SERIES F4 ¼ DIN RAMPING CONTROLLERS

Ramping Control Programming Made Easy Through Advanced Technology

The SERIES F4 ¼ DIN industrial ramping controllers offer an easy to set up and operate solution for the most demanding ramp and soak processing applications. The features and performance of these units make them ideally suited for environmental chamber or furnace and oven applications. Single and dual channel versions are available.

These competitively-priced controllers feature a four line, high-definition LCD interface display that makes profile programming and controller configuration significantly faster and easier. A 16-bit microprocessor supports all the accuracy and performance advantages you have come to expect from a Watlow® controller.

Up to 256 steps can be programmed into as many as 40 nameable profiles. Profiles can be programmed to wait for events or for up to three different process variables. A guaranteed soak feature allows you to set how closely your process needs to be controlled.

The four digital event inputs can be programmed to remotely start, pause or terminate any of your preprogrammed process recipes. The eight event outputs are segment programmable, or three of them can be assigned to a programmable compressor and boost heat/boost cool control. A real-time clock can be used to start a profile at any time.

Serial communication and dual alarm relays are included in the base unit. The SERIES F4 ramping controllers are packaged with a NEMA 4X front face to withstand harsh environments and a 4 in. (101.6 mm) deep case with removable connectors for wiring convenience.

The SERIES F4 controllers are manufactured by Watlow, ISO 9001 registered and backed 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
• 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

ISO 9001
Registered Company
Winona, Minnesota USA

WATLOW
Better Thermal Solutions...*Faster*

WIN-F4R-0908

Set Point Ramp and Soak Programming

The enhanced programming features found in the SERIES F4 ramping controllers are the result of listening to our customers' demand for greater capabilities with reduced programming complexity.

A profile guide leads the programmer through the programming process by offering choices for step configuration. For better operator recognition, profiles and digital I/O used for events can be given names of up to 10 characters in length.

Five step types including ramp, soak, jump, auto start and end offer the programmer complete 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. Up to eight event outputs are step selectable. Since your thermal systems characteristics may change 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 set date, a day of the week or daily, the choice is yours. The jump step can be used to jump within a profile or to another profile. The end step terminates a program with the control outputs programmed to your process needs.

Temperature and Humidity Chamber Application
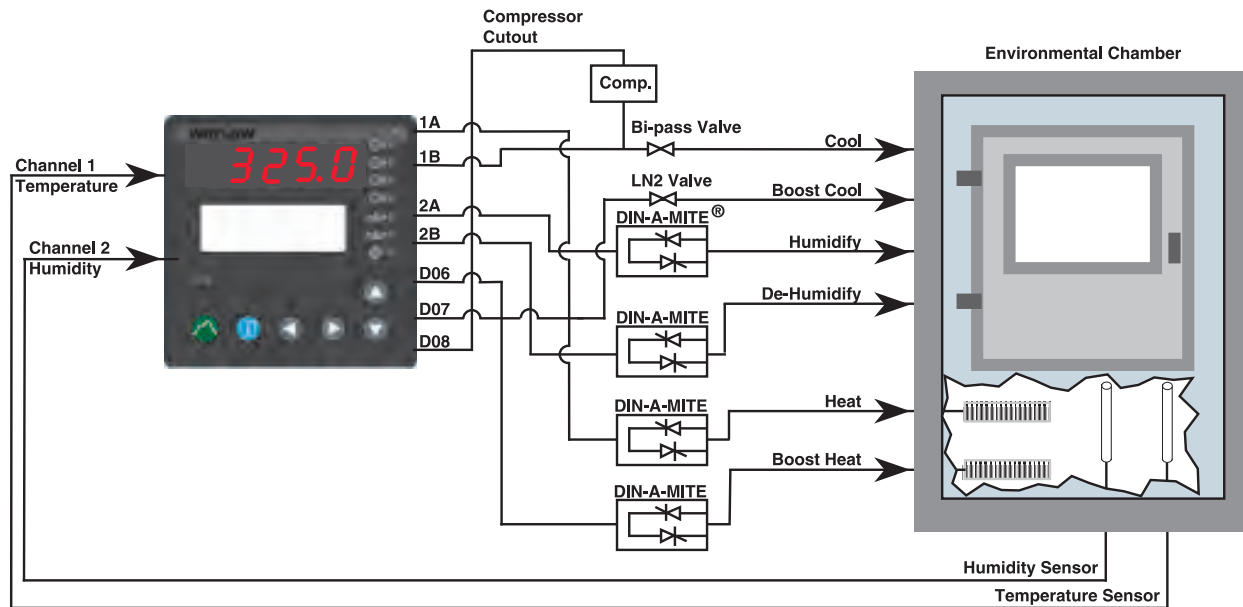

Serial Communication
EIA-232 and EIA-485 serial communication interfaces are included in the base unit of both the SERIES F4S (single channel) and the SERIES F4D (dual channel) controllers. The baud rate is selectable as either 9600 or 19200 Kbaud. The protocol is Modbus®.

