Temperature Controllers and Signal Conditioners

Section 26

SOLO™

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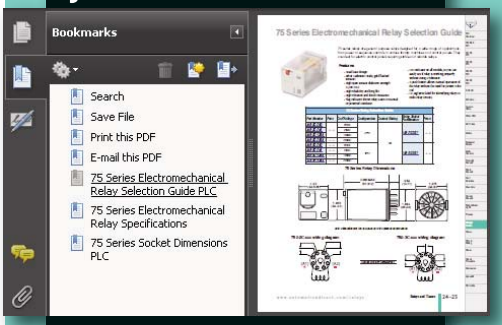

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SOLO™ Process and Temperature Controllers

Choose from 22 models

What is a temperature controller?

A temperature controller is simply a controller that takes an input signal from a temperature device, such as a thermo-couple RTD, or analog signal, and maintains a setpoint using an output signal. Temperature controllers are powerful control tools, but offer very simple operation. SOLO controllers offer four types of control modes: PID, ON/OFF, Ramp/Soak, and manual.

With the SOLO™ series, you get:

- **Precise control**
- **Flexible connectivity**
- **The right size to fit your application**
- **An unbeatable price that includes award-winning technical support**

Universal inputs

SOLO controllers support 13 types of temperature inputs and 5 types of analog inputs – all standard on each unit.

With the industry's best installation documentation, just follow a few simple steps and your process will be up and running in no time.

Simple navigation with pushbutton programming, or you can download the FREE software from our Web site for programming and monitoring the SOLO controllers.

Select the SOLO™ controller that best fits your application

SOLO brand controllers offer you outstanding features at unbeatable prices:

- 4 standard DIN sizes with a dual 4-digit, 7-segment displays for Process Variable and Setpoint
- Dual output control for heating and cooling
- Built-in PID with Autotuning (AT) function for fast and easy startups
- Universal inputs, including T/C, RTD, mA, mV and DC voltage, are standard on all controllers
- Flexible control modes to fit your process include PID, Ramp/Soak, On/Off and Manual
- IP65 environmental rating (when mounted in appropriate enclosures)

Features	1/32 DIN SL4824	1/16 DIN SL4848	1/8 DIN SL4896	1/4 DIN SL9696
Display of PV & SP	Yes	Yes	Yes	Yes
RS-485, MODBUS RTU/ASCII	Yes	Yes	Yes	Yes
Two Separate Event Inputs	No	No	Yes	Yes
Dual Oupputs for heat & cooling loops	Yes	Yes	Yes	Yes
Available Alarms Groups	1	3	3	3
Auto tuning Capability	Yes	Yes	Yes	Yes
Universal Inputs (T/C, RTD, mV & mA)	Yes	Yes	Yes	Yes
	go to page 26-8	go to page 26-9	go to page 26-10	go to page 26-11

Simple Configuration and Control

FREE configuration and monitoring software

That's right, FREE! Configuration and monitoring software (SL-SOFT, downloadable from our Web site) allows you to configure each controller with ease and gives you data analysis capabilities for up to 10 units simultaneously.

FREE software that's easy-to-use and intuitive, with a GUI that makes setting up the SOLO series of temperature controllers a breeze.
(Download at http://support.automationdirect.com/downloads.html)

Process control setup made easy

All units support RS-485 serial communications (up to 38.4K bps) , which allows you to use the free configuration software [SL-SOFT] to configure and monitor multiple SOLO controllers using Modbus RTU or Modbus ASCII protocols. For even simpler setup, the controller can be configured manually with the user-friendly keypad on each unit.

Collect and act on data

Using RS-485 communications, the SL-SOFT utility provides the ability to monitor and log historical data, using the built-in trending graph, from up to ten devices and save it to a .txt file.The RS-485 port can also provide connection to any HMI, PC or PLC supporting industry-standard Modbus RTU or Modbus ASCII protocol. This allows you to collect, monitor and have your application react to data being read from the SOLO controllers.

PLC Connection

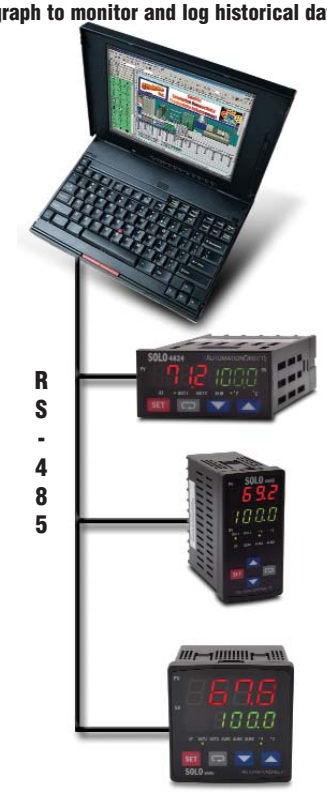
Use a PLC to collect data from the controllers and then have your program trigger events based on the values

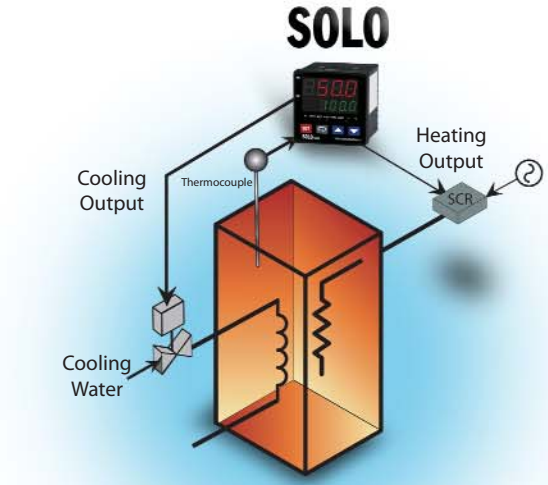
HMI Connection

Use an operator interface to collect data and monitor your process.

PC Connection

Use a PC to configure and monitor your SOLO controllers with SL-SOFT. Use the trending graph to monitor and log historical data.





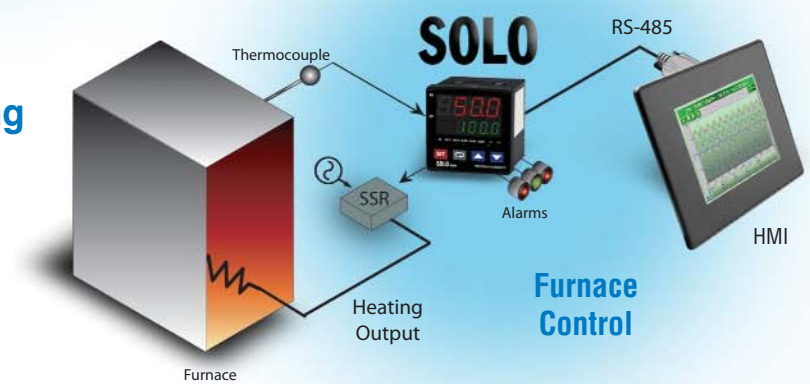
Heating/Cooling

Where can you put SOLO to work?

Process and temperature controllers are powerful process control tools, but they offer very simple operation. SOLO controllers can be used in a variety of applications, either as a stand-alone monitor or controller, or in conjunction with a PLC or other intelligent device.

