

PROTECTION MADE SIMPLE.

HighPROTEC

MRU4 VOLTAGE AND FREQUENCY RELAY

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.



New Features - Release 3.7

- ▶ VDE-AR-N 4110; VDE-AR-N 4120
- ▶ G99 Issue 1 Amendment 6
- ▶ Improved frequency and ROCOF precision
- ▶ Improved design of the PC tools
- ▶ Configurable SCADA protocols: Modbus, Profibus, IEC 60870-5-103/-104, DNP3

All HighPROTEC devices have been type tested and fully certified by KEMA Laboratories (IEC 60255-1:2009).

All Inclusive:

- ▶ All protection features without extra charge
- ▶ Parameter setting and evaluation software
- ▶ Disturbance record 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 under-voltage tripping characteristic

Six Elements Voltage Asymmetry Supervision

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

Logic

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

Additional Highlights

- ▶ Two Elements Residual Voltage Protection VE>
- ▶ Flexible Fourth Voltage measuring input 2 elements VE> or VX (for Synchro-check)
- ▶ Sliding-Mean-Square Supervision, adjustable (VDE-AR 4105)
- ▶ FRT (LVRT), adjustable LVRT-profiles, optionally AR-controlled
- ▶ Synchrocheck: Generator-to-System, System-to-System, options to switch onto dead bus bars
- ▶ 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

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)
- ▶ Configurable Datapoints, SCADApter for Retrofit

Control

- ▶ 1 breaker
- ▶ Breaker wear

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
- ▶ Integrated fault simulator
- ▶ Graphical display of tripping characteristics
- ▶ 8 languages selectable within the relay

PC Tools

- ▶ Setting and analyzing software
Smart view for free
- ▶ Including page editor to design own Control pages
- ▶ SCADApter to re-assign datapoints for Retrofit projects: Modbus, Profibus, IEC 60870-5-103/-104

Cyber Security

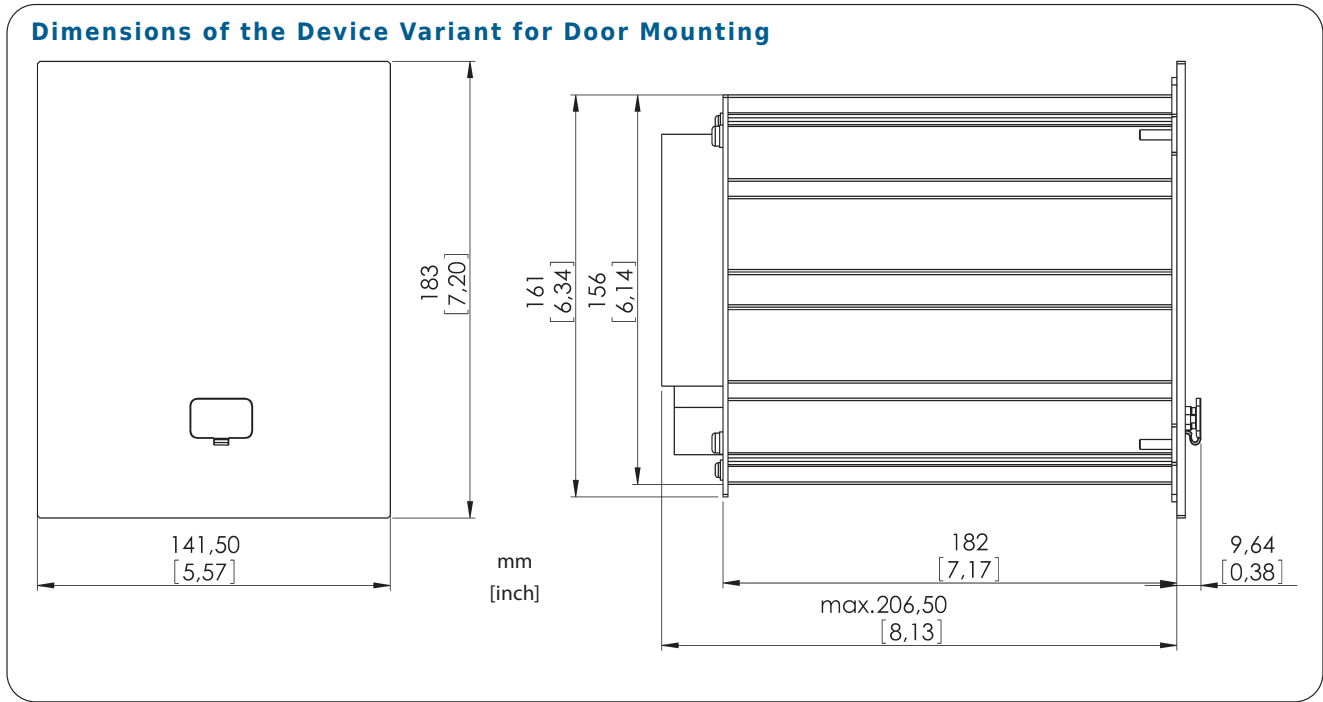
- ▶ Menu for the activation of security settings (e. g. hardening of interfaces)
- ▶ Security Logger
- ▶ Centralized Security Logs (Syslog)
- ▶ Encrypted Connection Smart view – Device
- ▶ Device specific certificates (No man in the middle attacks)

