Universal continuous-switching version, i.e. reduced stocks
100 ms cycle time, i.e. also suitable for fast control loops
Two freely configurable analog output, e.g. as process value output
Customer-specific Linearization for all sensors
Settings can be blocked via password and internal switch for high security
Extended temperature range up to 60 °C allows mounting close to the process
Easy 2-point or offset measurement correction
Monitoring of heating current and output circuit
Emergency operation after sensor break by means of the "output hold" function
Logical combination of digital outputs, e.g. for general alarm
RS 422/485 Modbus RTU interface
Built-in transmitter power supply
Splash-water proof front (IP 65)

APPLICATIONS
- chamber ovens
- melting and pot furnaces
- climatic and test chambers
- driers
- heat treatment
- test beds
- textile treatment (dyeing)
- glas industry (tempering)

DESCRIPTION
The program controller KS 90-1 is intended for universal, precise, and cost-effective control tasks in all branches of industry. For this, the unit provides simple 2-point (on/off) control, continuous PID control, or 3-point stepping control. The process value signal is connected via a universal input. A supplementary analog input can be used for heating current measurement, as an external set-point input for position feedback measurement of motorized stepping controllers. The optional 3rd input is an universal input that can be used for several functions, e.g. temperature dependend setpoint correction or differential control. Every KS 90-1 has four process outputs, either relays or up to 2 universal outputs that can be used for operating a solid-state relay, a continuous current/voltage output or to energize a two-wire transmitter. Optionally there are two additional opto coupler outputs.

Plug-in module
KS 90-1 program controllers are built as plug-in modules. This enables them to be replaced very quickly without tools, and without disturbing the wiring.

Self-tuning during start-up and to the setpoint
This new function determines the optimum settings for fast line-out without overshoot. With three-point controller configuration, the „cooling“ parameters are determined separately, thus ensuring an optimum match to the process. By pushing a button the KS 90-1 determines the best control parameters at the actual setpoint. This function does not require oscillation, and performs a minimal deviation of the process value.

Display and operation
The „day & night“ display of the KS 90-1 is charactarized by particularly high contrast in both dark and bright surroundings. The status fields show operating conditions, control mode, and error messages reliably. The display is in plain text and can show various process values numerically or as a bargraph.

Front interface and Engineering Tools
Control parameter adjustment in seconds has now also been implemented in the KS 90 class of instruments. Via the BlueControl software incl. its simulation functions, and especially the convenient BluePort® front panel interface, the required set-up for a specific control task can be determined without a detailed study of the operating instructions. Off cause
almost all adjustments can be done comfortably over the instrument front.
(see page , BlueControl)

**Password protection**
If required, access to the various operating levels can be protected with a password. Similarly, access to a complete level can be blocked.

**TECHNICAL DATA**

**INPUTS**

**SURVEY OF THE INPUTS**

<table>
<thead>
<tr>
<th>Input</th>
<th>Used for</th>
</tr>
</thead>
<tbody>
<tr>
<td>INP1</td>
<td>x1 (process value)</td>
</tr>
<tr>
<td>INP2</td>
<td>Heating current, ext. set-point or ext. correction, position feedback Yp, 2nd process value x2, ext.-correcting variable Y.E, input for additional limit signalling and indication</td>
</tr>
<tr>
<td>INP3 (option)</td>
<td>as for INP2</td>
</tr>
<tr>
<td>di1</td>
<td>Program run/stop, program reset, operation disabled, controller off, disabled auto/manual function, reset of stored alarms, switch-over to ... 2nd set-point SP.2, external set-point SP.E, fixed correcting variable Y2, ext. correcting variable Y.E, manual operation, parameter set 1 ↔ 2, process value INP1 ↔ X2</td>
</tr>
<tr>
<td>di2</td>
<td></td>
</tr>
<tr>
<td>di3 (option)</td>
<td></td>
</tr>
</tbody>
</table>

**PROCESS VALUE INPUT INP1**

Resolution:  > 14 bit
Decimal point: 0 to 3 decimals
Digital input filter: adjustable 0,000...9999 s
Scanning cycle: 100 ms
Measured value correction: 2-point or offset correction
Special (-linearization): 16 segments
Standard table: temperature sensor KTY 11-6

