

# RFS

MODEL



## DIN Rail Temperature Controller Specification Sheet

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### Ideal for

- Plastic Extrusion
- Thermoforming
- Injection Molding
- Packaging
- Food Processing

### Features

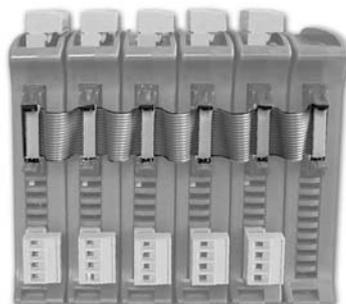
- Smart PID tune
- Universal input
- Three outputs
- Logic input
- Soft start power limiter
- Heater failure detection
- EIA485 Modbus
- PC Wizard configuration

Designed to offer outstanding control performance in a compact DIN rail package the RFS provides a comprehensive solution for a wide variety of applications: such as plastic manufacturing, packaging machinery and food processing applications requiring precise heat/cool control and process protection alarming.

Ideal as a slave PID loop to a programmable logic controller the RFS offers a cost effective alternative to performing loops in a PLC while at the same time improving loop performance. All inputs and outputs can be read directly over the Modbus communication interface by the supervisory host system. Additionally, the master can write to RFS outputs that are not assigned as alarm or status functions. This expands the available PLC and host supervisory system I/O, simplifies machine troubleshooting and provides the ability to perform remote diagnostics.

The RFS accepts one universal process input suitable for thermocouple, resistance thermometer or linear mV/mA and coupled with a responsive Smart PID self tuning algorithm it is equipped with special functions including soft start and non-linear cooling. Smart tuning automatically adjusts the PID sets according to the current process dynamics without the need to cycle the process and therefore has no detrimental effect on the current operating conditions. Three outputs are available providing a heat plus two alarms or heat/cool plus one alarm configuration. A complete set of process protection alarm functions: high and low limit, band and deviation are all included.

Modular interconnection allows simultaneous connection of all common instrument elements: power supply, serial interface, logic input and open collector output for common alarms. Making use of this interconnection the RFS-AL adds alarm expansion capability to RFS loop controllers connected to the same interconnection bus.



## Output Failure Detection

Using the CT input, the output failure detection function monitors the current in the load driven by output 1. This function provides the operator with an instant indication that a fault exists with the load and therefore enables the operator to take action to plan maintenance and prevent scrapped product.

During the ON period of the output, the instrument measures the current through the load and generates an alarm if the current is lower than a pre-programmed threshold. A low current indicates a partial or total failure of the heater circuit. During the OFF period of the output, the instrument measures the leakage current through the load and generates an alarm if the current is higher than a pre-programmed threshold. A high leakage current indicates a short circuit in the heater circuit.

## Soft Start

This function allows a gradual warm-up of the machine during start up. The energy applied is limited for a pre-determined time.

## Start –Up Energy Management

During an active Soft Start, to reduce the maximum electrical loading at machine start-up the sequence of the RFS heating control output is scheduled according to the selected instrument Modbus address. This significantly reduces maximum start up current requirements and offers potential savings in electrical installation capacity and cabling specification requirements.

## Synchronised Pre-Heating

Eliminates differential heating during start-up across different zones in applications such as plastic extruders and injection hot runner control. The warm up rates of all the heating zones are synchronised by holding back the ramping setpoint. In order to achieve this individual loop band alarms are controlled by the common alarm output and isolated logic functions.

## Wizard Configuration Software

The RFS can be configured using an easy to use software wizard. All parameters can be modified and the final configuration can be saved to file and reused or modified at a later time.



## SPECIFICATION

### General

Case:	PC/ABS grey
Self-extinguishing degree:	V0 according to UL 746C
Front protection:	IP20
Dimensions:	131 x 117 x 22.5mm
Weight:	250g. max
Power supply:	Switching 24V ac/dc ( $\pm 10\%$ nominal value)
Power consumption:	6VA
Insulation:	Reinforced insulation is guaranteed between supply input, instrument inputs and outputs
Common mode rejection:	120dB @ 50/60Hz
Normal mode rejection:	60dB @ 50/60Hz
Installation:	DIN rail mounting
Installation category:	II
EMC/Safety:	CE certified: compliant with regs 89/336/EEC (harmonised referenced standard EN-50081-1 and EN-50082-2) and 73/23/EEC e 93/68/EEC (harmonised references standard En 61010-1)
Sampling time:	250m Sec for linear inputs 500m Sec for TC or RTD inputs
Accuracy:	$\pm 0.2\%$ f.s.v. @ 25°C with nominal supply voltage
Operating temperature:	0 to +50°C
Storage temperature:	-20 to 70°C
Humidity:	20% to 85% RH, non-condensing

