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Electronic MICROSTAT-T

Temperature controller with digital indication for use with resistance thermometers and thermocouples Series 8650

for stock items see price list

Bezel: 48 x 48mm, 74 x 32mm, 72 x 72mm
Case size: 60mm dia.

Type 8650-66-48

Type 8650-67-32

Type 8650-65-72

Type 8650-66-60

Brief description

The electronic MICROSTAT-T is a temperature controller with “ON/OFF” switching action in different sizes for flush-panel mounting. Depending on the model, setpoint selection is either in analogue form with a pointer, by digital setpoint indication or against the process value display with changeover button. The process value is displayed continuously on a 3½-digit LCD display. Switching point and indication accuracy are ± 1.5% of span.
The standard version includes adjustable switching differential and zero adjustment for optimum adaptation of the sensor accuracy to the particular operating point or range. Sensors for direct connection to the instrument include exchangeable resistance thermometers with silicon semiconductor sensors and platinum resistors to DIN / IEC 751, both with positive temperature coefficient and thermocouples to DIN 43 710 and IEC 584. Different supply voltage versions are available: 12 V DC (VDE approved), 11.4 — 27 V DC and 10 — 19 V AC (TZ 120) or 230 V AC (TZ 116). For operation on other supply voltages, separate mains modules are available for C-rail or wall mounting (panel).
The standard transistor output is suitable for direct operation of electromechanical relays or electronic solid-state relays. Separate relay modules for C-rail or wall mounting are available. On request, the MICROSTAT-T is available with a factory-fitted electromechanical relay. Thanks to separate relay and supply modules, the MICROSTAT-T can be operated at ambient temperatures as high as +70°C.

Type designation

8650 **Series 8650**
Electronic MICROSTAT-T
as temperature controller
with digital display

8650-65 **Style 65**
setpoint selection by rotary knob,
analogue setpoint indication
by pointer against scale,
process value indication
on LCD display
(not with case size 74 x 32mm)

8650-66 **Style 66**
setpoint selection
by rotary knob,
setpoint indication on LCD
process value indication on LCD

8650-67 **Style 67**
setpoint indication
by rotary knob,
setpoint indication on
process value LCD display
through keystroke
(only for case size 74 x 32mm)

O	output “OFF” for x > w (process value above setpoint)
S	output: “OFF” for x < w (process value below setpoint)
w	for use with Pt100 resistance thermometers in 3-wire and 2-wire circuit
w 2000	for use with resistance thermometers with silicon semiconductor sensors in 2-wire circuit
t	for use with thermocouples (please specify type when ordering)

Case dimensions

-48	bezel 48 x 48 mm
-32	bezel 74 x 32 mm
-72	bezel 72 x 72 mm
-60	case size 60 mm dia.

Extra Codes

TZ 024 stop for setpoint limit
Style 65:
mechanical min. or max. limit with knob on front panel
Styles 66 and 67:
electronic max. limit with potentiometer on side of housing

TZ 026 instrument centred for 68 x 68 mm panel cut-out (only with bezel size 72 x 72 mm)

TZ 060 scale to customer specification

TZ 101 built-in relay 5 A, 250 V AC (for series 8650 with VDE approval "built-in relay 4 A, 250 V AC")

TZ 102 protective cover, transparent plastic (only for case size 48 x 48 mm)

TZ 103 2 mounting brackets with threaded spindle

TZ 104 setpoint adjusted with screwdriver (Styles 66 and 67 only)

TZ 106 switching transistor (open collector) max. 30 V DC, 100 mA (only for series 8650 with VDE approval "max. 24 V DC, 100 mA")

TZ 108 display format 0.1 °C / digit

TZ 112 LCD display with background lighting (only for Style 67)

TZ 113 instrument without process value LCD display (only for Style 65)

TZ 116 Supply 230 V AC, 50 Hz only for input w and w 2000 (no VDE approval)

TZ 120 special versions (no VDE approval):
- Supply 11.4 V DC up to 27 V or 10 to 19 V AC
- relay 5 A, 250 V AC built in with TZ 101
- switching transistor (open collector) max. 30 V DC, 100 mA with TZ 106

Accessories

standard:
1 mounting frame, push-in fitting
1 Operating Instructions

to special order: combination plate for MICROSTATS with 48 x 48 mm bezel, includes TZ 103 (see dimensions)

Temperature probes (TF)
Probe mountings (TA)
Pockets (SH)
see Data Sheet 60.8730
other versions to special order

Note:
Further thermocouples and resistance thermometers to DIN / IEC and special versions, see sectional catalogue "Transducers for temperature and humidity 90".

