

# HighPROTEC | PROTECTION TECHNOLOGY MADE SIMPLE

## MRI4 | COMBINED NON-DIRECTIONAL OVERCURRENT AND EARTH-FAULT RELAY

### NEW FEATURES - Release 3.6

- VDE-AR-N 4110
- Wattmetric Ground Fault Protection
- IEC 60870-5-104
- SCADApter for Retrofit
- Usability improvements
- IT Security

### APPLICATION

The MRI4 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. The MRI4 provides a number of three phase protection elements to safeguard against overcurrent, short-circuit and earth fault, all with inverse time (INV) and definite time (DEFT) tripping characteristics.

The MRI4 is also ideal for the protection of isolated, resonant, resistive and solidly earthed neutral systems. It is designed to be used in both radial networks and single fed open ring main systems. It can also serve as backup protection for differential protection systems on generators, transformers, bus bars and electrical lines. For overhead line protection the MRI4 is also available with an optional auto reclosing function. The protection functions of the MRI4 have been adapted to comply with the requirements of the VDE-AR-N-4110:2018.



### ALL INCLUSIVE:

- All protection features without extra charge
- Parameter setting and evaluation software
- Disturbance record analysis software

### SIX ELEMENTS PHASE OVER-CURRENT PROTECTION <sup>(1)</sup>

- Non-directional overcurrent/ short-circuit protection (DEFT/INV)
- Tripping characteristics: DEFT  
ANSI: MINV, VINV, EINV  
IEC: NINV, VINV, LINV, EINV  
Thermal Flat, IT, I2T, I4T

### FOUR ELEMENTS EARTH FAULT PROTECTION <sup>(2)</sup>

- Non-directional earth fault protection (DMT/IMDT)
- Tripping characteristics: DEFT  
ANSI: MINV, VINV, EINV  
IEC: NINV, VINV, LINV, EINV  
Thermal Flat, IT, I2T, I4T  
RXIDG
- Wattmetric Ground Fault Protection

### RECORDERS

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

### TWO ELEMENTS UNBALANCED LOAD PROTECTION

- Supervision by definite time or inverse tripping characteristic

### DEMAND MANAGEMENT/ PEAK VALUES

- Current (peak values) and average current

### POWER QUALITY

- THD protection

### SUPERVISION

- Current 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
- Comprehensive RMS and DFT measured values and statistics
- Masking of unused functions
- Multi-Password-Level

### 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
- 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
- IEC60870-5-104
- 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)
- IT Security Logger
- Syslog (to centralized server)
- Encrypted connection with Smart view

