**APPLICATION**

The MRU4 is a protection relay which uses the latest Dual-Core-Processor Technology to provide precise and reliable protective functions and is very easy to operate. It is designed to protect electrical equipment from dangerous voltage fluctuations. For example protection against under voltages caused by mains shortcircuits, or overvoltages due to load shedding or failure of a generator voltage controller. Its compact design makes the MRU4 ideal for installation within the LV terminal compartments of compact SF6-insulated MV systems.

The protection functions of the MRU4 have been adapted to comply with the requirements of the VDE-AR-N-4110:2018.

**ALL INCLUSIVE:**
- All protection features inclusive
- Parameter setting software
- Disturbance analysis software

**COMPREHENSIVE FREQUENCY PROTECTION PACKAGE**

Each of the six elements can be used as:
- f< or f> (over- and underfrequency supervision)
- df/dt (ROCOF)
  - Rate of change of frequency
- (f< and df/dt) or (f> and df/dt)
  - Combination of over- and under-rate of change of frequency (ROCOF)
- (f< and DF/DT) or (f> and DF/DT)
  - Combination of over- and under-increase of frequency
- Delta Phi (Vector surge)

**SIX ELEMENTS VOLTAGE PROTECTION**

- Under- and overvoltage
- Programmable time dependent undervoltage tripping characteristic
- Wattmetric Ground Fault Protection

**SLIDING-MEAN-SQUARE SUPERVISION**

- Adjustable (VDE-AR 4105)

**FRT (LRVT)**

- Adjustable LRVT-profiles
- Optionally AR-controlled

**FLEXIBLE FOURTH VOLTAGE MEASURING INPUT**

- 2 elements VE> or VX (for Synch Check)

*5 mHz from 45-55 Hz

**SYNCH CHECK**

- Generator-to-System, System-to-System
- Options to switch onto dead bus bars

**TWO ELEMENTS RESIDUAL VOLTAGE PROTECTION**

- VE>

**SIX ELEMENTS VOLTAGE ASYMMETRY SUPERVISION**

- Under- and overvoltage in positive phase sequence system, overvoltage in negative phase sequence system

**POWER QUALITY**

- THD-protection

**SUPERVISION**

- Voltage transformer supervision
- Trip circuit supervision
- CBF via position indicators

**RECORDER**

- 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 for free
- Including page editor to design own pages

**LOGIC**

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

**COMMISSIONING SUPPORT**

- USB connection
- Customizable Display (Single-Line, ...)
- Customizable Inserts
- Copy and compare parameter sets
- Configuration files are convertible
- Forcing and disarming of output relays
- Fault simulator
- Graphical display of tripping characteristics
- 8 languages selectable within the relay

**COMMUNICATION OPTIONS**

- IEC 61850, IEC 60870-5-103, Proibus DP
- IEC60870-5-104
- Modbus RTU and/or Modbus TCP
- DNP 3.0 (RTU, TCP, UDP)
- SCADApter for Retrofit

**IT SECURITY**

- Menu for the activation of BDEW-Whitepaper-compliant security settings (e.g. hardening of interfaces)
- IT Security Logger
- Syslog (to centralized server)
- Encrypted connection with Smart view

**ADDITIONAL HIGHLIGHTS**

- Plausibility checks
- Status display
- Comprehensive measured values and statistics
- Masking of unused functions
- Multi-Password-Level

**CONTROL**

- One breaker
- Breaker wear

**TIME SYNCHRONISATION**

- SNTP, IRIG-B00x, Modbus, DNP 3.0, IEC 60870-5-103/-104
**Functional Overview**

<table>
<thead>
<tr>
<th>Protective Functions</th>
<th>Elements</th>
<th>ANSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>V&gt;, V&lt;, V&lt;(&lt;t) under- and overvoltage protection, programmable time dependent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>undervoltage tripping characteristic</td>
<td>6</td>
<td>27, 59</td>
</tr>
<tr>
<td>FRT (optional coordination with AR-feature)</td>
<td>1</td>
<td>27 (t, AR)</td>
</tr>
<tr>
<td>Synchronism check</td>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>Each of the six frequency protection elements can be used as:</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>→ f&lt; or f&gt; (over- and under frequency supervision)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>→ df/dt rate of change of frequency (ROCOF)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>→ (f&lt; and df/dt) or (f&gt; and df/dt) combination of over-, under- and rate of change of frequency (ROCOF)</td>
<td>81U/O</td>
<td></td>
</tr>
<tr>
<td>→ (f&lt; and DF/DT) or (f&gt; and DF/DT) combination of over-, under- and increase of frequency</td>
<td>81R</td>
<td></td>
</tr>
<tr>
<td>→ Delta Phi (Vector surge)</td>
<td></td>
<td>78</td>
</tr>
<tr>
<td>VE, residual voltage protection</td>
<td>2</td>
<td>59N</td>
</tr>
<tr>
<td>Voltage asymmetry supervision (V012)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V1, under and overvoltage in positive phase sequence system</td>
<td>6</td>
<td>47</td>
</tr>
<tr>
<td>V2, overvoltage in negative phase sequence system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ExP, External alarm and trip functions</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>10-Minutes-Mean-Square-Sliding Supervision: adjustable according to VDE-AR 4105</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Control and Logic**
- Control: Position indication, supervision time management and interlockings for 1 breaker
- Logic: Up to 80 logic equations, each with 4 inputs, selectable logical gates, timers and memory function

<table>
<thead>
<tr>
<th>Supervision Functions</th>
<th>Elements</th>
<th>ANSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBF, circuit breaker failure protection (via position indicators)</td>
<td>1</td>
<td>62BF</td>
</tr>
<tr>
<td>TCS, trip circuit supervision</td>
<td>1</td>
<td>74TC</td>
</tr>
<tr>
<td>VTS, voltage transformer supervision by comparing phase and residual voltages</td>
<td>1</td>
<td>60FL</td>
</tr>
<tr>
<td>VTS, fuse failure protection via digital input</td>
<td>1</td>
<td>60FL</td>
</tr>
<tr>
<td>THD supervision</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
FUNCTIONAL OVERVIEW IN ANSI FORM

APPROVALS

- **CE** certified regarding UL508 (Industrial Controls)
- **UL** certified regarding CSA-C22.2 No. 14 (Industrial Controls)
- **EAC** certified by EAC (Eurasian Conformity)
- **EAC** Type tested (and certified) regarding IEC60255-1
- **CQC** (Declaration of Identity)

CONNECTIONS (EXAMPLE)

- Complies with IEEE 1547-2003 Amended by IEEE 1547a-2014
- Complies with ANSI C37.90-2005 Amendment 4 - July 2018
- Complies with „Engineering Recommendation G59 Issue 3“
**ORDER FORM MRU4**

<table>
<thead>
<tr>
<th>Voltage and Frequency Relay</th>
<th>MRU4 -2</th>
<th>A</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Voltage and Frequency supervision</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Version 2 with USB, enhanced communication and user options</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital Inputs</td>
<td>Binary output relays</td>
<td>Housing</td>
<td>Large display</td>
</tr>
<tr>
<td>8</td>
<td>6</td>
<td>B1</td>
<td>-</td>
</tr>
</tbody>
</table>

**Hardware variant**

- Standard

**Housing and mounting**

- Door mounting
- Door mounting 1.9" (flush mounting)

**Communication protocol**

- Without protocol
- Modbus RTU, IEC 60870-5-103, DNP 3.0 RTU | RS485/terminals
- Modbus TCP, DNP 3.0 TCP/UDP, IEC 60870-5-104 | Ethernet 100 MB/ RJ45
- Profinet-DP | optic fiber/ST-connector
- Profinet-DP | RS485/D-SUB
- Modbus RTU, IEC 60870-5-103, DNP 3.0 RTU | optic fiber/ST-connector
- Modbus RTU, IEC 60870-5-103, DNP 3.0 RTU | RS485/terminals
- Modbus TCP, DNP 3.0 TCP/UDP, IEC 60870-5-104 | Ethernet 100 MB/RJ45
- IEC 61850, Modbus TCP, DNP 3.0 TCP/UDP, IEC 60870-5-104 | Ethernet 100 MB/LC duplex connector
- IEC 60870-5-103, Modbus RTU, DNP 3.0 RTU | RS485/terminals
- IEC 61850, Modbus TCP, DNP 3.0 TCP/UDP, IEC 60870-5-104 | Optical Ethernet 100 MB/LC duplex connector
- Modbus TCP, DNP 3.0 TCP/UDP, IEC 60870-5-104 | Ethernet 100 MB/LC duplex connector
- IEC 60870-5-103, Modbus RTU, DNP 3.0 RTU | RS485/terminals
- IEC 61850, Modbus TCP, DNP 3.0 TCP/UDP, IEC 60870-5-104 | Ethernet 100 MB/RJ45

**Harsh 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.

The parameterizing- and disturbance analyzing software Smart view is included in the delivery of HighPROTEC devices.

### Voltage inputs

4 (0–800 V) with automatic CT Disconnect

### Digital inputs

Switching thresholds adjustable via software

### Power supply

Wide range power supply

### Terminals

- 24 Vdc – 270 Vdc / 48 Vdc – 230 Vdc (–20/+10%)
- All terminals plug type

### Mounting

Door mounting

### Type of enclosure (Front)

IP54

### Dimensions of housing

(W × H × D)

- 19” flush mounting: 141.5 mm × 173 mm × 209 mm
- 5.571 in. × 6.811 in. × 8.228 in.
- Door mounting: 141.5 mm × 183 mm × 209 mm
- 5.571 in. × 7.205 in. × 8.228 in.

### Weight (max. components)

approx. 2.4 kg

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