Separate mains and relay modules
see Data Sheet 60.8884 (mains modules)
see Data Sheet 60.8886 (relay modules)
see Data Sheet 70.9010, 70.9020 (electronic solid-state relays)

Ordering examples

Electronic MICROSTAT-T
Type: 8650-65-48
Range: 0 to +100°C
Extra Code: TZ 101
Output: O
Probe input: w 2000

Electronic MICROSTAT-T
Type: 8650-66-48
Range: 0 to +600°C
Output: O
Probe input: t NiCr-Ni

Technical data

Input: Resistance thermometer in 3-wire circuit, Code w

Ranges

Style 65	Style 66 / 67
–50 + 50°C	–50 + 50°C
0 + 60°C	0 +100°C
0 +100°C	0 +200°C
0 +200°C	0 +400°C
0 +400°C	0 +600°C
0 +600°C	

On Style 65 scale as range.

Lead compensation
not required with 3-wire circuit. With resistance thermometers in 2-wire circuit, e.g. JUMO Type TF 75 or TF 76, the error without compensation resistor is +0.5°C max. When using longer leads, a compensation resistor must be fitted between terminals 1 and 3.

$$R_{comp} = R_{lead}$$

Input: Resistance thermometer with silicon semiconductor sensors in 2-wire circuit w 2000

Ranges

Style 65	Style 66 / 67
–50 + 50°C	–50 + 50°C
–30 + 30°C	0 +100°C
–10 + 15°C	–20 +120°C
0 + 40°C	
0 +100°C	
0 +120°C	

On Style 65 scale as range

Lead compensation
not required

Input: thermocouple, Code t

Ranges

Fe-Con L	NiCr-Ni K
0 +200°C	0 + 600°C
0 +300°C	0 + 900°C
0 +400°C	0 +1000°C *

On Style 65 scale as range
* with series 8650 not VDE approved.

Lead compensation
not required

Temperature compensation
standard

Signal circuit monitoring

2-wire circuit
The resistance thermometer and the probe cable are monitored for break and short-circuit.

The thermocouple and the probe cable are monitored for break.

If one of these faults occurs, the transistor switch opens and the built-in or external relay is switched off.

3-wire circuit
The resistance thermometer is monitored for break and short-circuit.

If one of these faults occur, the transistor switch opens and the built-in or external relay is switched off.

Fault indication
With input w 2000, the faults short-circuit and break are indicated by different figures on the process value display.

With input w, the faults short-circuit and break are indicated by the same figure.

With input t, the fault break is indicated by overrange.

General data

Digital display

Styles 65 and 66:
3½-digit , 6.4 mm (0.25")
LCD display

Style 67:
3½-digit , 12.7 mm (0.5")
LCD display

Indication accuracy

± 1.5% of span
± 1 digit

Display format

1 °C / digit, standard
0.1 °C / digit, TZ 108 up to 199.9°C

Linearity error

w:

0.4 °C max. on spans up to 400ºC

0.8 °C max. on spans above 400ºC

w 2000:

0.5 °C max.

t:

Type L 1°C max. Type K 2°C max.

Switching point accuracy

± 1.5% of span

Switching differential

inputs w and w 2000:

x_{sd} = 0.5 to 15 °C on controls spans 300ºC and below, adjustable from the side

x_{sd} = 1 to 30 °C on control spans 300ºC and above, adjustable from the side

input t:

x_{sd} = 1.5 to 33 °C with Type L
x_{sd} = 3 to 38 °C with Type K

switch-off at process value x = setpoint w
switch on at process value x = setpoint w – differential x_{sd} with output action O

switch on at process value x = setpoint w + differential x_{sd} with output action S

Output

standard:
switching transistor for use with relay modules to Data Sheets 60.8886, 70.9010 and 70.9020

Extra Code TZ 101
built-in relay 1250W, 5 A at 250 V AC, resistive load (VDE-approved 1000W, 4 A 250 V AC, resistive load)

electrical contact life
approx. 300 000 operations at rated load (VDE-approved, Class II, 100 000 operations)

electrical contact life
approx. 1 000 000 operations at 2 A, 250 V AC, resistive load

Extra Code TZ 106
switching transistor (open collector)
30 V DC, 100mA max.
(VDE-approved, 24 V DC, 100mA max.)

