



# TB 40-1 Temperature Limiter

Applicable for heating and cooling applications  
For all types of thermocouples and resistance transducers  
BluePort Front interface and BlueControl Software  
Maintenance manager and error list  
Alarm reset via RESET-key  
Alarm reset via digital  
Type tested to DIN 3440

universal line

## APPLICATIONS

- All applications where an over or under temperature fault condition could present fire hazard or other hazard
- Heat generating plants with outflow temperatures up to 120°C (DIN 4751)
- Hot-water plants with outflow temperatures above 110°C (DIN 4752)
- Thermal transfer plants with organic transfer media (DIN 4754)
- Oil-heated plants (DIN 4755)

## DESCRIPTION

### Front interface and Engineering Tool

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.

### Plug-in module

KS 40-1 controllers are built as plug-in modules. This enables them to be replaced very quickly without tools, and without disturbing the wiring. Of course almost all adjustments can be done comfortably over the instrument front. (see page 4, BlueControl)

### Password protection

The access to the limit value is protected with a password and the internal security switch.

## TECHNICAL DATA

### INPUTS

#### PROCESS VALUE INPUT INP1

Resolution: > 14 bits  
Decimal point: 0 to 3 decimals  
Limiting frequency: 2 Hz  
Digital input filter: adjustable 0,000...9999 s  
Scanning cycle: 100 ms  
Measured value correction: 2-point or offset correction

#### Thermocouples (Table 1)

Input impedance:  $\geq 1 \text{ M}\Omega$   
Effect of source resistance:  $1 \mu\text{V}/\Omega$

#### Cold junction compensation

Max. additional error  $\pm 0,5 \text{ K}$

#### Sensor break monitoring

Sensor current:  $\leq 1 \mu\text{A}$   
Operating sense configurable (see page 2)

#### Resistance thermometer

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

#### Special measuring range

The BlueControl software can be used to match the input to the sensor KTY 11-6 (characteristic is stored in the controller).

Physical measuring range: 0...4500  $\Omega$   
Linearization segments: 16

### Current and voltage signals

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

### CONTROL INPUT DI1 (RESET)

Connection of a potential-free contact suitable for switching „dry“ circuits.

Switched voltage: 2,5 V  
Switched current: 50  $\mu\text{A}$

## OUTPUTS

### LC RELAY OUTPUT

#### Function

Interruption of heating or cooling power supply if the adjusted limit is reached.

Contacts: Potential-free changeover contact  
Max. contact rating: 500 VA, 250 VAC, 2A at 48...62 Hz, resistive load  
Min. contact rating: 5 V, 10 mA AC/DC  
Operating life (electric): 600.000 duty cycles with max. rating

RELAY OUTPUTS OUT1, OUT2

Function

Additional alarms with max, min or max and min monitoring with adjustable hysteresis

Signals which can be monitored:

- Process value (absolute)
- Difference between process value and adjusted limit value LC (relative)
- Sensor break or short circuit (Pt100)

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

Contacts: 2 NO contacts with common connection  
Max. contact rating: 500 VA, 250 VAC, 2A at 48...62 Hz, resistive load  
Min. contact rating: 6 V, 1 mA DC  
Operating life (electric): 800.000 duty cycles with max. rating

Table 1 Thermocouple ranges

Thermocouple		Range		Accuracy	Resolution (Ø)
L	Fe-CuNi (DIN)	-100...900°C	-148...1652°F	≤ 2 K	0,1 K
J	Fe-CuNi	-100...1200°C	-148...2192°F	≤ 2 K	0,1 K
K	NiCr-Ni	-100...1350°C	-148...2462°F	≤ 2 K	0,2 K
N	Nicrosil/Nisil	-100...1300°C	-148...2372°F	≤ 2 K	0,2 K
S	PtRh-Pt 10%	0...1760°C	32...3200°F	≤ 2 K	0,2 K
R	PtRh-Pt 13%	0...1760°C	32...3200°F	≤ 2 K	0,2 K
T	Cu-CuNi	-200...400°C	-328...752°F	≤ 2 K	0,05 K
C	W5%Re-W26%Re	0...2315°C	32...4199°F	≤ 2 K	0,4 K
D	W3%Re-W25%Re	0...2315°C	32...4199°F	≤ 2 K	0,4 K
E	NiCr-CuNi	-100...1000°C	-148...1832°F	≤ 2 K	0,1 K
B <sup>(1)</sup>	PtRh-Pt6%	0(100)...1820°C	32(212)...3308°F	≤ 3 K	0,3 K
Special		-25...75 mV		≤ 0,1 %	0,01 %

