PID with Time/ Temperature Profiling Controllers

SERIES SD_R

Specifications

Line Voltage/Power

- 100 to 240V~(ac), +10/-15 percent; (85-264V~[ac]) 50/60Hz, ±5 percent
- 24V⎓(ac/dc), +10/-15 percent; 50/60Hz, ±5 percent
- 10VA maximum power consumption
- Data retention upon power failure via nonvolatile memory

Environment

- -18 to 65°C (0 to 149°F) operating temperature
- -40 to 85°C (-40 to 185°F) storage temperature
- 0 to 90 percent RH, non-condensing

Accuracy

- Calibration accuracy and sensor conformity: ±0.1 percent of span, ±1°C @ the calibrated ambient temperature and rated line voltage
- Calibration ambient temperature = 25°C ±3°C (77°F ±5°F)
- Accuracy span: 540°C (1000°F) minimum
- Temperature stability: ±0.1°C/°C (±0.2°F/°F) rise in ambient maximum

Agency Approvals

- UL® 3121, C-UL®, CSA, CE, NEMA 4X/IP65
- Limit version features FM approval
- NSF for Type J, K, T & E thermocouples

Controller

- Microprocessor based user-selectable control modes
- Single universal input, up to three outputs
- Control sampling rates: Input = 6.5Hz, Display = 10Hz and Outputs = 6.5Hz

Operator Interface

- Dual 4 digit, 7 segment LED displays
- Advance, infinity and up down keys
- Optional IrDA infrared port (not available on 1/32 DIN)
- Isolated EIA-485 Modbus™ serial communications. 9600, 19.2K or 38.4K baud rates.

Wiring Termination-Touch Safe Terminals

- Input power and control outputs 12 to 22 AWG
- Sensor inputs and process outputs 20 to 28 AWG

Universal Input

- Thermocouple, grounded or ungrounded sensors
- RTD 2- or 3-wire, platinum, 100Ω @ 0°C calibration to DIN-curve (0.00385 Ω/Ω/°C)
- Process, 0-20mA @ 100Ω, or 0-10V⎓(dc) @ 20kΩ input impedance; Scalable
- Inverse scaling
- >20MΩ input impedance
- Maximum of 20Ω source resistance

Allowable Operating Range

Type J:	0	to	815°C
	(32	to	1500°F)
Type K:	-200	to	1370°C
	(-328	to	2500°F)
Type T:	-200	to	400°C
	(-328	to	750°F)
Type N:	0	to	1300°C
	(32	to	2372°F)
Type E:	-200	to	800°C
	(-328	to	1470°F)
Type C:	0	to	2315°C
	(32	to	4200°F)
Type D:	0	to	2315°C
	(32	to	4200°F)
Type PTII:	0	to	1395°C
	(32	to	2543°F)
Type R:	0	to	1760°C
	(32	to	3200°F)
Type S:	0	to	1760°C
	(32	to	3200°F)
Type B:	0	to	1816°C
	(32	to	3300°F)
RTD (DIN):	-200	to	800°C
	(-328	to	1472°F)
Process:	-1999	to	9999 units

Control Outputs

Outputs 1, 2 , 3 (Output 3 not available on 1/32 DIN)

- User selectable for heat/cool as on-off, P, PI, PD, PID or Alarm action. Not valid for limit controls
- Electromechanical relay. Form A, rated 2A @ 120V~(ac),2A @ 240V~(ac) or 2A @ 30V⎓(dc)

Dimensions

DIN Size	Behind Panel (max.)	Width	Height
1/32 DIN	97.8 mm (3.85 in.)	52.6 mm (2.07 in.)	29.7 mm (1.17 in.)
1/16 DIN	97.8 mm (3.85 in.)	52.1 mm (2.05 in.)	52.1 mm (2.05 in.)
1/8 DIN Vertical	97.8 mm (3.85 in.)	52.8 mm (2.08 in.)	99.8 mm (3.93 in.)
1/8 DIN Horizontal	97.8 mm (3.85 in.)	99.8 mm (3.93 in.)	52.8 mm (2.08 in.)
1/4 DIN	101.1 mm (3.98 in.)	99.8 mm (3.93 in.)	99.8 mm (3.93 in.)

PID with Time/ Temperature Profiling Controllers

SERIES SD_R

Specifications Cont.

- Switched dc non-isolated minimum turn on voltage of 6V⎓(dc) into a minimum 500Ω load with a maximum on voltage of not greater than 12V⎓(dc) into an infinite load. Maximum switched dc power supply current available for up to two outputs is 60mA
- Solid state relay, Form A, 0.5A @ 24V~(ac) minimum, 264V~(ac) maximum, opto-isolated, without contact suppression
- Process output (Non Isolated) User-selectable 0-10V⎓(dc), 0-5V⎓(dc), 1-5V⎓(dc) @ 1KΩ minimum, 0-20mA, 4-20mA @ 800Ω maximum
- Electromechanical relay. Form C, rated 5A @ 120V~(ac), 5A @ 240V~(ac) or 5A @ 30V⎓(dc)
- Open collector 42V⎓(dc) @ 250mA maximum
- EIA-485 serial communications with Modbus™ protocol

INFOSENSE™ Sensor Technology

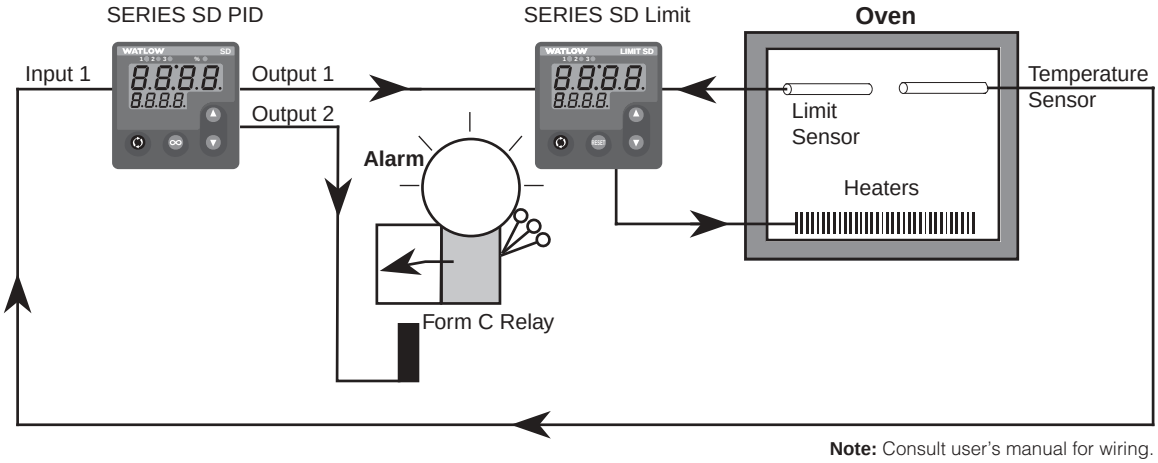
Watlow's INFOSENSE™ sensor technology improves temperature sensing accuracy by 50 percent.

Each INFOSENSE "smart" sensor contains four numeric values located on tags attached to each sensor that are programmed into the SERIES SD controller memory. These values characterize Watlow sensors and allow the controller to provide enhanced accuracy.

WATVIEW HMI

WATVIEW, Watlow's Windows® based HMI (Human Machine Interface) software, supports the SERIES SD controllers. The software can be used to setup, monitor and edit the values of controller parameters, to monitor and manage alarms and to log and graph process data.

Typical Block Diagram



Note: Consult user's manual for wiring.