When using relays or contactors of other manufacturers, a protective diode must be connected in parallel with the coil winding, e.g. 1N4148 or similar.

special version (TZ 120)
built-in relay 1250W,
5 A at 250 V 50 Hz, resistive load

electrical contact life
approx. 300 000 operations at rated load

electrical contact life
approx. 1 000 000 operations at 2 A, 250 V 50 Hz, resistive load

Status indication

a yellow LED on the front panel indicates: "Transistor switch closed" or "Relay energised"

02.02/00073311

Supply
11.4 to 27 V DC
10 to 19 V AC
230 V AC 50 Hz
12 V DC (VDE-approved)
The electronics is protected against incorrect polarity of the supply.

Power consumption
250 mW max. at 12 V supply (without external relay)

500 mW max. at 12 V supply and TZ 101

special version (TZ 120):
700 mW max. at 24 V supply (without external relay)

1.5 W max. at 24 V supply
(relay built in)

1.6 VA max. at 230 V AC supply (relay built in)

Electrical connection
faston connectors to DIN 46 244 /
A 6.3 x 0.8 mm

Permitted ambient temperature
0 to 70ºC

special version TZ 120:
0 — 60ºC at 24 V supply

0 — 50ºC at 24 V supply and built-in relay (TZ 101)

0 — 50ºC at 230 V AC supply and built-in relay (TZ 101)

Permitted storage and transport temperature
-30 — 80ºC

Ambient temperature error
0.5 °C max. per 10 °C with code w
0.5 °C max. per 10 °C with code w 2000
0.5 % max. per 10 °C with code t

Electromagnetic compatibility
EN 61 326
Noise immunity: general requirements
Interference emission: Class B

Zero adjustment
The zero adjustment on the side permits optimum adjustment of the switching point, display and probe accuracy to the corresponding operating point or range of the user. This adjustment requires a reference temperature at the temperature probe.

Construction

Case with bezel
polycarbonate, black

Style 65
black scale, white lettering
red setpoint pointer
transparent front
black knob

Style 66
black front panel, white lettering
transparent front
black knob

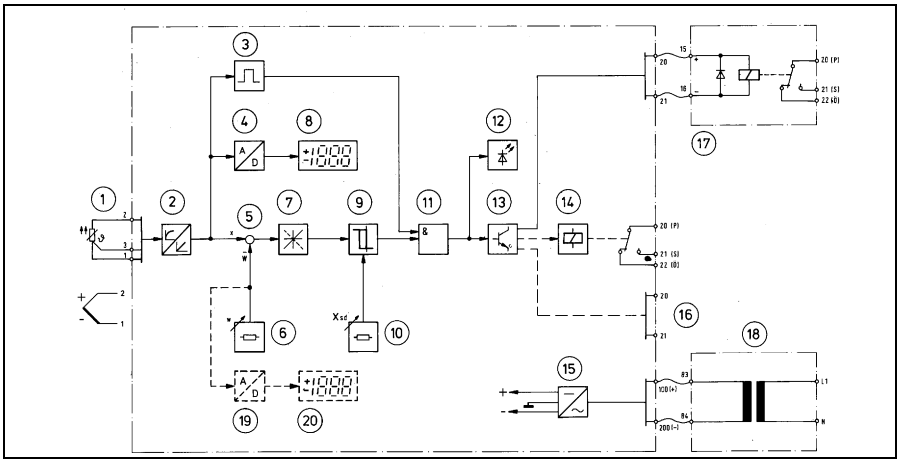
Style 67
black front panel, white lettering
red setpoint key
transparent front
black knob

Protection (Styles 65/66/67)
to DIN 40 050, front IP30
rear IP00
front IP50 when using a seal between bezel and panel.