<sup>(1)</sup> values applied above 100°C

Table 2 RTD's

Type	Sensor current	Range		Accuracy	Resolution (Ø)
Pt100	0,2 mA	-200...850°C	-328...1562°F	≤ 1 K	0,1 K
Pt1000		-200...200°C	-328...392°F	≤ 2 K	0,1 K
KTY 11-6*		-50...150 °C	-58...302 °F	≤ 2 K	0,05 K

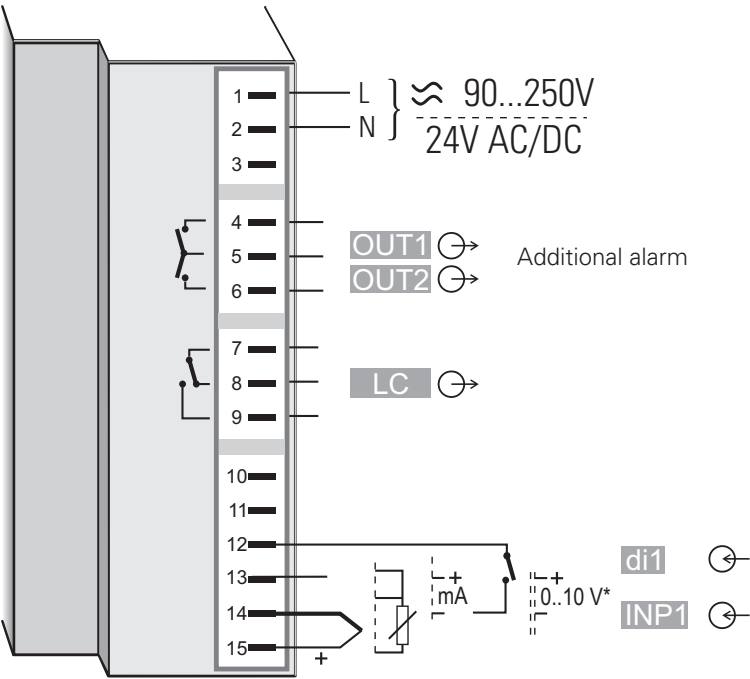
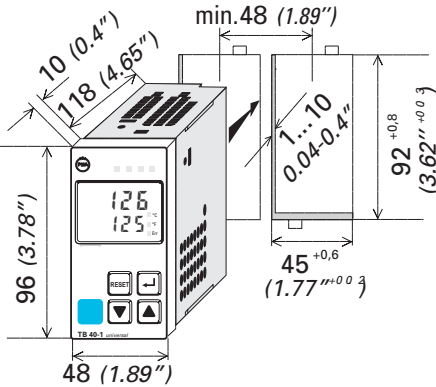
\* or special

Table 3 Current and voltage

Range	Input resistance	Accuracy	Resolution (Ø)
0-10 Volt	≈ 110 kΩ	≤ 0,1 %	0,6 mV
0-20 mA	49 Ω (voltage requirement ≤ 2,5 V)	≤ 0,1 %	1,5 µA

Electrical connections:

Dimensions (mm):



## 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  
latched limit messages  
Re-calibration warning  
Internal fault (RAM, EEPROM, ...)

