complies with ANSI C37.90-2005
- complies with "Engineering Recommendation G99, Issue 1, Amendment 3, May 2018"

**CONNECTIONS (EXAMPLE)**

X1, X2, X3, X4, X5, X6 diagrams with various symbols and connections.

X100, X102, X103, X104 diagrams showing Ethernet, Fiber connection, JWL, and TxO.
**ORDER FORM MCDLV4**

**Line differential protection**

<table>
<thead>
<tr>
<th>MCDLV4</th>
<th>-2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Version 2 with USB, enhanced communication and user options</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Voltage measuring</th>
<th>Digital Inputs</th>
<th>Binary output relays</th>
<th>Housing</th>
<th>Large display</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>8</td>
<td>7</td>
<td>B2</td>
<td>X</td>
</tr>
<tr>
<td>X</td>
<td>16</td>
<td>13</td>
<td>B2</td>
<td>X</td>
</tr>
<tr>
<td>X</td>
<td>24</td>
<td>20</td>
<td>B2</td>
<td>X</td>
</tr>
</tbody>
</table>

**Hardware variant 2**

- Phase Current 5 A/1 A, Ground Current 5 A/1 A
- Phase Current 5 A/1 A, Sensitive Ground Current 5 A/1 A

**Housing and mounting**

- Door mounting
- Door mounting 19” (flush mounting)

**Interdevice Communication**

- LC duplex connector, mono mode (up to 24 km), multi mode (up to 4 km)
- ST connector, BFOC2.5, multi mode (up to 2 km)

**Communication protocol**

<table>
<thead>
<tr>
<th>Without protocol</th>
<th>A</th>
<th>B*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modbus RTU, IEC60870-5-103, DNP3.0 RTU</td>
<td>RS485/terminals</td>
<td>Modbus TCP, DNP3.0 TCP/UDP, IEC60870-5-104</td>
</tr>
<tr>
<td>Profibus-DP</td>
<td>optic fiber/ST-connector</td>
<td>Profibus-DP</td>
</tr>
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<td>Modbus RTU, IEC60870-5-103, DNP3.0 RTU</td>
<td>optic fiber/ST-connector</td>
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</tr>
<tr>
<td>IEC61850, Modbus TCP, DNP3.0 TCP/UDP, IEC60870-5-104</td>
<td>Ethernet 100 MB/RJ45</td>
<td></td>
</tr>
<tr>
<td>IEC60870-5-103, Modbus RTU, DNP3.0 RTU</td>
<td>RS485/terminals</td>
<td></td>
</tr>
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<td>Modbus TCP, DNP3.0 TCP/UDP, IEC60870-5-104</td>
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<td></td>
</tr>
<tr>
<td>IEC61850, Modbus TCP, DNP3.0 TCP/UDP, IEC60870-5-104</td>
<td>Optical Ethernet 100 MB/LC duplex connector</td>
<td></td>
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**Hash Environment Option**

- None
- Conformal Coating

**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 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<sub>DC</sub> – 270 V<sub>DC</sub> / 48 V<sub>AC</sub> – 230 V<sub>AC</sub> (−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

* For more information please contact: © Woodward

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