For example, SOLO can perform simple monitoring (figure at bottom) and alert an operator to abnormal conditions via alarm LEDs on the unit or via a discrete relay alarm output.Data can also be collected and stored by an HMI such as C-more. For stand-alone control loops, SOLO can use a single output (such as furnace control shown below); the dual-output feature makes heating/cooling control straightforward (example at left).

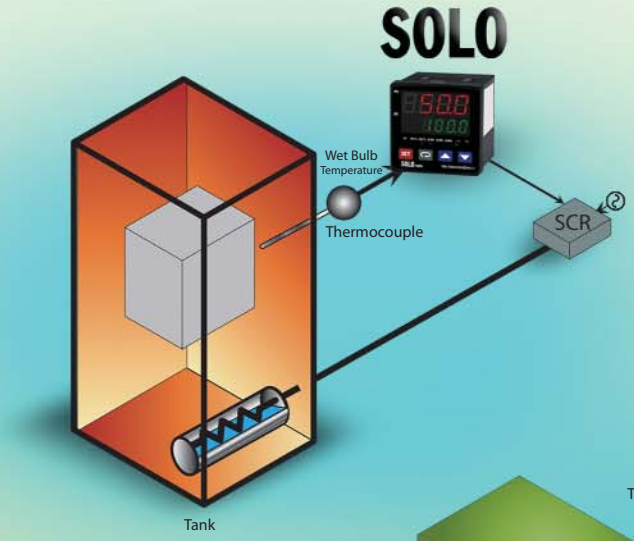
Industrial Heating/Cooling



Furnace Control

Oven Temperature Monitoring

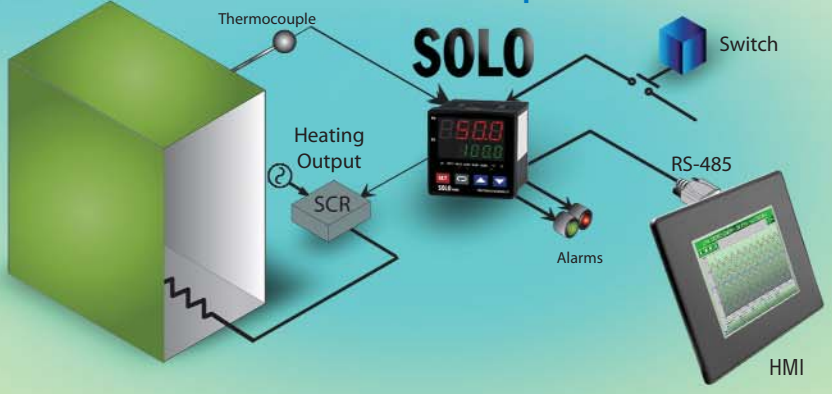
Environmental Control



In this example, SOLO performs control using either configured setpoints or external setpoints received remotely via an operator interface. An event input is used to signal the controller which parameters to use.

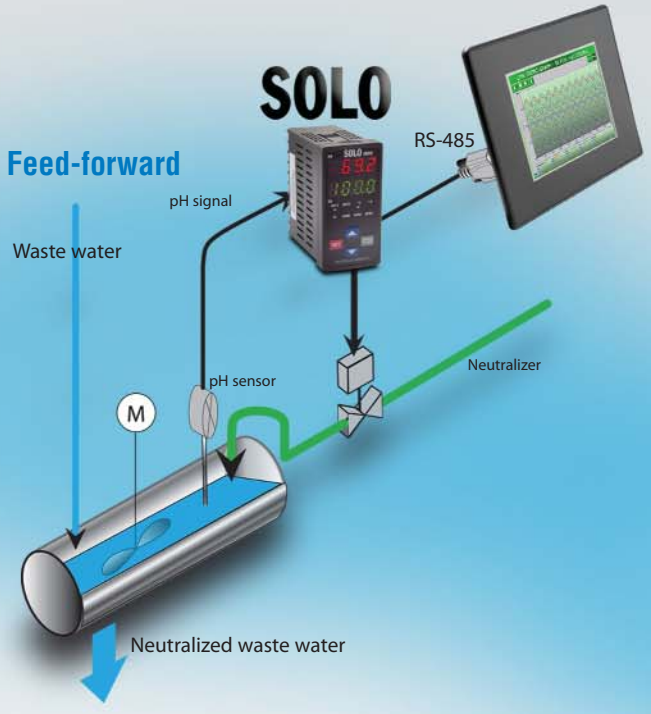
Humidity Control

External Setpoints

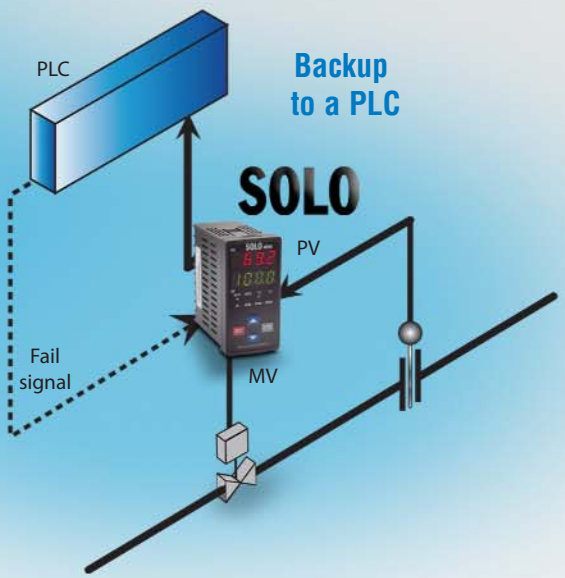


Process Control

Feed-forward



Backup to a PLC



SOLO™ Temperature Controllers

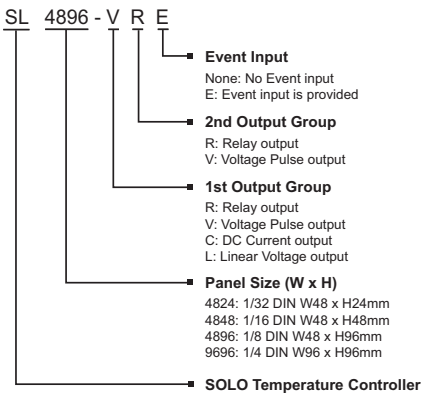
Overview

AutomationDirect's SOLO series includes single-loop dual-output temperature controllers that can control both heating and cooling simultaneously. There are four types of control modes: PID, ON / OFF, Ramp / Soak and Manual. Depending upon the model of controller, the available outputs include relay, voltage pulse, current, and linear voltage. There are up to three alarm outputs available. (The SL4824 series supports only one alarm output.) Select from seventeen alarm types in the initial setting mode. SOLO can accept various types of thermocouple, RTD, or analog inputs. SOLO has a built in RS-485 interface using Modbus slave (ASCII or RTU) communication protocol.