PID with Time/ Temperature Profiling Controllers

F.O.B.: Winona, Minnesota

SERIES SD_R

Infrared Communications

The Infrared Data Communications (IDC) option is available on all SERIES SD controller models except the 1/32 DIN and can support complete SERIES SD parameter configuration and operation. The IDC option supports wireless communications with PDAs (personal digital assistants) or other devices equipped with infrared communications that support the Infrared Data Association (IrDA) 1.0 Standard.

The actual user interface or configuration is dependent on the master device application software. A source for this software is Instant HMI from Software Horizons. For more information, visit www.instanthmi.com/watlow.

Advantages of IDC include automated logging of key process variables, increased accuracy and ease of use for recipe or configuration setups. Infrared data communications enhances controller data exchange in physically restricting environments (such as semiconductor clean rooms, governmental radio-active test labs or those hard to reach areas) and reduces the use of paper to record instrument information as well as human transposition errors.

Ordering Information

To order, complete the model number on the right with the information below.

SERIES SD_R = Single channel ramping controllers

S D _ R - _ _ _ - _ A

DIN Sizes
3 = 1/32 DIN
6 = 1/16 DIN
8 = 1/8 DIN Vertical
9 = 1/8 DIN Horizontal
4 = 1/4 DIN

Control Type
R = Ramping Dual Display

Power Supply
H = 100 to 240V≂(ac/dc)
L = 24 to 28V≂(ac/dc)

Output 1
C = Switched dc
K = SSR, Form A, 0.5A
F = Universal process
J = Mechanical relay, Form A, 2A①

Output 2
A = None
C = Switched dc
K = SSR, Form A, 0.5A
J = Mechanical relay, Form A, 2A①
U = EIA/485 Modbus™ communications

Output 3 (Not available on 1/32 DIN)
A = None
C = Switched dc/open collector
K = SSR, Form A, 0.5A
F = Universal process
E = Mechanical relay, Form C, 5A①

Infrared Comms Options (IrDA)
A = None (Default selection on 1/32 DIN)
R = IrDA ready (Not available on 1/32 DIN)

Display Colors and Custom Options
RG = Red Green (Dual display units)
RR = Red Red (Not available on 1/32 DIN Dual Display)
XX = Custom options, special overlays, etc.

① Electromechanical relays warranted for 100,000 closures only. Solid state switching devices recommended for applications requiring fast cycle times or extended service life.

PID with Time/ Temperature Profiling Controllers

SERIES SD6R_D

Watlow SERIES SD6R_D offers excellent static set point or Profile/Ramping control and application flexibility in a 1/16th DIN panel mount package. The SERIES SD6R_D controller has been successfully tested for use with both ODVA and Semi-conductor SIG standards for DeviceNet™ on CAN networks. Ramping profile capabilities include four profiles (maximum), 10 steps each (maximum) and five profile step types (Set Point, Soak, Jump Loop, Link and End).

The SD6R_D single channel controller includes a universal sensor input with two outputs that can be configured as heat or cool or alarm. The DeviceNet™ communications interface is supplied with either a five pin circular DIN connector for Semiconductor SIG specific applications, or with a five position removable screw terminal connector for traditional market applications.

Additional features of the SD6R_D family of controllers include Watlow's INFOSENSE™ sensor technology, a user definable menu system as well as a Save and Restore feature that allows the restoration of factory and user defined parameter values.

Watlow SD6R_D DeviceNet™ controllers offer a three year warranty, are UL®, C-UL® listed, CSA, CE and NSF certified, and include IP65/NEMA 4 ratings.

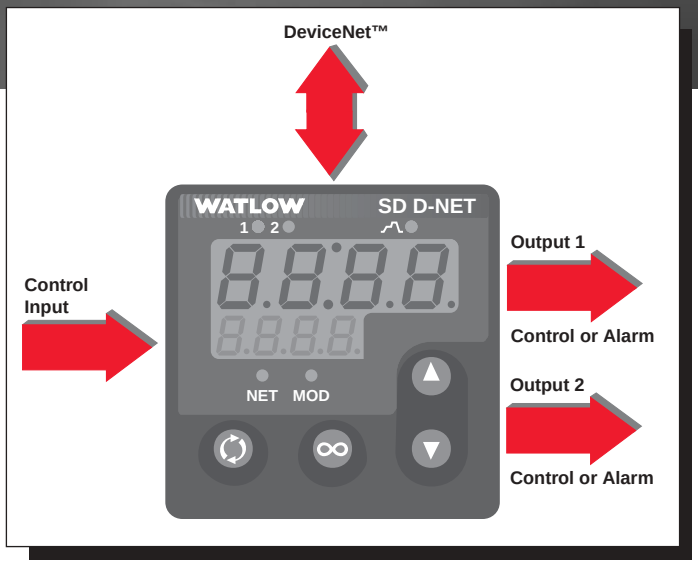
Features and Benefits

Variable burst fire

- Prolongs heater life

Ordering Options including DeviceNet™ on CAN or SEMI-SIG-ODVA protocols

- Provides DeviceNet™ on CAN for Semiconductor applications
- DeviceNet™ on CAN for the packaging or general industrial markets



Specifications

Line Voltage/Power

- 100 to 240V~(ac), +10/-15 percent; (85-264V~[ac]) 50/60Hz, ±5 percent
- 24V≂(ac/dc), +10/-15 percent; 50/60Hz, ±5 percent
- 10VA maximum power consumption
- Data retention upon power failure via nonvolatile memory

Environment

- -18 to 65°C (0 to 149°F) operating temperature
- -40 to 85°C (-40 to 185°F) storage temperature
- 0 to 90 percent RH, non-condensing

Accuracy

- Calibration accuracy and sensor conformity: ±0.1 percent of span, ±1°C @ the calibrated ambient temperature and rated line voltage
- Calibration ambient temperature = 25°C ±3°C (77°F ±5°F)
- Accuracy span: 540°C (1000°F) minimum
- Temperature stability: ±0.1°C/°C (±0.2°F/°F) rise in ambient maximum

Agency Approvals

- UL® 3121, C-UL®, CSA, CE, IP65/NEMA 4X and NSF-2

DeviceNet™ is a trademark of the Open DeviceNet Vendors Association.

PID with Time/ Temperature Profiling Controllers

F.O.B.: Winona, Minnesota

SERIES SD6R_D

Specifications Cont.

Controller

- Microprocessor based user-selectable control modes
- Single universal input, up to three outputs
- Control sampling rates: input = 6.5Hz, display = 10Hz, outputs = 6.5Hz

Operator Interface

- Dual 4 digit, 7 segment LED displays
- Advance, infinity and up down keys
- DeviceNet™ on CAN (for the packaging or general industrial markets) or SEMI-SIG-ODVA (for the semi-conductor industry)

Allowable Operating Range

Type J:	0	to	815°C
	(32	to	1500°F)
Type K:	-200	to	1370°C
	(-328	to	2500°F)
Type T:	-200	to	400°C
	(-328	to	750°F)
Type N:	0	to	1300°C
	(32	to	2372°F)
Type E:	-200	to	800°C
	(-328	to	1470°F)
Type C:	0	to	2315°C
	(32	to	4200°F)
Type D:	0	to	2315°C
	(32	to	4200°F)
Type PTII:	0	to	1395°C
	(32	to	2543°F)
Type R:	0	to	1760°C
	(32	to	3200°F)
Type S:	0	to	1760°C
	(32	to	3200°F)
Type B:	0	to	1816°C
	(32	to	3300°F)
RTD (DIN):	-200	to	800°C
	(-328	to	1472°F)
Process:	-1999	to	9999 units

Control Outputs 1 & 2

- User selectable for heat/cool as on-off, P, PI, PD, PID or Alarm action
- Electromechanical relay. Form A, rated 2A @ 120V~(ac), 2A @ 240V~(ac) or 2A @ 30V⎓(dc)
- Switched dc non-isolated minimum turn on voltage of 6V⎓(dc) into a minimum 500Ω load with a maximum on voltage of not greater than 12V⎓(dc) into an infinite load. Maximum switched dc power supply current available for up to two outputs is 60mA
- Solid-state relay, Form A, 0.5A @ 24V~(ac) minimum, 264V~(ac) maximum, opto-isolated, without contact suppression
- Process output (Non Isolated)
  User-selectable 0-10V⎓(dc), 0-5V⎓(dc), 1-5V⎓(dc) @
  1KΩ minimum, 0-20mA, 4-20mA @ 800Ω maximum
- Electromechanical relay. Form C, rated 5A @ 120V~(ac), 5A @ 240V~(ac) or 5A @ 30V⎓(dc)
- Open collector 42V⎓(dc) @ 250mA maximum

Dimensions

SD6C_D or SD6R_D or SD6L_D

- 1/16 DIN Size
- 97.8 mm (3.85 in.) behind panel maximum
- Width 52.1 mm (2.05 in.)
- Height 52.1 mm (2.05 in.)