**Thermocouples (Table 1)**

<table>
<thead>
<tr>
<th>Thermocouple</th>
<th>Range</th>
<th>Accuracy</th>
<th>Resolution (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L Fe-CuNi (DIN)</td>
<td>-100...900°C</td>
<td>≤ 2 K</td>
<td>0.1 K</td>
</tr>
<tr>
<td>J Fe-CuNi</td>
<td>-100...1200°C</td>
<td>≤ 2 K</td>
<td>0.1 K</td>
</tr>
<tr>
<td>K NiCr-Ni</td>
<td>-100...1350°C</td>
<td>≤ 2 K</td>
<td>0.2 K</td>
</tr>
<tr>
<td>N Nichrome/Nisil</td>
<td>-100...1300°C</td>
<td>≤ 2 K</td>
<td>0.2 K</td>
</tr>
<tr>
<td>S PtRh-Pt 10%</td>
<td>0...1760°C</td>
<td>≤ 2 K</td>
<td>0.2 K</td>
</tr>
<tr>
<td>R PtRh-Pt 13%</td>
<td>0...1760°C</td>
<td>≤ 2 K</td>
<td>0.2 K</td>
</tr>
<tr>
<td>T Cu-CuNi</td>
<td>-200...400°C</td>
<td>≤ 0.5 K</td>
<td></td>
</tr>
<tr>
<td>C W5%Re-W26%Re</td>
<td>0...2315°C</td>
<td>≤ 2 K</td>
<td>0.4 K</td>
</tr>
<tr>
<td>D W3%Re-W25%Re</td>
<td>0...2315°C</td>
<td>≤ 2 K</td>
<td>0.4 K</td>
</tr>
<tr>
<td>E NiCr-CuNi</td>
<td>-100...1000°C</td>
<td>≤ 2 K</td>
<td>0.1 K</td>
</tr>
<tr>
<td>B(1) PtRh-Pt6%</td>
<td>(0400...1820°C)</td>
<td>≤ 3 K</td>
<td>0.3 K</td>
</tr>
</tbody>
</table>

special: -25...75 mV ≤ 0.1 % 0.01 %

1 values applied above 400°C

**Table 2 Resistance transducers**

<table>
<thead>
<tr>
<th>Type</th>
<th>Sensor current</th>
<th>Range</th>
<th>Accuracy</th>
<th>Resolution (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pt100</td>
<td>0,2 mA</td>
<td>0...450 Ω</td>
<td>≤ 0.1 %</td>
<td>0.01 %</td>
</tr>
<tr>
<td>Pt1000</td>
<td></td>
<td>-200...200°C</td>
<td>≤ 2 K</td>
<td>0.1 K</td>
</tr>
<tr>
<td>KTY 11-6</td>
<td>0...150°C</td>
<td>-58...302 °F</td>
<td>≤ 2 K</td>
<td>0.05 K</td>
</tr>
</tbody>
</table>

special: 0...450 Ω

* corresponds to special 0...4500 Ω

**Table 3 Current and voltage**

<table>
<thead>
<tr>
<th>Type</th>
<th>Input resistance</th>
<th>Accuracy</th>
<th>Resolution (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10 Volt</td>
<td>110 kΩ</td>
<td>≤ 0.1 %</td>
<td>0.5 mV</td>
</tr>
<tr>
<td>0-100 mV</td>
<td>≥ 1M Ω</td>
<td>≤ 0.1 %</td>
<td>6 mV</td>
</tr>
<tr>
<td>0-20 mA</td>
<td>20 Ω</td>
<td>≤ 0.1 %</td>
<td>1.5 μA</td>
</tr>
</tbody>
</table>

**Resistance thermometer**

Connection: 3-wire
Lead resistance: max. 30 Ω
Input circuit monitor: Break and short circuit

**Current and voltage signals**

Span start, end of span: anywhere within measuring range selectable -1999...9999
Scaling: 16 segments, adaptable with BlueControl
Special linearization: adjustable
Input circuit monitor: 12,5% below span start (2mA, 1V)

The measuring range 0...100mV can be used together with the special linearization function for connection of thermocouples with external temperature compensation!

