APPLICATION

The MCA4 is a precise and reliable protection, control and monitoring relay for feeder, grid and generator applications. The latest generation series from SEG/Woodward, the MCA4 incorporates all the ANSI and IEC concepts to comply with ever changing grid interconnection requirements. Flexibility in hardware, software, application, user interface and communications makes the MCA4 adaptable to requirements today and in the future. The hardware is designed for all nominal values in combination with protection and control functionality. The parameterizing and analyzing software Smart view is usable for each HighPROTEC device and free of charge.

COMPREHENSIVE PROTECTION PACKAGE

- Six elements phase overcurrent protection directional and non-directional (ANSI/IEC/S1C/S1V)
- Four elements earth fault protection (1) non-directional or directional (multi-polarising)
- Two elements unbalanced load protection
- Voltage protection (2)
- Six elements selectable: V<, V>, V<(t)
- Six elements unbalanced voltage supervision
- Flexible Fourth Voltage measuring input (2)
- 2 elements VE> or VX (for synch-check)
- Synchro-check options
- Generator-to-System or System-to-System
- Each of the six elements frequency protection can be used as: f<, f>, ROCOF, vector surge...
- Six elements power protection each can be used as: P>, P<, Pr, Q>, Q<, Qr, S>, S<
- Two elements power factor (PF)

POWER QUALITY
- THD protection

DEMAND MANAGEMENT/PEAK VALUES
- Peak values of current and power, average current and energy demand

INTERCONNECTION PACKAGE

The comprehensive interconnection package is summarized within one menu:
- Non-discriminating active power direction depending load shedding
- FRT (LVRT): Settable FRT-Profiles, optional AR coordinated
- QV-Protection: Undervoltage-Reactive Power protection
- Automatic Reconnection
- Frequency protection: Six elements configurable as f<, f>, df/dt (ROCOF), Vector Surge
- CB-Intertripping
- Synch Check (Generator to mains, mains-to-mains), options e.g. to switch onto dead bus

SLIDING-MEAN-SQUARE SUPERVISION
- Adjustable (VDE-AR 410S)

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

PC TOOLS
- Setting and analyzing software
- Smart view for free
- Including page editor to design own 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
- 8 languages selectable within the relay

COMMUNICATION OPTIONS
- IEC 61850
- Profibus DP
- Modbus RTU and/or Modbus TCP
- IEC 60870-5-103
- DNP 3.0 (RTU, TCP, UDP)

IT SECURITY
- Menu for the activation of BDEW-Whitepaper-compliant security settings (e.g. hardening of interfaces)

CONTROL
- of up to six breakers (or isolators/grounding switches)
- Breaker wear

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

TIME SYNCHRONISATION
- SNTP, IRIG-800X, Modbus, DNP 3.0, IEC 60870-5-103

(1) DFT, True RMS or I2T based
(2) DFT or True RMS based
**FUNCTIONAL OVERVIEW**

### Protective Functions

<table>
<thead>
<tr>
<th>Elements</th>
<th>ANSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>I, time overcurrent and short circuit protection, all elements can be configured for directional or non-directional supervision. Multiple reset options (instantaneous, definite time, reset characteristics according to IEC and ANSI).</td>
<td>50P, 51P, 67P</td>
</tr>
<tr>
<td>Voltage controlled overcurrent protection by means of adaptive parameters</td>
<td>51C</td>
</tr>
<tr>
<td>Voltage dependent overcurrent protection</td>
<td>51V</td>
</tr>
<tr>
<td>Negative phase sequence overcurrent protection</td>
<td>51Q</td>
</tr>
<tr>
<td>I2&gt;, unbalanced load protection with evaluation of the negative phase sequence currents</td>
<td>46</td>
</tr>
<tr>
<td>I8, overload protection with thermal replica and separate pick-up values for alarm and trip functions</td>
<td>49</td>
</tr>
<tr>
<td>IH2/In, inrush detection with evaluation of the 2nd harmonic</td>
<td>Inrush</td>
</tr>
<tr>
<td>IG, earth overcurrent and short circuit protection, all elements can be configured for directional (multi-polarising) or non-directional supervision. Tremendous reset options (instantaneous, definite time, reset characteristics according to IEC and ANSI).</td>
<td>50N, 51N, 67N</td>
</tr>
<tr>
<td>V&lt;, V&gt;, V(t)&lt;, under- and overvoltage protection, time dependent undervoltage protection</td>
<td>27, 59</td>
</tr>
<tr>
<td>Voltage asymmetry supervision (V012)</td>
<td>47</td>
</tr>
<tr>
<td>V1, under and overvoltage in positive phase sequence system</td>
<td>32, 37</td>
</tr>
<tr>
<td>V2, overvoltage in negative phase sequence system</td>
<td>55</td>
</tr>
<tr>
<td>Each of the six frequency protection elements can be used as: f&lt;, f&gt;, df, dt, ROCOF, DF/DT, vector surge, ...</td>
<td>81U/O, 81R, 78</td>
</tr>
<tr>
<td>VX, residual voltage protection or bus bar voltage for Synch Check</td>
<td>25 or 59N</td>
</tr>
<tr>
<td>AR, automatic reclosing</td>
<td>79</td>
</tr>
<tr>
<td>ExP, External alarm and trip functions</td>
<td>4</td>
</tr>
<tr>
<td>PQS, Power protection</td>
<td>6</td>
</tr>
<tr>
<td>PF, Power factor</td>
<td>32, 37</td>
</tr>
<tr>
<td>FRT (optional coordination with AR-feature)</td>
<td>27 (t)</td>
</tr>
</tbody>
</table>

