**FUNCTIONS**

The MRM4 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 MRM4 provides all necessary functions to protect low and medium voltage motors at all power levels. The protection functions are based on current measurement. They supervise the motor start sequence (motor start), they detect a stall or locked rotor condition and they monitor the thermal condition of the motor. Overcurrent and earth overcurrent protection as well as unbalanced load protection are included in the protection package. The status and operation of the motor will also be monitored by means of the statistic and trend recorder. All important events and measuring values will be logged by means of the start, event, failure and disturbance recorder.

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

**MOTOR PROTECTION FUNCTIONS**
- Thermal overload protection 49M
- Locked rotor protection 51LRS
- JAM or Stall protection 51L
- Underload protection 37
- Motor start 48
- Starts per Hour 66
- Negative phase sequence (current unbalance) 46
- Overcurrent/short circuit.prot. 50P/51P
- Earth overcurrent and short circuit protection 50N/51N
- Reclosing lockout 86
- RTD supervision via external temperature box 26 (type MRM4-2B, on request)

**SYSTEM SUPERVISION FUNCTIONS**
- CBF, circuit breaker failure 50BF
- TCS, trip circuit supervision via digital inputs 74TC
- CTS, current transformer supervision 60

**HISTORY COUNTER**
- Motor starts, numbers of alarms and trips of all important protection functions like I, IG, thermal supervision, JAM, undercurrent and negative phase sequence

**TOTAL COUNTER**
- Breaker wear values
- Motor run time
- Motor operation counter
- History

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

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

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

**COMMUNICATION OPTIONS**
- IEC61850
- Profibus DP
- Modbus RTU or Modbus TCP
- IEC60870-5-103
- DNP 3.0 (RTU, TCP, UDP)

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

**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
- 7 languages selectable within the relay

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

**TIME SYNCHRONISATION**
- SNTP or IRIG-B00X

**ADDITIONAL HIGHLIGHTS**
- 20 mA output (Type MRM4-2B)
- 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 detection (stall) via digital input
- Motor stop inputs
- External alarm and trip inputs
- Multiple setting groups
## Functional Overview

### Protective Functions

<table>
<thead>
<tr>
<th>Elements</th>
<th>ANSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>IB, thermal overload protection</td>
<td>49M</td>
</tr>
<tr>
<td>I, time overcurrent and short circuit protection (non direction) (instantaneous, definite time, characteristics according to IEC60255, ANSI)</td>
<td>6 50P, 51P</td>
</tr>
<tr>
<td>I2, unbalanced load protection with evaluation of the negative phase sequence current</td>
<td>2 46</td>
</tr>
<tr>
<td>IG, earth time overcurrent and short circuit protection (non direction) (instantaneous, definite time, characteristics according to IEC60255, ANSI)</td>
<td>4 50N, 51N</td>
</tr>
<tr>
<td>I&lt; underload protection</td>
<td>2 37</td>
</tr>
<tr>
<td>Reclosing lockout</td>
<td>49R</td>
</tr>
<tr>
<td>Incomplete sequence</td>
<td>SILR</td>
</tr>
<tr>
<td>JAM protection</td>
<td>51RS</td>
</tr>
<tr>
<td>Locked rotor Protection</td>
<td>48</td>
</tr>
<tr>
<td>Motor start</td>
<td>66</td>
</tr>
<tr>
<td>Starts per Hour</td>
<td></td>
</tr>
<tr>
<td>Start control input</td>
<td></td>
</tr>
<tr>
<td>Reversing mode</td>
<td></td>
</tr>
<tr>
<td>Emergency start</td>
<td></td>
</tr>
</tbody>
</table>

### 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

<table>
<thead>
<tr>
<th>Elements</th>
<th>ANSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBF, circuit breaker failure</td>
<td>1 50BF/62BF</td>
</tr>
<tr>
<td>TCS, trip circuit supervision via digital inputs</td>
<td>1 74TC</td>
</tr>
<tr>
<td>CTS, current transformer supervision</td>
<td>1 60L</td>
</tr>
<tr>
<td>Demand management and peak value supervision (current)</td>
<td></td>
</tr>
<tr>
<td>Breaker wear with programmable wear curves</td>
<td></td>
</tr>
</tbody>
</table>

### Recorders

- Disturbance Recorder
- Fault recorder
- Event recorder
- Trend recorder
- Motor Start recorder
- Statistical recorder

## Dimensions

- **MOTOR PROTECTION DE DEVICE**
- Dimensions (mm): 141.50 (5.57) x 182 (7.20)
- Dimensions (inch): max. 206.50 (8.13) x 9.64 (0.38)
**FUNCTIONAL OVERVIEW IN ANSI FORM**

![Diagram of MRM4 with various connections and labels]

**APPROVALS**

- Certified regarding UL508 (Industrial Controls)
- Certified regarding CSA-C22.2 No. 14 (Industrial Controls)
- Type tested according to IEC60255-1
- Certified by EAC (Eurasian Conformity)

**CONNECTIONS (EXAMPLE)**

![Connection diagram with labels X1, X2, X3, X100, and X101]

- IRIG-B00X
- SNTP
- Logics
- Control
- Breaker Wear
- Measured and calculated values
  - RMS Values, Max/Min/Avg, Theta, Sequence currents, I, IE, THD
- Recorders
  - Event
  - Disturbance
  - Fault
  - Start
  - Statistic Trend
- Motor Statistics
  - 4-20 mA Output
- Device type: MRM4-2Bxxx
- Standard

**COMPLIES WITH**

- IEEE 1547-2003 amended by IEEE 1547a-2014
- ANSI C37.90-2005
**ORDER FORM MRM4-2**

<table>
<thead>
<tr>
<th>Motor Protection</th>
<th>MRM4-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version 2 with USB, enhanced communication and user options</td>
<td></td>
</tr>
<tr>
<td>Digital Inputs</td>
<td>Binary output relays</td>
</tr>
<tr>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>4</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, IEC60870-5-103, DNP3.0 RTU | RS485/terminals: B*
- Modbus TCP, DNP3.0 TCP/UDP | Ethernet 100 MB/RJ45: C*
- Profibus-DP | optic fiber/ST-connector: D*
- Profibus-DP | RS485/D-SUB: E*
- Modbus RTU, IEC60870-5-103, DNP3.0 RTU | optic fiber/ST-connector: F*
- Modbus RTU, IEC60870-5-103, DNP3.0 RTU | RS485/D-SUB: G*
- IEC61850, Modbus TCP, DNP3.0 TCP/UDP | Ethernet 100 MB/RJ45: H*
- IEC61850, Modbus TCP, DNP3.0 TCP/UDP | Optical Ethernet 100 MB/LC duplex connector: K*
- Modbus RTU, DNP3.0 TCP/UDP | Optical Ethernet 100 MB/LC duplex connector: L*

**Harsh Environment Option**

- None: A
- Conformal Coating: B

**Available menu languages**

- Standard English/German/Spanish/Russian/Polish/Portuguese/French

*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

**Digital inputs**

- Switching thresholds adjustable via software

**Power supply**

- Wide range power supply
- 24 Vdc - 270 Vdc / 48 Vdc - 230 Vdc (-20/+10%)
- All terminals plug type

**Terminals**

- IP54

**Dimensions of housing**

- 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.

**Weight (max. components)**

- approx. 2.9 kg / 6.393 lb

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