

# Temperature Level Control Amplifier for Pt-100 Temperature Sensor Type S 1481

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- Temperature control relay for temperature sensor type Pt-100
- 17 temperature ranges: -50°C to + 850°C in the same system
- Separate adjustment of operating temperature and hysteresis on 2 built-in potentiometers
- Range output: 0 to 10 VDC/0-1 mA
- Absolute output: 0 to 4.5 VDC
- Output relay: SPDT, 8 A
- LED-indication of relay ON and supply ON
- AC or DC supply voltage

## Product Description

Together with temperature sensor type Pt-100, this S-System can be used for temperature control in heating and cooling plants. In cooling applications, the relay function is inverted for safety reasons.

The adjustable hysteresis makes regulation with this S-System even more flexible. The supply voltage for the S-System must be applied continuously.

## Ordering Key

**S 1481 156 230**

Housing \_\_\_\_\_  
 Type/function \_\_\_\_\_  
 Output \_\_\_\_\_  
 Supply voltage \_\_\_\_\_

## Type Selection

Plug	Output	Temperature range	Supply: 24 VAC	Supply: 230 VAC	Supply: 24 VDC
Circular	Relay, SPDT, 8 A	-50°C to +850°C	<b>S 1481 156 024</b>	<b>S 1481 156 230</b>	<b>S 1481 156 724</b>

## Input Specifications

**Sensor voltage** Pins 5, 6 & 7: Pin 7 is ground

## Output Specifications

<b>Output</b>	Relay, SPDT
<b>Max. voltage</b>	250 VAC (rms) (cont./electr.)
<b>Contact ratings (AgNi)</b>	μ (micro gap) (IEC 60947-5-1/IEC 60337)
Resistive loads	AC1 8 A/250 VAC DC1 4 A/ 24 VDC
Small inductive loads	AC15 2.5 A/250 VAC AC 13 5 A/ 24 VDC
<b>Mechanical life</b>	≥ 30 x 10 <sup>6</sup> operations
<b>Electrical life</b> (@ max. load)	AC 1 ≥ 10 <sup>5</sup> operations
<b>Operating frequency</b>	≤ 7200 operations/h

## Output Specifications (cont.)

<b>Dielectric strength</b>	Dielectric voltage Rated impulse withstand voltage	≥ 2.0 kVAC (rms) (cont./electr.) 4 kV (1.2/50 μs) (cont./electr.) (IEC 60664)
<b>Range output</b>	Voltage output	0-10 VDC (DIN IEC 381) pins 7 & 11 (pin 11 positive) 100 mV/°C within the range
	Voltage deviation Low temperature High temperature Load	0 Volt 10 Volt ≤ 10 kΩ
<b>Connection of instrument</b>	Instrument specification Internal resistance	Pins 7 & 11 (pin 11 positive) Full scale deflection 1 mA, 110 Ω
<b>Absolute output</b>	Voltage output	Pins 7 & 9 (pin 9 positive) 5 mV/°C within the temperature range: -50°C to +850°C 0 Volt = -50°C 4.5 Volt = 850°C
	Load Accuracy	≤ 4 kΩ ± 1.5°C

## Supply Specifications

<b>Power supply AC types</b>	Installation cat. III (IEC 60664)
Rated operational voltage through pins 2 & 10	230 230 VAC ± 15%, 45 to 65 Hz
	024 24 VAC ± 15%, 45 to 65 Hz
Dielectric voltage	≥ 2 kVAC (rms) (suppl./elect.)
Rated impulse withstand volt.	2 kV (1.2/50 μs) (line/neutral)
<b>Power supply DC types</b>	Installation cat. III (IEC 60664)
Rated operational voltage through pins 2 & 10 (pin 2 positive)	724 24 VDC ± 15%
Dielectric voltage	None
Rated impulse withstand volt.	1 kV (1,2/50 μs)
<b>Consumption</b>	4 VA

## General Specifications

<b>Indication for</b>		
Supply ON		LED, green
Output ON		LED, yellow
<b>Environment</b>		
Degree of protection		IP 20
Pollution degree		2 (IEC 60664)
Operating temperature		-20° to +50°C (-4° to +122°F)
Storage temperature		-50° to +85°C (-58° to +185°F)
<b>Weight</b>	AC-types	200 g
	DC-types	125 g
<b>Sensor cable</b>		2-wire, normally unshielded, If used, shield is connected to pin 7. When used with a 3-wire temperature sensor, compensation up to 100 meter is built-in. When a 2-wire temperature sensor is used, pins 5 & 7 must be connected.
<b>Approvals</b>		UL, CSA
<b>CE-marking</b>		Yes