Operating position
unrestricted

Weight approx. 0.2 kg

Block diagram



Operation, Style 65

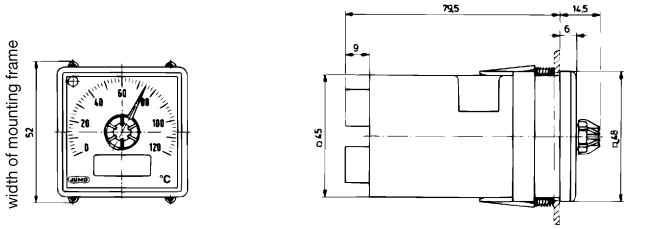
The input signal (1) is linearised and amplified in the input stage (2) and passed to the comparator (5) as process value x. In the comparator, the difference is formed between the process value x and the setpoint w selected on the setpoint unit (6), resulting in the control deviation x_w. At the same time, the process value signal passes through an A/D converter (4) and is indicated on a 3½-digit LCD display.
The contact action O = opening or S = closing is selected by internal links (7). The difference signal produced during a control deviation operates a trigger stage (9). The switching differential x_{sd} of the trigger stage is set with the potentiometer (10).

The unit is fitted as standard with a monitoring circuit (3) for probe and cable break or short-circuit. The result of the monitoring is linked in the logic stage (11) to the output signal of the trigger stage.
In the standard version, the switching transistor (13) operates an external relay (17). The extra Codes TZ 101 – relay 5 A, 250 V AC (VDE-approved 4 A 250 V AC) or TZ 106 – switching transistor, open collector 100 mA max. 30 V DC (VDE-approved 24 V DC) are available as alternatives. The LED (12) lights up for “relay energised”. The supply voltage required for operating the various circuits is produced in the external mains module (18) and stabilised internally by the voltage regulator (15).

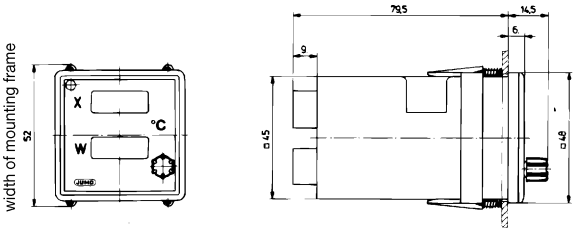
Operation, Style 66
as for Style 65, but the setpoint signal is indicated on a second LCD display (20) through an A/D converter (19).

Operation, Style 67
as for Style 65, but setpoint indication by keystroke on the display unit (4) and (8).

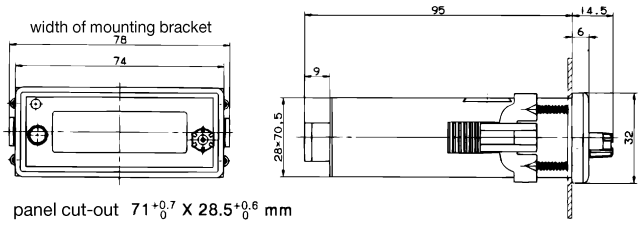
Dimensions



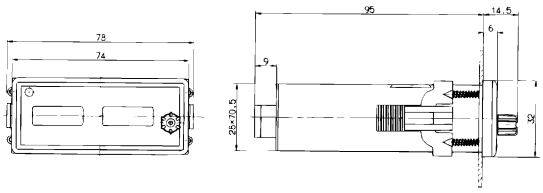
panel cut-out $45^{+0.6}_{0}$ X $45^{+0.6}_{0}$ mm
Type 8650-65-48



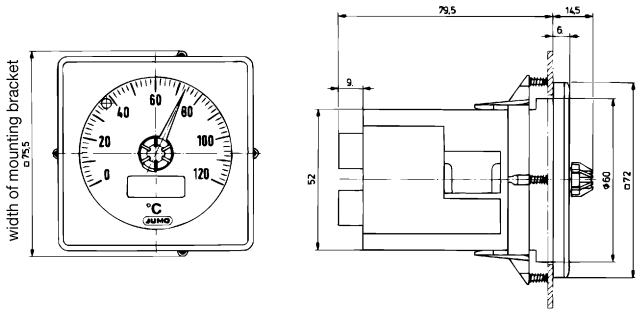
panel cut-out $45^{+0.6}_{0}$ X $45^{+0.6}_{0}$ mm
Type 8650-66-48



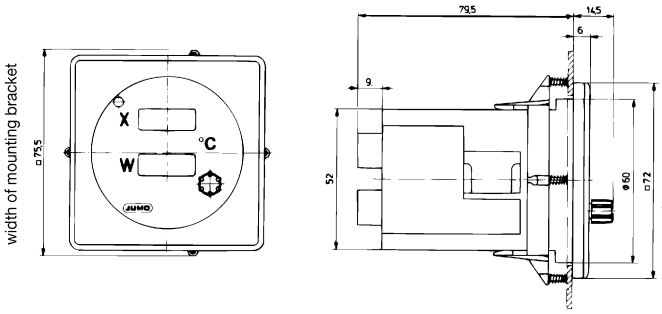
panel cut-out $71^{+0.7}_{0}$ X $28.5^{+0.6}_{0}$ mm
Type 8650-67-32