### Communications

Type:	Isolated EIA485
Protocol:	Modbus (2-wire)
Baud rate:	600 to 38400 Baud
Byte format:	8 bit
Parity:	Even, odd or none
Stop bit:	1
Address:	1 to 254
Voltage levels:	According to EIA comm standard
Line loading:	1/4 unit load

### Process Variable Input

All inputs are configurable and calibrated in the factory.

### Thermocouple Input

Sensor:	Open circuit sensor break detection
Cold junction compensation:	Automatic compensation for temperature between 0 and 50°C
Error of cold junction compensation:	0.1°C/°C
Input impedance:	>1M $\Omega$
Calibration:	According to IEC 584-1 DIN 43710-1977 for TC type L
Types:	L, J, K, N, R, S, T
Engineering units:	Programmable °C or °F

### RTD Input

Type:	3-wire Pt100
Calibration:	According to DIN 43760
Measuring current:	130 $\mu$ A
Line resistance:	Auto-compensation up to 20 ohms per wire with no measurable error
Engineering units:	Programmable °C or °F
Sensor break:	Indicates break of sensor or one or more wires; indicates short circuit when sensor resistance <12 ohms

### Linear Inputs

Type:	0-20mA, 4-20mA, 0-60mV, 12-60mV
Scaling:	Programmable from -2000 to 4000
Decimal point:	Programmable to any position

### Hardware

#### SSR

Output 1 and 2	Function: Control output
	Type: Non-isolated
	Logic level 1: 27V dc max. @ 1mA
	14V dc min. @ 20mA
	Logic level 0: <0.5V

#### Relay Type

Output 1	Function: Control output
	Type: SPST
	Contact load: 3A @ 250V ac max. on resistive load
Output 2	Function: Control output or alarm
	Type: Relay with SPST contact
	Contact load: 3A @ 250V ac max. on resistive load
Output 3	Function: Alarm output
	Type: Relay with SPDT contact
	Contact load: 3A @ 250V ac max. on resistive load

### Logic Input

Function: Selection of the operating setpoint (SP or SP2) or of the temporary hold of setpoint ramp  
 Type: Dry contact excitation 8V, 8mA  
 Insulation: Functional insulation  
 Insulation voltage: 50V rms

### Current Transformer Input

Input current: 50mA, 50/60Hz  
 Full scale range: 0-10A, 0-100A (configurable)  
 Resolution: 0-20A: 0.1A  
 21-100A: 1A  
 Programmable output: NO or NC relay control output; Logic level 1 or 0; SSR control output  
 Minimum period: On and off: 400m Sec