Ordering Information

To order, complete the model number on the right with the information below.

S D 6 R - _ _ A - D _ _

SERIES SD = 1/16 DIN-panel mount ramping controller with DeviceNet™

Control Type
R = PID Control plus ramping option

Power Supply
H = 100 to 240V≂(ac/dc)
L = 24 to 28V≂(ac/dc)

Output 1
C = Switched dc
K = SSR, Form A, 0.5A
J = Mechanical relay, Form A, 2A②
F = Universal process

Output 2
A = None
C = Switched dc
K = SSR, Form A, 0.5A
J = Mechanical relay, Form A, 2A②

DeviceNet™ Communications
N = DeviceNet™ on CAN (packaging or general industrial markets)
S = SEMI-SG-ODVA compliant (semi-conductor markets)

Display Colors and Custom Options
RG = Red Green (with Watlow name and SD logo)
RR = Red Red (with Watlow name and SD logo)
AA = Red Green (SD logo only)
AB = Red Red (SD logo only)

② Electromechanical relays warranted for 100,000 closures only. Solid state switching devices recommended for applications requiring fast cycle times or extended service life.

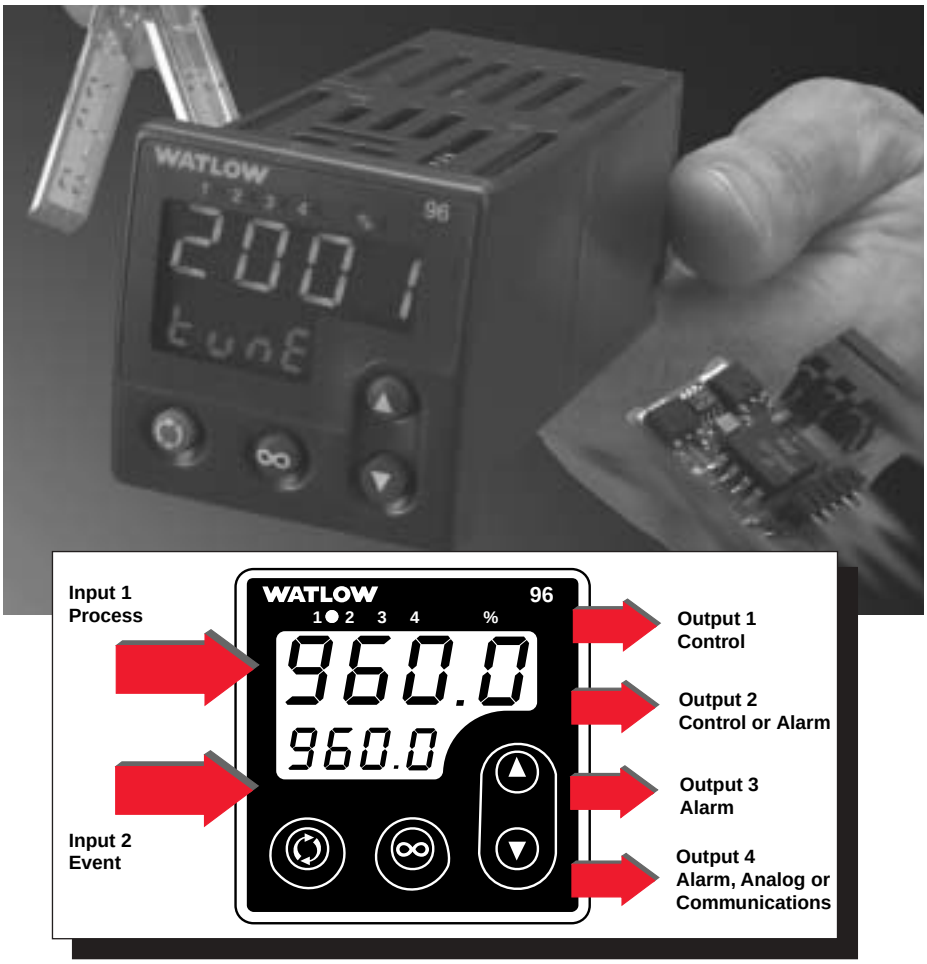
PID with Time/ Temperature Profiling Controllers

SERIES 96_AA

Watlow's SERIES 96 is a powerful 1/16 DIN dual display controller that offers many advanced functions. This new controller can be tailored to perform hardware and software needs with hardware modules that are plugable and exchangeable, and software menus that may be user programmed to fit exact application requirements.

With one universal input, a second auxiliary input and four outputs the SERIES 96 can be programmed to perform: temperature measurement, input event switching, heating, boost heating, cooling, alarms, digital communications and retransmit.

With fast 10Hz sampling, variable time base burst firing outputs, NEMA 4X front panel and 0.1 percent calibration accuracy, this controller can easily handle some of the toughest application needs.



Performance Capabilities

- Operating environment 0 to 65°C (32 to 149°F)

Features and Benefits

Profiles

- Two (2) 8-step profiles can be linked to create one (1) 15-step profile

Burst fire

- Increase heater life / better temperature controlability

One input, one auxiliary input, four outputs

- Powerful flexibility at a competitive price

No dipswitches

- Easily configurable from the front panel

Multiple set points

- Flexible automatic control

Plugable output modules

- Field expandable

Fast 10Hz sampling

- Improved control responsiveness

Open loop break protection

- Indication of thermal loop problem

NEMA 4X (IP65)①

- Water and corrosion resistant front panel can be washed down

Compact size

- Allows it to be mounted in small areas

Automatic tuning

- Easy one step tuning of PID control parameters

Three-year warranty②

- Provides Control Confidence®

Applications

- Packaging
- Semiconductor
- Food processing
- Lab equipment
- Furnace and ovens
- Plastics

Specifications

Controller

- Microprocessor-based, user selectable control modes
- Heat and cool auto-tune for control outputs
- Universal input one, auxiliary input two, four outputs
- Control outputs user selectable as on-off, P, PI, PID

① To effect NEMA 4X(IP65) rating requires a minimum mounting panel thickness of 1.5 mm (0.06 in.) and surface finish not rougher than 0.000812 mm (0.000032 in.).

② Electromechanical relays warranted for 100,000 closures only. Solid state switching devices recommended for applications requiring fast cycle times or extended service life.

PID with Time/ Temperature Profiling Controllers

SERIES 96_AA

Specifications Cont.