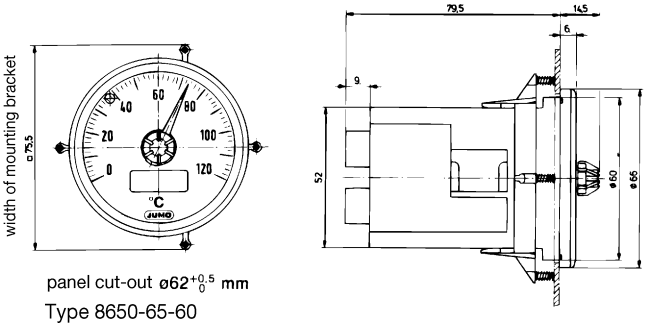
panel cut-out $71^{+0.7}_{0}$ X $28.5^{+0.6}_{0}$ mm
Type 8650-66-32



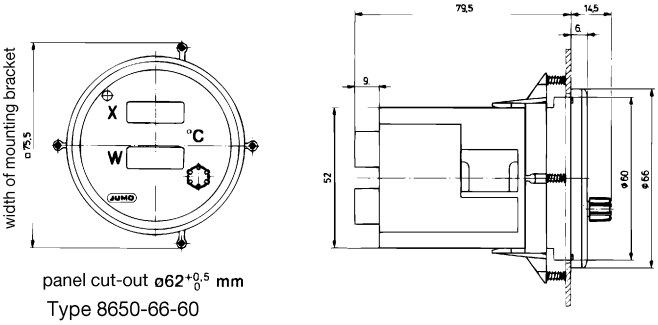
panel cut-out ø$62^{+0.5}_{0}$ mm
Type 8650-65-72



panel cut-out ø$62^{+0.5}_{0}$ **mm (**with Code TZ 026 **$68^{+0.7}_{0}$ X $68^{+0.7}_{0}$ mm)**
Type 8650-66-72

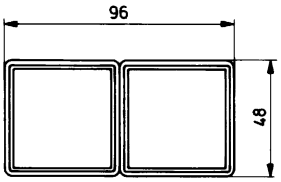


panel cut-out ø$62^{+0.5}_{0}$ mm
Type 8650-65-60

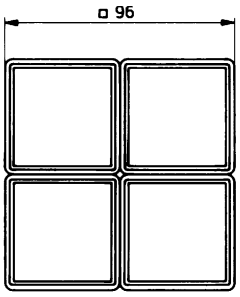


panel cut-out ø$62^{+0.5}_{0}$ mm
Type 8650-66-60

Combinations of 2 or 4 MICROSTATS, bezel 48 x 48 mm

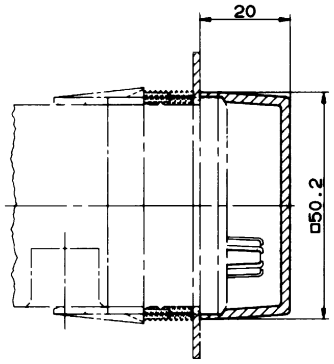


panel cut-out $93.5^{+0.8}_{0}$ X $45^{+0.6}_{0}$ mm

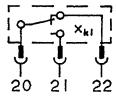
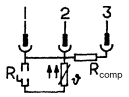
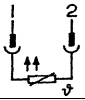


