



TB 40-1



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 EN 14597 and cULus

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. Off 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: 2-point or offset correction 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. 30Ω
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 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

Note:

For version TB40-1x2-... and TB40-1x3-...LC- and OUT2-contact are switched in series and controlled parallel !"

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

Note:

For version TB40-1x2-... and TB40-1x3-...OUT2 is not available as additional contact!"

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, ...)

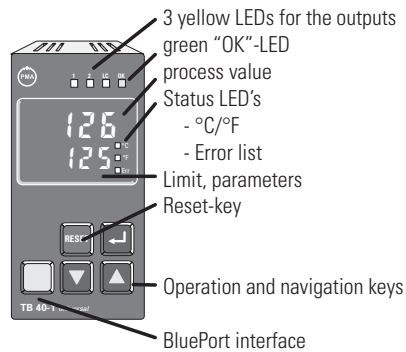
Flashing Error LED indicates active alarm in the error list:



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

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 ⁽¹⁾	PtRh-Pt6%	0(100)...1820°C	32(212)...3308°F	≤ 3 K	0,3 K
Special		-25...75 mV		≤ 0,1 %	0,01 %

⁽¹⁾ 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

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
(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 EN 14597

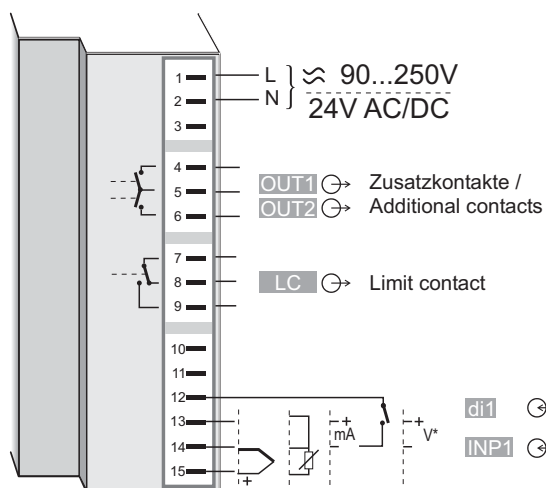
With certified sensors applicable for:

- Heat generating plants with outflow temperatures up to 120°C to DIN 4751

Electrical connections:

Fig. 1: TB 40-1 (bis 2011-12)

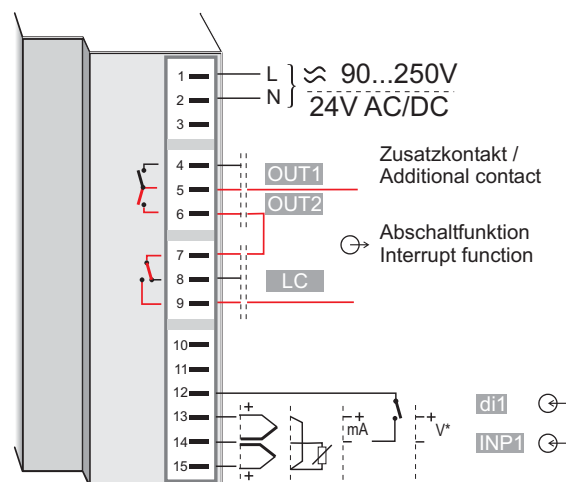
TB40-1x0-xxxxx/ TB40-1x1-xxxxx
configuration 3 or 4 (Tab.1)



Electrical connections:

Fig. 2: TB 40-1, EN 14597 (2009-1)

