

REGULUS RF / RD

PID Program Controller

Regulus RF
for panel mounting



Regulus RD
in desktop housing

Ultra Fast, Intelligent and Precise Control of Process Heating Applications:

- Induction surface hardening
 - Induction heating
 - Induction soldering
 - Inductive annealing
 - Inductive heat shrinking
 - Inductive melting
 - Conductive heating treatment
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- Extremely fast sampling time of 100 μ s
 - 990 program steps within 26 programs
 - Automatic detection of up to 2 Sensortherm pyrometers
 - Thermo couple inputs optional
 - Measurement range overlap control
 - AutoTune function for automatic P and I value detection
 - Multiple I/O's: 7 digital outputs and 6 digital inputs
 - Emissivity adjustable for every program step
 - Easy programming via software
 - Also for modernization of existing plants with control input

Overview

REGULUS RF and RD are programmable PID temperature controllers for panel-mounting or as bench model. They are optimized for use with Sensortherm pyrometers.

When using two pyrometers (only REGULUS RD) a second measuring point can be used for a redundant measurement. Selecting pyrometers with different measuring ranges, these can be combined to an expanded and thus very large total measuring range. Instead of a second pyrometer also a model with additional thermocouple input type K or S can be selected.

Pyrometer for Temperature Reading

The rapid response time of Sensortherm pyrometers coupled with the ultra-fast sensing and control capability of the REGULUS PID program controller make them the ideal solution for detecting and regulating fluctuations in temperature instantaneously.

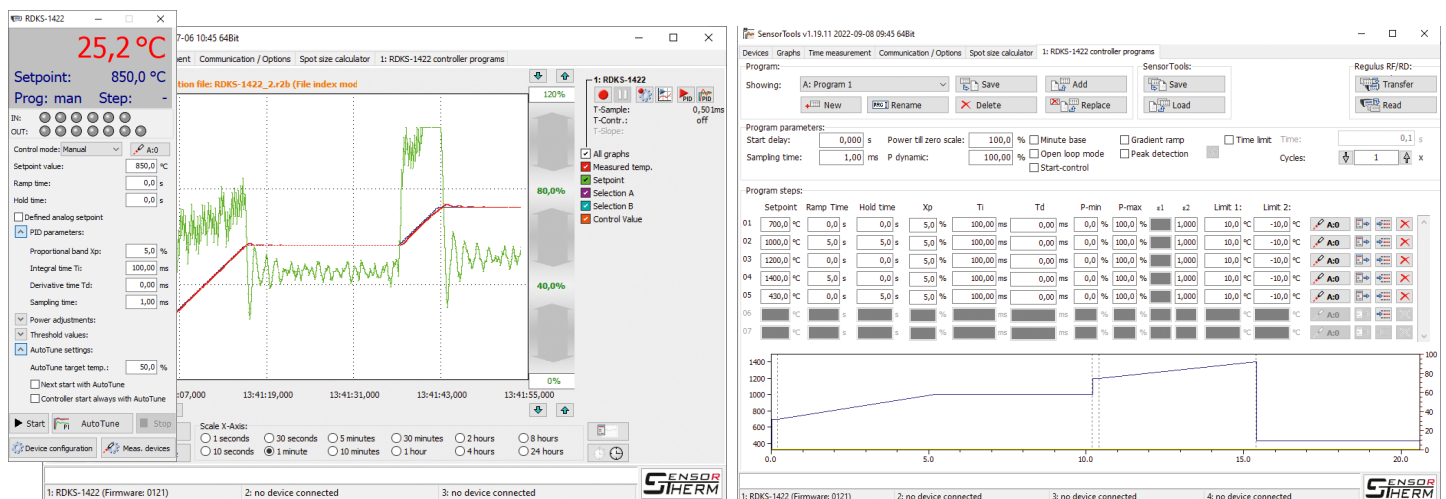
Optimized Control Processes

The advantages provided by an optimized control process are evident: increased productivity, reduced scrap rates and higher yield. The REGULUS RD and RF were developed to control and monitor processes and to perform control functions. The extensive logging functions of the *SensorTools* software is ideal for “online” monitoring and for subsequent analysis of the processes. The full potential of the Regulus controller is demonstrated by its trouble-free ability to manage the demanding requirements of multiple heating application processes

PC Software

The software *SensorTools* provides the user with a clean interface for configuration and programming of the control task. All entries can be written directly into the Regulus which allows a program execution without PC.