panel cut-out $93.5^{+0.8}_{0}$ X $93.5^{+0.8}_{0}$ mm

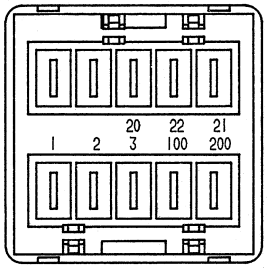
Extra Code TZ 102



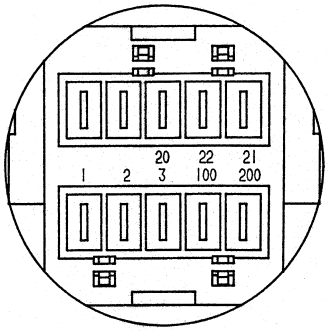
Electrical connection

Connection for	Control action		Terminals	
Relay output as on label	O	$x > x_{k1}$	20 (P) common 21 (S) n.o. (make) 22 (Ö) n.c. (break)	
	S	$x < x_{k1}$		
Logic control output for relay module 8840-6	O	$x > x_{k1}$	20 + 21 -	
	S	$x < x_{k1}$		
Switch output open collector	O	$x > x_{k1}$	20 + 21 -	
	S	$x < x_{k1}$		
Supply	TZ 120	AC 10 — 19 V	100 ~ 200 ~	
	TZ 116	AC 230 V, 50 Hz		
	TZ 120	DC 11.4 - 27 V	100 + 200 –	
		DC 12 V		
Input	Code			
Resistance thermometer in 2-wire circuit	w		1 2 $R_L = R_{comp}$ 3	
Resistance thermometer in 3-wire circuit			1 2 3	
Semiconductor probe KTY in 2-wire circuit	w 2000		1 2	
Thermocouple	t		1 – blue or green 2 + red	

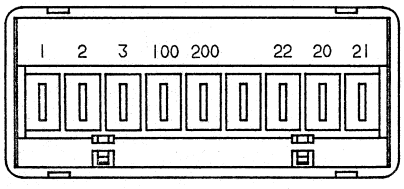
Rear view of controller



48 x 48

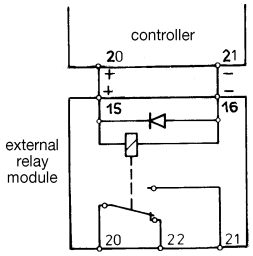


Ø 60 / 72 x 72

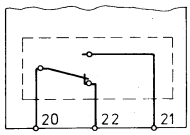


74 x 32

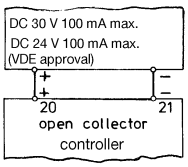
standard
Controller output
switching transistor
for use with relays
to
Data Sheet 60.8884,
Data Sheet 70.9010,
Data Sheet 70.9020



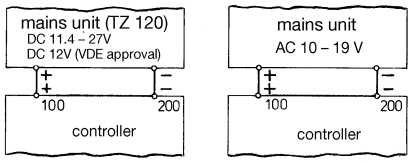
Controller output
TZ 101



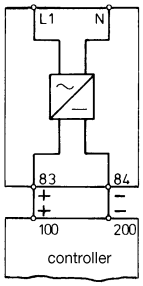
Controller output
switching transistor
open collector
TZ 106



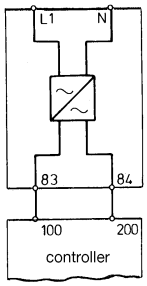
Supply



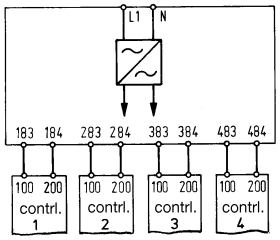
Mains module
8840-1.



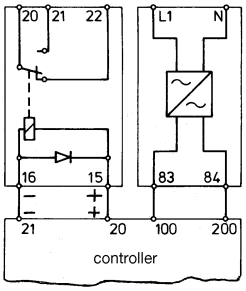
Mains module
8840-2.



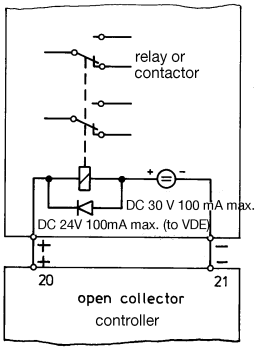
Mains module
8840-3.



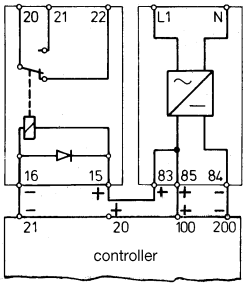
Combination mains
and relay module
8840-2. / 8846-1.



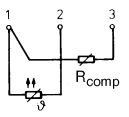
External relay
or contactor
(not from JUMO)



Combination mains
and relay module
8840-1. / 8846-1.



Resistance
thermometer in
2-wire circuit



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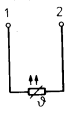
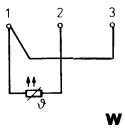
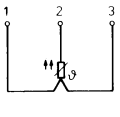


w 2000



w

Resistance
thermometer in
3-wire circuit



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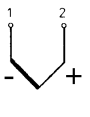
Thermocouple



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