

HighPROTEC

MRA4

PROTECTION TECHNOLOGY
MADE SIMPLE

PROTECTION AND CONTROL RELAY
FOR FEEDER, GRID AND GENERATOR
APPLICATIONS

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*

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.



COMPREHENSIVE PROTECTION PACKAGE ⁽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: $V<$, $V>$, $V<(t)$
- Six elements unbalanced voltage supervision
- Flexible Fourth Voltage measuring input ⁽²⁾ 2 elements $VE>$ or VX (for synch-check)
- Synchro-check options Generator-to-System or System-to-System
- 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)

POWER QUALITY

- THD protection

DEMAND MANAGEMENT/ PEAK VALUES

- Peak values of current and power, average current and energy demand

INTERCONNECTION PACKAGE

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
- Considerably frequency protection package: Six elements configurable as $f<$, $f>$, df/dt (ROCOF), Vector Surge
- CB-Intertripping
- Synch Check (Generator to mains, mains-to-mains), options e.g. to switch onto dead bus

SLIDING-MEAN-SQUARE SUPERVISION

- Adjustable (VDE-AR 4105)

RECORDERS

- Disturbance recorder: 120 s non volatile
- Fault recorder: 20 faults
- Event recorder: 300 events
- Trend recorder: 4000 non volatile entries

LOGIC

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

TIME SYNCHRONISATION

- SNTP, IRIG-B00X, Modbus, DNP 3.0, IEC60870-5-103/-104

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: current and voltage
- Graphical display of tripping characteristics
- 8 languages selectable within the relay

COMMUNICATION OPTIONS

- IEC 61850
- Profibus DP
- Modbus RTU and/or Modbus TCP
- IEC 60870-5-103
- IEC 60870-5-104
- 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)
- Security Logger
- Self-monitoring; Syslog
- Encrypted connection with Smart view

CONTROL

- 1 breaker
- Breaker wear

PC TOOLS

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

⁽¹⁾ DFT, True RMS or I2 based

⁽²⁾ DFT or True RMS based

*5 mHz von 45 Hz bis 55 Hz

FUNCTIONAL OVERVIEW

| | Elements | ANSI |
|---|----------|---------------------|
| Protective Functions | | |
| 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 |
| 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 |
| IB, overload protection with thermal replica and separate pick-up values for alarm and trip functions | 1 | 49 |
| IH2/In, inrush detection with evaluation of the 2nd harmonic | 1 | Inrush |
| IG, 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). | 4 | 50N/G, 51N/G, 67N/G |
| V<, V>, V(t)<, under- and overvoltage protection, time dependent undervoltage protection | 6 | 27, 59 |
| Voltage asymmetry supervision (V012) | | |
| V1, under and overvoltage in positive phase sequence system | 6 | 47 |
| V2, overvoltage in negative phase sequence system | | |
| 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 |
| VX, residual voltage protection or bus bar voltage for Synch Check | 2 | 59N |
| AR, automatic reclosing | 1 | 79 |
| ExP, External alarm and trip functions | 4 | |
| PQS, Power protection | 6 | 32, 37 |
| PF, Power factor | 2 | 55 |
| FRT (optional coordination with AR-feature) | 27 (t) | 27 (t, AR) |
| HVRT (OVRT) High Voltage Ride Through | 1 | 59 |
| Q(V) Protection (undervolt. dep. directional reactive power protection with reclosing disengaging) | | |
| UFLS (non-discriminating active power direction depending load shedding) | | |
| 10-Minutes-Mean-Square-Sliding Supervision: adjustable according to VDE-AR 4105 | | |
| Synch Check | | 25 |
| 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 | | |
| CBF, circuit breaker failure protection | 1 | 50BF |
| TCS, trip circuit supervision | 1 | 74TC |
| 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 | |
| Demand management and peak value supervision (current and power) | | |
| THD supervision | | |
| Breaker wear with programmable wear curves | | |
| Recorders: Disturbance recorder, fault recorder, event recorder, trend recorder | | |

MRA4 | PROTECTION AND CONTROL RELAY FOR FEEDER, GRID AND GENERATOR APPLICATIONS

ORDER FORM MRA4

| Directional Feeder Protection | | | | | MRA4 | -2 | | | | |
|---|-------------------|-------------------------|---------|------------------|------|----|--|--|--|--|
| Version 2 with USB, enhanced communication and user options | | | | | | | | | | |
| Analog In Analog Out | Digital Inputs | Binary output relays | Housing | Large display | | | | | | |
| - | 8 | 7 | B2 | X | A | | | | | |
| - | 16 | 13 | B2 | X | D | | | | | |
| - | 24 | 20 | B2 | X | E | | | | | |
| 2+2 | 16 | 15 | B2 | X | F | | | | | |
| 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 | | | | | |
| Communication protocol | | | | | | | | | | |
| Without protocol | | | | | A | | | | | |
| Modbus RTU, IEC60870-5-103, DNP3.0 RTU <i>RS485/terminals</i> | | | | | B* | | | | | |
| Modbus TCP, DNP3.0 TCP/UDP, IEC 60870-5-104 <i>Ethernet 100 MB/RJ45</i> | | | | | C* | | | | | |
| Profibus-DP <i>optic fiber/ST-connector</i> | | | | | D* | | | | | |
| Profibus-DP <i>RS485/D-SUB</i> | | | | | E* | | | | | |
| Modbus RTU, IEC60870-5-103, DNP3.0 RTU <i>optic fiber/ST-connector</i> | | | | | F* | | | | | |
| Modbus RTU, IEC60870-5-103, DNP3.0 RTU <i>RS485/D-SUB</i> | | | | | G* | | | | | |
| IEC61850, Modbus TCP, DNP3.0 TCP/UDP, IEC 60870-5-104 <i>Ethernet 100MB/RJ45</i> | | | | | H* | | | | | |
| IEC60870-5-103, Modbus RTU, DNP3.0 RTU <i>RS485/terminals</i> | | | | | I* | | | | | |
| Modbus TCP, DNP3.0 TCP/UDP, IEC60870-5-104 <i>Ethernet 100 MB/RJ45</i> | | | | | K* | | | | | |
| IEC61850, Modbus TCP, DNP3.0 TCP/UDP, IEC 60870-5-104 <i>Optical Ethernet 100MB/LC duplex connector</i> | | | | | L* | | | | | |
| Modbus TCP, DNP3.0 TCP/UDP, IEC 60870-5-104 <i>Optical Ethernet 100MB/LC duplex connector</i> | | | | | T* | | | | | |
| IEC60870-5-103, Modbus RTU, DNP3.0 RTU <i>RS485/terminals</i> | | | | | | | | | | |
| IEC61850, Modbus TCP, DNP3.0 TCP/UDP, IEC60870-5-104 <i>Ethernet 100 MB/RJ45</i> | | | | | | | | | | |
| 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 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) |
| 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 (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 |

19" Variants Available! **



<http://www.manuals.com/hpt-2>

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