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SERIES F4 Ramping - 1/4 DIN Single Channel Ramping Controller

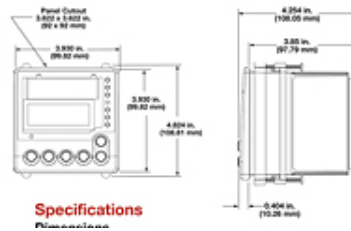
The SERIES F4 1/4 DIN industrial ramping controller meets the requirements of the most demanding ramp and soak processing applications. Easy to set up and operate, its programming features and proven performance capabilities are ideally suited for environmental chamber or furnace and oven applications. Single and dual channel versions are available.

Competitively-priced, the SERIES F4 ramping controller features a four line, high-definition LCD interface display for quick and easy profile programming and controller configuration. Its 16-bit microprocessor ensures accuracy and delivers performance advantages you can count on from a Watlow controller.

Up to 256 steps can be programmed into as many as 40 nameable profiles that can be programmed to wait for events or for up to three different process variables. A guaranteed soak feature allows a setting for how closely to control a process.

Program the four digital event inputs to remotely start, pause or terminate any preprogrammed process recipes. Eight event outputs are segment programmable and three outputs can be assigned to a programmable compressor and boost heat/boost cool control. A real-time clock can start a profile at any time.

Serial communication and dual alarm relays are included in the base unit. The SERIES F4 ramping controller is packaged with a NEMA 4X front face to withstand harsh environments and a 4 in. (102 mm) deep case with removable connectors for wiring convenience. It is manufactured by Watlow, ISO 9001 registered and protected by a three-year warranty.



Specifications

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Dimensions

- Width x height x depth 3.93 in. x 3.93 in. x 3.85 in. (99 mm x 99 mm x 97 mm) panel mount

Universal Analog Inputs 1 (2 and 3 Optional)

- Update rates, IN1 = 20Hz, IN2 and IN3 = 10Hz

Thermocouple

- Type J, K, T, N, E, C (W5), D (W3), PT100, R, S, B
- Input impedance 20M Ω

RTD

- 2- or 3-wire platinum, 100, 500 or 1000 Ω
- JIS or DIN curves, 1.0 or 0.1 indication

Process

- Input resolution \approx 50,000 bits at full scale
- Range selectable: 0-10VDC, 0-5VDC, 1-5VDC, 0-50mV, 0-20mA, 4-20mA
- Voltage input impedance 20K Ω
- Current input impedance 100 Ω

Digital Inputs (4)

- Update rate = 10Hz
- Contact or dc voltage (36VDC max.)
- 10K Ω input impedance

Control Outputs (1A, 1B, 2A, 2B)

- Update rate = 20Hz

Open Collector/Switched dc

- Internal load switching (nominal):
Switched dc, 22 to 28VDC, limited @ 30mA
- External load switching (max.):
Open collector 42VDC @ 0.5A

Solid State Relay

- Zero switched, optically coupled, 0.5A @ 24VAC min., 253VAC max.

Process Outputs (Optional Retransmit)

- Update rate = 1Hz
- User selectable 0-10VDC, 0-5VDC, 1-5VDC @ 1K Ω min., 0-20mA, 4-20mA @ 800 Ω max.
- Resolution:

dc ranges = 2.5mV nominal

mA ranges = 5 μ A nominal

- Calibration accuracy:

dc ranges = \pm 15mV

mA ranges = \pm 30 μ A

- Temperature stability 100ppm/ $^{\circ}$ C

Alarm Outputs

- Output update rate 1Hz
- Electromechanical relay, Form C, 2A @ 30VDC or 240VAC max.

Digital Outputs (8)

- Update rate = 10Hz
- Open collector output
- Off = 42VDC max. @ 10 μ A
- On = 0.2VDC max. @ 50mA sink
- Internal supply: 5VDC, @ 80mA

Communications

EIA-232 and EIA-485 serial communications with Modbus[®] RTU protocol

Safety and Agency Approvals

- UL[®]/C-UL[®] 916 listed, File #E185611

Process Control Equipment

- CE
- EN 61010-1
- EN 61326
- IP65 and NEMA 4X

Terminals

- Touch-safe, removable terminal blocks, accepts 12 to 22 gauge wire

Power

- 100-240VAC, -15%, +10%; 50/60Hz, \pm 5%
- 24-28VAC/VDC, -15%, +10% (order option)
- 39VA max. power consumption
- Data retention upon power failure via nonvolatile memory (7 years for battery backed RAM)
- Sensor input isolation from input to output to communication circuitry is 500VAC

Operating Environment

- 32 to 130 $^{\circ}$ F (0 to 55 $^{\circ}$ C)
- 0 to 90% RH, non-condensing
- Storage temperature: -40 to 158 $^{\circ}$ F (-40 to 70 $^{\circ}$ C)