Features

- 1/32 DIN, 1/16 DIN, 1/8 DIN, or 1/4 DIN panel size
- 2 line x 4 character 7-segment LED display for Process value (PV): Red color, and Set Point (SV): Green color
- PID control with Autotune (AT) function
- Accepts eleven types of thermocouples, two types of Pt100 RTD temperature sensors, and DC mA, mV, and Volt signals
- Selectable between°F and °C
- 0°C to 50 °C operating temperature range
- Up to three alarm groups, each with seventeen available alarm types.
- Four possible control output options depending on model; Relay, Voltage Pulse, Current, and Linear Voltage.
- Baud rates up to 38.4K bps.
- Thermocouple and Platinum RTD sample rates at 400 ms per scan
- Analog sample rate at 150 ms per scan
- 64 levels of Ramp / Soak control
- Two optional Event Inputs available in 1/8 DIN and 1/4 DIN sizes
- UL, CUL, and CE agency approvals

SOLO Controller Part Number Key



Specifications	
Input Power Requirements	100 to 240 VAC 50 / 60 Hz
Operation Voltage Range	85% to 110% of rated voltage
Power Consumption	5 VA Max
Memory Protection	EEPROM 4K bit, number of writes 100,000
Control Mode	PID, ON/OFF, Ramp / Soak control or Manual
Input Accuracy	Less than ± 0.2% full scale (except thermocouple R, S, & B types) Max ± 3° (thermocouple R, S, & B types)
Vibration Resistance	10 to 55 Hz, 10 m/s^2 for 10 min, each in X, Y and Z directions
Shock Resistance	Max. 300 m/s^2, 3 times in each 3 axes, 6 directions
Ambient Temperature Range	32°F to 122°F (0°C to 50°C)
Storage Temperature Range	-4°F to 149°F (-20°C to 65°C)
Altitude	2000m or less
Relative Humidity	35% to 80% (non-condensing)
RS-485 Communication	Modbus slave ASCII / RTU protocol
Transmission Speed	2400, 4800, 9600, 19.2K, 38.4K bps
IP Rating	IP65: Complete protection against dust and low pressure spraying water from all directions. (inside suitable enclosure)
Agency Approvals	UL, CUL, CE (UL file number E311366)
Pollution Degree	Degree 2 - Normally, only non-conductive pollution occurs. Temporary conductivity caused by condensation is to be expected
Input Types	
• Thermocouple	K, J, T, E, N, R, S, B, L, U, TXK (400 ms per scan)
• Platinum RTD	3-wire Pt100, JPt100 (400 ms per scan)
• Analog	0-50 mV, 0-5V, 0-10V, 0-20 mA, 4-20 mA (150 ms per scan)
Control Output Options	
• Relay (R)	SL4824, SL4848: SPST max. resistive load 3A @ 250 VAC SL4896, SL9696: SPDT max. resistive load 5A @ 250 VAC
• Voltage Pulse (V)	DC 14V Max, output current 40mA Max
• Current (C)	DC 4-20 mA output (Load resistance: Max 600 Ω)
• Linear Voltage (L)	DC 0-10V (Load resistance Min 1KΩ)

SOLO™ Temperature Controllers

SOLO Temperature Controller Selection Guide

Series		Part Number	Price	Dimensions	Control Output 1	Control Output 2	Event Inputs	Alarm Outputs	RS-485 Port
SL4824		SL4824-RR	<--->	W - 48mm H - 24mm D - 103mm (1/32 DIN)	Relay - 3A, SPST	Relay - 3A, SPST	N/A	Control Output 2 can be used as an Alarm	Yes
		SL4824-VR			Voltage Pulse				
		SL4824-CR			Current				
		SL4824-LR			Linear Voltage				
SL4848		SL4848-RR	<--->	W - 48mm H - 48mm D - 90mm (1/16 DIN)	Relay - 3A, SPST			Alarm 1 and Alarm 2 are 3A, SPST Relays with a shared common. Control Output 2 can be used as Alarm 3	
		SL4848-VR			Voltage Pulse				
		SL4848-CR			Current				
		SL4848-LR			Linear Voltage				
		SL4848-VV			Voltage Pulse	Voltage Pulse		Alarm 1 and Alarm 2 are 3A, SPST Relays with a shared common.	
		SL4848-CV			Current				
		SL4848-LV			Linear Voltage				
SL4896		SL4896-RRE	<--->	W - 48mm H - 96mm D - 92mm (1/8 DIN)	Relay - 5A, SPDT	Relay - 5A, SPDT	Event 1 / Event 2	Alarm 1 and Alarm 2 are 3A, SPST Relays. Control Output 2 can be used as Alarm 3	
		SL4896-VRE			Voltage Pulse				
		SL4896-CRE			Current				
		SL4896-LRE			Linear Voltage				
SL9696		SL9696-RRE	<--->	W - 96mm H - 96mm D - 95mm (1/4 DIN)	Relay - 5A, SPDT				
		SL9696-VRE			Voltage Pulse				
		SL9696-CRE			Current				
		SL9696-LRE			Linear Voltage				
		SL9696-VVE			Voltage Pulse	Voltage Pulse		Alarm 1 and Alarm 2 are 3A, SPST Relays	
		SL9696-CVE			Current				
		SL9696-LVE			Linear Voltage				

***Notes: EVENT1 input is a normally open contact input that controls the output(s) of the controller. All controller outputs are disabled when the contact is closed.**

***EVENT2 input is a normally open contact input that switches the control parameter group between two control parameter groups based on the state of EVENT2. If the contact is open, the primary control parameter group is used for all parameters and outputs. If the contact is closed, the secondary control parameter group is used for all parameters and outputs. Each temperature setting value has individual control parameters.**

User Configurable Output Options

Control Output 1	Control Output 2
Heating	(Alarm)
Cooling	(Alarm)
Heating	Cooling
Cooling	Heating

Mounting Clips

Series	Part Number	Pkg. Qty.	Price
SL4824	SL-CLP-1	8	<--->
SL4848	SL-CLP-2	20	<--->
SL4896			
SL9696			

Available Input Types

All SOLO temperature controllers support these input types.

Thermocouple Type and Range

Input Temperature Sensor Type	Temperature Range
Thermocouple TXK type	-328 to 1472°F (-200 to 800°C)
Thermocouple U type	-328 to 932°F (-200 to 500°C)
Thermocouple L type	-328 to 1562°F (-200 to 850°C)
Thermocouple B type	212 to 3272°F (100 to 1800°C)
Thermocouple S type	32 to 3092°F (0 to 1700°C)
Thermocouple R type	32 to 3092°F (0 to 1700°C)
Thermocouple N type	-328 to 2372°F (-200 to 1300°C)
Thermocouple E type	32 to 1112°F (0 to 600°C)
Thermocouple T type	-328 to 752°F (-200 to 400°C)
Thermocouple J type	-148 to 2192°F (-100 to 1200°C)
Thermocouple K type	-328 to 2372°F (-200 to 1300°C)

RTD Type and Range

Input Temperature Sensor Type	Temperature Range
Platinum Resistance (Pt100)	-328 to 1112°F (-200 ~ 600°C)
Platinum Resistance (JPt100)	-4 to 752°F (-20 ~ 400°C)

Voltage Input Type and Input Range

Voltage Input Type	Engineering Range
0~50mV Analog Input	-999 to 9999
0V~10V Analog Input	-999 to 9999
0V~5V Analog Input	-999 to 9999

Current Input Type and Range

Current Input Type	Engineering Range
4~20mA Analog Input	-999 to 9999
0~20mA Analog Input	-999 to 9999