**SUPPLEMENTARY INPUT INP2**

Resolution: > 14 bit
Scanning cycle: 100 ms

**Heating current measurement**

via current transformer

Measuring range: 0...50 mA AC
Scaling: adjustable -1999...0.000...9999 A

**Current measurement range**

Input resistance: approx. 120 Ω
Span: 0 to 20mA
Scaling: adjustable -1999...9999
Input circuit monitor: 12,5% below span start (4...20mA → 2mA)

**Potentiometer**

Ranges see Table 2

Connection: 2-wire
Lead resistance: max. 30 Ohm
Input circuit monitor: Break
**SUPPLEMENTARY INPUT INP3 (OPTION)**

Resolution: > 14 bit
Scanning cycle: 100 ms

Technical data as for INP1 except the 10V range.

**CONTROL INPUTS DI1, DI2**

Configurable as direct or inverse switch or push-button!
Connection of a potential-free contact suitable for switching „dry” circuits.

Switched voltage: 5 V
Switched current: 100 µA

**CONTROL INPUTS DI2, DI3 (OPTION)**

The digital input di2 located on the A-card and di2 located on the option card are or-linked.
Configurable as switch or push-button!
Optocoupler input for active triggering
Nominal voltage: 24 V DC, external
Logic „0”: -3...5 V
Logic „1”: 15...30 V
Current requirement: approx. 5 mA

**TRANSMITTER SUPPLY UT (OPTION)**

Output: 22 mA / 18 V

If the universal outputs OUT3, 4 are used there may be no external galvanic connection between measuring and output circuits!

**OUTPUTS**

**SURVEY OF THE OUTPUTS**

<table>
<thead>
<tr>
<th>Output Used for</th>
<th>OUT1,2 (relays)</th>
<th>OUT3,4 (relays or logic)</th>
<th>OUT3,4 (continuous)</th>
<th>OUT5, OUT6 (Optocoupler)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control output heating/cooling or Open/Close, limit contacts, alarms, control (event) tracks, program end, operator call *</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>as OUT1 and OUT2</td>
<td></td>
<td></td>
<td>as OUT1 and OUT2</td>
</tr>
</tbody>
</table>

* All logic signals can be OR-linked!

**Electrical connections:**

**Dimensions (mm):**

**Galvanic isolations:**

- Safety isolation
- Functional isolation

**Mains supply**

- Process value input INP1
- Supplementary input INP2
- Optional input INP3
- Digital inputs di1, di2
- Relay OUT1 RS422/485 interface
- Relay OUT2 Digital inputs di2, 3
- Relay OUT 3 Universal output OUT3
- Relay OUT 4 Universal output OUT4
- Transmitter supply UT
- OUT5, OUT6
**RELAY OUTPUTS OUT1..OUT4**

Contacts: Potential-free changeover contact
Max. contact rating: 500 VA, 250 VAC, 2A at 48...62 Hz, resistive load
Min. contact rating: 6 V, 1 mA AC/DC
Operating life (electric): 800,000 duty cycles with max. rating

Note:
If the relays operate external contactors, these must be fitted with RC snubber circuits to manufacturer specifications to prevent excessive switch-off voltage peaks.

**OUT3, OUT4 AS UNIVERSAL OUTPUT**

Galvanically isolated from the inputs.
Freely scalable
Resolution: 11 bit
DA-converter limiting frequency $T_{90}$: 50 ms
Limiting frequency of the complete continuous controller: > 2 Hz

_Current output_
0/4...20 mA, configurable.
Signal range: 0...approx. 22 mA
Load: 500
Load effect: none
Resolution: 22 µA (0.1%)  
Error: 40 µA (0.2%)

_Voltage output_
0/2...10V, configurable
Signal range: 0...11 V
Load: ≥ 2 kΩ
Load effect: none
Resolution: 11 mV (0.1%)
Error: 20 mV (0.2%)

**OUT3, OUT4 used as transmitter supply**
Output: 22 mA / 13 V

**OUT3 used as logic output**
Load 500 0/ 20 mA
Load > 500 0/> 13 V

**OUTPUTS OUT5, OUT6 (OPTIONAL)**
Galvanically isolated opto-coupler outputs.
Grounded load:
common positive control voltage.
Output rating: 18...32 VDC, =70 mA Internal voltage drop: =1 V with $I_{\text{max}}$
Protective circuit: built-in against short circuit, overload, reversed polarity (free-wheel diode for relay loads).