- Input sample period; Single input 10Hz (100ms), dual input 5Hz (200ms) digital filter adjustable
- Display update; 2Hz (500ms), time filter adjustable
- Output update; burst, 0.1 to 999.9 seconds
- Input/Output/Communication isolation
- Displayed in °C, °F or process units

Operator Interface

- Dual four-digit LED displays: upper 10.2 mm (0.4 in.), lower 6.2 mm (0.244 in.)
- Advance, Up Arrow, Down Arrow, Infinity tactile keys

Standard Conditions For Specifications

- Ambient temperature 25°C (77°F) ±3°C, rated line voltage, 50 to 60Hz, 0 to 90 percent RH non-condensing, 15 minute warm-up

Universal Input 1

Thermocouple

- Type J, K, T, N, C (W5), E, Pt 2, D (W3), B, R, S thermocouple
- >20MΩ input impedance
- Maximum 20Ω source resistance
- 30µA open detection bias

RTD

- 2- or 3-wire platinum, 100Ω
- JIS and DIN-curves
- Whole or tenth degree indication
- 150µA nominal RTD excitation current

Process

- Range selectable: 0-10V⎓(dc), 0-5V⎓(dc), 1-5V⎓(dc), 0-20mA, 4-20mA
- Voltage input impedance 20kΩ
- Current input impedance 100Ω
- Minimum current source resistance 1MΩ
- Input resolution 50,000 bits (approx.) at full scale
- mV input impedance 20MΩ

Input 2

Event Input

- Contact or voltage
- 20KΩ input impedance
- Voltage input: event high state 3 to 36V⎓(dc), event low state 0 to 2V⎓(dc)
- Resistance/contact input: event high state >23kΩ, event low state 0 to 2kΩ

Output Types

Open Collector/Switched DC

- Open collector configuration: Maximum voltage 42V⎓(dc) Maximum current 200mA Maximum on resistance 1.1Ω Maximum off state leakage current 100µA
- Switched dc configuration: Switched dc supply voltage 22 to 28V⎓(dc) dc supply current limited to 30mA

Solid State Relay

- Optically isolated
- Zero cross switched
- Without contact suppression
- Minimum load current 0.5mA rms
- Maximum current 0.5A rms at 20 to 280V~(ac)
- Maximum off state leakage current 10µA rms
- For resistive loads only, must use RC suppression for inductive loads

Electromechanical Relay

- Form C contact configuration
- Minimum load current 10mA @ 5V⎓(dc)
- Rated resistive and inductive loads: 2A @ 250V~(ac) or 30V⎓(dc) maximum
- Electrical life 100,000 cycles at rated current
- For resistive loads only, must use RC suppression for inductive loads

Process

- Range selectable: 0-20mA, 4-20mA, 0-5V⎓(dc), 1-5V⎓(dc), 0-10V⎓(dc)
- Reverse or direct acting
- 0 to 10V⎓(dc) voltage output into 1000Ω minimum load resistance
- 0 to 20mA current output into 800Ω maximum load resistance
- Resolution: V⎓(dc) ranges = 2.5mV nominal mA ranges = 5µA nominal
- Calibration accuracy: V⎓(dc) ranges = ±15mV mA ranges = ±30µA
- Temperature stability 100ppm/°C

Retransmit

- Range selectable: 0-20mA, 4-20mA, 0-5V⎓(dc), 1-5V⎓(dc), 0-10V⎓(dc)
- 0 to 10V⎓(dc) voltage output into a 1,000Ω minimum load resistance
- 0 to 20mA current output into an 800Ω maximum load resistance
- Resolution: V⎓(dc) ranges = 2.5mV nominal mA ranges = 5µA nominal
- Calibration accuracy: V⎓(dc) ranges = ±15mV mA ranges = ±30µA
- Temperature stability 100ppm/°C

Communications

- EIA/TIA-485, EIA/TIA-232
- Opto-isolated
- Modbus™ RTU protocol
- 1200, 2400, 4800, 9600, 19200 baud rates
- 32 maximum units can be connected (With additional 485 repeater hardware, up to 247 units may be connected)

PID with Time/ Temperature Profiling Controllers

SERIES 96_AA

Accuracy

Input ranges

Type J	0	to	750°C (32 to 1382°F)
Type K	-200	to	1250°C (-328 to 2282°F)
Type T	-200	to	1250°C (-328 to 2282°F
Type N	0	to	1250°C (32 to 2282°F)
Type E	-200	to	900°C (-328 to 1652°F)
Type C(W5)	0	to	2315°C (32 to 4200°F)
Type D(W3)	0	to	2315°C (32 to 4200°F)
Pt 2	0	to	1393°C (32 to 2540°F)
Type R	0	to	1450°C (32 to 2642°F)
Type S	0	to	1450°C (32 to 2642°F)
Type B	870	to	1700°C (1598 to 3092°F)
DIN	-200	to	800°C (-328 to 1472°F)
JIS	-200	to	630°C (-328 to 1166°F)
Process	-1999 to 9999 units		

Thermocouple Inputs

- Calibration accuracy ±0.1 percent of span ±1°C at standard conditions

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

  Types R and S: 0.15 percent of span for 0°C to 100°C (32°F to 2120°F)

  Type B: 0.24 percent of span for 870°C to 1700°C (1598°F to 3092°F)
- Accuracy span: 540°C (1000°F) minimum
- Temperature stability: ±0.1 degree per degree change in ambient

RTD Inputs

- Calibration accuracy ±0.1 percent of span ±1°C at standard conditions
- Accuracy span: 540°C (1000°F) minimum
- Temperature stability: ±0.05 degree per degree change in ambient

Process Inputs

- Voltage input ranges

  Accuracy ±15mV ±1 LSD at standard conditions

  Temperature stability ±100ppm/°C maximum
- Milli-amp input ranges

  Accuracy ±30µA ±1 LSD at standard conditions

  Temperature stability ±100ppm/°C maximum

Agency Approvals

- UL® 916, File #E185611, C-UL®, CE, NEMA 4X

Terminals

- Touch safe
- 22 to 12 AWG

Power

- 100-240V~(ac) +10 percent, -15 percent; 50/60Hz, ±5 percent
- 24-28V~(ac) or V⎓(dc) +10 percent, -15 percent; 50/60Hz, ±5 percent
- 7.0VA maximum power consumption
- Data retention upon power failure via nonvolatile memory

Operating Environment

- 0 to 65°C (32 to 149°F)
- 0 to 90 percent RH, non-condensing
- Storage temperature: -40 to 85°C (-40 to 185°F)

Controller Weight (approx.)

- 0.2 kg (0.4 lb)

Allowable Operating Ranges

Type J	1.0	0	to	815°C (32 to 1500°F)
	0.1	0	to	815°C (32 to 1499°F)
Type K	1.0	-270	to	1370°C (-454 to 2498°F)
	0.1	-199.9	to	999.9°C (-327.8 to 1831.8°F)
Type T	1.0	-270	to	400°C (-454 to 750°F)
	0.1	-199.9	to	400°C (-327.8 to 750°F)
Type N	1.0	0	to	1300°C (32 to 2372°F)
	0.1	0	to	999.9°C (32 to 1831.8°F)
Type E	1.0	-270	to	800°C (-454 to 1470°F)
	0.1	-199.9	to	800°C (-327.8 to 1472°F)
Type C	1.0	0	to	2315°C (32 to 4200°F)
	0.1	0	to	999.9°C (32 to 1831.8°F)
Type D	1.0	0	to	2315°C (32 to 4200°F)
	0.1	0	to	999.9°C (32 to 1831.8°F)
Pt 2	1.0	0	to	1395°C (32 to 2543°F)
	0.1	0	to	999.9°C (32 to 999.9°F)
Type R	1.0	0	to	1760°C (32 to 3200°F)
Type S	1.0	0	to	1760°C (32 to 3200°F)
Type B	1.0	0	to	1816°C (32 to 3300°F)
DIN	1.0	-200	to	800°C (-328 to 1472°F)
	0.1	-199.9	to	800°C (-327.8 to 1472°F)
JIS	1.0	-200	to	630°C (-328 to 1166°F)
	0.1	-199.9	to	630.0°C (-327.8 to 1166°F)

Process -1999 to 9999 units

PID with Time/ Temperature Profiling Controllers

F.O.B.: Winona, Minnesota

SERIES 96_AA

Functionality Matrix

	Universal Input	Event & Remote Set Point	Control	Alarm	Retransmit	232 485 Comm
Input 1	■					
Input 2		■				
Output 1			■			
Output 2			■	■		
Output 3				■		
Output 4				■	■	■

Dimensions

Overall

Height:	52 mm	(2.05 in.)
Width:	52 mm	(2.05 in.)
Length:	107 mm	(4.2 in.)