SOLO™ Temperature Controllers 1/32 DIN

SL4824 Series <--->

Features

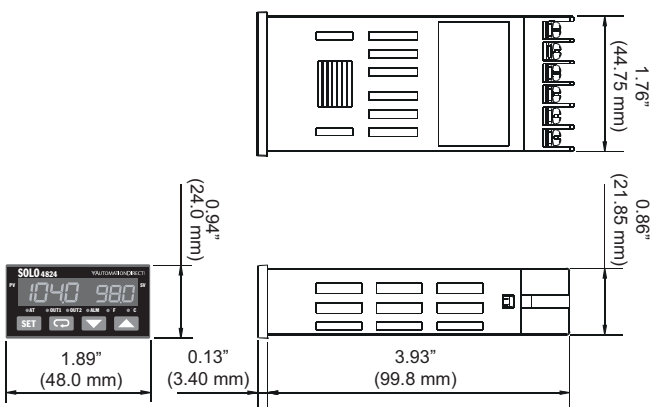
- 1/32 DIN panel size
- PID with Autotune
- Thermocouple, RTD, mA, mV and voltage inputs
- Output #1: Relay, Voltage Pulse, Current or Linear Voltage
- Output #2; Relay or Alarm Relay
- RS-485 communications port
- UL, CUL and CE approvals

Output Specifications			
Part Number	***Price***	***Output #1***	***Output #2 / Alarm****
SL4824-RR	<--->	Relay - SPST	Relay - SPST
SL4824-VR		Voltage Pulse	Relay - SPST
SL4824-CR		Current	Relay - SPST
SL4824-LR		Linear Voltage	Relay - SPST
****Output #2 can be configured as a control output or an alarm output***			

Note: The mounting clip and a 249 Ω resistor are included.

Extra mounting clips are available (Part Number: SL-CLP-1, Qty: 8 per package)

Dimensions



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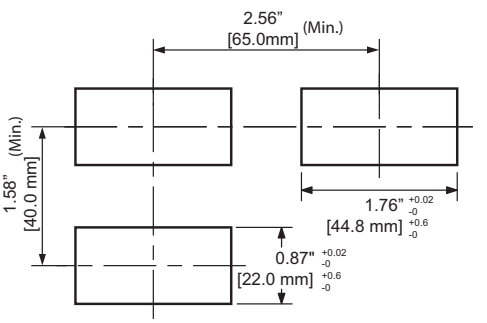


For wiring diagrams go to www.automationdirect.com documentation section.

SOLO™ Temperature Controllers 1/16 DIN

SL4848 Series <--->

Features

- 1/16 DIN panel size
- PID with Autotune
- Thermocouple, RTD, mA, mV and voltage inputs
- Output #1: Relay, Voltage Pulse, Current or Linear Voltage
- Output #2: Relay or Voltage Pulse for control or Alarm output
- RS-485 communications port
- UL, CUL and CE approvals

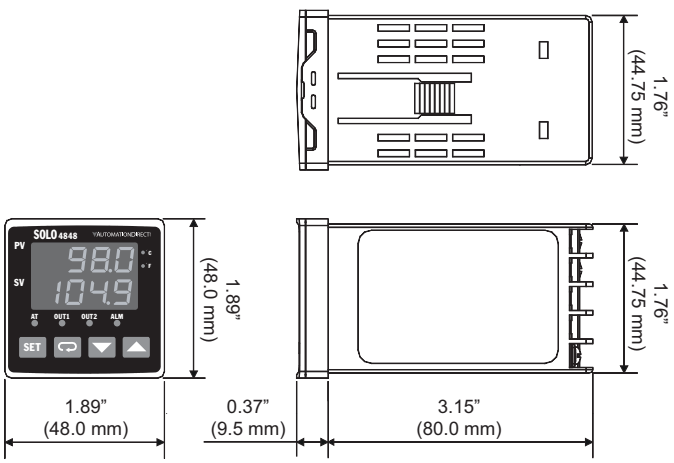
Output Specifications					
Part Number	**Price**	**Output #1**	**Output #2 / Alarm #3***	**Alarm #1****	**Alarm #2****
SL4848-RR		Relay - SPST	Relay - SPST	Relay - SPST	Relay - SPST
SL4848-VR		Voltage Pulse	Relay - SPST	Relay - SPST	Relay - SPST
SL4848-CR		Current	Relay - SPST	Relay - SPST	Relay - SPST
SL4848-LR	<--->	Linear Voltage	Relay - SPST	Relay - SPST	Relay - SPST
SL4848-VV		Voltage Pulse	Voltage Pulse	Relay - SPST	Relay - SPST
SL4848-CV		Current	Voltage Pulse	Relay - SPST	Relay - SPST
SL4848-LV		Linear Voltage	Voltage Pulse	Relay - SPST	Relay - SPST

*Output #2 can be configured as a control output or as Alarm #3
** Alarm #1 and Alarm #2 have a shared common

Note: A set of mounting clips and a 249 Ω resistor are included.

Extra mounting clips are available (Part Number: SL-CLP-2, Qty: 20 per package)

Dimensions



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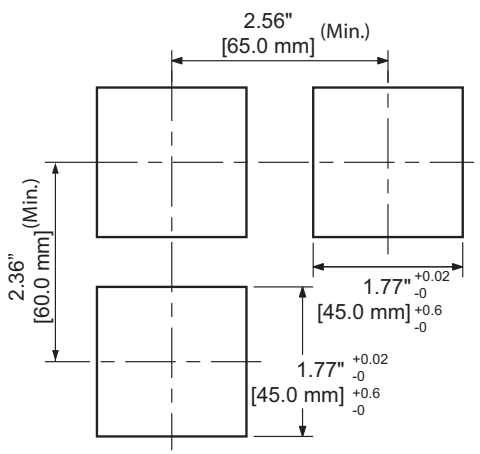


For wiring diagrams go to www.automationdirect.com's Documentation section.

SOLO™ Temperature Controllers 1/8 DIN

SL4896 Series <--->

Features

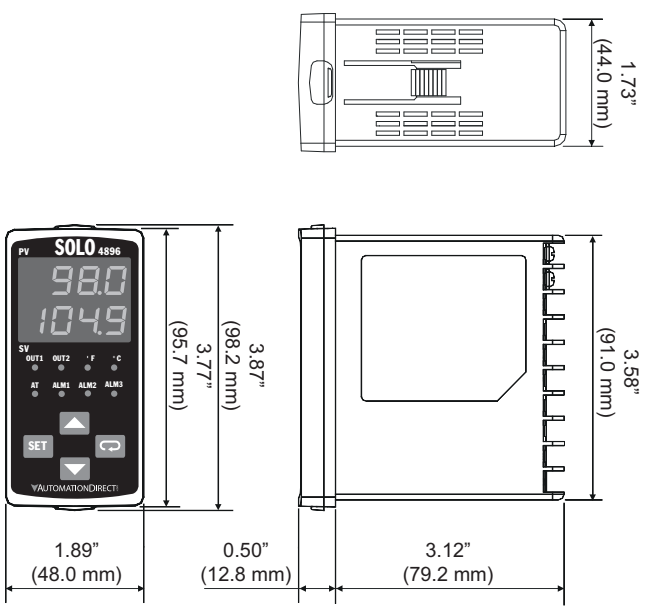
- 1/8 DIN panel size
- PID with Autotune
- Thermocouple, RTD, mA, mV and voltage inputs
- 2 event inputs
- Output #1: Relay, Voltage Pulse, Current or Linear Voltage
- Output #2: Relay or Alarm Relay
- RS-485 communications port
- UL, CUL and CE approvals