---

**FUNCTIONS**

**PROGRAMMER**

- programs: 8 or 16 (depending on version)
- control (event) tracks: 4
- segments: 16 each
- types of segments:
  - ramp (setpoint and time)
  - ramp (setpoint and ramp)
  - dwell segment (dwell time)
  - step segment (with limit monitoring suppression)
  - end segment

All types of segments can be combined with “wait at the end and operator call”.

- time base: configurable hours:minutes or minutes:seconds
- max. segment duration: 9999 hours = 1 year 51 days
- max. program duration: > 18 years
- ramp: 0.01°C/h (-/min) to 9999°C/h (-/min)
- program names: 8 characters, adjustable with BlueControl Software
- bandwidth: upper and lower bandwidth ($b_{\text{Lo}}$, $b_{\text{Hi}}$) configurable for each program

---

**FUNCTIONS**

**Control behaviour**

- Signalizer with asymmetric adjustable switching differential (ON/OFF controller)
- PID controller (2-point and continuous)
- Delta / Star / Off or 2-point controller with switch over from partial to full load
- 2 x PID (heating/cooling)
- 3-point stepping controller with or without position feedback
- Continuous controller with internal positioner (stepping controller)

Two parameter sets for manual gain scheduling
Self-tuning control parameters or adjustable manually via front keys or BlueControl software.

**Behaviour with 2- and 3-point controllers**

- Standard behaviour:
  For precise matching of the required output value at the output signal limits, the controller changes the cycle times for heating and cooling automatically and continuously.
- With constant cycle times:
  The length of the shortest heating and cooling pulse is adjustable.
Set-point functions

- Adjustable set-point gradient (rate) 0,01...9999 °C/min
- Set-point control
- Program control
- Programm control with external correction
- Set-point/cascade control
- Set-point/cascade control with external correction

Process value calculation

- Standard (xeff = INP1)
- Ratio (INP1/X2)
- Difference (INP1-X2)
- Max (INP1, X2)
- Min (INP1, X2)
- Mean value (INP1, X2)
- Switch-over between INP1 and X2

Behaviour with sensor break or short circuit:

- Control outputs switched off
- Switch-over to a safe output value
- Switch-over to a mean output value

SPECIAL FUNCTIONS

Modbus Master

The KS 90-1 can be configured as Modbus Master. This enables it to transmit user-specified signals or parameters cyclically to all connected Slave controllers. For example, the following applications are possible:

- Set-point shifting relative to the set-point adjusted in the Slave (see picture)
- Matching of control parameters, limit contacts, etc.
- Limiting the output value (override OVC)
- ...

LIMIT SIGNALLING FUNCTIONS

Max., Min. or Max./Min. monitoring with adjustable hysteresis.

Signals which can be monitored:

- Process value
- Control deviation
- Control deviation with suppression during start-up or set-point changes
- Effective set-point
- Output signal Y
- Input values of INP1, INP2, INP3
- Difference INP1 - X2. This function allows to detect aged thermocouples.

Functions

- Input signal monitoring
- Input signal monitoring with latch (reset via front key or digital input)
- Rate of change monitoring (l/min)
- Adjustable discriminator time of 0...9999 seconds

Several limit signals or alarms can be OR-linked before being output.
Applications: Release of a brake with motor actuators, general alarms, etc.
**ALARMS**

**Heating current alarm**
- Overload and short circuit
- Open circuit and short circuit

Limit value adjustable 0...9999 A

**Control loop alarm**
Automatic detection if there is no response of the process to a change of output value.

**Sensor break or short circuit**
Depending on selected input type, the input signal is monitored for break and short circuit.

**MAINTENANCE MANAGER**

Display of error signals, warnings, and latched limit messages in the error list. Signals are latched, and can be reset manually.