Depth behind panel surface

98.4 mm (3.875 in.)

Ordering Information

To order, complete the code number on the right with the information below:

96 - - -

SERIES 96 = Microprocessor-based 1/16 DIN, with universal input 1. Options include: software, power supply, input 2, outputs and display color.

Power Supply

A = 100-240V≂(ac/dc)
B = 24-28V≂(ac/dc)

Input 2

0 = None
1 = Event input and 0-5V⎓(dc)/4-20mA (Remote set point input)

Output 1

C = Switched dc/open collector
D = Electromechanical relay, Form C, 2A, without RC suppression②
F = Universal Process, range selectable: 0-20mA, 4-20mA, 0-5V⎓(dc), 1-5V⎓(dc), 0-10V⎓(dc)
K = 0.5A solid state relay without RC suppression

Output 2

A = None
C = Switched dc/open collector
D = Electromechanical relay, Form C, 2A, without RC suppression②
F = Universal Process, range selectable: 0-20mA, 4-20mA, 0-5V⎓(dc), 1-5V⎓(dc), 0-10V⎓(dc)
K = 0.5A solid state relay without RC suppression

Output 3

A = None
D = Electromechanical relay, Form C, 2A, without RC suppression②

Output 4

A = None
D = Electromechanical relay, Form C, 2A, without RC suppression②
R = 232 Communications
U = 485 Communications
M = Universal Retransmit, range selectable: 0-20mA, 4-20mA, 0-5V⎓(dc), 1-5V⎓(dc), 0-10V⎓(dc)

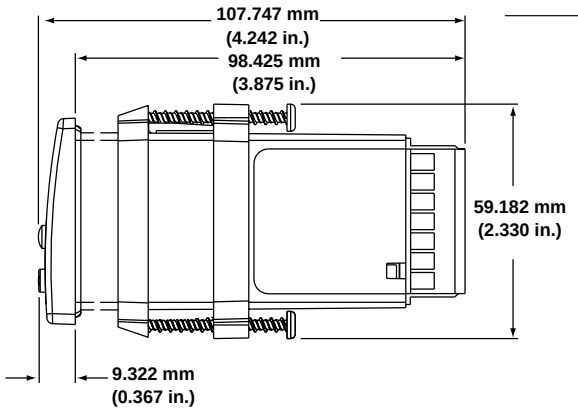
Software/Preset Parameters

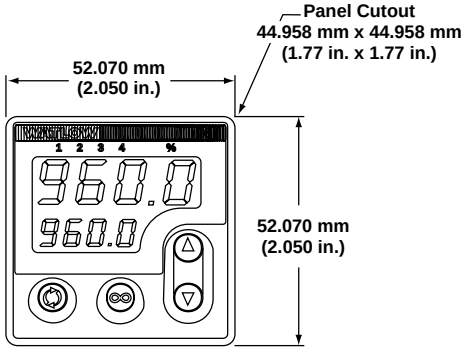
AA = Ramping software

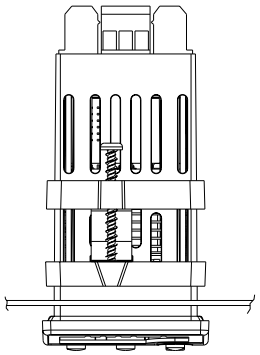
Display/Overlay

	Upper/Lower		Upper/Lower
RR =	Red/Red display	GR =	Green/Red display
RG =	Red/Green display	GG =	Green/Green display

② Electromechanical relays warranted for 100,000 closures only. Solid state switching devices recommended for applications requiring fast cycle times or extended service life.







PID with Time/ Temperature Profiling Controllers

SERIES 981/982

The Watlow SERIES 981 (horizontal) and SERIES 982 (vertical) are ⅛ DIN time/temperature profile controllers. Among the most easy-to-use time/temperature profile controllers, they are designed with most typical programming needs in mind. Both vertical and horizontal models offer four-file/24-step program capability or easy-to-use fixed set point operation.

Time/temperature profile operation includes four files with six steps in each file. Programming options include ramp-rate or time-based profiles, guaranteed soak deviation, program looping and program status selection after power outage. The files may be linked to create a single 24-step program.

The primary analog input accepts 11 different thermocouple types, RTD or scalable process inputs. A second analog input can be factory configured for a slidewire feedback input, common in gas valve control. With up to two event inputs, the SERIES 981/982 offers remote program start or hold capability and allows the operator to program a wait-for event.

Performance Capabilities

- Exceptional accuracy to ±0.1 percent of span
- Operating environment 0 to 55°C (32 to 130°F)

Features and Benefits

Four files/six steps per file

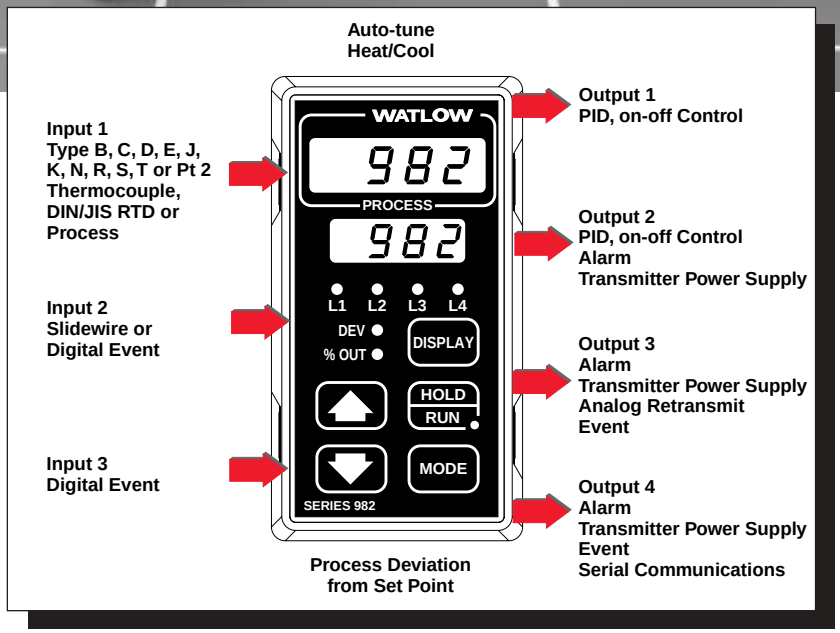
- Meets the need of most time/ temperature profile applications (files may be linked together)

Auto-tuning of both heat and cool outputs

- Provide easy operation with one-step tuning of system parameters

Optional dual auxiliary outputs

- Give flexibility to time-based events or alarm outputs



Optional retransmit of set point or process variable

- For master programmer or chart recorder connection

Hardware and software parameter lockout options

- Provide several levels of operator security

UL®, CE, NEMA 4X① (IP65) front panel

- Provides corrosion resistance

10Hz sampling rate and burst-fire control

- Delivers smooth, accurate process control

Slidewire feedback

- Interfaces with most slidewire input positioning devices

Three-year warranty②

- Provides Control Confidence®

Applications

- Any process requiring time/temperature profile control
- Processes requiring slidewire control of valves or positions

① To effect NEMA 4X (IP65) rating requires a minimum mounting panel thickness of 1.5 mm (0.06 in.) and surface finish not rougher than 0.000812 mm (0.000032 in.).

