HighPROTEC
ELECTRICAL PROTECTION MADE SIMPLE

POWER SYSTEM CONTROL AND PROTECTION

HighPROTEC | POWER SYSTEM CONTROL AND PROTECTION
Always Innovating for a Better Future | *www.woodward.com*

WOODWARD

RELIABLE
POWER SYSTEM PROTECTION

The Woodward HighPROTEC line offers an outstanding solution for reliable medium voltage protection of distribution, generator, substation and motor. The innovative PC tool minimizes commissioning and training costs. The high degree of proven reliability guaranties high availability of your electrical grid and equipment. Each model type has the flexibility to handle the many variations that can be encountered in a specific application.

The "All Inclusive Concept" of HighPROTEC devices offers you a complete portfolio of protection functions, plus the operating and setting software Smart view and a tool for analyzing disturbance records, and all that without any hiddden costs or extra fees.

SUSTAINABLE TECHNOLOGIES

When developing the HighPROTEC Line we incorporated the latest standards and listened to our customers' input to deliver a product that offers long term availability to the market. For example, the protection functions of all HighPROTEC relays have been adapted to comply with the requirements of the VDE-AR-N-4110/4120:2018.

With 50 years of experience, combined with the ability to leverage our existing product lines, the HighPROTEC product line offers precision, flexibility, reliability, and uncomplicated handling.

ALL INCLUSIVE – COMPETITIVELY PRICED

As standard, the devices are fully equipped with all functions required by the corresponding application. For example, the Feeder Protection Relay MRA4 provides functions such as Auto Reclosing, Vector Surge, df/dt (ROCOF) and six Frequency Protection Stages onboard, without extra charge.

→ All devices in the HighPROTEC line arrive with a clear manual and few variations.
→ All current and ground current inputs are designed for 1 A and 5 A.
→ All terminals can be easily removed and the current connections are equipped with automatic short circuiters.
→ The nominal voltage of the voltage inputs and the switching thresholds of the digital inputs can be adjusted via software.
→ The wide range power supply unit covers all standard auxiliary voltages, both for AC and DC.
→ The non-volatile disturbance recorder records up to 120 seconds with 32 samples per cycle.
→ Page editor to design individual Control pages with breakers and measuring values.

Intuitive operation
with guiding texts

Plausibility test

Approvals / global certifications
CE, UL, CSA, EAC, KEMA, IEEE,
Lloyd's Register*, G99 Issue 1 Amndmt. 3**,
FNN 2015 ("FNN-Hinweis: Anforderungen an
digitale Schutzeinrichtungen", 2015)***

Wide-range power supply
for all standard auxiliary voltage ranges

Current inputs
for 1 A and 5 A

ANSI and IEC menu structure

Nominal Voltage
for digital inputs are settable

Languages
English, German, Portuguese, Spanish,
French, Polish, Russian, Romanian

HighPROTEC – Highest performance because
of dual-core processor technology

* MCDGV4 and MRDT4

** MRA4, MRU4, MCA4, MCDGV4, MCDLV4, MRMV4, MCDTV4

*** See Declaration of Conformity for details

YOUR BENEFITS

→ Simplified planning: You do not have to decide on the rated quantities.

→ Short delivery times: Due to the modular design we are able to react far quicker to our customers' enquiries.

→ Facilitate your commisioning efforts:
The wide functional range enables you to have fewer different relay types in stock, and helps to simplify your planning.

→ We have made it much easier for your technical engineers: The convenient operating concept applies to all relay types and also for the parameter setting software "Smart view", which is available for free.

→ Choice between multiple communications protocols, including Modbus, Profibus, DNP3.0, IEC 61850, IEC 60870-5-103 and IEC 60870-5-104 capabilities.

→ Front face USB port to make communications easier.

→ *New as of Release 3.4:* IT Security features

→ *New as of Release 3.6:* Individual Register Mappings for the Modbus and IEC 60870-5-104 protocols, using the new convenient graphical tool SCADApter.

POWER PROTECTION APPLICATIONS

Directional feeder protection	MCA4 / MRA4
Overcurrent and earth fault protection OC&EF protection	MRI4
Voltage and frequency protection	MRU4
Transformer differential protection with voltage measurement	MCDTV4
Transformer differential protection	MRDT4
Generator differential protection	MCDGV4
Line differential protection	MCDLV4
Motor protection	MRM4
Motor protection with voltage	MRMV4

MR = Protection // MC = Control and protection

OUR SERVICE

You will become entirely familiar with the HighPROTEC devices in virtually no time, we are convinced of this. But we do not want you to have the feeling it is only technology you are going to buy; you can be sure that you will be well supported by Woodward. Our support team is available to assist you during sales process or in the after sales process. In addition, we offer special product training and service engineering.

CERTIFIED QUALITY

All our electronic devices are developed and tested according to current international standards such as the IEC 60255. Production of our products is subject to strict quality processes. This is proven by certification to ISO 9001 and ISO 14001.

Wind Turbine Applications

Photovoltaic Applications

Engine Generator Applications

Medium Voltage Applications

HighPROTEC
OVERVIEW

SMART VIEW

Our PC tool offers:

- → Menu-controlled parameter setting incl. plausibility checks
- → Offline configuration of all relay types
- → Graphical visualization of tripping curves and direction determination settings
- → Reading and evaluating of statistical data and measuring values
- → Commissioning support functions
- → Device status display
- → Fault analysis with event, fault, trend and disturbance recorder
- → Device models can be downloaded from the protective device
- → Integrated fault simulator
- → Page editor tool

DATA VISUALIZATION

With the HighPROTEC line your fault analysis becomes transparent and clear:

- → Analysis and graphical representation of the integrated fault simulation
- → Representation of digital and analog recordings with 32 samples per period
- → Immediate evaluation of individual measurements
- → Import and export of fault records in the ASCII and COMTRADE formats

IT SECURITY

- → Menu for the activation of BDEW-Whitepaper-compliant security settings (e.g. hardening of interfaces)
- → Encrypted TCP/IP connection between Smart view and protection relay
- → Dedicated password for remote access
- → Time penalties for multiple input of a false password
- → Syslog support

MCA4 | DIRECTIONAL FEEDER PROTECTION

The MCA4 is designed for the protection and control of mid-range voltage feeders. In addition to numerous protection functions for feeder protection and the utility connection point, the switch control can be fully monitored and controlled by the MCA4 by remote control or on location.

MRA4 | DIRECTIONAL FEEDER PROTECTION

The MRA4 is specifically tailored to the protection of incoming and outgoing feeders in MV systems and can be used for grid and generator protection.

MRI4 | NON-DIRECTIONAL FEEDER PROTECTION

The MRI4 is an overcurrent and earth fault relay. The relay is used for incoming and outgoing feeder applications and recloser can also be used as backup protection for differential protection systems.

MRU4 | VOLTAGE AND FREQUENCY MONITORING

The MRU4 is designed to protect electrical equipment against dangerous voltage and frequency fluctuations, and is used for busbar, generator and feeder protection.

MRM4 | MOTOR PROTECTION

The MRM4 is designed for the protection of motors. All the protection functions based on current, as well as monitoring functions such as motor start-up and incomplete start-up sequence for motor protection are covered by the MRM4.

Full flexibility and easy use.
HighPROTEC – the most efficient and
easiest solution for your application.

MCDTV4 | ENHANCED TRANSFORMER DIFFERENTIAL PROTECTION

The MCDTV4 is a transformer protection device with phase and earth differential protection and with a large backup protection package. The device is specially designed to protect medium and large HV / MV / LV transformers in distribution and substation systems. The MCDTV4 is additional equipped with grid coupling functions for Distributed Energy Resources, especially for generator power plants.

MRDT4 | NON-DIRECTIONAL TRANSFORMER

The MRDT4 is a transformer differential relay designed to protect two winding transformers. The relay can also be used as a generator differential protection and incorporates backup protection functions.

MCDGV4 | GENERATOR DIFFERENTIAL PROTECTION

The high-precision generator differential protection relay MCDGV4 is designed for the protection of medium and large generators. The step-up transformer can be integrated into the protection zone (unit protection). In addition to the differential protection package the device offers pole slip protection, phase distance (backup) protection and a broad interconnection package (FRT, QV, Reconnection Release) as well as full packages for phase, earth, voltage, frequency and power protection, and many more.

MCDLV4 | LINE DIFFERENTIAL PROTECTION

The cable / line differential protection relay MCDLV4 is designed to protect cables and lines up to 24 km. There can even be an in-zone transformer within the line to be protected. In addition, it comes with a very comprehensive protection package like phase, restricted earth fault, inrush detection, and monitoring functions including grid interconnection and control functionality up to 6 switchgears.

MRMV4 | MOTOR PROTECTION WITH VOLTAGE MEASUREMENT

Compared with the MRM4, the MRMV4 is a motor protection relay that also features voltage measurement and is therefore able to monitor power, voltage and frequency.

FEATURES
OVERVIEW

Protection functions	ANSI	MCA4	MRA4	MRI4	MRU4	MCDTV4	MRDT4	MCDGV4	MCDLV4	MRM4	MRMV4
Phase current prot. (non-directional)	50/51	-	-	6	-	-	4	-	-	6	6
Phase current prot. (non-directional and directional)	50/51/67	6	6	-	-	6	-	6	6	-	-
Generator or Transformer differential protection	87G/87T	-	-	-	-	•	•	•	-	-	-
Cable / line differential protection	87L	-	-	-	-	-	-	-	•	-	-
Restricted earth fault protection	87N (64REF)	-	-	-	-	2	2	2	2	-	-
Voltage controlled current protection	51C	•	•	-	-	•	-	•	•	-	-
Voltage restraint current protection	51V	•	•	-	-	•	-	•	•	-	-
Earth current elements (non-directional)	50N/51N	-	-	4	-	-	4	-	-	4	4
Earth current elements (non-directional and directional)	50N/51N/67N	4	4	-	-	4	-	4	4	-	-
Negative sequence current prot. (DEFT/INV)	46	2	2	2	-	2	2	2	2	2	2
Negative sequence current prot. (IEC/ANSI curves)	51Q	•	•	-	-	•	-	•	•	•	•
Overload protection with thermal replica	49	•	•	•	-	•	•	•	•	•	•
Voltage protection	27/59	6	6	-	6	6	-	6	6	-	6
Residual voltage protection	59N	2	2	-	2	2	-	2	2	-	2
Frequency protection	81 U/O	6	6	-	6	6	-	6	6	-	6
Inrush detection (2nd harmonic)		•	•	•	-	•	•	•	•	-	-
Voltage transformer supervision	60FL	•	•	•	•	•	-	•	•	-	•
Current transformer supervision	60L	•	•	•	-	•	•	•	•	•	•
Auto reclosing	79	•	•	•	-	-	-	-	-	-	-
Negative/positive sequence elements (voltage)	47	6	6	-	6	6	-	6	6	-	6
Phase distance protection	21P	-	-	-	-	-	-	2	-	-	-
Power swing blocking	68	-	-	-	-	-	-	•	-	-	-
Load blinder		-	-	-	-	-	-	•	-	-	-
Out of step tripping (Pole slip protection)	78 / 68	-	-	-	-	-	-	•	-	-	-
Circuit breaker failure protection	50 BF/62BF	•	•	•	•	•	•	•	•	•	•
Trip circuit supervision	74TC	•	•	•	•	•	•	•	•	•	•
Frequency gradient (ROCOF)	81R	•	•	-	•	•	-	•	•	-	•
Vector surge	78	•	•	-	•	•	-	•	•	-	•
Power protection: P, Q, Qr, S, Pr	32/37FQRS	6	6	-	-	6	-	6	6	-	6
Power factor cos (φ)	55	2	2	-	-	2	-	2	2	-	2
QV protection (reactive-power/undervoltage protection)		•	•	-	-	•	-	•	•	-	-