### Control and Logic

#### Control
- Position indication, supervision time management and interlockings for up to 6 breakers

#### 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 protection</td>
<td>50BF</td>
</tr>
<tr>
<td>TCS, trip circuit supervision</td>
<td>741C</td>
</tr>
<tr>
<td>LOP, loss of potential</td>
<td>60FL</td>
</tr>
<tr>
<td>FF, fuse failure protection via digital input</td>
<td>60FL</td>
</tr>
<tr>
<td>CTS, current transformer supervision</td>
<td>60L</td>
</tr>
<tr>
<td>CLPU, cold load pickup</td>
<td>1</td>
</tr>
<tr>
<td>SOTF, switch onto fault</td>
<td>1</td>
</tr>
<tr>
<td>Demand management and peak value supervision (current and power)</td>
<td></td>
</tr>
<tr>
<td>THD supervision</td>
<td></td>
</tr>
<tr>
<td>Breaker wear with programmable wear curves</td>
<td></td>
</tr>
<tr>
<td>Recorders: Disturbance recorder, fault recorder, event recorder, trend recorder</td>
<td></td>
</tr>
</tbody>
</table>

**Released**
**FUNCTIONAL OVERVIEW IN ANSI FORM**

- Metering, Statistics and Demand
- Current and Volt: unbalance, %THD and THD, Fund. and RMS, Max/Min/Avg, phasors and angles
- Power: Fund. and RMS, P, Q, S, PF
- Fault recorder
- Event recorder
- Disturbance recorder
- Trend recorder

**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 and regarding IEC61850
- certified regarding "BDEW-Richtlinie für Erzeugungsanlagen am Mittelspannungsnetz, Ausgabe Juni 2008" (German grid code standard)
- complies with IEEE 1547-2003 amended by IEEE 1547a-2014
- complies with ANSI C37.90-2005

**CONNECTIONS (EXAMPLE)**
ORDER FORM MCA4-2

Directional Feeder Protection

Version 2 with USB, enhanced communication and user options

<table>
<thead>
<tr>
<th>Digital Inputs</th>
<th>Binary output relays</th>
<th>Housing</th>
<th>Large display</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>7</td>
<td>B2</td>
<td>X</td>
</tr>
<tr>
<td>16</td>
<td>13</td>
<td>B2</td>
<td>X</td>
</tr>
</tbody>
</table>

Hardware variant 2

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

Housing and mounting

Door mounting

Door mounting 19” (flush mounting)

Communication protocol

Without protocol

Modbus RTU, IEC 60870-5-103, DNP 3.0 RTU | RS485/terminals

Modbus TCP, DNP 3.0 TCP/UDP | Ethernet 100 MB/RJ4S

Profibus-DP | optic fiber/ST-connector

Profibus-DP | RS485/D-SUB

Modbus RTU, IEC 60870-5-103, DNP 3.0 RTU | optic fiber/ST-connector

Modbus RTU, IEC 60870-5-103, DNP 3.0 RTU | RS485/D-SUB

IEC 61850, Modbus TCP, DNP 3.0 TCP/UDP | Ethernet 100 MB/RJ4S

IEC 60870-5-103, Modbus RTU, DNP 3.0 RTU | RS485/terminals

Modbus TCP, DNP 3.0 TCP/UDP | Ethernet 100 MB/RJ4S

IEC 61850, Modbus TCP, DNP 3.0 TCP/UDP | Optical Ethernet 100 MB/LC duplex connector

Modbus TCP, DNP 3.0 TCP/UDP | Optical Ethernet 100 MB/LC duplex connector

IEC 60870-5-103, Modbus RTU, DNP 3.0 RTU | RS485/terminals

IEC 61850, Modbus TCP, DNP 3.0 TCP/UDP | Ethernet 100 MB/RJ4S

IEC 60870-5-103, Modbus RTU, DNP 3.0 RTU | RS485/terminals

IEC 61850, Modbus TCP, DNP 3.0 TCP/UDP | Optical Ethernet 100 MB/LC duplex connector

IEC 60870-5-103, Modbus RTU, DNP 3.0 RTU | RS485/terminals

IEC 61850, Modbus TCP, DNP 3.0 TCP/UDP | Optical Ethernet 100 MB/LC duplex connector

Harsh Environment Option

None

Conformal Coating

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 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 Vdc ~ 270 Vdc / 48 Vdc ~ 230 Vdc (~20/+10%)

All terminals plug type

Terminals

IP54

Dimensions of housing

19” flush mounting: 212.7 mm x 173 mm x 208 mm

8.374 in. x 6.811 in. x 8.189 in.

Door mounting: 212.7 mm x 183 mm x 208 mm

8.374 in. x 7.205 in. x 8.189 in.

Weight (max. components)

approx. 4.2 kg / 9.259 lb

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