APPLICATION
The MRA4 is a high precision and reliable protection and control relay. The intuitive setting concept with plausibility test enables reliable and time optimized configuration of the extensive protection function to a variety of applications such as incoming or outgoing feeder protection, network protection and generator protection. The implemented switchgear management guaranties an efficient and safe control and supervision. The device is a bench mark in flexibility and usability and offers various communication options. The hardware is designed for all nominal values in combination with protection and control functionality. The parameterizing and analyzing software Smart view SE is usable for each HighPROTEC device and free of charge.

SIX STAGES PHASE OVERCURRENT PROTECTION
- Directional and non-directional
- Voltage controlled and restraint

FOUR STAGES EARTH FAULT PROTECTION
- Non-directional or Directional (multi-polarising)

TWO STAGES UNBALANCED LOAD PROTECTION

VOLTAGE PROTECTION
- Six stages selectable: V<, V>, V<(t)

FLEXIBLE FOURTH VOLTAGE MEASURING INPUT
- 2 stages VE> or VX (for synch-check)

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

FREQUENCY PROTECTION
Each of the six stages can be used as:
- f<, f>, ROCOF, vector surge...

SIX STAGES VOLTAGE ASYMMETRY SUPERVISION

POWER PROTECTION
- Six stages power protection each can be used as:
  P>, P<, Pr, Q>, Q<, Qr, S>, S<
- Two stages power factor (PF)

FRT (LRVT)
- Adjustable LVRT-profiles
- Optionally AR-controlled

Q(V) PROTECTION
- Undervoltage directional reactive power protection with reclosing disengaging

SLIDING AVERAGE VALUE SUPERVISION
- Adjustable (VDE-AR 4105)

DEMAND MANAGEMENT/PEAK VALUES
- Peak values of current and power, average current and energy demand

POWER QUALITY
- THD protection

SUPERVISION
- Current and voltage transformer supervision
- Circuit breaker failure protection
- Trip circuit supervision
- Cold load pickup
- Switch onto fault

ADDITIONAL HIGHLIGHTS
- Automatic reclosing
- Inrush
- Thermal replica
- Plausibility checks
- Adaptive parameter sets
- Status display

RECORDERS
- Disturbance recorder, 120 s non volatile
- Fault recorder
- Event recorder
- Trend recorder: 4000 non volatile entries

COMMISSIONING SUPPORT
- Copy and compare parameter sets
- Configuration files are convertible
- Forcing and disarming of output relays
- Fault simulator: current and voltage

COMMUNICATION OPTIONS
- IEC61850
- Profinet DP
- Modbus RTU or Modbus TCP
- IEC60870-5-103