### CONTROL

- One breaker
- Breaker wear

### PC TOOLS

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

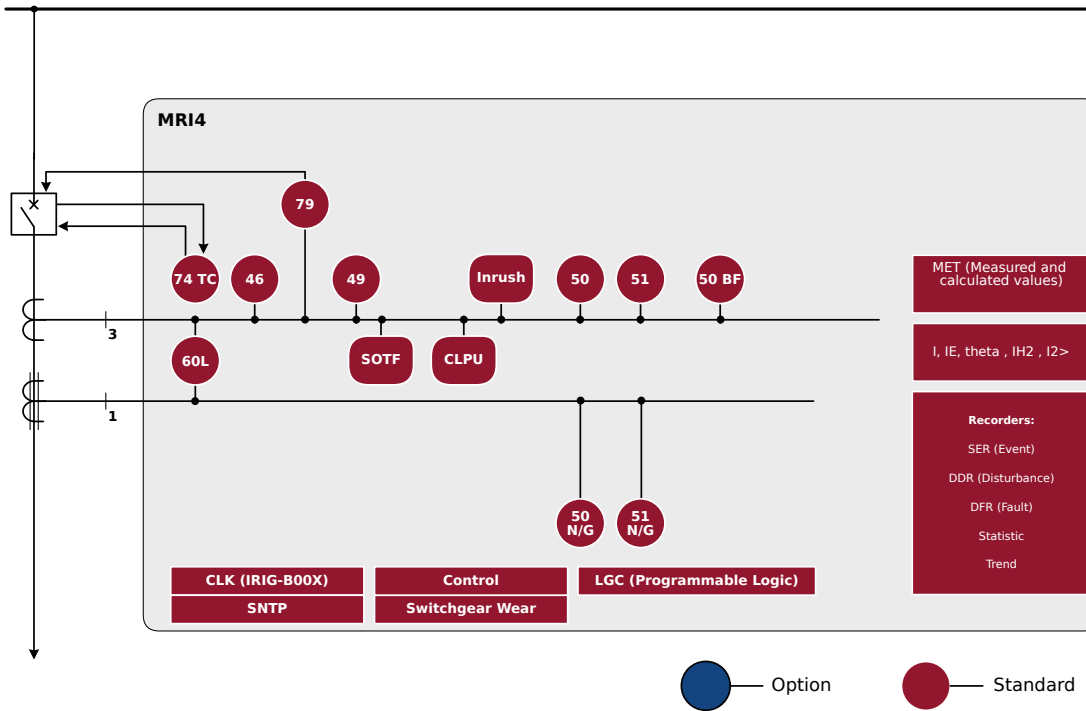
<sup>(1)</sup> DFT, True RMS or I2 based

<sup>(2)</sup> DFT or True RMS based

## FUNCTIONAL OVERVIEW

	Elements	ANSI
<b>Protective Functions</b>		
I, time overcurrent and short circuit protection, multiple reset options (instantaneous, definite time, reset characteristics according to IEC and ANSI)	6	50P, 51P, 67P
Negative phase sequence overcurrent protection		51Q
I <sub>2&gt;</sub> , unbalanced load protection with evaluation of the negative phase sequence currents	2	46
ThA, overload protection with thermal replica and separate pick-up values for alarm and trip functions	1	49
IH <sub>2</sub> /In, inrush detection with evaluation of the 2nd harmonic	1	Inrush
IG, earth overcurrent and short circuit protection	4	50N/G, 51N/G
AR, automatic reclosing	1	79
ExP, External alarm and trip functions	4	
<b>Control and Logic</b>		
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		
<b>Supervision Functions</b>		
CBF, circuit breaker failure protection	1	50BF
TCS, trip circuit supervision	1	74TC
CTS, current transformer supervision	1	60L
CLPU, cold load pickup	1	
SOTF, switch onto fault	1	
Demand management and peak value supervision		
THD supervision		
Breaker wear with programmable wear curves		
Recorders: Disturbance recorder, fault recorder, event recorder, trend recorder		

## 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)



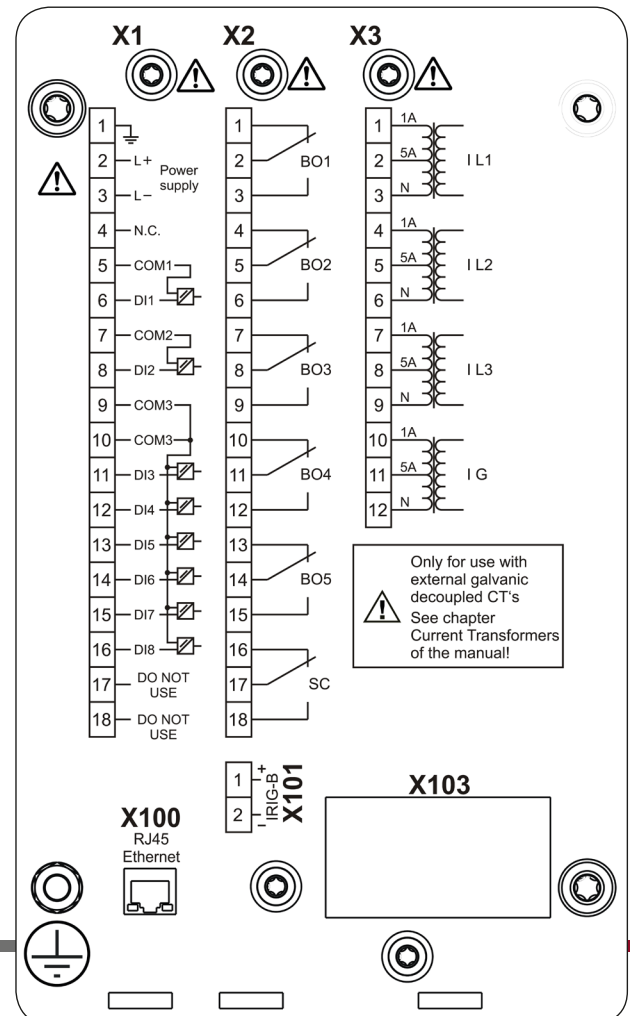
Type tested (and certified)  
regarding IEC60255-1