Accuracy

- Calibration accuracy and sensor conformity: \pm 0.1% of span \pm 1 $^{\circ}$ C @ 77 $^{\circ}$ F \pm 5 $^{\circ}$ F (25 $^{\circ}$ C \pm 3 $^{\circ}$ C) ambient and rated line voltage \pm 10% with the following exceptions:
Type T: 0.12% of span for -328 to -58 $^{\circ}$ F (-200 to -50 $^{\circ}$ C)
Types R and S: 0.15% of span for 32 to 212 $^{\circ}$ F (0 to 100 $^{\circ}$ C)
Type B: 0.24% of span for 1598 to 3092 $^{\circ}$ F (870 to 1700 $^{\circ}$ C)
- Accuracy span: Less than or equal to operating ranges, 1000 $^{\circ}$ F (540 $^{\circ}$ C) min.
- Temperature stability: \pm 0.1 $^{\circ}$ F/ $^{\circ}$ F (\pm 0.1 $^{\circ}$ C/ $^{\circ}$ C) rise in ambient for thermocouples

±0.05°F/°F (±0.05°C/°C) rise in ambient for RTD sensors

Displays

- Process: 5 digit, 7 segment LED, red
- Control interface display: 4-row, 20-character high definition LCD green

Sensor Operating Ranges

Type J: 32 to 1500°F or 0 to 815°C
Type K: -328 to 2500°F or -200 to 1370°C
Type T: -328 to 750°F or -200 to 400°C
Type N: 32 to 2372°F or 0 to 1300°C
Type E: -328 to 1470°F or -200 to 800°C
Type C (W5): 32 to 4200°F or 0 to 2315°C
Type D (W3): 32 to 4352°F or 0 to 2400°C
Type Pt 2: 32 to 2543°F or 0 to 1395°C
Type R: 32 to 3200°F or 0 to 1760°C
Type S: 32 to 3200°F or 0 to 1760°C
Type B: 32 to 3300°F or 0 to 1816°C
RTD (DIN): -328 to 1472°F or -200 to 800°C
RTD (JIS): -328 to 1166°F or -200 to 800°C
Process: -19,999 to 30,000 units

Sensor Accuracy Ranges

Input ranges

Type J: 32 to 1382°F or 0 to 750°C
Type K: -328 to 2282°F or -200 to 1250°C
Type T: -328 to 662°F or -200 to 350°C
Type N: 32 to 2282°F or 0 to 1250°C
Type E: -328 to 1470°F or -200 to 800°C
Type C (W5): 32 to 4200°F or 0 to 2315°C
Type D (W3): 32 to 4352°F or 0 to 2400°C
Type Pt 2: 32 to 2540°F or 0 to 1393°C
Type R: 32 to 2642°F or 0 to 1450°C
Type S: 32 to 2642°F or 0 to 1450°C
Type B: 1598 to 3092°F or 870 to 1700°C
RTD (DIN): -328 to 1472°F or -200 to 800°C
RTD (JIS): -328 to 1166°F or -200 to 630°C
Process: -19,999 to 30,000 units

Note: Specifications subject to change without notice.

Guided 256 step, 40 profile ramp and soak programmable memory

- Supports a wide range of processing applications

High-definition, four line LCD controller interface display

- Simplifies setup and operation

Menu customization

- Offers enhanced process monitoring

High-performance, 16-bit microprocessor

- Precise process control

Universal inputs

- Provides application versatility

Expandable modular construction

- Field upgradable

Enhanced environmental chamber control

- Supports humidity, compressor, boost heat/boost cool control

Cascade control

- Provides precise two variable control

Real-time clock with battery backup

- Offers operational flexibility
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In response to customer needs, the Watlow SERIES F4 ramping controller has been enhanced with programming features that offer more capabilities with less programming complexity.

A programming guide provides step-by-step instructions for building profiles, offering choices for step configuration. For better operator recognition, profiles and digital I/O used for events can be named using up to 10 characters.

Five step types including ramp, soak, jump, auto start and end, offer complete programming flexibility.

Ramp steps can be based on time or rate. Ramp and soak steps can be programmed to wait for up to four event inputs and three process variables. As many as eight event outputs are step selectable. To accommodate changes to thermal systems characteristics over the operating range, up to 10 sets of PID heat/cool parameters are step selectable. The auto start step can start a profile based on a chosen set date, day of the week or daily. A jump step enables movement within a profile or to another profile. The end step terminates a program with the control outputs programmed to specific process needs.

EIA-232 and EIA-485 serial communication interfaces are included in the base unit of both the SERIES F4S (single channel) and the SERIES F4D (dual channel) controllers. The baud rate is selectable as either 9600 or 19200 Kbaud. The protocol is Modbus® RTU.

Two Form "C" electromechanical alarm relays are included in the base units. These alarms can be programmed as either process or deviation alarms. The alarms can be tied to up to three process variables.

Optional retransmit capability is available to retransmit one or two variables. These variables include up to three process variables, control set points or percent load power.
