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Plug and Play Firmware and Hardware



Features and Benefits

Burst fire

- Increase heater life/better temperature controllability

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

Pluggable output modules

- Field expandable

Fast 10Hz sampling

- Improved control responsiveness

Programmable menus (Patent pending)

- Can be self-tailored for exact user needs

Open loop break protection

- Indication of thermal loop problem

NEMA 4X (IP65)

- Water and corrosion resistant front panel can be washed down

16 programmable ramp and soak steps

- Profiles of dynamic production processes can be programmed into the controller

Automatic tuning

- Easy one step tuning of PID control parameters

Your Authorized Watlow Distributor Is:

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 pluggable 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, remote set point input, heating, boost heating, cooling, alarms, digital communications, ramp and soak and retransmit. These features make this controller ideally suited for applications in markets such as plastics packaging, semiconductor, food processing and lab equipment.

Set point ramping operations include two files with eight steps in each. The files can be linked to create a 16-step profile.

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

The SERIES 96 is manufactured by ISO 9001 registered Watlow Controls and reliably backed by a three-year warranty.

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Specifications—1841

Controller

- Microprocessor-based, user selectable control modes
- Heat and cool auto-tune for control outputs
- Universal input 1, auxiliary input 2, 4 outputs
- Control outputs user selectable as on-off, P, PI, PID
- Input sample period; Single input 10Hz (100 ms), dual input 5Hz (200 ms) adjustable digital filter
- Display update; 2Hz (500 ms), adjustable digital filter
- Output update; burst, 0.1 to 999.9 seconds
- Input/Output/Communication isolation
- Displayed in °C, °F, or process units

Operator Interface

- Dual 4-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 types
- >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

Remote Set Point Input: mA or VDC Range Selectable

- Voltage input impedance 20kΩ
- Current input impedance 100Ω

Output Types

Open Collector/Switched DC

- Open collector configuration:
  Maximum voltage 42V⎓(dc)
  Maximum current 200mA
  Maximum “on” resistance 1.1Ω
  Maximum offstate 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 offstate 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:
  dc ranges = 2.5mV nominal
  mA ranges = 5µA nominal
- Calibration accuracy:
  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:
  dc ranges = 2.5mV nominal
  mA ranges = 5µA nominal
- Calibration accuracy:
  dc ranges = ±15mV
  mA ranges = ±30µA
- Temperature stability 100ppm/°C

Communications

- EIA/TIA-485 or 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)

Accuracy

- Input ranges

Type J:	0	to	750°C	or	32	to	1382°F
Type K:	-200	to	1250°C	or	-328	to	2282°F
Type T:	-200	to	350°C	or	-328	to	662°F
Type N:	0	to	1250°C	or	32	to	2282°F
Type E:	-200	to	900°C	or	-328	to	1470°F
Type C(W5):	0	to	2315°C	or	32	to	4200°F
Type D(W3):	0	to	2315°C	or	32	to	4200°F
Type Pt 2:	0	to	1393°C	or	32	to	2540°F
Type R:	0	to	1450°C	or	32	to	2642°F
Type S:	0	to	1450°C	or	32	to	2642°F
Type B:	870	to	1700°C	or	1598	to	3092°F
DIN:	-200	to	800°C	or	-328	to	1472°F
JIS:	-200	to	630°C	or	-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,
  Types R and S; 0.15 percent of span for 0°C to 100°C
  Types B; 0.24 percent of span for 870°C to 1700°C
- 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 ±10mV ±1 LSD at standard conditions
  Temperature stability ±100ppm/°C maximum
- Milliamp input ranges
  Accuracy ±20µA ±1 LSD at standard conditions
  Temperature stability ±100ppm/°C maximum

Agency Approvals

- UL®916 file number E185611, C-UL®, CE, NEMA 4X

Terminals

- Touch safe
- 22 to 12 AWG

Power

- 100-240V≂(ac/dc) +10 percent, -15 percent; 50/60Hz, ±5 percent
- 24-28V≂(ac/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% RH, non-condensing
- Storage temperature: -40 to 85°C, -40 to 185°F

Dimensions

- Width 52 mm (2.05 in.)
- Height 52 mm (2.05 in.)
- Length 107 mm (4.2 in.)
- Depth behind panel surface 98.4 mm (3.875 in.)
- Approximate controller weight 0.2 kg (0.4 lbs)