② Electromechanical relays warranted for 100,000 closures only. Solid state switching devices recommended for applications requiring fast cycle times or extended service life.

PID with Time/ Temperature Profiling Controllers

SERIES 981/982

Applications Cont.

- Complex process furnaces
- Environmental chambers
- Processes needing data logging

Specifications

Control Mode

- Single input, quad output, optional retransmit of set point or process variable
- Programmable direct and reverse acting control outputs
- 4-file/6 steps per file time/ temperature profile or fixed set point control
- Ramp-rate or time-based programming
- Selectable control status following power loss

Agency Approvals

- 89/336/EEC Electromagnetic Compatibility Directive
- EN 50081-2: 1994 Emissions
- EN 50082-2: 1994 Immunity
- 73/23/EEC Low Voltage Directive
- EN 601010-1: 1993 Safety
- UL® #873, C-UL® File #43684
- NEMA 4X

Operator Interface

- Dual, four digit LED displays. Upper: 10 mm (0.4 in.) Lower: 8 mm (0.3 in.)
- MODE, HOLD/RUN, DISPLAY, UP and DOWN keys

Accuracy

- Calibration accuracy and sensor conformity: ±0.1 percent of span, ±1 LSD, 25°C ±3°C (77°F ±5°F) ambient and rated line voltage ±10 percent
- Accuracy span: 540°C (1000°F) minimum
- Temperature stability: 0.1°C/°C (± 0.2°F/°F) change in ambient

Sensors/Inputs

- Contact input for software function select (event input)
- Thermocouple Types B, C[1], D[1], E, J, K, N, R, S, T and Pt 2[1]
- RTD resolution in 1° or 0.1° RTD scales
- Process variables: 0-50mV⎓(dc), 0-20mA⎓(dc), 4-20mA⎓(dc), 0-5V⎓(dc), 1-5V⎓(dc), 0-10V⎓(dc)
- Slidewire or digital event input options
- Sensor break protection de-energizes system for safety. Latching or non-latching

Input Range

Specified temperature ranges represent the controller's operational span.

Thermocouple

Available with basic or universal signal conditioner

Type C[1]	0	to	2316°C
	(32	to	4200°F)
Type D[1]	0	to	2316°C
	(32	to	4200°F)
Type E	-200	to	799°C
	(-328	to	1470°F)
Type J	0	to	816°C
	(32	to	1500°F)
Type K	-200	to	1371°C
	(-328	to	2500°F)
Type N	0	to	1300°C
	(32	to	2372°F)
Type T	-200	to	399°C
	(-328	to	750°F)
Pt 2[1]	0	to	1395°C
	(32	to	2543°F)

Available with universal signal conditioner

Type B	870	to	1816°C
	(1598	to	3300°F)
Type R	0	to	1760°C
	(32	to	3200°F)
Type S	0	to	1760°C
	(32	to	3200°F)

RTD Resolution (DIN or JIS)

1° (DIN)	-200	to	800°C
	(-328	to	1472°F)
1° (JIS)	-200	to	630°C
	(-328	to	1166°F)
0.1° (DIN and JIS)			
	-73.3	to	537.7°C
	(-99.9	to	999.9°F)

Process

0-5V⎓(dc)	1-5V⎓(dc)
0-10V⎓(dc)	0-20mA⎓(dc)
4-20mA⎓(dc)	0-50mV⎓(dc)

-999 to 9999 units

#2 input slidewire feedback

100 to 1200Ω

Output Options

- Solid state relay, Form A, 0.5A @ 24V~(ac) min., 253V~(ac) max., opto-isolated, burst fire switching. With or without contact suppression. Off state output impedance is 20kΩ with RC suppression, 31MΩ without contact suppression
- Open collector or switched dc signal provides a minimum turn on voltage of 3V⎓(dc) into a minimum 500Ω load; maximum on voltage not greater than 32V⎓(dc) into an infinite load, isolated
- Electromechanical relay[2], Form C, 5A @ 120/240V~(ac), 6A @ 28V⎓(dc), ⅛ hp. @ 120V~(ac), 125VA @ 120V~(ac). With or without contact suppression. Off state output impedance with RC suppression is 20kΩ
- Process, 0-20mA⎓(dc), 4-20mA⎓(dc) into 800Ω maximum, 0-5V⎓(dc), 1-5V⎓(dc), or 0-10V⎓(dc) into 1kΩ minimum reverse acting, isolated
- Electromechanical relay[2], Form A/B, 5A @ 120/240V~(ac), 6A @ 28V⎓(dc), ⅛ hp. @ 120V~(ac), 125VA @ 120V~(ac). Without contact suppression

[1] Not an ANSI Symbol.
[2] Electromechanical relays warranted for 100,000 closures only. Solid state switching devices recommended for applications requiring fast cycle times or extended service life.

PID with Time/ Temperature Profiling Controllers

F.O.B.: Winona, Minnesota

SERIES 981/982

- External transmitter power supply, 5, 12 or 20V⎓(dc) @ 30mA
- EIA/TIA-232 communications or EIA/TIA-485/EIA/TIA-422 communications, opto-isolated
- Retransmit: 0-20mA⎓(dc), 4-20mA⎓(dc) with 600Ω max. load impedance, or 0-5V⎓(dc), 1-5V⎓(dc) and 0-10V⎓(dc) with 500Ω min. load impedance

Line Voltage/Power

- 100-240V≂(ac/dc) +10 percent, -15 percent; 50/60Hz, ±5 percent
- 24 to 28V≂(ac/dc) +10 percent, -15 percent; 50/60Hz, ±5 percent
- Fused internally (factory replaceable only) Slo-Blo® type (time-lag)
  2A, 250V for high voltage versions
  5A, 250V for low voltage versions
- Power consumption 16VA maximum
- Data retention upon power failure via non-volatile memory

Operating Environment

- 0 to 55°C (32 to 130°F)
- 0 to 90 percent RH, non-condensing

Note: If this output will drive a solenoid, MDR, contactor or other inductive device, order a Quencharc® (0804-0147-0000) for output protection. See user's manual for wiring.

① Electromechanical relays warranted for 100,000 closures only. Solid state switching devices recommended for applications requiring fast cycle times or extended service life.

② Output cannot be configured as an event output.

③ Event output capable.

Availability

Four working days for orders less than 20 units. For orders over 20 units, consult factory for release and shipment schedules.

Slo-Blo® is a registered trademark of Littelfuse, Inc.
Quencharc® is a registered trademark of ITW Paktron.

Ordering Information

To order, complete the code number with the information below:

9 8 C - - -

SERIES 981/982 = Ramping controller
1 analog input, 4 outputs, 2 digital inputs

Power Supply & Mounting
1 = 100 to 240V≂(ac/dc) nominal, horizontal mounting
2 = 100 to 240V≂(ac/dc) nominal, vertical mounting
3 = 24 to 28V≂(ac/dc) nominal, horizontal mounting
4 = 24 to 28V≂(ac/dc) nominal, vertical mounting

Software
C = Standard (4-file/6 step per file program capability)
S = Special customer feature

Input 1
1 = Basic thermocouple signal conditioner (excluding Type B, R and S)
2 = Universal signal conditioner (see Range Information)

Input 2
0 = None
3 = Slidewire feedback (see Range Information)
5 = Second digital event (one digital event is standard on all units)

Output 1②
B = Solid state relay, Form A, 0.5A, with RC suppression
C = Switched dc or open collector, isolated
D = Electromechanical relay①, Form C, 5A with RC suppression
E = Electromechanical relay①, Form C, 5A without contact suppression
F = Universal process, 0-5V⎓(dc), 1-5V⎓(dc), 0-10V⎓(dc), 0-20mA⎓(dc), 4-20mA⎓(dc), isolated
K = Solid state relay, Form A, 0.5A, without contact suppression