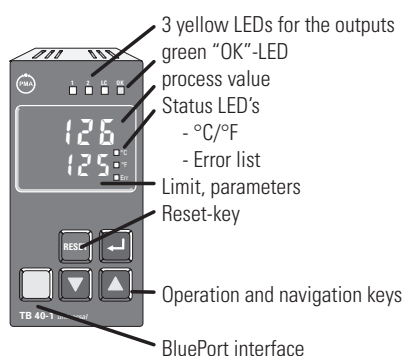
*Flashing Error LED indicates active alarm in the error list:*



## OPERATION AND DISPLAY

### Display

Process value: LED with 7 segments, 10,5 mm  
Lower display: LED with 7 segments, 7,8 mm



## POWER SUPPLY

Depending on version:

### AC SUPPLY

Voltage: 90...260 VAC  
Frequency: 48...62 Hz  
Power consumption approx. 7 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. 7 VA (W)

### BEHAVIOUR WITH POWER FAILURE

Configuration, parameters, and adjusted limits:  
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 TB 40-1.

## ENVIRONMENTAL CONDITIONS

### Protection modes

Front panel: IP 65 (NEMA 4X)  
Housing: IP 20  
Terminals: IP 00

### Permissible temperatures

For specified accuracy: 0...60°C  
Warm-up time: < 15 minutes  
For operation: -20...65°C  
For storage: -40...70°C

### Humidity

75% yearly average, no condensation

### Shock and vibration

#### Vibration test $F_c$ (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 $E_a$ (DIN IEC 68-2-27)

Shock: 15g  
Duration: 11ms

### Electromagnetic compatibility

Complies with EN 61 326-1  
(for continuous, unattended operation)

#### HF interference on leads (EN 61000-4-6):

Class B, Effect  $\leq 0,5\%$

## GENERAL

### Housing

Material: Makrolon 9415,  
flame-retardant  
Flammability class: UL 94 VO, 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

### Type tested to DIN 3440

Can therefore be used in:

- Heat generating plants with outflow temperatures up to 120°C to DIN 4751
- Hot-water plants with outflow temperatures above 110°C to DIN 4752
- Thermal transfer plants with organic transfer media to DIN 4754
- Oil-heated plants to DIN 4755

### UL certification (applied for)

### Electrical connections

Flat-pin connectors 1 x 6,3 mm or  
2 x 2,8 mm to DIN 46 244

### 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 TB 40-1 temperature limiter. 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.

Software requirements:

Windows 95/98/NT/2000.

The built-in simulation serves to test the settings.

**Configurations that can only be implemented via the BlueControl software (not via the front-panel keys):**

- Customer-specific linearizations
- Adjustment of limits for operating hours and switching cycles
- Switch-over to 60 Hz mains frequency
- Disable operator actions and operating levels, plus password definition

#### 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](http://www.pma-online.de)

## ORDERING INFORMATION

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Flat pin connectors  
Screw terminal connectors

90..250V AC, 3 relays

24VAC / 18..30VDC, 3 relays

Standard configuration

Configuration to specification

No manual

Manual german

Manual english

Manual french

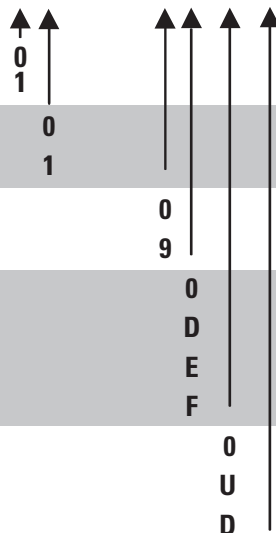
Standard

UL certificated

DIN 3440

Standard version

Customer specification



## ACCESSORIES

Description			Order no.
PC adapter, for connecting BlueControl software to the BluePort			9407-998-00001
Standard rail adapter			9407-998-00061
Operating manual	german		9499-040-63418
Operating manual	english		9499-040-63411
Operating manual	french		9499-040-63432
BlueControl Mini	german/english/french		<a href="http://www.pma-online.de">www.pma-online.de</a>
BlueControl Basic	german/english/french		9407-999-11001
BlueControl Expert	german/english/french		9407-999-11011



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