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- 8 individually selectable regulating zones, thermocouples and Pt100
- Extremely short sampling interval for all channels (100 ms)
- Control functions: duty cycle controller, limit transducer, two and three-position controller, step-action controller, continuous-action controller
- · Cascade, differential and hot-runner control
- Actual value management by groups for the avoidance of thermal stressing
- 16 binary inputs / outputs with short-circuit detection, can be freely assigned to controller states, functions and channels, factory default configuration: 2 actuator outputs per regulating zone
- Optional expansion to 20 binary inputs / outputs or 4 additional continuous outputs
- RS 232 service interface parameters configuration and data transfer via notebook with software tool
- Fieldbus interfaces: Profibus DP, CAN with CANOpen, RS 485 with EN 60870 or Modbus protocol for integration into controls and management systems
- 24 V DC auxiliary power supply



Applications

The R6000 is a compact 8-channel temperature controller in a top-hat rail mount housing. The controller is used in machines or systems with centralized control and display concepts. Communications are possible via a number of standardized fieldbus interfaces, or by means of the integrated service interface.

The controller's range of applications includes multi-channel temperature control for plastics processing machines (injection molding, extrusion, blow molding and hot runner technology), semiconductor manufacturing processes, industrial and laboratory ovens, textile machinery, climatic test cabinets, environmental simulation chambers, food and beverage vending machines, packaging machinery and process engineering.

Description

The controller can be snap-mounted to top-hat rails in accordance with DIN EN 50022. Reliable wiring is accomplished with the help of screw and clamp-type terminals which are separated according to function, allowing for rapid device replacement in the event that service is required.

The decentralized control unit is equipped with inputs for all common temperature sensors, and drives semiconductor relays or proportional actuators via freely assignable outputs. Parameters configuration for the control channels is performed via the service interface with a convenient software tool for use with a notebook. The control unit functions autonomously and exchanges actual values, setpoint values, alarm and status messages with the controls or the management system via the fieldbus interface. Complete parameters configuration can, of course, also be performed via the fieldbus interface.

Clear-cut status displays with LEDs keep the user informed concerning the status of switching outputs and inputs at the controller and the field bus. Readback outputs allow for automatic short-circuit detection and provide for a comprehensive errors recognition concept together with monitoring of sensor inputs and heating circuits.

R6000

8-Channel Controller

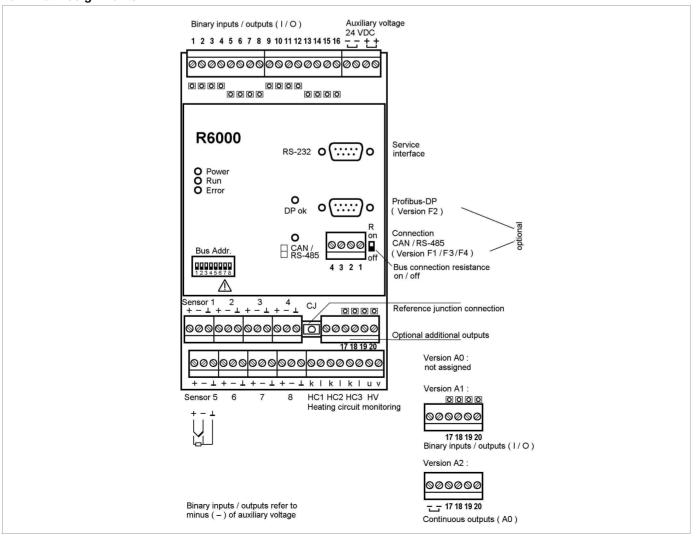
Features

- Integrated self-restoring overload protection
- Monitoring for sensor breakage, cable interruption, polarity reversal and short-circuiting
- Regulated value is active in the event of sensor breakage
- Immune to interference due to leakage current at thermocouples
- Setpoint ramp
- Feed-forward control: targeted alteration of controller state for the avoidance of overshooting and undershooting
- Regulating zones can be assigned to groups
- Deactivate zones as desired with internal or external signal
- · Heating circuit monitoring without additional transformer
- Heating current monitoring with up to 3 external current transformers (3-phase current), and an optional voltage transformer for compensation of voltage fluctuation
- Remote diagnosis supported with numerous monitoring functions
- Can be adapted at any time
- 2nd set of parameters