Output Specifications					
Part Number	***Price***	***Output #1***	***Output #2 / Alarm #3****	***Alarm #1***	***Alarm #2***
SL4896-RRE	<--->	Relay - SPDT	Relay - SPDT	Relay - SPST	Relay - SPST
SL4896-VRE		Voltage Pulse	Relay - SPDT	Relay - SPST	Relay - SPST
SL4896-CRE		Current	Relay - SPDT	Relay - SPST	Relay - SPST
SL4896-LRE		Linear Voltage	Relay - SPDT	Relay - SPST	Relay - SPST
Output #2 can be configured as a control output or as Alarm #3					

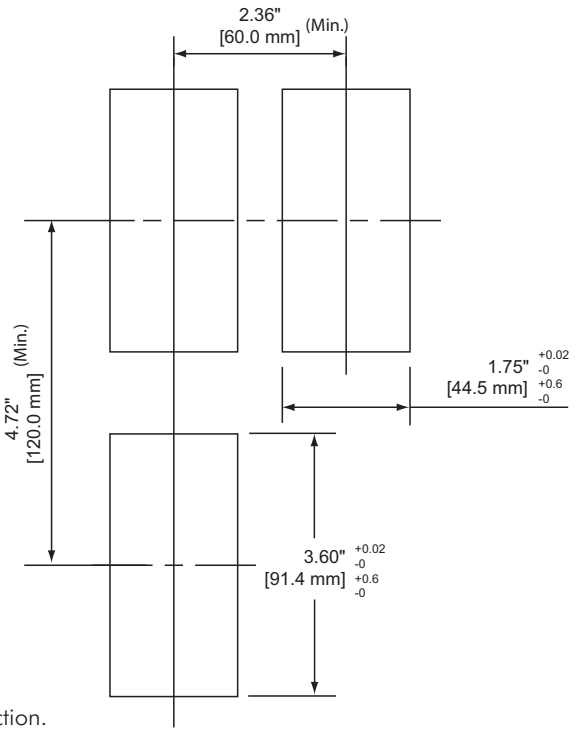
Note: A set of mounting clips and a 249 Ω resistor are included.

Extra mounting clips are available (Part Number: SL-CLP-2, Qty: 20 per package)

Dimensions



Minimum Cutout and Spacing



For wiring diagrams go to www.automationdirect.com documentation section.

SOLO™ Temperature Controllers 1/4 DIN

SL9696 Series <--->

Features

- 1/4 DIN panel size
- PID with Autotune
- Thermocouple, RTD, mA, mV and voltage inputs.
- 2 event inputs
- Output #1: Relay, Voltage Pulse, Current or Linear Voltage
- Output #2: Relay or Voltage Pulse for control or Alarm output
- RS-485 communications port
- UL, CUL and CE approvals

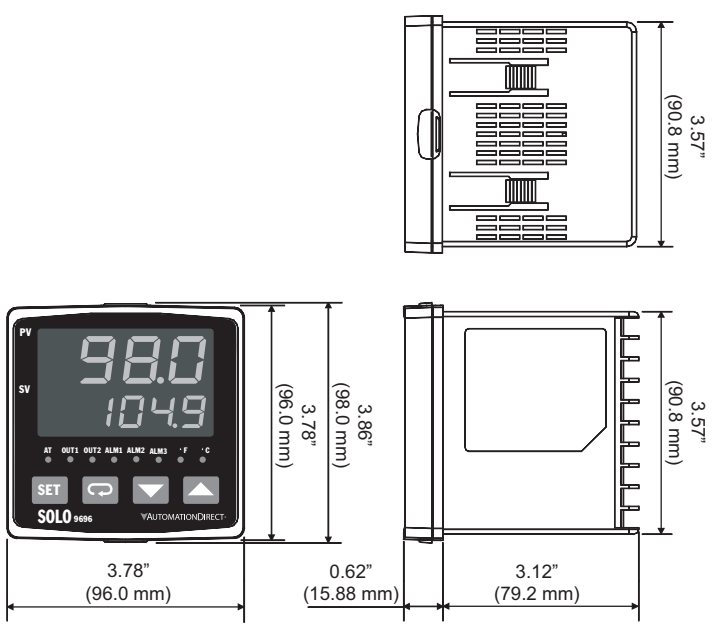
Output Specifications					
Part Number	**Price**	**Output #1**	**Output #2 / Alarm #3***	**Alarm #1**	**Alarm #2**
SL9696-RRE	<--->	Relay - SPDT	Relay - SPDT	Relay - SPST	Relay - SPST
SL9696-VRE		Voltage Pulse	Relay - SPDT	Relay - SPST	Relay - SPST
SL9696-CRE		Current	Relay - SPDT	Relay - SPST	Relay - SPST
SL9696-LRE		Linear Voltage	Relay - SPDT	Relay - SPST	Relay - SPST
SL9696-VVE		Voltage Pulse	Voltage Pulse	Relay - SPST	Relay - SPST
SL9696-CVE		Current	Voltage Pulse	Relay - SPST	Relay - SPST
SL9696-LVE		Linear Voltage	Voltage Pulse	Relay - SPST	Relay - SPST

Output #2 can be configured as a control output or as Alarm #3

Note: A set of mounting clips and a 249 Ω resistor are included.

Extra mounting clips are available (Part Number: SL-CLP-2, Qty: 20 per package)

Dimensions



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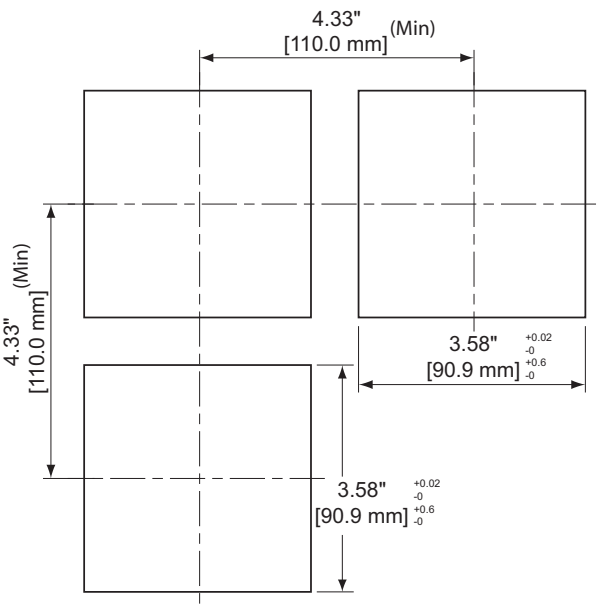


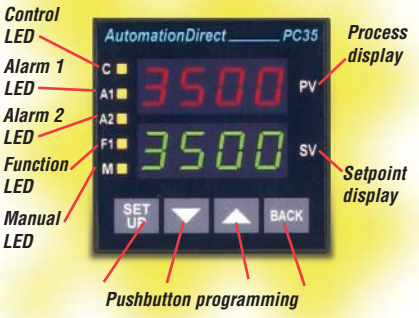
For wiring diagrams go to www.automationdirect.com documentation section.