Allowable Operating Ranges

Type J:	1.0	0	to	815°C	or	32	to	1500°F
	0.1	0.0	to	815.0°C	or	32.0	to	999.9°F
Type K:	1.0	-270	to	1370°C	or	-454	to	2500°F
	0.1	-199.9	to	999.9°C	or	-199.9	to	999.9°F
Type T:	1.0	-270	to	400°C	or	-454	to	750°F
	0.1	-199.9	to	400.0°C	or	-199.9	to	750.0°F
Type N:	1.0	0	to	1300°C	or	32	to	2372°F
	0.1	0.0	to	999.9°C	or	32.0	to	999.9°F
Type E:	1.0	-270	to	800°C	or	-454	to	1470°F
	0.1	-199.9	to	800.0°C	or	-199.9	to	999.9°F
Type C:	1.0	0	to	2315°C	or	32	to	4200°F
	0.1	0.0	to	999.9°C	or	32.0	to	999.9°F
Type D:	1.0	0	to	2315°C	or	32	to	4200°F
	0.1	0.0	to	999.9°C	or	32.0	to	999.9°F
Type Pt 2:	1.0	0	to	1395°C	or	32	to	2543°F
	0.1	0.0	to	999.9°C	or	32.0	to	999.9°F
Type R:	1.0	0	to	1760°C	or	32	to	3200°F
Type S:	1.0	0	to	1760°C	or	32	to	3200°F
Type B:	1.0	0	to	1816°C	or	32	to	3300°F
DIN	1.0	-200	to	800°C	or	-328	to	1472°F
	0.1	-199.9	to	800.0°C	or	-199.9	to	999.9°F
JIS	1.0	-200	to	630°C	or	-328	to	1166°F
	0.1	-199.9	to	630.0°C	or	-199.9	to	999.9°F
Process	-1999	to	9999 units					

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				■	■	■

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Note: These specifications are subject to change without prior notice.

Ordering Information—1842

SERIES 96 **9 6 _ _ - _ _ _ _ - _ _ _**

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

Power Supply

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

Input 2

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

Output 1

C = Switched dc/open collector
D = Electromechanical relay, Form C, 2A, without RC suppression
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 output/open collector
D = Electromechanical relay, Form C, 2A, without RC suppression
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 suppression

Output 4

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

Software/Preset Parameters

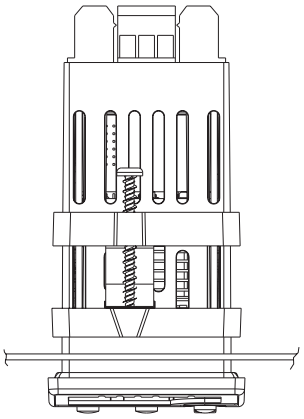
00 = Standard software (order with Standard Display/Overlay)
AA = Ramping software (order with Ramping Display/Overlay)
XX = Custom software
XX = Preset parameters

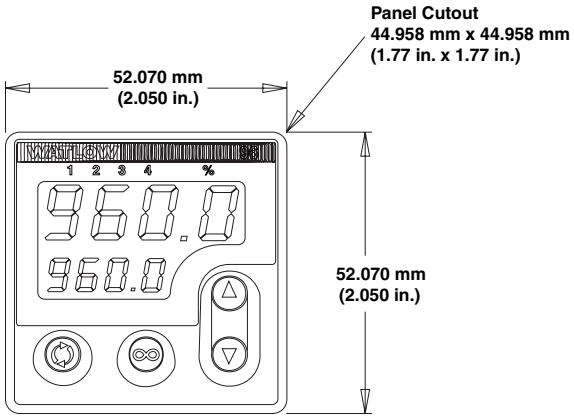
Standard Display/Overlay

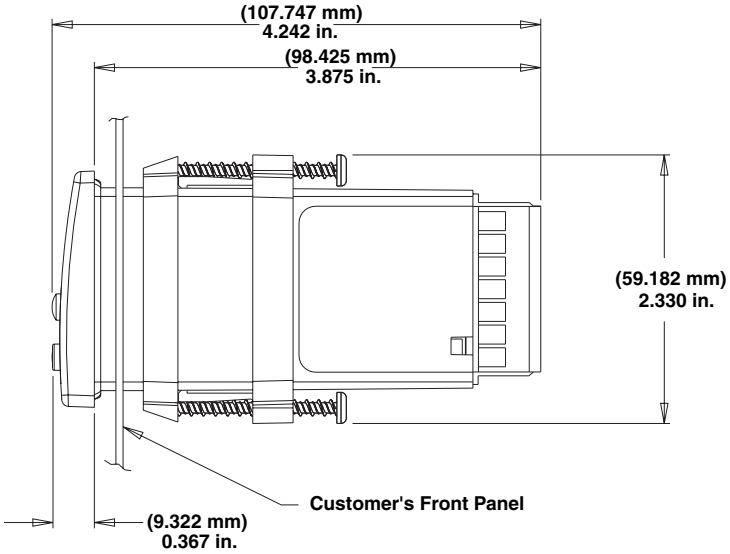
Upper/Lower
RR = Red/Red display
RG = Red/Green display
GR = Green/Red display
GG = Green/Green display

Ramping Display/Overlay

Upper/Lower
BA = Red/Red display
BB = Red/Green display
BC = Green/Red display
BD = Green/Green display







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