- Controller configuration
- Creating and saving programs
- Recording and storing of controlling and temperature processes for documentation purposes
- Presentation and interpretation of stored events
- AutoTune function for automatic detection of P and I values



Manual control

Measurement and control curves

Programming window

Easy program call on the REGULUS

The versatile REGULUS PID program controller can “stand alone” or operate with a PC connection as needed.

PC Connected: Operation with PC allows direct visual control of a running process. All control processes can be optimized and data can be stored in a separate file and retained for process and quality assessment.

Stand Alone: Especially useful for control processes in the field, initializing a program can be accomplished directly using the touch pads, or via an external control signal through one of the digital inputs.

Versatile Connectivity

7 digital outputs and 6 digital inputs provide the integration in almost every temperature monitoring and control process and enable an easy connection to existing controls.

Particular emphasis was placed on ease of use and simple integration into industrial processes.

Functions for digital inputs:

- Start / stop controlling (trigger)
- Activate controlling (switch)
- Emergency stop (switch)
- Error reset (trigger)
- Program step switching (trigger)
- Front panel start secure start (switch)
- Program selection (switch)

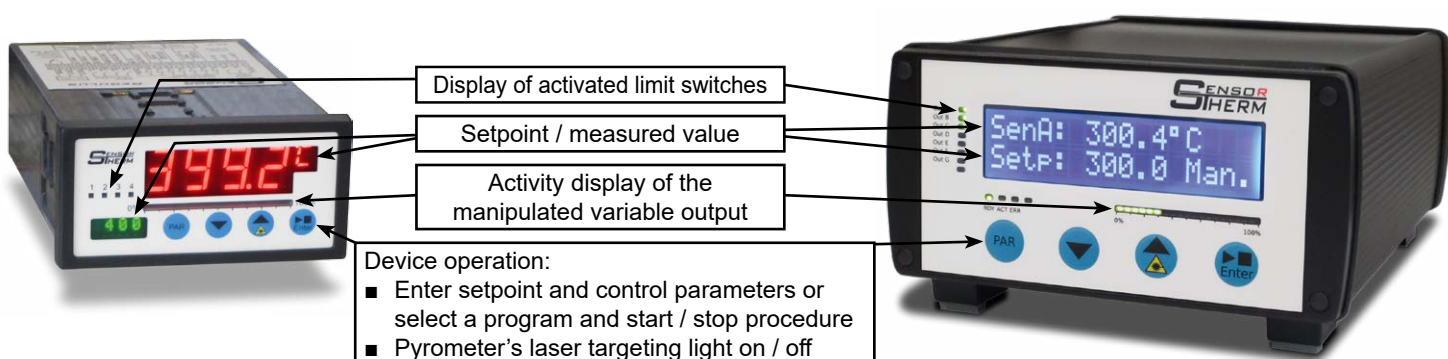
Functions for digital outputs:

- Limit temperature exceedance with defined switching value or with activation time and hold time
- Monitor two limit temperatures or the range in between, relative to the setpoint
- Status messages: controller ready / controller active / control process successfully completed / digital input active / time limit reached / temperature peak detection started / device error
- Generator on / off when the setpoint value falls below a threshold
- Temperature limit contact / temperature peak detection