Applicable Regulations and Standards

IEC 61010-1 / EN 61010-1 / VDE 0411, Part 1	Safety requirements for electrical equipment for measurement, control and laboratory use	
IEC 60529 / EN 60529 DIN VDE 0470, Part 1	Protection provided by enclosures for electrical equipment (IP code)	
DIN EN 60204-1 / VDE 0113, Part 1	Machine safety	
DIN 3440	Temperature controllers and limiting devices for heating systems	
IEC 61326-1 / EN 61326-1	Electromagnetic compatibility (EMC) interference emission	
IEC 61 326 / A1 / EN 61 326 / A1	Electromagnetic compatibility (EMC) interference immunity	
IEC 60584 / EN 60584 (DIN 43710)	Thermocouples	
IEC 60751 / DIN EN 60751	Industrial platinum resistance thermometers and platinum resistance elements, Pt100 sensors	
DIN EN 50022	Mounting rails, top-hat rail with 35 mm width for snap mounting devices	
CSA	Canadian Standards Association, in preparation	

Terminal Assignments



Characteristic Values

Inputs / Outputs

Sampling Rates 100 ms for each controlled variable

Thermocouple Measurement Input

per IEC 60584 / EN 60584 / DIN 43710 Thermocouples

type J, L, K, R, S, B and N

linear 0 ... 50 mV Measuring Range

Nominal Input

0 ... 900 ° C Range for Type J, L

Κ 0 ... 1300 ° C R, S 0 ... 1750 ° C 0 ... 1800 ° C В Ν 0 ... 1300 ° C

Accuracy / Error < 0.7% of measuring range span

for types J, L, K, N

< 2.0 % of measuring range span for

types R, S, for Typ B from 600 °C onwards

Resolution

Cont. AC Overload 50 / 60 Hz / 50 V AC, sinusoidal

> 1 V DC DC

Input Impedance $> 50 \text{ k}\Omega$

for sensor breakage or polarity reversal, or Error Messages

temperature outside of measuring range

Reference Junction Measurement Input

Nominal Input Range 0 ... 70 ° C Accuracy ±2K

Reference Junction two-step

Pt100 Resistance Thermometer Measurement Input, 2 or 3-Wire Connection

Pt100 per IEC 60751 / DIN EN 60751

 $60 \dots 280 \Omega$ Measuring Range Nominal Input Range -100 ... 500 ° C Sensor Current < 0.2 mA

Offset Compensation possible by means of parameter entry

Accuracy / Error < 0.7 % of measuring range

Resolution

Cont. AC Overload 50 / 60 Hz / 50 V AC, sinusoidal

1 V DC

Input Impedance $13 \text{ k}\Omega$

Cable Resistance

(both directions) 2-wire connection: 0 ... 30 Ω , adjustable

3-wire connection: 0 ... 30 Ω , compensated

for sensor breakage or short-circuit, or Error Messages temperature outside of measuring range

Sensor Input Configuration

Sensor type is selected separately for each input via the interface. Switching between thermocouple and Pt100 is accomplished with the DIP switch at the left-hand side of the housing.

Heating Current Monitoring Input

Measuring Range 1 A AC (direct connection of a

commercially available measuring

transducer)

Resolution < 0.1% of upper range value

Accuracy typically < 5% of upper range value < (1% of measurement value + 0.5% of Reproducibility

upper range value)

Heating Voltage Monitoring Input

Measuring Range 10 ... 50 A AC (direct connection of a

commercially available measuring

transducer)

Resolution < 0.1% of upper range value

Accuracy typically < 5% of upper range value Reproducibility < (1% of measurement value + 0.5% of

upper range value)

Binary Inputs / Outputs

Output Function Active switching outputs,

supplied directly from auxiliary voltage Switching output (heating/cooling, or

more/less for step-action controllers)

Adjustable within a range of 0.1 ... 300 s

Alarm output

Read-Out Cycle

Nominal Range

Function

of Use

H signal: U ≥ auxiliary voltage, - 0.5 V

I ≤ 500 mA

Total current ≤ 3 A per device

L signal: < 0.1 mA

e.g. for driving up to 3 commercially available semiconductor relays (SSR) in

Input Function Read back output status, external control

of PLC etc.

