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SERIES F4 1/4 DIN Ramping Controllers



Ramping Control Programming Made Easy Through Advanced Technology

The SERIES F4 1/4 DIN industrial ramping controller meets the requirements of the most demanding ramp and soak processing applications. Easy to setup 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 wprotected by a three-year warranty.

Features and Benefits

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
- Provides 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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Winona, Minnesota USA

WIN-F4R-0811

Set Point Ramp and Soak Programming

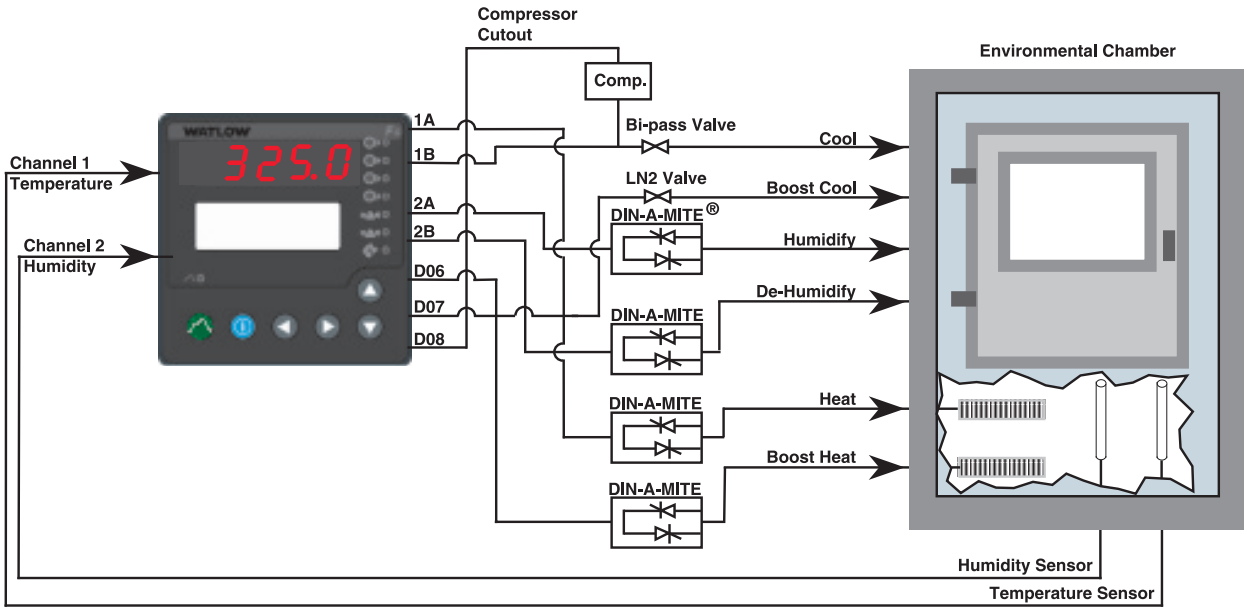
In response to customer needs, the Watlow SERIES F4 ramping controller has been enhanced with programming features that offer more capabilities with less programming complexity.

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.

Temperature and Humidity Chamber Application



Serial Communication

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.

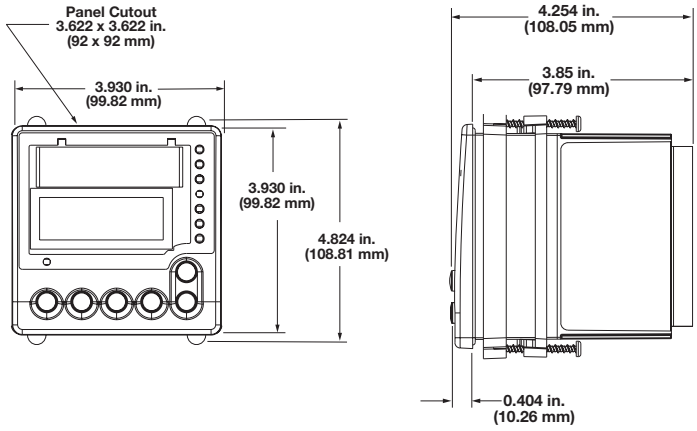
Alarms

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

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.

Dimensional Drawings



Dimension Specifications

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

Specifications

Universal Analog Inputs 1 (2 and 3 Optional)
- Updates rates, IN1 = 20Hz, IN2 and IN3 = 10HZ

Thermocouple
- Type J, K, T, N, E, C (W5), D (W3), PTII, R, S, B
- Input impedance 20MΩ

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

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

Digital Inputs (4)
- Update rate = 10Hz
- Contact or dc voltage (36VDC max.)
- 10KΩ 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 @ 1KΩ min., 0-20mA, 4-20mA @ 800Ω max.
- Resolution: dc ranges = 2.5mV nominal mA ranges = 5µA nominal
- Calibration accuracy: dc ranges = ±15mV mA ranges = ±30µA
- Temperature stability 100ppm/°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. @ 10µA
- 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, ±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 input to output to communication circuitry is 500VAC

Operating Environment
- 32 to 130°F (0 to 55°C)
- 0 to 90% RH, non-condensing
- Storage temperature: -40 to 158°F (-40 to 70°C)

Accuracy
- Calibration accuracy and sensor conformity: ±0.1% of span ±1°C @ 77°F ±5°F (25°C ±3°C) ambient and rated line voltage ±10% with the following exceptions:

  Type T: 0.12% of span for -328 to -58°F (-200 to -50°C)

  Types R and S: 0.15% of span for 32 to 212°F (0 to 100°C)

  Type B: 0.24% of span for 1598 to 3092°F (870 to 1700°C)
- Accuracy span: Less than or equal to operating ranges, 1000°F (540°C) min.
- Temperature stability: ±0.1°F/°F (±0.1°C/°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.