PM/TC/PC Series Process Controllers

Flexible and powerful

- **Universal sensor inputs.** How many times have you had to open a secret compartment with tiny dipswitches just to select your input range? This is even more difficult to do on a preinstalled controller. With all AUTOMATIONDIRECT process/temperature controllers, this difficulty is eliminated with the ability to select your inputs from the front panel.
- **Configurability.** Many controller manufacturers force the user to choose their input sensors and output control parameters before they can order the controller. Each controller has a predetermined input, such as a J-type thermocouple. If your application changes, you must order a whole new controller. With these process/temperature controllers, all inputs and outputs are configurable from the front panel. With a push of a button, switch from a thermocouple input to a RTD input to a voltage/current input.
- **Sensor break detection.** All models include built-in logic to detect if an input sensor is broken. If a wire is cut or the sensor just quits working, the controllers will turn on an alarm contact. This feature could save thousands of dollars in lost time.
- **Control logic.** TC33 and PC35 controllers offer full "PID Autotuning" in the automatic or manual control modes. Algorithms available range from simple on/off control to full PID control including P, PI, or even PID control. This selectability allows the controller to be used in almost all types of applications.

Process/temperature controllers with great features



All controllers offer:

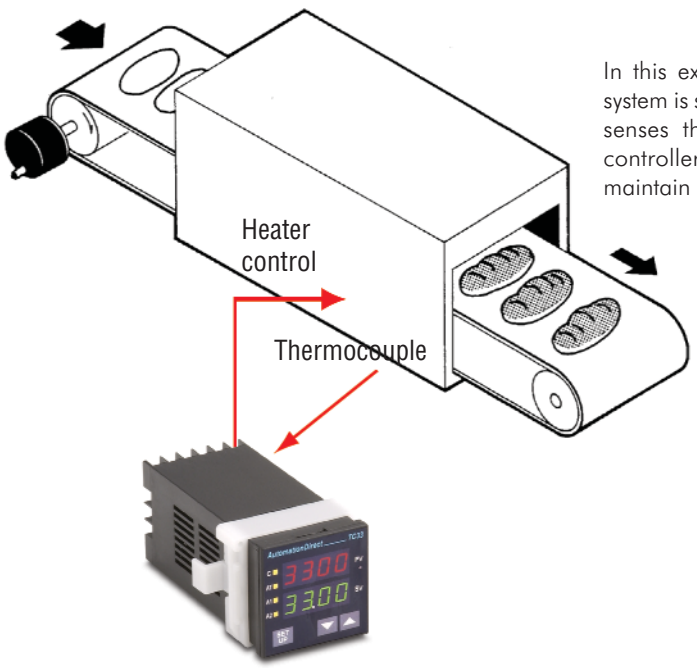
- LCD display(s)
- LED status indicators
- Programming keys for easy setup and monitoring.

Feature	PM24 Series	TC33 Series	PC35 Series
Temperature (T/C & RTD) inputs	Yes	Yes	Yes
Other process inputs	Yes	No	Yes
Digital input	No	No	Yes
On/off control	Yes	Yes	Yes
4-20 mA control	No	Yes	Yes
Time proportioned control	No	Yes	Yes

Temperature / Process Controllers

Temperature/Process Controllers Selection Guide			
			
Description	***On/Off Controller PM Series***	***Temperature Controller TC Series***	***Process Controller PC35 Series***
	On/Off controller with two mechanical relays. Universal inputs include T/C, RTD, mA,mV, V Fully scalable display	Temperature controller with two mechanical relays and one 4-20mA output. Inputs include T/C and RTD. Autotune PID control with ramp and soak profile	Process controller with two mechanical relays and one 4-20mA output. Inputs include T/C, RTD, mA, mV, V. Autotune PID control with 49 segment ramp/soak profile
Input (Universal PV)	T/C, RTD, mA, mV, V	T/C, RTD	T/C, RTD, mA, mV, V
Input (Digital)	N/A	N/A	Optional: One
Outputs (Control, Alarm)	Two mechanical relays	Two mechanical relays or one mechanical relay Optional: One 4-20mA output Optional: DC pulse output	Two mechanical or two solid state relays Optional: One 4-20mA output Optional: DC pulse output
Output Relay Ratings	Mechanical 3A @ 250VAC	Mechanical 3A @ 250VAC	Mechanical 3A @ 250VAC Solid state 1A @ 240VAC
4-20 mA Load Rating	N/A	500Ω @ 12VDC	500Ω @ 24VDC
Input Power	90-260VAC	90-260VAC	90-260VAC
Control Routines	On/off control	PID, autotune, on/off control, Time proportioned	PID, autotune, time proportioned, ON, OFF
Security	Three level function protection via keypad	N/A	Seven level function protection via keypad
Enclosure Rating	NEMA 1 - faceplate	NEMA 1 - faceplate	Nema 1 - faceplate
Prices starting at	<--->	<--->	<--->
Note: The manual for these products is available online. Please visit our Web site at www.automationdirect.com.			

Application example: oven temperature control



In this example, an oven control system is shown. The thermocouple senses the temperature and the controller adjusts the heater to maintain a constant temperature.

PM24 Series Controller Specifications

Overview

The PM24 is a smart process/temperature indicator with two standard relay output alarms. It is used for monitoring and temperature control, as well as for reading analog signals in industrial processes and laboratories.

Universal inputs on the PM24 are all standard, so you can select the input signal from the front panel, without internal dipswitches, jumpers or hardware changes. It accepts seven types of thermocouples and two types of Pt100 RTDs, with selectable °F/°C for all temperature sensors. The linear input accepts 4-20 mA, 0-50 mV and 0-10 Volt signals. The module also accepts and linearizes nine types of 4-20 mA input signals from non-linear thermocouples and RTD field transmitters. The voltage and current inputs are fully scalable to engineering units from -1,999 to 9,999 digital units, with a selectable decimal point, which makes the PM24 perfect for use with pressure transmitters, pH, flow level, strain-gage, and other linear process inputs.

Features

- Process and temperature multi-sensor selectable input, without dipswitches or hardware change
- Accepts seven types of thermocouples, two types of Pt100 RTD temperature sensors, and DC mA, mV, and Volt signals
- Pt100 RTD input with 0.1˚ or 1˚ temperature resolution
- Selectable °F/°C for all temperature sensors
- Linearizes 9 types of "non-linear 4-20mA" input signals from field non-linear temperature transmitters
- Two standard SPST output relay alarms with 11 function modes: process high/low, deviation high/low, differential, sensor break, and alarm inhibition at power-up
- Input sensor break alarm in any condition
- Fast 100ms (10Hz) sampling input improves the alarm loop control
- Universal power supply from 90 to 260 VAC