Possible signals in the error list:
- Sensor break, short circuit, reversed polarity
- Heating current alarm
- Control loop alarm
- Fault during self-tuning
- Latched limit messages
- Re-calibration warning
- Maintenance interval of actuator
- Internal fault (RAM, EEPROM, ...)

Flashing Error symbol indicates active alarm in the error list:

---

**OPERATION AND DISPLAY**

**Display**
Multi-function Day&Night display with red backlighting (adjustable)

- Process value: 4 x 7 segment 10.5 mm
- Lower display: 4 x 7 segment 7.8 mm
- Text display: 8-character dot matrix used as numeric or bargraph display

**Operating functions**
The functions of the key are configurable:

<table>
<thead>
<tr>
<th>Function</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y.2 (2nd output value)</td>
<td></td>
</tr>
<tr>
<td>SP.E (external setpoint)</td>
<td></td>
</tr>
<tr>
<td>Manual operation</td>
<td></td>
</tr>
<tr>
<td>C.OFF (controller function off)</td>
<td></td>
</tr>
<tr>
<td>Reset of latched limits and error list</td>
<td></td>
</tr>
</tbody>
</table>

Several functions can be combined e.g. SP.2 and parameter set switch-over (gain scheduling) with only one key.

**POWER SUPPLY**
Depending on version:

**AC SUPPLY**
- Voltage: 90...260 VAC
- Frequency: 48...62 Hz
- Power consumption: approx. 8 VA

**UNIVERSAL SUPPLY 24 V UC**
- AC voltage: 20.4...26.4 VAC
- Frequency: 48...62 Hz
- DC voltage: 18...31 V DC
- Power consumption: approx. 8 VA (W)

---

**BEHAVIOUR WITH POWER FAILURE**
Configuration, parameters, and adjusted set-points, control mode:
Non-volatile storage in EEPROM

**BLUEPORT® FRONT INTERFACE**
Connection of PC via PC adapter (see „Accessories“). The BlueControl software is used to configure, set parameters, and operate the KS 90-1.

**BUS INTERFACE (OPTION)**

**RS 422/485 INTERFACE**
Galvanically isolated
- Physical: RS 422/485
- Protocol: Modbus RTU
- Transmission speed: 2400, 4800, 9600, 19.200 bits/s
- Address range: 00...99
- Number of controllers per bus: 32
- Repeaters must be used to connect more controllers.

**PROFIBUS DP**
> see data sheet 9499-737-44813

**ENVIRONMENTAL CONDITIONS**

**Protection modes**
- Front panel: IP 65
- Housing: IP 20
- Terminals: IP 00

**Permissible temperatures**
- For specified accuracy: 0...60°C
- Warm-up time: < 15 minutes
- Temperature effect: < 100ppm/K
- For operation: -20...65°C
- For storage: -40...70°C

**Humidity**
75% yearly average, no condensation

**Shock and vibration**
- Vibration test Fc (DIN 68-2-6)
- Frequency: 10...150 Hz
- Unit in operation: 1g or 0,075 mm
- Unit not in operation: 2g or 0,15 mm

- Shock test Ea (DIN IEC 68-2-27)
  - Shock: 15g
  - Duration: 11ms

**Electromagnetic compatibility**
Complies with EN 61 326-1
- Complies with the immunity requirements for continuous, unattended operation
- Complies with the emission requirements class B for rural areas
- Surge disturbances may increase the measurement error and lead to error messages
GENERAL

Housing
Material: Makrolon 9415, flame-retardant
Flammability class: UL 94 V0, self-extinguishing
Plug-in module, inserted from the front

Safety tests
Complies with EN 61010-1 (VDE 0411-1):
Over voltage category II
Contamination class 2
Working voltage range 300 VAC
Protection class II

Certifications
UL certification (applied for)

Electrical connections
Depending on version:
- Flat-pin connectors 1 x 6,3 mm or 2 x 2,8 mm to DIN 46 244
- Screw terminals for conductor cross-section from 0,5 to 2,5 mm²

Mounting
Panel mounting with two fixing clamps at top/bottom or left/right
Close mounting possible
Mounting position: not critical
Weight: 0,27 kg (9.52 oz)

Accessories supplied with unit
Operating instructions
2 fixing clamps

ACCESSORY EQUIPMENT

BlueControl (Engineering Tool)
PC-based program for configuring, setting parameters, and operating (commissioning) the KS 90-1 controller. Moreover, all the settings are saved, and can be printed on demand.
Depending on version, a powerful data acquisition module is available, complete with trend graphics.