Ordering Information — 1/4 DIN Single Channel Ramping Controller

Part Number

① ②	③ Single Channel Ramping	④ Power Supply	⑤ Output 1A	⑥ Output 1B	⑦	⑧ Auxiliary Input Module		⑨ Auxiliary Retransmit Module	⑩ Language and RTD Options	⑪ ⑫ Display and Custom Options
F4	S	H			A		-			

③	Single Channel Ramping Controller
S =	1 universal analog input, 4-digital inputs, 8-digital outputs, 2 alarms, EIA-232/485 comms

④	Power Supply
H =	100-240VAC/VDC

⑤	Output 1A
C =	Open collector/switched dc
F =	Process, 0-5, 1-5, 0-10VDC, 0-20mA, 4-20mA
K =	Solid state Form A 0.5A relay

⑥	Output 1B
A =	None
C =	Open collector/switched dc
F =	Process, 0-5, 1-5, 0-10VDC, 0-20mA, 4-20mA
K =	Solid state Form A 0.5A relay

⑧	Auxiliary Input Module
0 =	None
6 =	Dual universal inputs

⑨	Auxiliary Retransmit Module
0 =	None
1 =	Single retransmit output 0-5, 1-5, 0-10VDC, 0-20mA, 4-20mA
2 =	Dual retransmit outputs 0-5, 1-5, 0-10VDC, 0-20mA, 4-20mA

⑩	Language and RTD Option
1 =	English with 100Ω RTD
2 =	German with 100Ω RTD
3 =	French with 100Ω RTD
4 =	Spanish with 100Ω RTD
5 =	English with 500 and 1KΩ RTD
6 =	German with 500 and 1KΩ RTD
7 =	French with 500 and 1KΩ RTD
8 =	Spanish with 500 and 1KΩ RTD

⑪ ⑫	Display and Custom Options
RG =	Standard display (Red/Green display only)
XX =	Custom options: software, setting parameters, overlay

Ordering Information — 1/4 DIN Dual Channel Ramping Controller

Part Number

① ②	③ Dual Channel Ramping	④ Power Supply	⑤ Output 1A	⑥ Output 1B	⑦ Output 2A	⑧ Output 2B		⑨ Auxiliary Retransmit Module	⑩ Language and RTD Options	⑪ ⑫ Display and Custom Options
F4	D	H					-			

③	Dual Channel Ramping Controller
D =	3 universal analog inputs, 4-digital inputs, 8-digital outputs, 2 alarms, EIA-232/485 comms

④	Power Supply
H =	100-240VAC/VDC

⑤	Output 1A
C =	Open collector/switched dc
F =	Process, 0-5, 1-5, 0-10VDC, 0-20mA, 4-20mA
K =	Solid state Form A 0.5A relay

⑥	Output 1B
A =	None
C =	Open collector/switched dc
F =	Process, 0-5, 1-5, 0-10VDC, 0-20mA, 4-20mA
K =	Solid state Form A 0.5A relay

⑦	Output 2A
C =	Open collector/switched dc
F =	Process, 0-5, 1-5, 0-10VDC, 0-20mA, 4-20mA
K =	Solid state Form A 0.5A relay

⑧	Output 2B
A =	None
C =	Open collector/switched dc
F =	Process, 0-5, 1-5, 0-10VDC, 0-20mA, 4-20mA
K =	Solid state Form A 0.5A relay

⑨	Auxiliary Retransmit Module
0 =	None
1 =	Single retransmit output 0-5, 1-5, 0-10VDC, 0-20mA, 4-20mA
2 =	Dual retransmit outputs 0-5, 1-5, 0-10VDC, 0-20mA, 4-20mA

⑩	Language and RTD Option
1 =	English with 100Ω RTD
2 =	German with 100Ω RTD
3 =	French with 100Ω RTD
4 =	Spanish with 100Ω RTD
5 =	English with 500 and 1KΩ RTD
6 =	German with 500 and 1KΩ RTD
7 =	French with 500 and 1KΩ RTD
8 =	Spanish with 500 and 1KΩ RTD

⑪ ⑫	Display and Custom Options
RG =	Standard display (Red/Green display only)
XX =	Custom options: software, setting parameters, overlay

Compatible Accessories

Operator Interface Terminals (OIT)



Silver Series touchscreen operator interface terminals provide a customizable user interface and log and graph data for Watlow controllers and other devices. A Silver Series operator interface terminal paired with Watlow controllers, is the perfect solution for industrial processes or machine control applications.

SpecView



SpecView from Watlow is designed for industrial users and includes features such as data logging, trending and support for bar code readers and touch screens. Errors are reduced for any process by creating application-specific screens. The software provides a historical replay option, easy-to-use recipe features and remote access options, including LAN, internet and modem.

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