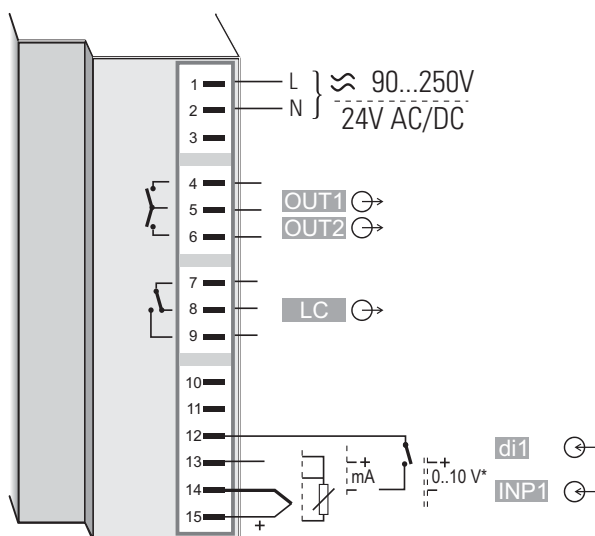
TB40-1x2-xxxxx / TB40-1x3-xxxxx
configuration 7 or 8 (Tab.1)



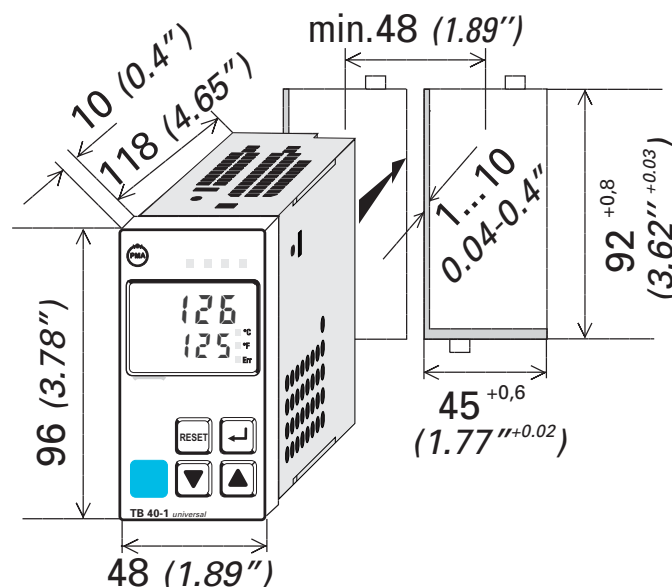
Electrical connections:

Fig. 3: TB 40-1Is Temperature monitor TW

TB40-1x2-xxxxx / TB40-1x3-xxxxx
configuration 5 or 6



Dimensions (mm):



- 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

cULus-certification

(Type 1, indoor use)
File: E 208286

Note: Versions **TB40-1x0-...** and **TB40-1x1-...** only!

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

ORDERING INFORMATION

TB 40-1-000-									
Flat pin connectors		0	↑	↑	↑	↑			
Screw terminal connectors		1	↑						
90..250V AC, 3 relays,		TW ¹⁾	0						
24VAC / 18..30VDC, 3 relays,		TW ¹⁾	1						
90..250V AC, 2 relays,		TB ²⁾	2						
24VAC / 18..30VDC, 2 relays,		TB ²⁾	3						
Standard configuration			0						
Configuration to specification			9						
No manual			0						
Manual German			D						
Manual English			E						
Manual French			F						
Standard CE-certified)			0						
cULus certified (with screw terminals only!)		³⁾	U						
EN14597 certified (replaces DIN 3440)			D						
Standard version								00	
Customer specification								..	

1) Temperature monitor

2) Temperature limiter TB (EN14597, 2009-1), not available with cULus

3) Not available as Temperature limiter TB (EN14597, 2009-1)

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

Description			Order no.
PC adapter, for connecting BlueControl software to the BluePort			9407-998-00001
Standard rail adapter			9407-998-00061
Operating manual Temperature monitor TW	german		9499-040-63418
Operating manual Temperature monitor TW	english		9499-040-63411
Operating manual Temperature monitor TW	french		9499-040-63432
Operating manual Temperature limiter TB/TW	german		9499-040-93418
Operating manual Temperature limiter TB/TW	english		9499-040-93411
Operating manual Temperature limiter TB/TW	french		9499-040-93432
BlueControl Mini	german/english/french		www.pma-online.de
BlueControl Basic	german/english/french		9407-999-11001
BlueControl Expert	german/english/french		9407-999-11011

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