Time Synchronisation

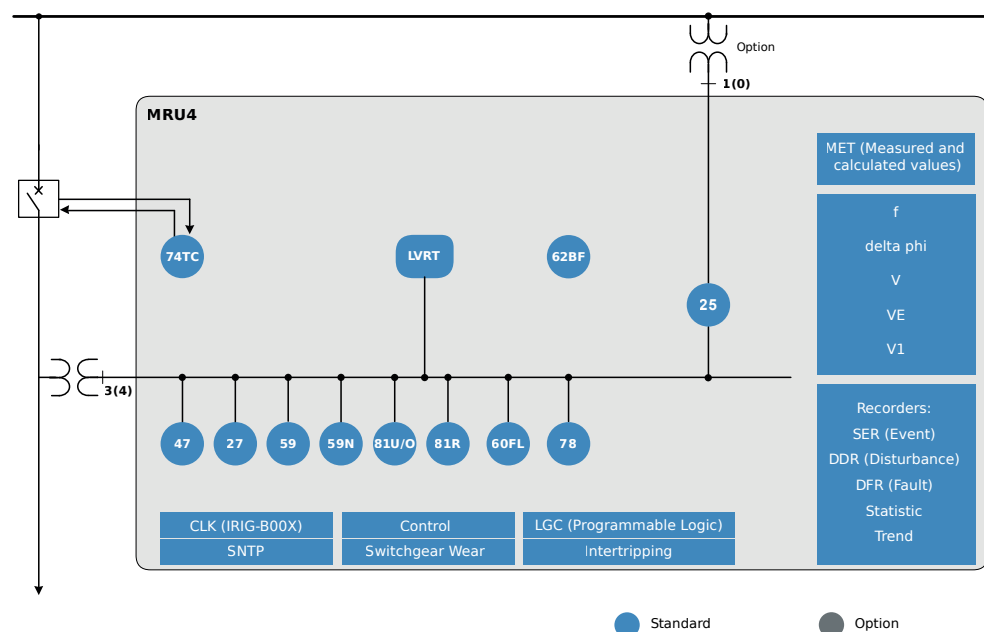
- ▶ SNTP, IRIG-B00X, Modbus, DNP 3.0, IEC 60870-5-103/-104

Functional Overview

Protective Functions	ANSI		IEC 61850
V>, V<, V<(t) under- and overvoltage protection, programmable time dependent undervoltage tripping characteristic	6	27, 59	PTOV, PTUV
FRT (optional coordination with AR-feature)	1	27 (t, AR)	
Synchronism check	1	25	RSYN
Six frequency protection elements, each can be used as: <ul style="list-style-type: none">▸ 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-, 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)	6	81U/O 81R 78	PTOF, PTUF, PFRC, PPAM
VX, residual voltage protection	2	27A/N, 59A/N	PTOV, PTUV
Voltage asymmetry supervision (V012)	6	47	PTOV, PTUV
V1, under and overvoltage in positive phase sequence system			
V2, overvoltage in negative phase sequence system			
ExP, External alarm and trip functions	4		GAPC
10-Minutes-Mean-Square-Sliding Supervision: adjustable according to VDE-AR 4105			
Control and Logic			
Control: Position indication, supervision time management and interlockings for 1 breaker			CILO, CSWI, XCBR, XSWI
Logic: Up to 80 logic equations, each with 4 inputs, selectable logical gates, timers and memory function			
Supervision Functions			
CBF, circuit breaker failure protection (via position indicators)	1	62BF	RBRF
TCS, trip circuit supervision	1	74TC	SCBR
VTs, voltage transformer supervision by comparing phase and residual voltages	1	60FL	
VTs, fuse failure protection via digital input	1	60FL	
THD supervision			



Functional Overview in ANSI / IEEE C37.2 Form



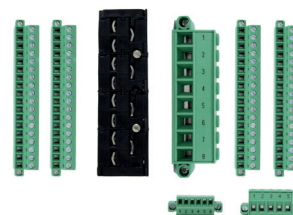
19 " Variants Available!