Output 2②
A = None
B = Solid state relay, Form A, 0.5A, with RC suppression
C = Switched dc or open collector, isolated
D = Electromechanical relay①, Form C, 5A with RC suppression
E = Electromechanical relay①, Form C, 5A without contact suppression
F = Universal process 0-5V⎓(dc), 1-5V⎓(dc), 0-10V⎓(dc), 0-20mA⎓(dc), 4-20mA⎓(dc), isolated
K = Solid state relay, Form A, 0.5A, without contact suppression
T = External signal conditioner power supply, 5, 12 or 20V⎓(dc) @ 30mA

Output 3③
A = None
B = Solid state relay, Form A, 0.5A, with RC suppression
C = Switched dc or open collector, isolated
J = Electromechanical relay①, Form A or B, 5A without contact suppression
K = Solid state relay, Form A, 0.5A without contact suppression
M = Retransmit, 0-20mA⎓(dc), 4-20mA⎓(dc)
N = Retransmit, 0-5V⎓(dc), 1-5V⎓(dc), 0-10V⎓(dc)
T = External signal conditioner power supply, 5, 12 or 20V⎓(dc) @ 30mA

Output 4③
A = None
B = Solid state relay, Form A, 0.5A, with RC suppression
C = Switched dc or open collector, isolated
D = Electromechanical relay①, Form C, 5A with RC suppression
E = Electromechanical relay①, Form C, 5A without contact suppression
K = Solid state relay, Form A, 0.5A without contact suppression
R = EIA/TIA-232 communications, opto-isolated
S = EIA/TIA-485/EIA/TIA-422 communications, opto-isolated
U = EIA/TIA-232, EIA/TIA-485 software selectable, communications, opto-isolated
T = External signal conditioner power supply, 5, 12 or 20V⎓(dc) @ 30mA

Display Color (Upper/Lower)
GG = Green/Green
GR = Green/Red
RG = Red/Green
RR = Red/Red
XX = Custom overlays or default settings

PID with Time/ Temperature Profiling Controllers

SERIES 981/982

Storage Temperature

- -40 to 85°C (-40 to 185°F)

Terminals

- #6 compression universal head screws, accepts 28-14 gauge wire

Controller Weight

- 0.45 kg (1.0 lb)

Shipping Weight

- 1.35 kg (3.01 lbs)

Dimensions

Vertical Orientation

Overall

Height:	100 mm	(4.03 in.)
Width:	55 mm	(2.18 in.)
Depth:	120 mm	(4.74 in.)

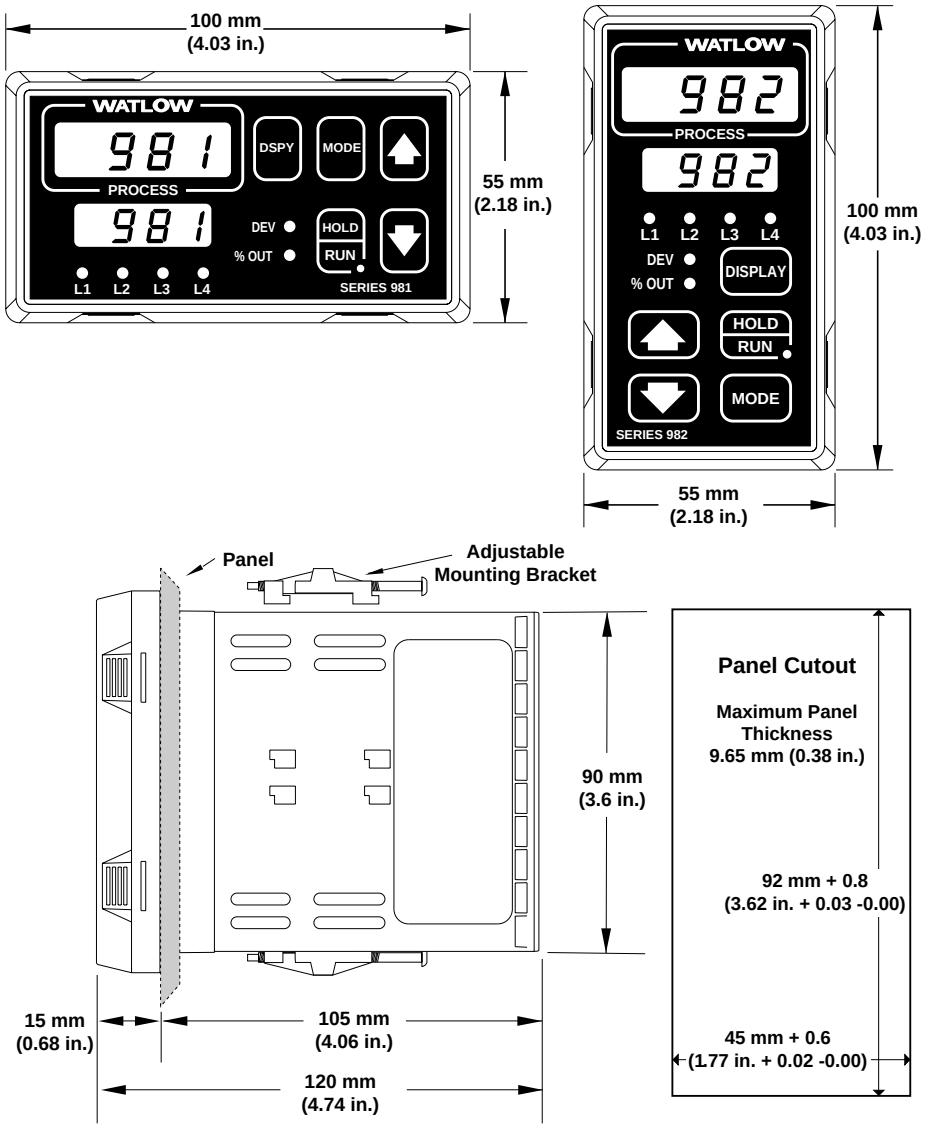
Bezel

Height:	100 mm	(4.03 in.)
Width:	55 mm	(2.18 in.)
Depth:	15 mm	(0.68 in.)

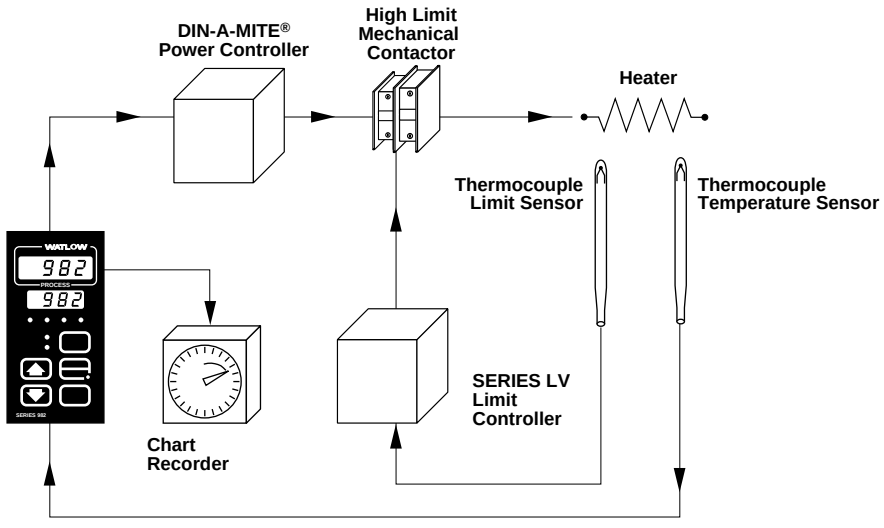
Chassis

Height:	90 mm	(3.6 in.)
Width:	45 mm	(1.7 in.)
Depth:	105 mm	(4.06 in.)