Specifications		
Controller Series		PM24 Series
Dimensions		48x48x106 mm (1/16 DIN), weight 200g (approximate)
Panel Cutout		45.5x45.5mm (+/-0.3 mm)
Terminal Connection		Screws accepting 16-24 AWG wires or 6.3 mm fork lug
Power		90 to 260 VAC - 7VA maximum
Operating Environment		0 to 50°C (32° to 122°F), humidity: 10 to 90% RH, non-condensing
Instrument Case		1/16 DIN size, flame-retardant ABS plastic case
Warm-up Time		15 minutes maximum
Input	***Display Resolution***	0.1°F/C or 1°F/C (Pt100 RTD); 1°F/C (thermocouples)
	Input Sample Rate	10 per second (100 ms)
	Accuracy	Thermocouples J, K, N, T and E: 0.2% of span ±1°C ± 1 digit Thermocouples R and S: 0.25% of span ±3°C ± 1 digit Pt100, mA mV and Volts: 0.2% of span ± 1 digit
	Impedance	0-50mV and thermocouples: >10 MΩ 0-10 Volts DC: >1 MΩ 4-20 mA DC: 100Ω
	Pt100 Measurement	DIN 43760 standard (α=0.00385) 3-wire circuit, cable resistance compensation Excitation current: 170µA
Output	***Resistive***	2 - SPST Relays: 3A@ 250VAC/3A @ 125VAC/3A @ 30VDC
	Inductive	2 - SPST Relays: 2A @ 250VAC/2A @ 30VDC

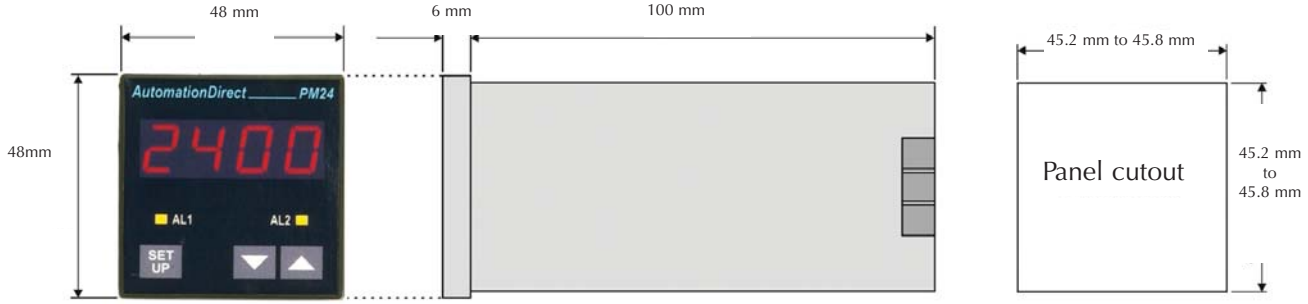
PM24 Series Controller Specifications

Part Number Selection Guide								
Part Number	**Input Power**	**PV Universal Sensor Input**	**Remote SP Analog Input**	**Digital Input**	**Discrete Output**	**Analog Output**	**Pulse Output**	**Price**
PM24-2000-AC	90-260VAC	Table 1	None	None	2 mechanical relays	None	None	<--->

Accessories		
Part Number	**Description**	**Price**
PANEL-16	Mounting clip for 1/16th DIN timers and temperature/process controllers. Package of 5 clips. (One clip included with each controller)	<--->

Table 1 - Selectable Input types	
Input Type	**Range**
Thermocouple J (1°C resolution)	-166 to 1400F° (-110 to 760°C)
Thermocouple K (1°C resolution)	-238 to 2498°F (-150 to 1370°C)
Thermocouple S (1°C resolution)	32 to 3200°F (0 to 1760°C)
Thermocouple T (1°C resolution)	-256 to 752°F (-160 to 400 °C)
Thermocouple E (1°C resolution)	-130 to 1328°F (-90 to 720°C)
Thermocouple N (1°C resolution)	-238 to 2372°F (-150 to 1300°C)
Thermocouple R (1°C resolution)	32 to 3200°F (0 to 1760°C)
RTD Pt100 (0.1°C resolution)	-199.9 to 986.0°F (-199.9 to 530°C)
RTD Pt100 (1°C resolution)	-326 to 986°F (-199 to 530°C)
4 to 20 mA	Linearized J: -166 to 1400°F (-110 to 760°C)
4 to 20 mA	Linearized K: -238 to 2498°F (-150 to 1370°C)
4 to 20 mA	Linearized S: 32 to 3200°F (0 to 1760°C)
4 to 20 mA	Linearized T: -256 to 752°F (-160 to 400 °C)
4 to 20 mA	Linearized E: -130 to 1328°F (-90 to 720°C)
4 to 20 mA	Linearized N: -238 to 2372°F (-150 to 1300°C)
4 to 20 mA	Linearized R: 32 to 3200°F (0 to 1760°C)
4 to 20 mA	Linearized Pt100: -199.9 to 986.0°F (-199.9 to 530.0°C)
4 to 20 mA	Linearized Pt100: -326 to 986°F (-199 to 530°C)
0 to 50mV	Linear. Programmable range from -1999 to 9999
4 to 20 mA	Linear. Programmable range from -1999 to 9999
0 to 10V	Linear. Programmable range from -1999 to 9999

Main dimensions and panel cutout



TC33 and PC35 Series Controllers

Overview

The TC33 and PC35 series are 1/16 DIN size PID auto-tune micro-processor-based controllers. A dual LED display offers optimum process information at a glance.

Individual LEDs identify the status of the controller and the tactile keyboard makes it easy to configure inputs, outputs and setup data, without internal dipswitch or jumper changes.

The universal inputs accept thermocouples and Pt100 RTDs. No dipswitches are required to make changes as the units are fully keypad programmable.

The units operate on a universal power supply from 90 to 260 VAC.

TC33 Features

- Temperature multi-sensor selectable PV input without hardware change
- Multi-sensor input accepts seven types of thermocouples and two types Pt100 RTD
- Full PID and auto-tune temperature control - available algorithms: P, PI, PD, PID or ON/OFF with hysteresis
- RTD input with 0.1˚ or 1˚ resolution
- Selectable ˚F / ˚C temperature units
- Sensor break protection in any condition
- Output options include relay, 4-20 mA out, or isolated DC pulse output
- Ramp / Soak: one controlled ramp and one timed soak are standard

PC35 Features

- Universal multi-sensor selectable PV input without hardware change
- Programmable Ramp / Soak: Seven 7-segment profiles can be linked to make longer programs up to 49 segments
- Square root function
- Sensor break protection in any condition
- Output options: relay, SSR, isolated linear 4-20 mA, 0-20 mA or isolated DC pulse output*
- Up to three alarms, two programmable timer alarms
- Process variable or setpoint 0-20 mA, 4-20 mA isolated analog retransmission*
- Auto/manual "bumpless" transfer
- One isolated digital input with programmable functions*
- Linear remote setpoint input*
- Programmable soft start (0 to 9999 sec)