Nominal Range

of Use

H signal: > 14 V

8 ... 16 mA at 24 V

L signal: < 7 V / < 0.2 mA

Overrange Limit

H, L Signal Continuous short-circuit, interruption

Continuous Outputs

Output Function Actuator Output for Proportional Actuator

Output Quantity $0...10 \text{ V at} > 1 \text{ k}\Omega \text{ load}$

 $0 \dots 20 \text{ mA}$ at $< 300 \Omega$ load

Resolution 0.1% of upper range value Accuracy < 3% of upper range value

Status Displays

Power on green green Run

Bus communication

active yellow Frror red

Binary Inputs / Outputs Active vellow 3 mm dia. LEDs on metal housing

SMD LEDs at clamptype terminal blocks

R6000

8-Channel Controller

Control Performance

Setpoints

Setpoint limiting	Adjustable upper and lower setting limits
Proxy setpoint	Activated via binary input or bus, adjustable value
Ramp function (separate for rise and fall)	Specification of a gradual temperature change in degrees per minute Activated by means of: Turn on auxiliary voltage Change current setpoint value Activate proxy setpoint Switch from manual to automatic operation

Configurable Control Modes

Not in use				
Measuring	With limit value monitoring			
Actuator				
Limit transducer	Two / three position controller v	without time response		
PDPI controller	Heating Cooling			
	Can be combined as desired			
	Switching Switching			
	Hot-runner Water cooling			
	Continuous Continuous			
	Step Step			
	No heating No cooling			
Proportional actuator	Two / three position controller without time response			

In addition to fixed value control, each of these control modes also includes differential and cascade controller functions.

Self-Optimization

From any operating state.

Control parameters can be changed.

Control Parameter Setting Ranges

Designation	Setting Range
Proportional zone heating	0 measuring range span
Proportional zone cooling	0 measuring range span
Dead spot (for 3 position and step-action controllers)	0 measuring range span
Path delay	0 3000 s
Read-out cycle time	0.1 300 s

Alarms

All errors and alarms for all channels, inputs / outputs and functions are separately available via the bus and/or service interface. Selected errors and alarms can be issued to binary outputs. The selection and allocation to a special output can be freely configured.

Heating Current Monitoring

Heating Current

Monitoring Permanently installed

Heating Current

Acquisition With external, commercially available

current transformer

Heating Current Nominal

Value Transfer Compensation of current fluctuation by

means of heating voltage measurement

Error messages for	
Antivalence	Actuator signal OFF + heating current ON Actuator signal ON + heating current OFF
Actual current value less than nominal value	Dip below nominal heating current value by more than 5% + 0.1 A with actuator signal ON

Heating Circuit Monitoring

Without external transformer, without additional parameters

Configurable
Error messages for

Heating circuit monitoring active / inactive 100% heat without rising temperature, i.e.

short-circuited thermocouple,

interrupted heating, no sensor in heating circuit

Auxiliary Power

A completely separate safety power supply unit is to be used for operating the controller.

Nominal Value 24 V DC

Nominal Range of Use 18 V... 30 V DC

Power Consumption Max. 10 VA, typically 6 W (without load)

Data Interfaces

Туре	Service Interface	Fieldbus Interface		
Interface	RS 232	Profibus DP	CAN / CANOpen	RS 485
Maximum number of devices	1	32	100	32
Range of addresses	_	0 126	0 127	0 254
Transmission speed	4.8, 9.6 or 19.2 kBaud	9.6 kBaud 12 MBaud	10 kBaud 1 MBaud	4.8, 9.6 or 19.2 kBaud
Protocol per	EN 60870	EN 50170	IEC 1131 CANOpen	EN 60870
Connection	9-pin D sub	9-pin D sub	4-pole scr	ew terminal

Bus Address Selection

The bus address is selected with the DIP switch at the front panel.

Service Interface

A laptop or a notebook can be connected to the RS 232 interface for service purposes.

Reference Conditions

Reference Quantity	Reference Condition		
Auxiliary voltage	24 V DC ± 1 V		
Superimposed alternating voltage	sinusoidal, or sinusoidal half-waves: 0.1 V AC		
Allowable common-mode voltage	to electrically connected inputs: 0 V DC / AC		
Ambient temperature	23 °C ± 2 K		
Reference junction temperature	23 °C ± 2 K		
Warm-up time	3 minutes		
Measuring inputs	Thermocouple, low-resistance termination: \leq 10 Ω Pt100: 110 \pm 10 Ω		

Influencing Quantities and Influence Error

Influencing Quantity	Nominal Range of Use	Maximum Influence Error
Ambient temperature - Thermocouple / Pt100 - Reference junction	0 °C + 50 °C 0 °C + 50 °C	± 0.05 % MRS ¹⁾ / K 0.1 K / K
Cable resistance - Thermocouple - Pt100, 2-wire - Pt100, 3-wire	$ \begin{array}{ll} R = 0 \ & 200 \ \Omega \\ R = 0 \ & 30 \ \Omega \\ R = 0 \ & 30 \ \Omega \\ \end{array} $	\pm 0.1% MRS ¹⁾ / 10 Ω approx. 3 K / Ω (adjustable) \pm 2 K / 10 Ω
Warm-up influence	≤ 3 minutes	±1%

 $^{^{1)}\,\}mathrm{MRS}=\mathrm{measuring}\;\mathrm{range}\;\mathrm{span}$

Electrical Safety

Standard	IEC 61010-1 / EN 61010-1 / VDE 0411, part 1
Safety class	II
Overvoltage category	CAT II
Fouling factor	2
Protection	IEC 60529 / EN 60529 / VDE 0470, part 1
Housing	IP 20
PCB	IP 10
Terminals	IP 20

Attention: The instrument is not equipped with an integrated circuit breaker.