Technical Data

Model	REGULUS RF	REGULUS RD
Measured value display	4 digit red 7 segment LED display, 13 mm height of digits	LCD dot matrix, white text on blue background, height of digits: 4.84 x 9.66 mm
Program and status display	4-digit alphanumeric LED display	LCD dot matrix, white text on blue background, height of digits: 4.84 x 9.66 mm
Control output display	20 digit green LED bar display	
Temperature unit	Switchable °C / °F	
Sampling time	100 µs to 25 ms (in 10 µs selectable)	
Number of programs	26	
Program steps:	Overall 990 free assignable, up to 255 for each program	
Program step duration	100 ms to 108 min in 100 ms steps adjustable, max. 45.5 days	
Program period	max. 255 x 45.5 days	
Proportional band Xp	0.0 to 1000%	
Integral time constant Ti	0 to max. 27 minutes (1638 s), adjustable in increments of 0.1 ms to 25 ms	
Differential time constant Td	0 to max. 27 minutes (1638 s), adjustable in increments of 0.1 ms to 25 ms	
Control output limit	P _{min} to P _{max} adjustable from 0.0 to 100% in 0.1% steps	
Dynamic control output limit P _{dyn}	0.0 to 100% in 0.1% steps	
AutoTune function	To determine the PI parameters	
Digital interface to pyrometer	RS232 (4.8–230.4 kbit/s) and bus-compatible RS485, half duplex, (4.8–921.6 kbit/s)	
Analog input for pyrometer	4–20 mA, resolution 16 Bit	
(Option) Thermocouple input type K	NiCr-Ni, temperature range 0–1300°C resolution 0.1°C	
(Option) Thermocouple input type S	Pt10Rh-Pt, temperature range 0–1750°C, resolution 0.1°C	
Analog control output	0/4–20 mA switchable to 0–10 V, 0–5 V, resolution each 16 Bit, accuracy <0.1%, PWM output	
Analog actual value output	0/4–20 mA switchable to 0–10 V, 0–5 V, resolution each 16 Bit, accuracy <0.1%	
Digital inputs	6 digital inputs (input resistance >10 kOhm)	
Digital outputs	7 digital switching outputs (24 V / 100 mA)	
Relays outputs	–	4 changeover relays: 230 V, 6 A (relay pull-in time t ≤ 9 ms relay dropout time t ≤ 5 ms)
Digital interface to PC	RS232 / RS485	RS232 / RS485 / USB
Program parameters	Setpoint value, ramp time, hold time, proportional band, integral time constant, differential time constant, minimum control output power, maximum control output, control output power, pyrometer emissivity, setpoint limits for digital outputs, sensor selection for temperature measurement, start delay, control output power limitation, sensor sampling time, program cycles, gradient ramp in degree per second, open loop mode for control processes without pyrometer, language (d + e), pyrometer parameters.	
Power supply	24 V DC (18–32 V)	
Current consumption	200 mA (24 V) without external wiring	
Terminals	Screw terminals, nominal cross-section 1.5 mm	
Isolation	Serial interface and analog output are galvanically isolated to each other and to the power supply, thermocouple input galvanically isolated.	
Operation temperature	0 to 60°C / 32 to 140°F	
Storage temperature	-20 to 70°C / -4 to 158°F	
Housing	Panel mounting housing DIN IEC 61554	Aluminum
Weight	320 g	1700 g
Protection	Front IP40	Front IP65
CE mark	According to EU directives	