### Software

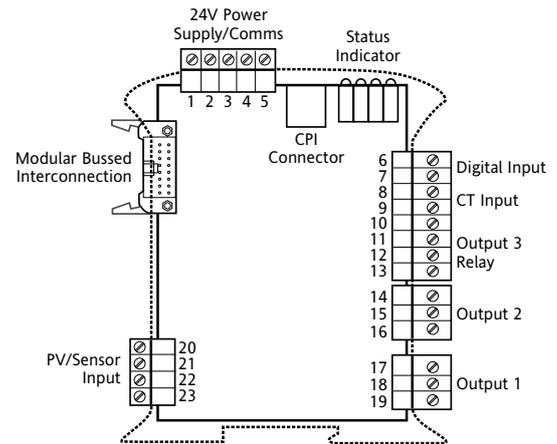
#### Control Action

Type: 1 (heating) or 2 (heating/cooling) control outputs  
 Output action: Time proportioning  
 Control action: ON/OFF  
 PI or PID + SMART  
 Proportional band: 1.0% to 100.0% of the input range for 1 control element;  
 1.5% to 100.0% of the input range for 2 control elements:  
 Setting PB = 0 causes ON/OFF control  
 Programmable from 0.1% to 10.0% of the input span  
 Hysteresis: Programmable from 1 sec to 20 mins (or none)  
 (for ON/OFF control) Programmable from 1 sec to 10 mins (or none)  
 Integral time: For 1 control element (heating), the offset is programmable from 0 to 100% of the output range; for 2 control elements (heating/cooling) the offset is programmable from -100% to +100% of the output range  
 Derivative time: 1 second to 200 seconds  
 Integral offset: Bumpless  
 Manual to auto: Programmable from 0.20 to 1.00 of the proportional band  
 Output 1 cycle time: 1 second to 200 seconds  
 Output 2 relative gain: Programmable from -20% (deadband) to +50% (overlap) of the proportional band  
 Output 2 cycle time: 1 second to 200 seconds  
 Overlap/deadband: Programmable from -20% (deadband) to +50% (overlap) of the proportional band

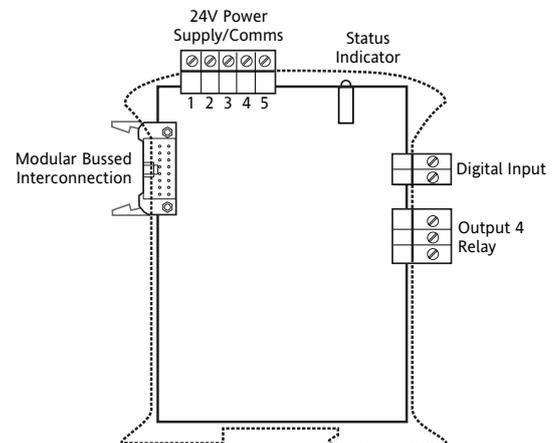
#### Dual Setpoint Selection

Two user configurable operation setpoints are selectable through logic input or the communication interface. This provides a method for fast and convenient run-hold switching, either by an external switch or by a host supervisory system.

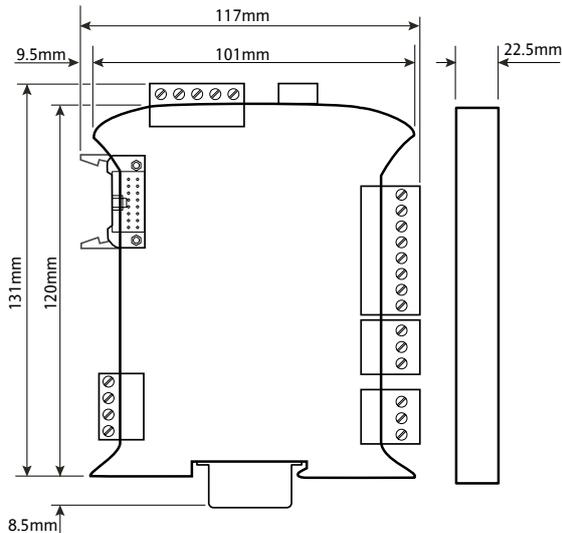
### RFS WIRING



### RFS-AL WIRING



### DIMENSIONS



## ORDER CODE



Model Number		3 Output 1		5 Options	
RFS	DIN Rail temperature Controller	1	Relay	0	None
1	Input	6	Logic	4	OFD* - Logic in
5	TC, RTD, mA, mV	4	Output 2	5	Alm2 + OFD + Logic in
2	Control Action	0	None	* OFD = Output failure detector	
3	PID + Smart	1	Relay	6 Power Supply	
		6	Logic	5	24V dc

<b>ARFSFLAT13000</b>	Interconnecting Bus Cable
<b>Current Transformers</b>	
<b>CTR100000/000</b>	10A Current transformer
<b>CTR200000/000</b>	25A Current transformer
<b>CTR400000/000</b>	50A Current transformer
<b>CTR500000/000</b>	100A Current transformer
<b>CPI1200000N</b>	RFS Configuration clip
<b>ARFSAL00000ER</b>	RFS Alarm unit
<b>HA136732</b>	RFS User manual CD

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**AUSTRIA** Vienna  
Eurotherm GmbH  
T (+43 1) 7987601  
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E [info.at@eurotherm.com](mailto:info.at@eurotherm.com)

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Eurotherm S.A./N.V.  
T (+32) 85 274080  
F (+32) 85 274081  
E [info.be@eurotherm.com](mailto:info.be@eurotherm.com)

**BRAZIL** Campinas-SP  
Eurotherm Ltda.  
T (+5519) 3707 5333  
F (+5519) 3707 5345  
E [info.br@eurotherm.com](mailto:info.br@eurotherm.com)

