

R2180

Compact Controller 96 x 96 mm

3-349-218-03
3/8.14

- **Temperature controller**
for the direct connection of thermocouples and resistance thermometer Pt100
- **Available as 2-step and 3-step controller with and without time response**
- **Compact housing, front panel dimensions: 96 x 96 mm per DIN 43700**
For installation to panel switchboards, front panels etc.
- **Easy operation, extensive standard functions and few device variants**
- **Two keys each for function selection and value settings**
- **Replaces GTR 0218**



Applications

Primary applications include temperature control in plastics processing and packaging machines, oven manufacturing and food processing.

The R2180 controller is suitable for control systems with the following characteristic values:

Characteristic value		
Tu	delay	1 s ... 10 min
Tg	balancing time	1 min ... 10 h
Tg/Tu		> 5

Features

- Harmonic-free PDPI algorithm
- Proxy setpoint
- Self-optimization
- Current settings can be saved as user-defined default settings

Description

Actual and setpoint values are both displayed digitally at the same time. LEDs indicate the status of switching and alarm outputs, and whether or not manual operation and the proxy setpoint are active.

Control parameters and configuration values are entered with a membrane keypad. Current settings can be saved as user-defined default settings and recalled as required.

Applicable Regulations and Standards

IEC 61010-1 / DIN EN 61010-1/ VDE 0411 part 1	Safety requirements for electrical equipment for measurement, control and laboratory use
DIN EN 61 326 VDE 0843 part 20	Electrical equipment for measurement, control and laboratory use - EMC requirements
DIN VDE 0106 part 1	Protection against electric shock
EN 60529	Degrees of protection provided by enclosures (IP code)

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Characteristic Values

Inputs

Measurement Input	14 bit transformer resolution
Measuring Range	See order information
Sampling Cycle	0.5 s
Offset Compensation	Possible by means of parameter entry

Sensor Input Configuration

Sensor Type	Selectable via Keypad	
Thermocouple Pt100	°C/°F configurable	Measuring ranges and designations: see order information

Thermocouple

Continuous overload	3 V / 50 Hz AC, sinusoidal 1 V DC
Input impedance	> 50 k Ω
Reference junction	Integrated equalizing circuit
Error messages	For broken sensor, polarity reversal or temperature above or below measuring range

Pt100 Resistance Thermometer

	2-Wire Connection	3-Wire Connection
Cable resistance (both directions)	Balancing from 0 to 30 Ω (by means of keystroke with short-circuited sensor)	Compensated from 0 to 30 Ω
Continuous overload	3 V AC / 50 Hz sinusoidal 1 V DC	
Measuring current	approx. 0.2 mA	
Error messages	For broken sensor or short-circuit, or temperature above or below the measuring range	

Binary Input

Activation of the proxy setpoint by means of floating contact or isolated electronic switch (optocoupler etc.)

Open circuit voltage approx. 15 V
Short-circuit current approx. 1.5 mA

Active	Voltage drop via contact	< 2 V
Inactive	Residual current via contact	< 0.02 mA

Display

Display range	4-place, digital
Display height	13 mm

Status and Switching Outputs

	Symbol	Display Type
Status	W2, hand	LED
Switching outputs	I, II, A1,A2	LED

Controlled Variable

Measuring Range	Display Resolution
All	1 °C or °F; 0.1 °C or °F also with Pt100

Setpoints

Setpoint limiting	Adjustable upper and lower setting limits
Proxy setpoint	Activation via external contact, value can be programmed at the device

Control Performance

Configurable Control Modes

PDPI 2-step controller	For heating
PDPI 2-step controller	For cooling
PDPI 3-step controller	
Limit transducer	2 / 3-step controller without time response
Actuator	

Self-optimization By means of keystroke from any mode. Control parameters can be changed manually.