CONTROL
- One switchgear
- Switchgear wear
- Exchange of single lines

LOGIC
- Up to 80 logic equations

TIME SYNCHRONISATION
- SNTP or IRIG-B00X

(1) DFT, True RMS or I2 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>i, time overcurrent and short circuit protection, all stages can be configured for directional or non-directional supervision. Tremendous reset options (instantaneous, definite time, reset characteristics according to IEC and ANSI).</td>
<td>6</td>
</tr>
<tr>
<td>Voltage controlled overcurrent protection by means of adaptive parameters</td>
<td></td>
</tr>
<tr>
<td>Voltage dependent overcurrent protection</td>
<td></td>
</tr>
<tr>
<td>Negative phase sequence overcurrent protection</td>
<td></td>
</tr>
<tr>
<td>( I_d &gt; ), unbalanced load protection with evaluation of the negative phase sequence currents</td>
<td>2</td>
</tr>
<tr>
<td>JB, overload protection with thermal replica and separate pick-up values for alarm and trip functions</td>
<td>1</td>
</tr>
<tr>
<td>IH2/In, inrush detection with evaluation of the 2nd harmonic</td>
<td>1</td>
</tr>
<tr>
<td>IG, earth overcurrent and short circuit protection, all stages 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>4</td>
</tr>
<tr>
<td>( V &lt;, V &gt;, V(t)&lt;, ) under- and overvoltage protection, time dependent undervoltage protection</td>
<td>6</td>
</tr>
<tr>
<td>Voltage asymmetry supervision (V012)</td>
<td></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></td>
</tr>
<tr>
<td>Each of the six frequency protection stages can be used as: ( f &lt;, f_s, df, dt, \text{ ROCOF}, \text{ DF/DT}, \text{ vector surge}, \ldots )</td>
<td>6</td>
</tr>
<tr>
<td>VX, residual voltage protection or bus bar voltage for synchrocheck</td>
<td>2</td>
</tr>
<tr>
<td>AR, automatic reclosing</td>
<td>1</td>
</tr>
<tr>
<td>ExP, External alarm and trip functions</td>
<td>4</td>
</tr>
<tr>
<td>PQS, Power protection</td>
<td>6</td>
</tr>
<tr>
<td>PF, Power factor</td>
<td>2</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 with reclosing disengaging)</td>
<td></td>
</tr>
<tr>
<td>10-Minutes-Mean-Square-Sliding Supervision: adjustable according to VDE-AR 4105</td>
<td></td>
</tr>
<tr>
<td>Synchrocheck</td>
<td></td>
</tr>
</tbody>
</table>

### Control and Logic

- **Control**: Position indication, supervision time management and interlockings for 1 switchgear
- **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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</tr>
</thead>
<tbody>
<tr>
<td>CBF, circuit breaker failure protection</td>
<td>1</td>
</tr>
<tr>
<td>TCS, trip circuit supervision</td>
<td>1</td>
</tr>
<tr>
<td>LOP, loss of potential</td>
<td>1</td>
</tr>
<tr>
<td>FF, fuse failure protection via digital input</td>
<td>1</td>
</tr>
<tr>
<td>CTS, current transformer supervision</td>
<td>1</td>
</tr>
<tr>
<td>CLPU, cold load pickup</td>
<td>1</td>
</tr>
<tr>
<td>SOTF, switch onto fault</td>
<td>1</td>
</tr>
<tr>
<td>Demand management and peak value supervision (current and power)</td>
<td></td>
</tr>
<tr>
<td>THD supervision</td>
<td></td>
</tr>
<tr>
<td>Switchgear wear with programmable wear curves</td>
<td></td>
</tr>
<tr>
<td>Recorders: Disturbance recorder, fault recorder, event recorder, trend recorder</td>
<td></td>
</tr>
</tbody>
</table>
certified regarding UL508 (Industrial Controls)
certified regarding CSA-C22.2 No. 14 (Industrial Controls)
certified by GOST-R
Type tested (and certified) regarding IEC60255-1
certified regarding “BDEW-Richtlinie für Erzeugungsanlagen am Mittelspannungsnetz, Ausgabe Juni 2008” (German grid code standard)
ORDER FORM MRA4

Directional Feeder Protection

<table>
<thead>
<tr>
<th>Digital Inputs</th>
<th>Binary output relays</th>
<th>Housing</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>7</td>
<td>B2</td>
</tr>
<tr>
<td>16</td>
<td>13</td>
<td>B2</td>
</tr>
</tbody>
</table>

Hardware variants

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

Housing and mounting

- Door mounting
- Door mounting 19" (flush mounting)

Communication protocol

- Without protocol
- Modbus RTU, IEC60870-5-103, RS485/terminals
- Modbus TCP, Ethernet 100 MB/RJ45
- Profibus-DP, optic fiber
- Profibus-DP RS485/D-SUB
- Modbus RTU, IEC60870-5-103, optic fiber
- Modbus RTU, IEC60870-5-103, RS485/D-SUB
- IEC61850, Ethernet 100MB/RJ45

Available menu languages

- English/German/Russian/Polish/Portuguese/French

All devices are equipped with IRIG-B interface. 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 short-circuiters

Voltage inputs

4 (0–800 V)

Digital Inputs

Switching thresholds adjustable via software

Power supply

Wide range power supply

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

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. 4.7 kg / 10.36 lb

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