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.
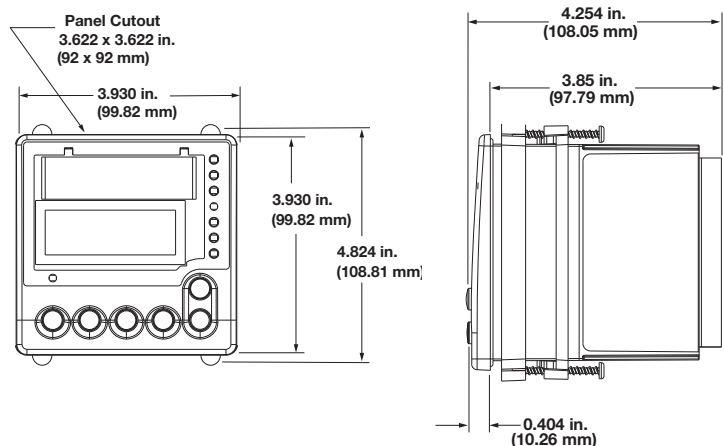
Specifications

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

Modbus® is a registered trademark of AEG Schneider Automation.

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: 0-10V⎓(dc), 0-5V⎓(dc), 1-5V⎓(dc), 0-50mV, 0-20mA, 4-20mA
- Voltage input impedance 20KΩ
- Current input impedance 100Ω

Digital Inputs (4)
- Update rate = 10Hz
- Contact or dc voltage (36V⎓(dc) 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 28V⎓(dc), limited @ 30mA
- External load switching (max.):
  Open collector 42V⎓(dc) @ 0.5A

Solid State Relay
- Zero switched, optically coupled, 0.5A @ 24V~(ac) min., 253V~(ac) max.

Process Outputs (Optional Retransmit)
- Update rate = 1Hz
- User selectable 0-10V⎓(dc), 0-5V⎓(dc), 1-5V⎓(dc) @ 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 @ 30V⎓(dc) or 240V~(ac) max.

Digital Outputs (8)
- Update rate = 10Hz
- Open collector output
- Off = 42V⎓(dc) max @ 10µA
- On = 0.2V⎓(dc) max @ 50mA sink
- Internal supply: 5V⎓(dc), @ 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

UL® and C-UL® are registered trademarks of Underwriter's Laboratories, Inc.

Power
- 100-240V~(ac), -15%, +10%; 50/60Hz, ±5%
- 24-28V≈(ac/dc), -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 500V~(ac)

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, 7 segment LED red
- Control interface display: 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:	-32	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 PTII:	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 PTII:	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
¼ DIN Single Channel Ramping Controller

SERIES F4   **F4 S - ☐☐☐ A - ☐☐☐ ☐☐**
¼ DIN, Single Channel
Ramping Controller

Single Channel
Ramping Controller
1 universal analog input, 4-digital
inputs, 8-digital outputs, 2 alarms,
EIA-232/485 comms
Power Supply
H = 100-240V≈(ac/dc)
L = 24-28V≈(ac/dc)
Output 1A
C = Open collector/switched dc
F = Process, 0-5, 1-5, 0-10V═(dc),
       0-20mA, 4-20mA
K = Solid state Form A 0.5A relay
Output 1B
A = None
C = Open collector/switched dc
F = Process, 0-5, 1-5, 0-10V═(dc),
       0-20mA, 4-20mA
K = Solid state Form A 0.5A relay
Auxiliary Input Module
0 = None
6 = Dual universal inputs
Auxiliary Retransmit Module
0 = None
1 = Single retransmit output
       0-5, 1-5, 0-10V═(dc), 0-20mA, 4-20mA
2 = Dual retransmit outputs
       0-5, 1-5, 0-10V═(dc), 0-20mA, 4-20mA
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
Display and Custom Options
RG = Standard display (Red/Green display only)
XX = Custom options: software, setting parameters, overlay

Your Authorized Watlow Distributor is:

Ordering Information
¼ DIN Dual Channel Ramping Controller

SERIES F4   **F4 D - ☐☐☐☐ - ☐☐☐ ☐☐**
¼ DIN, Dual Channel
Ramping Controller

Dual Channel
Ramping Controller
3 universal analog inputs, 4-digital
inputs, 8-digital outputs, 2 alarms,
EIA-232/485 comms
Power Supply
H = 100-240V≈(ac/dc)
L = 24-28V≈(ac/dc)
Output 1A
C = Open collector/switched dc
F = Process, 0-5, 1-5, 0-10V═(dc),
       0-20mA, 4-20mA
K = Solid state Form A 0.5A relay
Output 1B
A = None
C = Open collector/switched dc
F = Process, 0-5, 1-5, 0-10V═(dc),
       0-20mA, 4-20mA
K = Solid state Form A 0.5A relay
Output 2 A
C = Open collector/switched dc
F = Process, 0-5, 1-5, 0-10V═(dc), 0-20mA,
       4-20mA
K = Solid state Form A 0.5A relay
Output 2 B
A = None
C = Open collector/switched dc
F = Process, 0-5, 1-5, 0-10V═(dc), 0-20mA, 4-20mA
K = Solid state Form A 0.5A relay
Auxiliary Retransmit Module
0 = None
1 = Single retransmit output 0-5, 1-5, 0-10V═(dc),
       0-20mA, 4-20mA
2 = Dual retransmit outputs 0-5, 1-5, 0-10V═(dc),
       0-20mA, 4-20mA
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
Display and Custom Options
RG = Standard display (Red/Green display only)
XX = Custom options: software, setting parameters, overlay

To be automatically connected to the nearest North American Technical Sales Office:
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