Control Parameter Setting Ranges

Display	Meaning	Setting Range
<i>Pb I</i>	Proportional band switching output I	0.1 ... 999.9%
<i>Pb II</i>	Proportional band switching output II (with 3-step controller)	0.1 ... 999.9%
<i>dbnd</i>	Dead spot (for 3-step and step-action controllers)	0 ... MRS ¹⁾
<i>tu</i>	Path delay	0 ... 9999 s
<i>tc</i>	Read-out cycle time	0.5 ... 600 s

¹⁾ MRS = measuring range span

Outputs

Control Outputs

Function	Switching output I (heating) Switching output II (cooling)
Read-out cycle	Adjustable within a range of 0.5 ... 600 s
Output type	Relay or transistor output
Relay output	Floating contact, normally open Switching capacity 250 V AC / DC, 2 A, 500 VA / 50 W Service life > 2 x 10 ⁵ switching cycles at nominal load
Interference suppression	Provide external RC element (100 Ω - 47 nF) at contactor
CSA	300 V CAT II
Transistor output	Suitable for commercially available semiconductor relays (SSR)

Switching Status	Open-Circuit Voltage	Output Current
Active (load \leq 800 Ω)	< DC 17 V	10 ... 15 mA
Inactive	< DC 17 V	< 0.1 mA

Overload limit Short-circuit, continuous interruption

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Auxiliary Voltage

Nominal Value	Nominal Range of Use		CSA	Power Consumption
	Voltage	Frequency		
AC 110 V / 230 V	AC 95 V ... 253 V	48 Hz ... 62 Hz	300 V CAT II	Max. 10 VA typ. 6 W

Accuracy

Controlled Variable Input	Error Limit relative to MRS ¹⁾	Resolution relative to MRS ¹⁾
Thermocouple – In general, except for types R, S, B – Types R, S	< (0.5% m.v. + 2 K) < 1%	< 0.2% < 0.05%
Resistance thermometer	< 4 K	< 0.1 K
	Error limit	
Reference junction	± 2 K	

¹⁾ MRS = measuring range span

Reference Conditions

Reference Quantity	Reference Condition
Ambient temperature Tref	23 °C ± 2 K
Reference junction temperature Tver	23 °C ± 2 K
Auxiliary voltage	Nominal value ± 1% at 50 Hz AC ± 1%, sinusoidal; Allowable common-mode voltage to electrically connected inputs: 0 V DC / AC
Warm-up time	10 min. (inputs within measuring range)

Ambient Conditions

Annual mean relative humidity, no condensation	75%
Ambient temperature	
– Nominal Range of Use	0 °C ... +50 °C
– Functional range	0 °C ... +50 °C
– Storage range	-25 °C ... +70 °C

Influencing Quantities and Influence Error

Influencing Quantity	Nominal Range of Use	Maximum Influence Error
Ambient temperature Tu	0 °C ... +50 °C	0.1K (Tu - Tref) / K
Reference junction temperature Tver	0 °C ... +50 °C	0.1 K (Tver - Tref) / K
Cable resistance		
– Thermocouple in general, except for types R, S, B types R, S	RL = 0 ... 200 Ω RL = 0 ... 200 Ω	0.4 K / 10 Ω 2 K / 10 Ω
– Pt100 2-wire	RL = 0 ... 30 Ω	3 K / Ω (adjustable)
– Pt100 3-wire	RL = 0 ... 30 Ω	0.5K / 10 Ω
Warm-up influence	≤ 5 minutes	± 1%

Electrical Safety

Safety class	II, panel-mount device per DIN EN 61010-1 section 6.5.4
Contamination Level	1, per DIN EN 61010-1 section 3.7.3.1 and IEC 664
Overvoltage category	II, per DIN EN 61010 appendix J and IEC 664
Operating voltage	300 V per DIN EN 61010