Electromagnetic Compatibility

Interfere	nce Emission	IEC 61326-1 / EN 61326-1		
Interfere	nce Immunity	IEC 61326	6 / A1 / EN 61326 / A1	
Test type	Standard	Test Severity Criterion		Criterion
ESD	EN 61000-4-2	4 kV 8 kV	contact discharge atmospheric discharge	B B
E field	EN 61000-4-3	10 V / m	80 1000 MHz	А
Burst	EN 61000-4-4	2 kV	at all connector cables	В
Surge	EN 61000-4-5	1 kV 2 kV	symmetrical asymmetrical	A A
HF	EN 61000-4-6	3 V	0.15 80 MHz, all terminals	А

Ambient Conditions

Annual mean relative humidity, no condensation	75%
Ambient temperature - Nominal range of use - Operating range - Storage range	0 °C + 50 °C 0 °C + 50 °C - 25 °C + 70 °C

Mechanical Design

Housing Sheet metal / plastic per UL-V0

Dimensions Including Terminal Blocks

(H x W x D) Max. 182 x 109 x 78 mm

Weight Approx. 0.6 kg including terminal blocks

Connectors Terminal blocks

for wire cross-sections to 2.5 mm² or double wire-end ferrules for 2 x 1.0 mm²

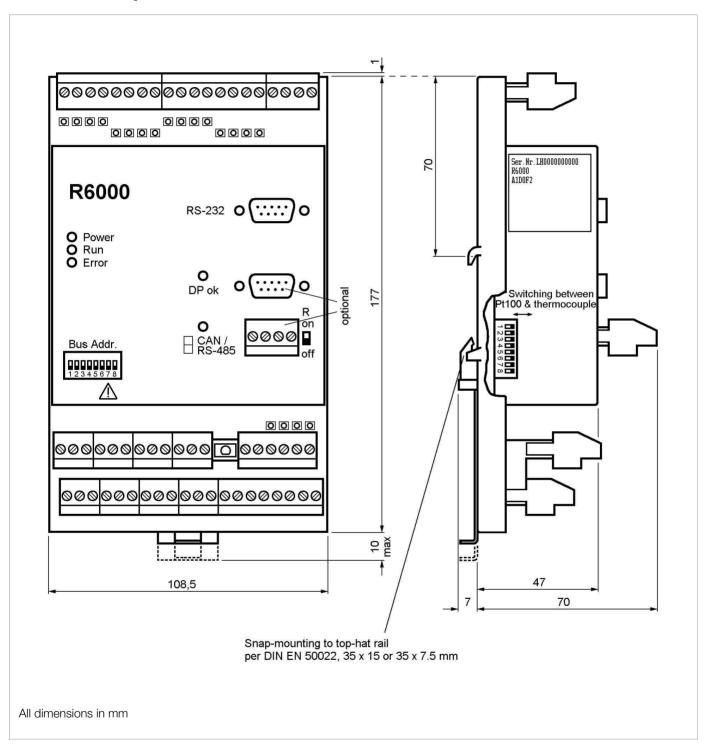
Mounting Integrated

for top-hat rails per DIN EN 50022, 35 x 7.5 mm or 35 x 15 mm

R6000

8-Channel Controller

Dimensional Drawing



Order Information

Description	Article Number / Feature
8-channel controller with installation instructions	R6000
Inputs / Outputs	
16 binary inputs / outputs	A0
20 binary inputs / outputs	A1
16 binary inputs / outputs, 4 continuous outputs	A2
Connectors	
Screw terminal blocks	D0
Clamp-type terminal blocks	D1
Bus Interface	
CAN / CANOpen	F1
Profibus DP	F2
RS-485 / Modbus protocol	F3
RS 485 / EN 60870 protocol	F4

Accessories

Description		Article Number
Two-step reference junction		Z306A
Operating instructions	German	Z307A
	English	Z307B
	French	Z307C
	Italian	Z307D
Modem cable for connection of service interface		GTZ 3241000R0001

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