(Declaration of Identity)

Complies with IEEE 1547-2003  
Amended by IEEE 1547a-2014  
Complies with ANSI C37.90-2005

## CONNECTIONS (EXAMPLE)



**ORDER FORM MRI4**

<b>Non-directional Feeder Protection</b>				MRI4	-2				
Version 2 with USB, enhanced communication and user options									
<b>Digital Inputs</b>	<b>Binary output relays</b>	<b>Housing</b>	<b>Large display</b>						
8	6	B1	-					A	
<b>Hardware variant 2</b>									
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									
<b>Housing and mounting</b>									
Door mounting									
Door mounting 19" (flush mounting)									
<b>Communication protocol</b>									
Without protocol									
Modbus RTU, IEC60870-5-103, DNP3.0 RTU   RS485/terminals									
Modbus TCP, DNP3.0 TCP/UDP, IEC60870-5-104   Ethernet 100 MB/RJ45									
Profibus-DP   optic fiber/ST-connector									
Profibus-DP   RS485/D-SUB									
Modbus RTU, IEC60870-5-103, DNP3.0 RTU   optic fiber/ST-connector									
Modbus RTU, IEC60870-5-103, DNP3.0 RTU   RS485/D-SUB									
IEC61850, Modbus TCP, DNP3.0 TCP/UDP, IEC60870-5-104   Ethernet 100MB/RJ45									
IEC60870-5-103, Modbus RTU, DNP3.0 RTU   RS485/terminals									
Modbus TCP, DNP3.0 TCP/UDP, IEC60870-5-104   Ethernet 100 MB/RJ45									
IEC61850, Modbus TCP, DNP3.0 TCP/UDP, IEC60870-5-104   Optical Ethernet 100MB/LC duplex connector									
Modbus TCP, DNP3.0 TCP/UDP, IEC60870-5-104   Optical Ethernet 100MB/LC duplex connector									
IEC60870-5-103, Modbus RTU, DNP3.0 RTU   RS485/terminals									
IEC61850, Modbus TCP, DNP3.0 TCP/UDP, IEC60870-5-104   Ethernet 100 MB/RJ45									
<b>Harsh Environment Option</b>									
None									
Conformal Coating									
<b>Available menu languages (in every device)</b>									
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.

<b>Current inputs</b>	4 (1 A and 5 A) with automatic CT Disconnect
<b>Digital Inputs</b>	Switching thresholds adjustable via software
<b>Power supply</b>	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%)
<b>Terminals</b>	All terminals plug type
<b>Type of enclosure</b>	IP54
<b>Mounting</b>	Door mounting or 19" flush mounting
<b>Dimensions of housing (W x H x D)</b>	19" flush mounting: 141.5 mm x 173 mm x 209 mm 5.571 in. x 6.811 in. x 8.228 in. Door mounting: 141.5 mm x 183 mm x 209 mm 5.571 in. x 7.205 in. x 8.228 in.
<b>Weight (max. components)</b>	approx. 2.9 kg / 6.393 lb

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