Visibility mask
The BlueControl software can be used to blind out parameters in the instrument. Thus, only allowed parameters can be changed on side. Safety relevant parameters are invisible!

Simulation
The built-in simulation serves to test the controller settings, but can also be used for general training and observing the interaction between controller and control loop.

Software requirements

Two parameters are blinded out:

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Visible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setup</td>
<td>setpoint</td>
<td>✔</td>
</tr>
</tbody>
</table>

Configurations that can only be implemented via the BlueControl software (not via the front-panel keys):
- Customer-specific linearizations
- Enable „forcing“ for inputs/outputs
- Adjustment of limits for operating hours and switching cycles
- Switch-over to 60 Hz mains frequency
- Master/slave configuration
- Disable operator actions and operating levels, plus password definition
- Prevent automatic optimization of cycle times T1, T2

Hardware requirements:
A PC adapter (see „Accessories“) is required for connecting the controller.

Updates and demo software can be downloaded from: www.pma-online.de

BlueControl, versions and functionality:

<table>
<thead>
<tr>
<th>Functionality</th>
<th>Mini</th>
<th>Basic</th>
<th>Expert</th>
</tr>
</thead>
<tbody>
<tr>
<td>parameter and configuration setting</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>controller and control loop simulation</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>download: writes an engineering to the controller</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>online mode/visualisation</td>
<td>SIM</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>creation of user defined linearizations</td>
<td>SIM</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>configuration of extended operating level</td>
<td>SIM</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>upload: reads an engineering from the controller</td>
<td>SIM</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>basic diagnosis function</td>
<td>SIM</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>file, save engineering data</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>printer function</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>online documentation, help system</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>measurement correction (calibration procedure)</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>program editor</td>
<td>SIM</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>data acquisition and trend function</td>
<td>SIM</td>
<td>SIM</td>
<td>yes</td>
</tr>
<tr>
<td>network and multiuser licence</td>
<td>no</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>personal assistant function</td>
<td>no</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>extended simulation</td>
<td>no</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>extended diagnostic and service functions</td>
<td>no</td>
<td>no</td>
<td>yes</td>
</tr>
</tbody>
</table>

Der Programmeditor in der BlueControl Expert Version:
### ORDERING INFORMATION

<table>
<thead>
<tr>
<th>Description</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>50A AC Current converter</td>
<td>9404-407-50001</td>
</tr>
<tr>
<td>PC adapter, for connecting the BlueControl software to the BluePort®</td>
<td>9407-998-00001</td>
</tr>
<tr>
<td>Standard rail adapter</td>
<td>9407-998-00061</td>
</tr>
<tr>
<td>Operating manual German</td>
<td>9499-040-66118</td>
</tr>
<tr>
<td>Operating manual English</td>
<td>9499-040-66111</td>
</tr>
<tr>
<td>Operating manual French</td>
<td>9499-040-66132</td>
</tr>
<tr>
<td>BlueControl Mini German/English/French</td>
<td><a href="http://www.pma-online.de">www.pma-online.de</a></td>
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<td>BlueControl Expert German/English/French</td>
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### ACCESSORIES

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<tr>
<th>Description</th>
<th>Order no.</th>
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<tr>
<td>Current converter 50A AC</td>
<td>9404-407-50001</td>
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<tr>
<td>PC adapter, for connecting the BlueControl software to the BluePort®</td>
<td>9407-998-00001</td>
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<tr>
<td>Standard rail adapter</td>
<td>9407-998-00061</td>
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<td>Operating manual German</td>
<td>9499-040-66118</td>
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<tr>
<td>Operating manual English</td>
<td>9499-040-66111</td>
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<td>Operating manual French</td>
<td>9499-040-66132</td>
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