See Order Form on page 4, housing type "rack mounting"



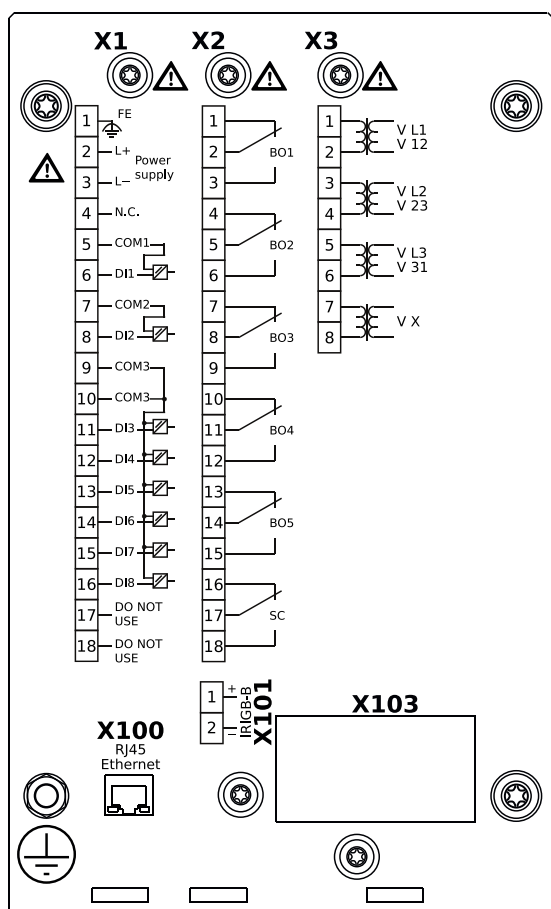
<https://docs.SEGelectronics.de/hpt-2>

Terminals Available Separately!



Order codes HPTTERMKIT-1 ... -5
For MRU4: HPTTERMKIT-3
The terminal kits allow for making all required wirings in advance, thus speeding up the installation and commissioning work.

Connections (Example)



Approvals / Standards



certified regarding UL508
(Industrial Controls)



certified regarding
CSA-C22.2 No. 14
(Industrial Controls)



certified by EAC
(Eurasian Conformity)



Type tested and certified by KEMA
Laboratories in accordance with the
complete type test requirements of
IEC 60255-1:2009.



Component certificate regarding the
German grid code standard
VDE-AR-N 4110 (2018-11)
Component certificate regarding the
German grid code standard
VDE-AR-N 4120 (2018-11)

Complies with G99 Issue 1 Am. 6.
Complies with IEEE 1547-2003.
Amended by IEEE 1547a-2014.
Complies with ANSI C37.90-2005.

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Order Form MRU4

Voltage and Frequency Protection Relay				MRU4	-2	A	0			
Version 2 with USB, enhanced communication and user options										
Digital Inputs	Binary output relays	Housing	Large display							
8	6	B1	—							
Hardware variant										
Standard										
Housing and mounting										
Housing suitable for door mounting									A	
Housing suitable for 19" rack mounting									B	
Communication protocol										
Without protocol										A*
Modbus RTU, IEC 60870-5-103, DNP3.0 RTU RS485/terminals										B*
Modbus TCP, DNP 3.0 TCP/UDP, IEC 60870-5-104 Ethernet 100 MB/RJ45										C*
Profibus-DP optic fiber/ST-connector										D*
Profibus-DP RS485/D-SUB										E*
Modbus RTU, IEC 60870-5-103, DNP3.0 RTU optic fiber/ST-connector										F*
Modbus RTU, IEC 60870-5-103, DNP3.0 RTU RS485/D-SUB										G*
IEC 61850, Modbus TCP, DNP 3.0 TCP/UDP, IEC 60870-5-104 Ethernet 100MB/RJ45										H*
IEC 60870-5-103, Modbus RTU, DNP 3.0 RTU RS485/terminals										I*
Modbus TCP, DNP 3.0 TCP/UDP, IEC60870-5-104 Ethernet 100 MB/RJ45										J*
IEC 61850, Modb. TCP, DNP 3.0 TCP/UDP, IEC 60870-5-104 Opt. Eth. 100MB/LC dupl. conn.										K*
Modbus TCP, DNP 3.0 TCP/UDP, IEC 60870-5-104 Opt. Ethernet 100MB/LC duplex conn.										L*
IEC 60870-5-103, Modbus RTU, DNP 3.0 RTU RS485/terminals										T*
IEC 61850, Modbus TCP, DNP 3.0 TCP/UDP, IEC60870-5-104 Ethernet 100 MB/RJ45										
Harsh Environment Option										
None										A
Conformal Coating										B
Special Standards-Related Packages										
None										
G99 Type-Tested Variant (based on a special EREC-G99-adapted Release 3.6)										+G
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 can be used without extra costs.

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 (Front)	IP54
Dimensions of housing (W x H x D)	19" flush mounting: 141.5 mm x 173 mm x 208 mm 5.571 in. x 6.811 in. x 8.228 in. Door mounting: 141.5 mm x 183 mm x 208 mm 5.571 in. x 7.205 in. x 8.228 in.
Weight (max. components)	approx. 2.4 kg / 5.29 lb

Contact:

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Service & Support

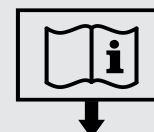
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Find Your Local Distributor on

<http://www.SEGelectronics.de>

Technical Documents:

<https://docs.SEGelectronics.de/mru4-2>



For more information please contact: