**FUNCTIONS**

The MRMV4 is a protection relay which uses the latest Dual-Core-Processor Technology to provide precise and reliable protective functions. Also it is very easy to operate.

The MRMV4 provides all necessary functions to protect low and medium voltage motors at all power levels. The protection functions are based on current and voltage measurement and supervise all thermal conditions, motor start sequence, stall and locked rotor, under-current and incomplete sequence. Overcurrent functions and earth fault functions are also available as power protection, frequency and voltage elements. The motor operation can be monitored by statistic and trend recorders.

**APPLICABLE FOR:**
- Low and high voltage asynchronous motors. Protection based on current and voltage measurement.

**MOTOR PROTECTION**
- Thermal overload protection 49M
- Locked rotor Protection 51LRS
- JAM or Stall protection 51LR
- Underload protection 37
- Motor start 48
- Starts per Hour 66
- Negative phase sequence (current unbalance) 46
- Overcurrent/short circuit protection 50P/51P
- Earth overcurrent- and short circuit protection 50N/51N
- Reclosing lockout 86
- RTD supervision via optional external temperature box (Type MRMV4-B) 26
- Wattmetric Ground Fault Protection

**ADDITIONAL PROTECTION**
- 6 Overcurrent elements (nondir)
- 4 Earth Overcurrent elements (nondir)
- 2 Elements Residual Voltage
- 4 Over-/Undervoltage elements
- 6 Frequency elements
- 6 Power protection elements
- 2 Power Factor elements
- Demand Management
- THD Protection

**SUPERVISION FUNCTIONS**
- Breaker Failure, Trip Circuit Superv.
- Loss of Potential, Switch onto Fault

**MOTOR START RECORDER**
- Max. RMS values of phase currents
- Negative phase sequence currents
- Start duration, successful starts
- Used thermal capacity
- Temperature profile (optional)

**STATISTIC RECORDER**
- Number of successful starts
- Average I2T values
- Average max. start current

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

**COUNTERS**
- History (e.g. Motor starts values, Alarms, Trips...)
- Total Counters (e.g. Run Time...)

**COMMUNICATION OPTIONS**
- IEC61850, IEC60870-5-103
- IEC60870-5-104, Profibus DP
- Modbus RTU and/or Modbus TCP
- DNP 3.0 (RTU, TCP, UDP)
- SCADAppter for Retrofit

**IT SECURITY**
- Menu for the activation of BDEW-White-paper-compliant security settings (e.g. hardening of interfaces)
- IT Security Logger
- Syslog (to centralized server)
- Encrypted connection with Smart view

**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

**NEW FEATURES - Release 3.6**
- VDE-AR-N 4110
- Wattmetric Ground Fault Protection
- IEC 60870-5-104
- SCADAppter for Retrofit
- Usability improvements
- IT Security
- Improved Frequency and ROCOF precision

**ADDITIONAL HIGHLIGHTS**
- 4 Analog Outputs (Type MRMV4-B)
- Long starting time for reduced voltage starts
- Emergency Start
- Incomplete sequence
- Anti-backspin time delay
- Permitted number of cold starts
- Supervision of starts per hour
- Mechanical load shedding
- Zero speed indication via input
- Motor stop inputs
- External alarm and trip inputs
- 4 setting groups

**CONTROL AND SUPERVISION**
- of one breaker

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

**TIME SYNCHRONISATION**
- SNTP/IRIG-B00X, Modbus, DNP 3.0, IEC 60870-5-103/-104

---

*5 mHz from 45-55 Hz*
## Functional Overview

### Protective Functions

<table>
<thead>
<tr>
<th>Protective Functions</th>
<th>Elements</th>
<th>ANSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>IB, thermal overload protection</td>
<td>49M</td>
<td></td>
</tr>
<tr>
<td>I, time overcurrent and short circuit protection (non direction)</td>
<td></td>
<td>50P, 51P</td>
</tr>
<tr>
<td>Voltage controlled overcurrent protection by means of adaptive parameters.</td>
<td>6</td>
<td>51C</td>
</tr>
<tr>
<td>Voltage dependent overcurrent protection</td>
<td></td>
<td>51V</td>
</tr>
<tr>
<td>Negative phase sequence overcurrent protection</td>
<td></td>
<td>51Q</td>
</tr>
<tr>
<td>I2, unbalanced load protection with evaluation of the negative phase sequence current</td>
<td>2</td>
<td>46</td>
</tr>
<tr>
<td>IG, earth time overcurrent and short circuit protection (non direction)</td>
<td>4</td>
<td>50N/G, 51N/G</td>
</tr>
<tr>
<td>I&lt; underload protection</td>
<td>2</td>
<td>37</td>
</tr>
<tr>
<td>Reclosing lockout</td>
<td></td>
<td>49R</td>
</tr>
<tr>
<td>Incomplete sequence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>JAM protection</td>
<td>2</td>
<td>51LR</td>
</tr>
<tr>
<td>Locked rotor Protection</td>
<td></td>
<td>51LR</td>
</tr>
<tr>
<td>Motor start</td>
<td></td>
<td>48</td>
</tr>
<tr>
<td>Starts per Hour</td>
<td></td>
<td>66</td>
</tr>
<tr>
<td>Start control input</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reversing mode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency start</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V&lt;, V&gt;, V(t)&lt; under- and overvoltage protection, time dependent undervoltage protection</td>
<td>6</td>
<td>27, 59</td>
</tr>
<tr>
<td>Voltage asymmetry supervision (V012)</td>
<td></td>
<td>47</td>
</tr>
<tr>
<td>V1, under and overvoltage in positive phase sequence system</td>
<td>6</td>
<td>47</td>
</tr>
<tr>
<td>V2, overvoltage in negative phase sequence system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Each of the six frequency protection elements can be used as:</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>- f&lt; or f&gt; (over- or under frequency supervision)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- df/dt rate of change of frequency (ROCOF)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- (f&lt; and df/dt) or (f&gt; and df/dt) combination of over-, under- and ROCOF)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- (f&lt; and DF/DT) or (f&gt; and DF/DT) combination of over-, under- and increase of frequency</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Delta Phi (Vector surge)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VX, residual voltage protection</td>
<td>2</td>
<td>59N</td>
</tr>
<tr>
<td>PQS, Power protection</td>
<td>6</td>
<td>32, 37</td>
</tr>
<tr>
<td>PF, Power factor</td>
<td>2</td>
<td>55</td>
</tr>
</tbody>
</table>

### Control and Logic

- **Control**: Position indication, supervision time management and interlockings a breaker
- **Logic**: Up to 80 logic equations, with 4 inputs, selectable logical gates, timers and memory function

### Supervision Functions

<table>
<thead>
<tr>
<th>Supervision Functions</th>
<th>Elements</th>
<th>ANSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBF, circuit breaker failure protection</td>
<td>1</td>
<td>50BF/62BF</td>
</tr>
<tr>
<td>TCS, trip circuit supervision</td>
<td>1</td>
<td>74TC</td>
</tr>
<tr>
<td>LOP, loss of potential</td>
<td>1</td>
<td>60FL</td>
</tr>
<tr>
<td>CTS, current transformer supervision</td>
<td>1</td>
<td>60L</td>
</tr>
<tr>
<td>SOTF, switch onto fault</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demand management and peak value supervision (current and power)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>THD supervision</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breaker wear with programmable wear curves</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recorders: Disturbance, fault, event, trend, start and statistic recorders</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
FUNCTIONAL OVERVIEW IN ANSI FORM

APPROVALS

- **CE**
- **UL** certified regarding UL508 (Industrial Controls)
- **CSA** certified regarding CSA-C22.2 No. 14 (Industrial Controls)
- Type tested according to IEC60255-1
- **EAC** certified by EAC (Eurasian Conformity)
- **KESCO** (Declaration of Identity)

COMPLIES WITH:
- IEEE 1547-2003
- Amended by IEEE 1547a-2014
- ANSI C37.90-2005
- Complies with "Engineering Recommendation GS9 Issue 3 Amendment 4 - July 2018"
## ORDER FORM MRMV4

**Motor Protection**

**MRMV4 -2**

<table>
<thead>
<tr>
<th>Digital Inputs</th>
<th>Binary output relays</th>
<th>Analog Inputs/Outputs</th>
<th>Housing</th>
<th>Large display</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>7</td>
<td>0/4</td>
<td>B2</td>
<td>A</td>
</tr>
<tr>
<td>8</td>
<td>13</td>
<td>0/4</td>
<td>B2</td>
<td>C</td>
</tr>
</tbody>
</table>

**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**

- Door mounting: A
- Door mounting 19” (flush mounting): B

**Communication protocol**

- Without protocol: A
- Modbus RTU, IEC 60870-5-103, DNP 3.0 RTU | RS485/terminals: B
- Modbus TCP, DNP 3.0 TCP/UDP, IEC 60870-5-104 | Ethernet 100 MB/RI45: C
- Profinet-DP | optic fiber/ST-connector: D
- Profinet-DP | RS485/D-SUB: E
- Modbus RTU, IEC 60870-5-103, DNP 3.0 RTU | optic fiber/ST-connector: F
- Modbus RTU, IEC 60870-5-103, DNP 3.0 RTU | RS485/D-SUB: G
- IEC 61850, Modbus TCP, DNP 3.0 TCP/UDP, IEC 60870-5-104 | Ethernet 100 MB/RI45: H
- IEC 60870-5-103, Modbus RTU, DNP 3.0 RTU | RS485/terminals: I
- Modbus TCP, DNP 3.0 TCP/UDP, IEC 60870-5-104 | Ethernet 100 MB/RI45: J
- IEC 61850, Modbus TCP, DNP 3.0 TCP/UDP, IEC 60870-5-104 | Optical Ethernet 100 MB/DC duplex connector: K
- Modbus TCP, DNP 3.0 TCP/UDP, IEC 60870-5-104 | Optical Ethernet 100 MB/DC duplex connector: L
- IEC 60870-5-103, Modbus RTU, DNP 3.0 RTU | RS485/terminals: M
- IEC 61850, Modbus TCP, DNP 3.0 TCP/UDP, IEC 60870-5-104 | Ethernet 100 MB/RI45: N

**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 (RI45).

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} \rightarrow 230 \, V_{ac} (-20/+10\%)
  - All terminals plug type

**Terminals**

- IP54

**Dimensions of housing**

- 19” flush mounting: 212.7 mm × 173 mm × 208 mm
  - 8.374 in. × 6.811 in. × 8.189 in.
- Door mounting: 212.7 mm × 183 mm × 208 mm
  - 8.374 in. × 7.205 in. × 8.189 in.

**Weight (max. components)**

- approx. 4.2 kg / 9.259 lb

---

**CONTACT:**

**North & Central America**

- Phone: +1 970 962 7272
- Phone: +1 208 278 3370
- E-mail: SalesPGD_NAandCA@woodward.com

**South America**

- Phone: +55 19 3708 4760
- E-mail: SalesPGD_SA@woodward.com

**Europe**

- Phone (Kempen): +49 2152 145 331
- Phone (Stuttgart): +49 711 78954 510
- E-mail: SalesPGD_EMEA@woodward.com

**Middle East & Africa**

- Phone: +971 2 678 4424
- E-mail: SalesPGD_EMEA@woodward.com

**Russia**

- Phone: +49 711 78954 515
- E-mail: SalesPGD_EMEA@woodward.com

**China**

- Phone: +86 512 8818 5515
- E-mail: SalesPGD_CHINA@woodward.com

**India**

- Phone: +91 124 4399 500
- E-mail: Sales_India@woodward.com

**ASEAN & Oceania**

- Phone: +49 711 78954 510
- E-mail: SalesPGD_ASEAN@woodward.com

© Woodward

All Rights Reserved | 01/2019