## Temperature Setting

<b>Temperature range</b>	-50 to + 850°C
<b>Adjustable relative scale</b>	0 – 100%

### Temperature ranges

(Selectable by a DIP-switch placed behind a small removable front plate on the relay)

1	2	3	4	5		
					-50°C to 50°C	-58°F to 122°F
					0°C to 100°C	32°F to 212°F
					50°C to 150°C	122°F to 302°F
					100°C to 200°C	212°F to 392°F
					150°C to 250°C	302°F to 482°F
					200°C to 300°C	392°F to 572°F
					250°C to 350°C	482°F to 662°F
					300°C to 400°C	572°F to 752°F
					350°C to 450°C	662°F to 842°F
					400°C to 500°C	752°F to 932°F
					450°C to 550°C	842°F to 1.022°F
					500°C to 600°C	932°F to 1.112°F
					550°C to 650°C	1.022°F to 1.202°F
					600°C to 700°C	1.112°F to 1.292°F
					650°C to 750°C	1.202°F to 1.382°F
					700°C to 800°C	1.292°F to 1.472°F
					750°C to 850°C	1.392°F to 1.562°F

<b>Inversion</b>		
DIP-switch no. 6 next to temperature selector		ON = Heating control OFF = Cooling (inversion)
<b>Power On delay</b>		≤ 2 s
<b>Hysteresis</b>		1 to 20°C in all temperature ranges. Adjustable on relative scale 5-100%
<b>Response time</b>		
Time constant		$\tau = 0,5$ s In worst case, up to: $5 \times \tau$ <b>Example:</b> Actual temperature suddenly exceeds set value: Response time is $< \tau$ Actual temperature suddenly increases to set value: Response time is $\leq 5 \times \tau$ Actual temperature slowly increases to or exceeds set value: Reaction time approaches 0
<b>Potentiometer adjustment</b>		
Upper potentiometer		Operating temperature
Lower potentiometer		Hysteresis
<b>Range accuracy</b>		$< \pm 2\%$

## Mode of Operation

On the upper scale of the S-System, the temperature (relative scale 0-100%) is set, at which the relay will operate or release.

On the lower scale of the system, the hysteresis is set, ie the temperature variation which will cause the relay to change its output status again.

S-System with IEC-standard-range output 0-10 VDC, where 0-10 VDC is a function of the measured temperature.

**Example**  
If the range 0°C to 100°C is selected, a measured temperature of 50°C will result in an output voltage of 5 VDC. The S-System also features an absolute voltage output of 0 to 4.5 VDC, which gives a voltage variation of 5 mV/°C within the range -50°C to +850°C. (-50°C = 0 VDC, +850°C = 4.5 VDC).

**Heating control**  
(DIP-switch 6 is ON).

The relay operates when the temperature drops below the set level minus hysteresis and releases when the temperature increases to the set level.

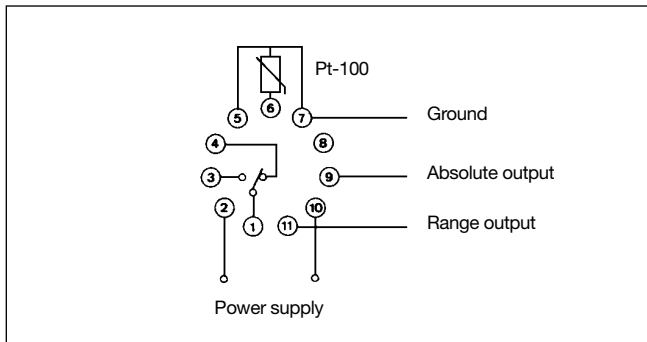
The relay releases in case of broken wire and operates in case of cable- or sensor short-circuit.

**Cooling**  
(DIP-switch 6 is OFF).

The relay operates when the temperature exceeds the set level and releases when the temperature drops below the set level minus hysteresis.

The relay operates in case of broken wire and releases in case of cable- or sensor short-circuit.

## Wiring Diagram



## Accessories

Socket ◊	S 411 ZPD 12 (touch protected)
Hold down spring ◊	HF
Socket cover	BB 4 (til S 411)
Front mounting bezel	FRS 2
Sensor	Pt-100
Moving coil instrument	IH 120

## Operation Diagram