Dimensions



System Diagram



PID with Time/ Temperature Profiling Controllers

SERIES F4S

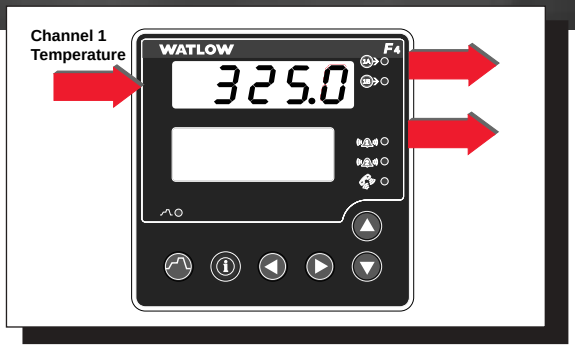
The SERIES F4S ¼ DIN industrial ramping controllers offer an easy to set up and operate solution for the most demanding ramp and soak processing applications. The features and performance of these units make them ideally suited for environmental chamber or furnace and oven applications.

The F4S is a competitively priced controller which features a four line, high definition LCD interface display that makes profile programming and controller configuration significantly faster and easier. A 16 bit micro-processor 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 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 F4S ramping controllers are packaged with a NEMA 4X front face to withstand harsh environments and a 101.6 mm (4.0 in.) deep case with removable connectors for wiring convenience.



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
- 20Hz update rate on input 1
- 10Hz update rate on inputs 2 and 3

Field upgradeable firmware

- Downloads available at no charge from www.watlow.com/F4
- Reduces downtime
- Eliminates the need for an RMA

Universal inputs

- Provide application versatility

Expandable modular construction

- Field upgradeable

Enhanced environmental chamber control

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

Cascade control

- Provides precise two variable control
- Auxiliary inputs required (ordering option)

Real time clock with battery backup

- Offers operational flexibility and peace of mind

PID with Time/ Temperature Profiling Controllers

SERIES F4S

Set Point Ramp and Soak Programming

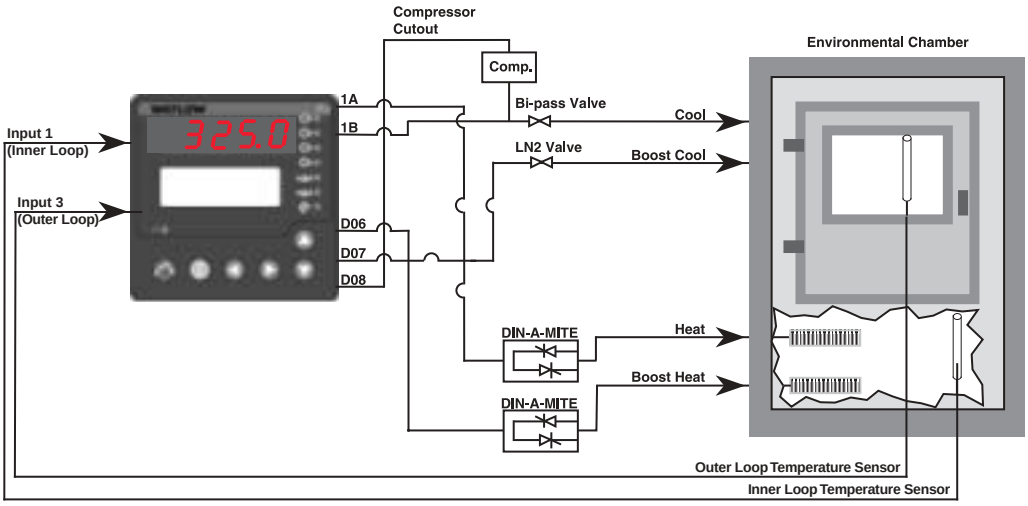
The enhanced programming features found in the SERIES F4S ramping controllers are the result of listening to our customers' demand for greater capabilities with reduced programming complexity.

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 Chamber Application with Cascade

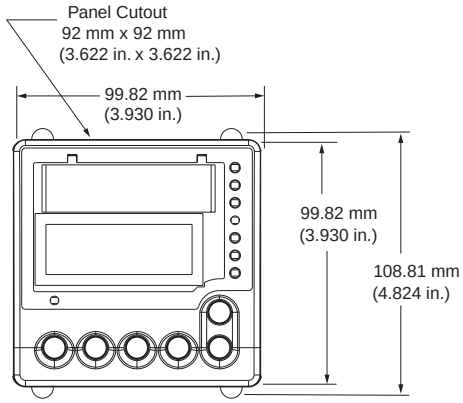


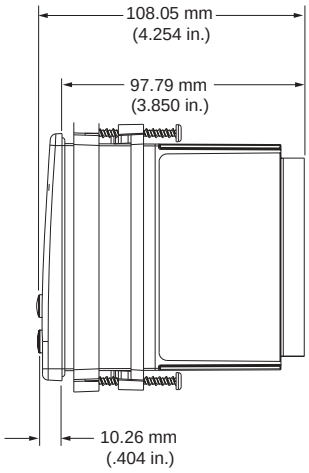
Serial Communication

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 baud. 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(s)

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.

PID with Time/ Temperature Profiling Controllers

SERIES F4S

Specifications

Dimensions

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

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) maximum)
- 10KΩ input impedance

Control Outputs (1A, 1B)

- Update rate = 20Hz

Open Collector/Switched dc

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

Solid State Relay

- Zero switched, optically coupled, 0.5A @ 24V~(ac) minimum, 253V~(ac) maximum

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) maximum

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
- IP65 and NEMA 4X
- CE to EN 61010-1 and 631326

Terminals

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

Power

- 100-240V~(ac), -15 percent, +10 percent; 50/60Hz, ±5 percent
- 24-28V≂(ac/dc), -15 percent, +10 percent (order option)
- 39VA maximum power consumption
- Data retention upon power failure via nonvolatile memory (seven years for battery backed ram)
- Sensor input isolation from input to input to output to communication circuitry is 500V~(ac)

Operating Environment

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

Accuracy

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

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

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

  Type B: 0.24 percent of span for 870°C to 1700°C (1598°F to 3092°F)
- Accuracy span: Less than or equal to operating ranges, 540°C (1000°F) minimum
- Temperature stability: ±0.1°C/°C (±0.1°F/°F) rise in ambient for thermocouples

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

Displays

- Process: Five, seven segment LED, red
- Control interface display: high definition LCD, green

PID with Time/ Temperature Profiling Controllers

F.O.B.: Winona, Minnesota

SERIES F4S

Sensor Operating Ranges:

Type J:	0	to	815°C
	(32	to	1500°F)
Type K:	-200	to	1370°C
	(-328	to	2500°F)
Type T:	-200	to	400°C
	(-328	to	750°F)
Type N:	0	to	1300°C
	(32	to	2372°F)
Type E:	-200	to	800°C
	(-328	to	1472°F)
Type C: (W5)	0	to	2315°C
	(32	to	4200°F)
Type D: (W3)	0	to	2400°C
	(32	to	4352°F)
Type PTII:	0	to	1395°C
	(32	to	2543°F)
Type R:	0	to	1760°C
	(32	to	3200°F)
Type S:	0	to	1760°C
	(32	to	3200°F)
Type B:	0	to	1816°C
	(32	to	3300°F)
RTD (DIN):	-200	to	800°C
	(-328	to	1472°F)
RTD (JIS):	-200	to	800°C
	(-328	to	1472°F)

Process:-19,999 to 30,000 units

Sensor Accuracy Ranges:

Input ranges

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

Process:-19,999 to 30,000 units

Ordering Information

To order, complete the code number on the right with the information below:

F4 S - A -

SERIES F4S = 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 0.5 amp 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 0.5 amp 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 Options
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