**CHINA**  
Eurotherm China  
T (+86 21) 61451188  
F (+86 21) 61452602  
E [info.cn@eurotherm.com](mailto:info.cn@eurotherm.com)

**Beijing Office**  
T (+86 10) 63108914  
F (+86 10) 63107291  
E [info.cn@eurotherm.com](mailto:info.cn@eurotherm.com)  
**Guangzhou Office**  
T (+86 20) 38106506  
F (+86 20) 38106511  
E [info.cn@eurotherm.com](mailto:info.cn@eurotherm.com)

**DENMARK** Copenhagen  
Eurotherm Danmark AS  
T (+45 70) 234670  
F (+45 70) 234660  
E [info.dk@eurotherm.com](mailto:info.dk@eurotherm.com)

**FINLAND** Abo  
Eurotherm Finland  
T (+358) 22506030  
F (+358) 22503201  
E [info.fi@eurotherm.com](mailto:info.fi@eurotherm.com)

**FRANCE** Lyon  
Eurotherm Automation SA  
T (+33 478) 664500  
F (+33 478) 352490  
E [info.fr@eurotherm.com](mailto:info.fr@eurotherm.com)

**GERMANY** Limburg  
Eurotherm Deutschland GmbH  
T (+49 6431) 2980  
F (+49 6431) 298119  
E [info.de@eurotherm.com](mailto:info.de@eurotherm.com)

**HONG KONG**  
Eurotherm Hongkong  
T (+85 2) 28733826  
F (+85 2) 28700148  
E [info.hk@eurotherm.com](mailto:info.hk@eurotherm.com)

**INDIA** Chennai  
Eurotherm India Limited  
T (+91 44) 24961129  
F (+91 44) 24961831  
E [info.in@eurotherm.com](mailto:info.in@eurotherm.com)

**IRELAND** Dublin  
Eurotherm Ireland Limited  
T (+353 1) 4691800  
F (+353 1) 4691300  
E [info.ie@eurotherm.com](mailto:info.ie@eurotherm.com)

**ITALY** Como  
Eurotherm S.r.l.  
T (+39 031) 975111  
F (+39 031) 977512  
E [info.it@eurotherm.com](mailto:info.it@eurotherm.com)

**KOREA** Seoul  
Eurotherm Korea Limited  
T (+82 31) 2738507  
F (+82 31) 2738508  
E [info.kr@eurotherm.com](mailto:info.kr@eurotherm.com)

**NETHERLANDS** Alphen a/d Rijn  
Eurotherm B.V.  
T (+31 172) 411752  
F (+31 172) 417260  
E [info.nl@eurotherm.com](mailto:info.nl@eurotherm.com)

**NORWAY** Oslo  
Eurotherm A/S  
T (+47 67) 592170  
F (+47 67) 118301  
E [info.no@eurotherm.com](mailto:info.no@eurotherm.com)

**POLAND** Katowice  
Invensys Eurotherm Sp z o.o.  
T (+48 32) 2185100  
F (+48 32) 2177171  
E [info.pl@eurotherm.com](mailto:info.pl@eurotherm.com)

**SPAIN** Madrid  
Eurotherm España SA  
T (+34 91) 6616001  
F (+34 91) 6619093  
E [info.es@eurotherm.com](mailto:info.es@eurotherm.com)

**SWEDEN** Malmo  
Eurotherm AB  
T (+46 40) 384500  
F (+46 40) 384545  
E [info.se@eurotherm.com](mailto:info.se@eurotherm.com)

**SWITZERLAND** Wollerau  
Eurotherm Produkte (Schweiz) AG  
T (+41 44) 7871040  
F (+41 44) 7871044  
E [info.ch@eurotherm.com](mailto:info.ch@eurotherm.com)

**UNITED KINGDOM** Worthing  
Eurotherm Limited  
T (+44 1903) 268500  
F (+44 1903) 265982  
E [info.uk@eurotherm.com](mailto:info.uk@eurotherm.com)  
[www.eurotherm.co.uk](http://www.eurotherm.co.uk)

**U.S.A.** Leesburg VA  
Eurotherm Inc.  
T (+1 703) 443 0000  
F (+1 703) 669 1300  
E [info.us@eurotherm.com](mailto:info.us@eurotherm.com)  
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