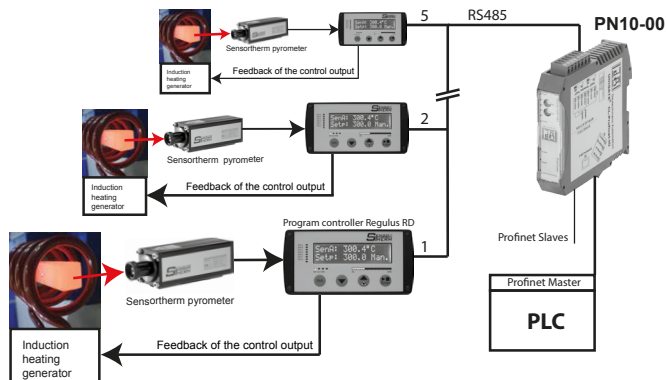
Operation



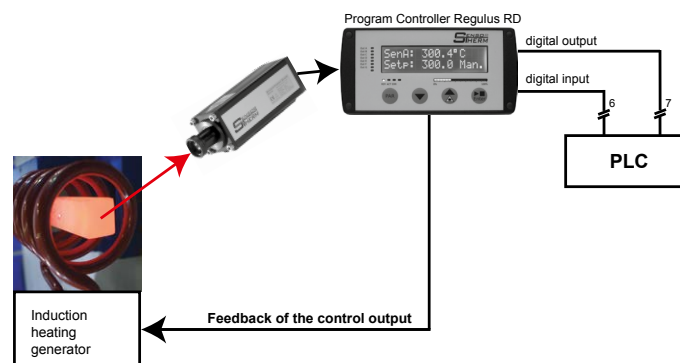
Controller Connections

The signal transmission of the measured temperature from the pyrometer to the controller can be 4-20 mA analog, or digitally via RS232 or RS485. A 0-10 V or 0-20 mA signal power specification to the generator is selectable. The temperature sensor, controller and generator form a closed circuit that requires only a start / stop signal.

The protocol converter PN10-00 allows Profinet connection of up to five Regulus controllers to a higher-level control. All necessary parameters are accessible and programs stored in the controller can be selected and started via the Profinet master.

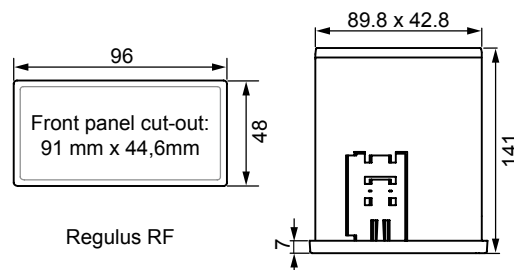
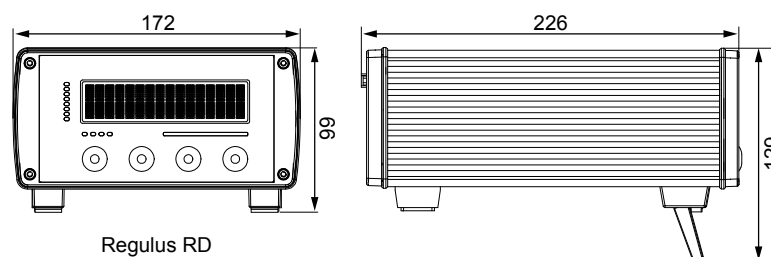


The Regulus is connected to the master controller via digital inputs and outputs. It receives the start and stop signals at the 24 V and forwards status messages and temperature thresholds to the PLC via its 7 digital outputs.



Dimensions

All dimensions in mm



Reference Numbers

RF00-00 REGULUS RF for one pyrometer
 RFK0-00 REGULUS RF for one pyrometer and a thermocouple type K
 RFS0-00 REGULUS RF for one pyrometer and a thermocouple type S

RD00-00 REGULUS RD for up to 2 pyrometers
 RDK0-00 REGULUS RD for up to 2 pyrometers and one thermo couple type K (standard miniature connector)
 RDKK-00 REGULUS RD for up to 2 pyrometers and 2 thermo couples type K (standard miniature connectors)
 RDS0-00 REGULUS RD for up to 2 pyrometers and one thermo couple type S (standard miniature connector)
 RDSS-00 REGULUS RD for up to 2 pyrometers and 2 thermo couples type S (standard miniature connectors)
 RDKS-00 REGULUS RD for up to 2 pyrometers and 2 thermo couples K+S (standard miniature connectors)

Scope of delivery:

RD: 4 plug connectors for sensors and electrical connections, inputs/outputs and 2 for relays contacts, USB cable, *SensorTools* software, AC/DC power supply unit 100-240 V AC, 50-60 Hz to 24 V / 2.5 A

RF: program controller with clamps for case mounting, 2 multiple plug connectors f, software *SensorTools*

Recommended accessories:

Pyrometer Digital Sensortherm pyrometer type METIS or SIRIUS.
 AR11 / AR43 / AR10 RD pyrometer connection cable (with plug connector to Sensortherm pyrometer, length in 5 m steps) with connector: right-angle / straight / right-angle with laser targeting light button
 AL11 / AL43 / AL10 Pyrometer connection cable (with open wire ends, length in 5 m steps) with connector: right-angle / straight / right-angle with laser targeting light button
 PN10-00 Profinet converter



Sensortherm reserves the right to make changes in scope of technical progress or further developments.

Sensortherm-Datasheet_Regulus_RF_RD (Mar. 01, 2023)

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