Electromagnetic Compatibility

Interference emission	EN 61326 measuring method EN 55011, class B limit value		
Interference immunity	EN 61326		
Test type	Standard	Test severity	Criterion
ESD	EN 61000-4-2	4 kV contact discharge 8 kV atmospheric discharge	B B
E field	EN 61000-4-3	10 V / m 80 ... 1000 MHz	B
Burst	EN 61000-4-4	2 kV at power supply cables	B
HF	EN 61000-4-6	10 V 0.15 ... 80 MHz, all terminals	A
Surge voltage	EN 61000-4-5	2 kV at all connector cables	A
Voltage dip	EN 61000-4-11	½ period	A

Mechanical Design

Design	Panel-mount device per DIN 43700 Housing made from plastic per UL V0 Side-by-side mounting with separator ≥ 10 mm
Front panel dimensions	96 x 96 mm ²
Installation depth	50 mm
Panel cutout	92 ^{+0.8} mm x 92 ^{+0.8} mm
Mounting position	Front panel vertical or tilted back up to 45°
Protection	front panel IP 65 housing IP 20 terminals IP 20
Weight	approx. 0.5 kg

Standard Equipment

- Controller
- 2 mounting components
- Bilingual operating instructions German/English

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Order Information

Feature	Designation	
Electronic PDPI controller	R2180	
Controller type		
2-step controller	A1	
3-step controller	A2	
2-step controller with limit contact MAX	A3	
2-step controller with limit contact MAX / MIN	A4	
Time response		
short	B1	
medium	B2	
long	B3	
Measuring ranges		
Thermocouple °C	type L Fe-CuNi 0 ... 199 °C	C01
	0 ... 399 °C	C02
	0 ... 599 °C	C03
	type J Fe-CuNi 0 ... 199 °C	C04
	0 ... 399 °C	C05
	0 ... 599 °C	C06
	32 ... 392 °F	C13
	32 ... 752 °F	C14
	32 ... 1112 °F	C15
	type K NiCr-Ni 0 ... 399 °C	C07
	0 ... 599 °C	C08
	0 ... 799 °C	C09
	0 ... 1200 °C	C10
	32 ... 752 °F	C16
	32 ... 1112 °F	C17
	32 ... 1472 °F	C18
	32 ... 2192 °F	C19
	type R Pt13Rh-Pt 0 ... 1600 °C	C11
32 ... 2912 °F	C20	
type S Pt10Rh-Pt 0 ... 1600 °C	C12	
32 ... 2912 °F	C21	
Resistance thermometer Pt100 (2-wire connection)	-99.9 ... +99.9 °C	C30
	-99.9 ... +199.9 °C	C31
	0 ... +99.9 °C	C32
	0 ... +199.9 °C	C33
	0 ... +399.9 °C	C34
	-148 ... +212 °F	C37
	-148 ... +392 °F	C38
	32 ... 212 °F	C39
	32 ... 392 °F	C40
	32 ... 752 °F	C41

Feature	Designation
Resistance thermometer Pt100 (3-wire connection)	C50
-99.9 ... +99.9 °C	C51
0 ... +99.9 °C	C52
0 ... +199.9 °C	C53
0 ... +399.9 °C	C54
-148 ... +212 °F	C57
-148 ... +392 °F	C58
32 ... 212 °F	C59
32 ... 392 °F	C60
32 ... 752 °F	C61
Output type 1st switching point	
Relay	D1
Transistor	D2

When placing your order, please quote the designation of the basic instrument R2180 and, for each additional feature, only one type designation of the same letter. If the letter of a type designation is followed by the digit zero, you do not need to indicate this type designation in your order.

Features C35, C42, C55, C62 and E1 of controller GTR0218 cannot be replaced.

Auxiliary voltage is generally AC 110 ... 230 V.

A switch to deactivate the control outputs is always available (see feature F1 of controller GTR0218).

Sample Order

Feature	Designation
Electronic PDPI controller	R2180
2-step controller	A1
Medium time response	B2
Thermocouple type J Fe-CuNi 0 ... 400 °C	C05
Output type 1 st switching point: relay	D1

Example of a complete type designation:
R2180 A1 B2 C05 D1