	ANSI	MCA4	MRA4	MRI4	MRU4	MCDTV4	MRDT4	MCDGV4	MCDLV4	MRM4	MRMV4
Protection functions											
Underfrequency load shedding		•	•	-	-	•	-	-	•	-	-
Synchro check	25	•	•	-	-	•	-	•	-	-	•
Motor start supervision		-	-	-	-	-	-	-	-	•	•
Locked rotor protection		-	-	-	-	-	-	-	-	•	•
JAM protection	51J	-	-	-	-	-	-	-	-	•	•
I< underload protection steps	37	-	-	-	-	-	-	-	-	•	•
Lockout function	86	•	•	•	•	•	•	•	•	•	•
Overexcitation V/Hz	24	-	-	-	-	•	-	•	-	-	•
Loss of excitation	40	-	-	-	-	-	-	•	-	-	•
100% stator earth fault protection	59TN/27TN	-	-	-	-	-	-	•	-	-	•
Protection parameter sets		4	4	4	4	4	4	4	4	4	4
Reverse interlocking		•	•	•	-	•	•	•	•	•	•
Event, failure and disturbance recorder		•	•	•	•	•	•	•	•	•	•
Control											
Control function for up to 6 switchgears		•	-	-	-	•	-	•	•	-	•
Control function for 1 switchgear		-	•	•	•	-	•	-	-	•	-
Measuring functions											
Currents		•	•	•	-	•	•	•	•	•	•
Thermal overload θ		•	•	•	-	•	•	•	•	•	•
Voltages		•	•	-	•	•	-	•	•	•	•
Frequency		•	•	-	•	•	-	•	•	•	•
Power: P, Q, S, Pr, PF (cos φ), Energy: Wp+, Wp-, Wq+, Wq- (4 quadrant energy counter)		•	•	-	-	•	-	•	•	•	•
Trend recording		•	•	•	•	•	•	•	•	•	•
Statistic measuring functions (min, max and avg values)											
Currents		•	•	•	-	•	•	•	•	•	•
Voltages		•	•	-	•	•	-	•	•	•	•
Frequency		•	•	-	•	•	-	•	•	•	•
Power: P, Q, S, PF (cos φ)		•	•	-	•	•	-	•	•	•	•
Thermal overload θ		•	•	•	-	•	•	•	•	•	•
Energy		•	•	-	-	•	-	•	•	•	•

* MCDGV4 and MRDT4

** MCA4, MCDGV4, MRDT4, MRU4

*** "FNN-Hinweis: Anforderungen an digitale Schutzeinrichtungen", 2015. See Declaration of Conformity for details.

Released

GLOBAL
SUPPORT

North and Central America, South America, Europe, Middle East and Africa, Russia, China, India, ASEAN and Oceania

Our global presence allows us to respond quickly to the needs of our customers. Customers and the industry at large recognize our people as a competitive advantage through their diverse representation of the global community. Additionally, as a company and as employees, we respond to the needs of our local communities by donating our time, talent, and money.

For distributor information, visit www.woodward.com/directory

If you would like more information about the HighPROTEC-2 visit www.woodward.com/HPT-2 or contact us directly. To learn more about Woodward technologies and services visit www.woodward.com

Description	Specification	User Manual
MCA4-2	DOK-FLY-MCA4-2E	MCA4-3.6-EN-MAN
MRA4-2	DOK-FLY-MRA4-2E	MRA4-3.6-EN-MAN
MRI4-2	DOK-FLY-MRI4-2E	MRI4-3.6-EN-MAN
MRU4-2	DOK-FLY-MRU4-2E	MRU4-3.6-EN-MAN
MCDTV4-2	DOK-FLY-MCDTV4-2E	MCDTV4-3.6-EN-MAN
MRDT4-2	DOK-FLY-MRDT4-2E	MRDT4-3.6-EN-MAN
MCDGV4-2	DOK-FLY-MCDGV4-2E	MCDGV4-3.6-EN-MAN
MCDLV4-2	DOK-FLY-MCDLV4-2E	MCDLV4-3.6-EN-MAN
MRM4-2	DOK-FLY-MRM4-2E	MRM4-3.6-EN-MAN
MRMV4-2	DOK-FLY-MRMV4-2E	MRMV4-3.6-EN-MAN

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DOK-FLY-HPT-2OE
DOK-FLY-HPT-2OE Rev. E | 02/2019

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