HighPROTEC PROTECTION TECHNOLOGY MADE SIMPLE

MRU4 VOLTAGE AND FREQUENCY RELAY

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-, under- and rate of change of frequency (ROCOF)
- $(f<$ and $DF/DT>)$ or $(f>$ and $DF/DT>)$
- Combination of over-, under- and 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 LVRT-profiles
- Optionally AR-controlled

FLEXIBLE FOURTH VOLTAGE MEASURING INPUT
- 2 elements VE$>$ or VX (for Synch Check)

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

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 for free
- Including page editor to design own pages

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

*5 mHz from 45-55 Hz

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 relays
- 8 languages selectable within the relay

COMMUNICATION OPTIONS
- IEC 61850, IEC 60870-5-103, Profibus DP
- IEC60870-5-104
- Modbus RTU and/or Modbus TCP
- DNP 3.0 (RTU, TCP, UDP)
- SCADAppter 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-800X, Modbus,
  DNP 3.0, IEC 60870-5-103/-104

NEW FEATURES – Release 3.6
- VDE-AR-N 4110
- G99 Issue 1 Amendment 3
- Wattmetric Ground Fault Protection
- IEC 60870-5-104
- SCADAppter for Retrofit
- Usability improvements
- IT Security
- Improved Frequency and ROCOF precision*
### FUNCTIONAL OVERVIEW

#### Protective Functions

<table>
<thead>
<tr>
<th>Elements</th>
<th>ANSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>V&gt;, V&lt;, V&lt;(t) under- and overvoltage protection, programmable time dependent undervoltage tripping characteristic</td>
<td>6 27, 59</td>
</tr>
<tr>
<td>FRT (optional coordination with AR-feature)</td>
<td>1 27 (t, AR)</td>
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<tr>
<td>Synchronism check</td>
<td>1 25</td>
</tr>
</tbody>
</table>

Each of the six frequency protection elements can be used as:

- f< or f> (over- and under frequency supervision)
- df/dt rate of change of frequency (ROCoF)
- (f< and df/dt) or (f> and df/dt) combination of over- and rate of change of frequency (ROCOF)
- (f< and dF/dT) or (f> and dF/dT) combination of over- and increase of frequency
- Delta Phi (Vector surge)

#### VE, residual voltage protection

<table>
<thead>
<tr>
<th>Elements</th>
<th>ANSI</th>
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<td>2 59N</td>
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#### Voltage asymmetry supervision (V012)

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<th>Elements</th>
<th>ANSI</th>
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<td>6 47</td>
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</table>

#### ExP, External alarm and trip functions

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<tr>
<th>Elements</th>
<th>ANSI</th>
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<tbody>
<tr>
<td>4</td>
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</table>

#### 10-Minutes-Mean-Square-Sliding Supervision: adjustable according to VDE-AR 4105

<table>
<thead>
<tr>
<th>Elements</th>
<th>ANSI</th>
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</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

#### Supervision Functions

<table>
<thead>
<tr>
<th>Elements</th>
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</thead>
<tbody>
<tr>
<td>CBF, circuit breaker failure protection (via position indicators)</td>
<td>1 62BF</td>
</tr>
<tr>
<td>TCS, trip circuit supervision</td>
<td>1 74TC</td>
</tr>
<tr>
<td>VTS, voltage transformer supervision by comparing phase and residual voltages</td>
<td>1 60FL</td>
</tr>
<tr>
<td>VTS, fuse failure protection via digital input</td>
<td>1 60FL</td>
</tr>
<tr>
<td>THD supervision</td>
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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 (and certified) regarding IEC60255-1

CONNECTIONS (EXAMPLE)

- Complies with "Engineering Recommendation G99 Issue 1 Amendment 3 – July 2018".
- Amended by IEEE 1547a-2014.
- Complies with ANSI C37.90-2005.
## ORDER FORM MRU4

**Voltage and Frequency supervision**

<table>
<thead>
<tr>
<th>MRU4</th>
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<tbody>
<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>
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</tbody>
</table>

**Hardware variant**

- Standard
- 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. 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.

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**Voltage inputs**

- 4 (0–800 V) with automatic CT Disconnect

**Digital inputs**

- Switching thresholds adjustable via software

**Power supply**

- Wide range power supply
  - $24 \text{V}_{\text{dc}} - 270 \text{V}_{\text{dc}}$ / 48 \text{V}_{\text{ac}} - 230 \text{V}_{\text{ac}} (-20/+10%)

**Terminals**

- 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
  - 5.57 in. × 6.81 in. × 8.228 in.
  - Door mounting: 141.5 mm × 183 mm × 209 mm
  - 5.57 in. × 7.205 in. × 8.228 in.

**Weight (max. components)**

- approx. 2.4 kg