***Refer to "Part Number Selection Guide" on the following pages for specific I/O availability information.**

Specifications				
Controller Series			***TC33 Series***	***PC35 Series***
Dimensions			48x48x106 mm (1/16 DIN), weight 200g (approximate)	48x48x106 mm (1/16 DIN), weight 200g (approximate)
Panel Cutout			45.5mmx45.5mm (+/- 0.3mm)	45.5mmx45.5mm (+/- 0.3mm)
Terminal Connection			Screws accepting 16 to 24 AWG wires or 6.3 mm fork lugs	Screws accepting 16 to 24 AWG wires or 6.3 mm fork lugs
Power			90 to 260VAC - 7VA maximum	90 to 260VAC - 7VA maximum
Operating Environment			Temperature: 0 to 50°C (32 to 122°F), humidity: 10 to 85% RH, non-condensing	Temperature: 0 to 50°C (32 to 122°F), humidity: 10 to 85% RH, non-condensing
Instrument Case			Flame-retardant ABS plastic case	Flame-retardant ABS plastic case
Warm-up Time			15 minutes maximum	15 minutes maximum
Input	***Display Resolution***		0.1°F/C or 1°F/C (Pt100 RTD)	0.1°F/C or 1°F/C (Pt100 RTD)
	Input Sample Rate		10 per second (100 ms)	5 per second (200 ms)
	Accuracy		Thermocouples J, K, N, E, and T : 0.2% of span ±1°C Thermocouples R and S: 0.25% of span ±3°C Pt100: 0.2% of span (+/-0.5°C)	Thermocouples J, K and T: 0.2% of span ±1°C Thermocouple S: 0.25% of span ±3°C Pt100: 0.2% of span (+/-0.5°C) Current (4-20mA) and voltage (50mV or 5V): 0.2% of span
	Impedance		Thermocouple: >10 MΩ	Thermocouple: >10 MΩ
	Pt100 Measurement		DIN 43760 standard (α=0.00385) 3-wire circuit, cable resistance compensation Excitation current: 170µA	DIN 43760 standard (α=0.00385) 3-wire circuit, cable resistance compensation Excitation current: 170µA
Output	***Mechanical****	***Resistive***	Single or dual SPST Relays 3A @ 250VAC/3A @ 30VDC	Dual SPST Relays 3A @ 250VAC/3A @ 30VDC
		Inductive	Single or dual SPST Relays 2A @ 250VAC/2A @ 30VDC	Dual SPST Relays 2A @ 250VAC/2A @ 30VDC
	Solid State - Triac*		none	1A @ 20 to 240VAC
	Solid State - DC Pulse*		12VDC pulsed @ 15mA maximum	12VDC pulsed @ 15mA maximum
	Analog*		4-20mA sourcing @ 500Ω maximum load	0/4-20mA sourcing @ 500Ω maximum load

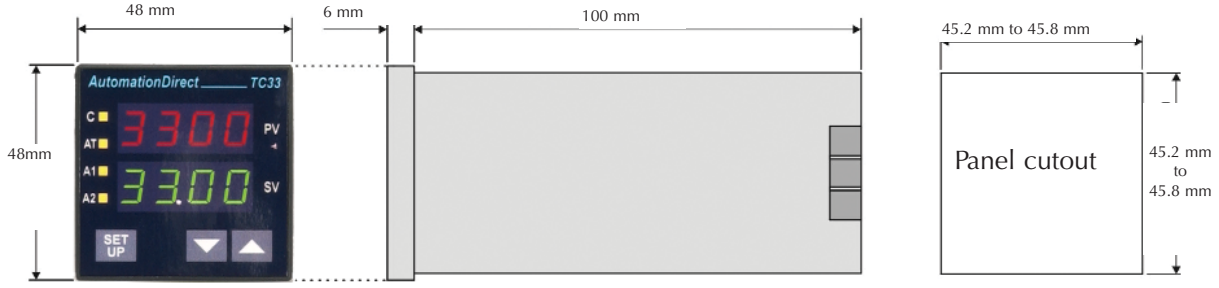
Note: Model dependent. See specifications on following pages.

TC33 Series Controllers Specifications

Part Number Selection Guide							
Part Number	***Input Power***	***PV Multi-Sensor Input***	***Digital Input***	***Discrete Outputs***	***Analog Outputs***	***Pulsed Output***	***Price***
TC33-1100-AC	90-260VAC	Table 2	None	1 Mechanical relay	None	12VDC	<--->
TC33-2010-AC	90-260VAC	Table 2	None	2 Mechanical relays	4-20mA	none	<--->
Accessories							
Part Number	***Description***						***Price***
PANEL-16	Mounting clip for 1/16th DIN timers and temperature/process controllers. Package of 5 clips. (One clip included with each controller)						<--->

Table 2 - Selectable Input types	
Input Type	***Range***
Thermocouple J (1°C resolution)	-58 to 1400 °F (-50 to 760°C)
Thermocouple K (1°C resolution)	-130 to 2498°F (-90 to 1370°C)
Thermocouple S (1°C resolution)	32 to 3200°F (0 to 1760°C)
Thermocouple T (1°C resolution)	-148 to 752°F (-100 to 400°C)
Thermocouple E (1°C resolution)	-22 to 1328°F (-30 to 720°C)
Thermocouple N(1°C resolution)	-130 to 2372°F (-90 to 1300°C)
Thermocouple R (1°C resolution)	32 to 3200° F (0 to 1760°C)
RTD Pt100 (0.1°C resolution)	-199.9 to 986.0°F (-199.9 to 530.0 °C)
RTD Pt100 (1°C resolution)	-328 to 986°F (-200 to 530°C)

Main dimensions and panel cutout



PC35 Series Controllers Specifications

Part Number Selection Guide								
Part Number	***Input Power***	***PV Universal Sensor Input***	***Remote SP Analog Input***	***Digital Input***	***Discrete Outputs***	***Analog Output***	***Pulsed Output***	***Price***
PC35-2000-AC	90-260VAC	See Table 3	None	None	2 Mechanical relays	None	None	<--->
PC35-2010-AC	90-260VAC	See Table 3	Voltage[1]	Dry Contact[2]	2 Mechanical relays	Current[3]	None	<--->
PC35-0210-AC	90-260VAC	See Table 3	Voltage[1]	Dry Contact[2]	2 Solid State relays	Current[3]	None	<--->
PC35-2110-AC	90-260VAC	See Table 3	Voltage[1]	Dry Contact[2]	2 Mechanical relays	Current[3]	12VDC	<--->
Accessories								
Part Number	***Description***							***Price***
PANEL-16	Mounting clip for 1/16th DIN timers and temperature/process controllers. Package of 5 clips. (One clip included with each controller)							<--->

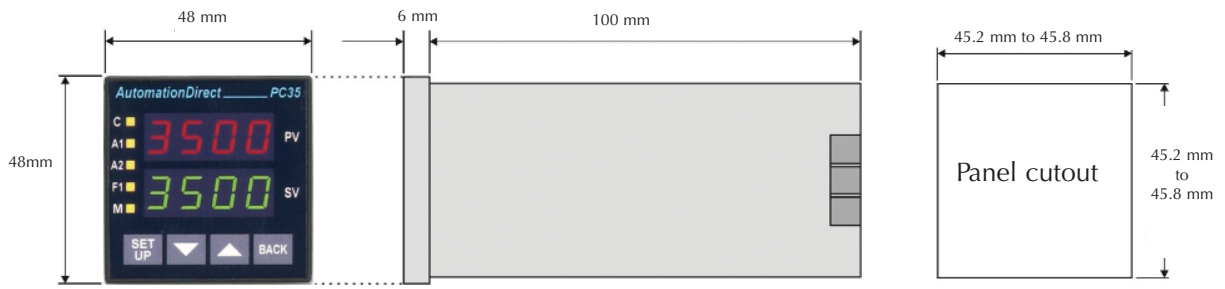
Note 1: Remote set point analog input: 0.4 to 2.0 VDC (for 4-20 mA input, add external 100Ω/0.1% shunt resistor). RSP function not available if Analog Output is used.

Note 2: Digital Input function not available if Analog Output is used.

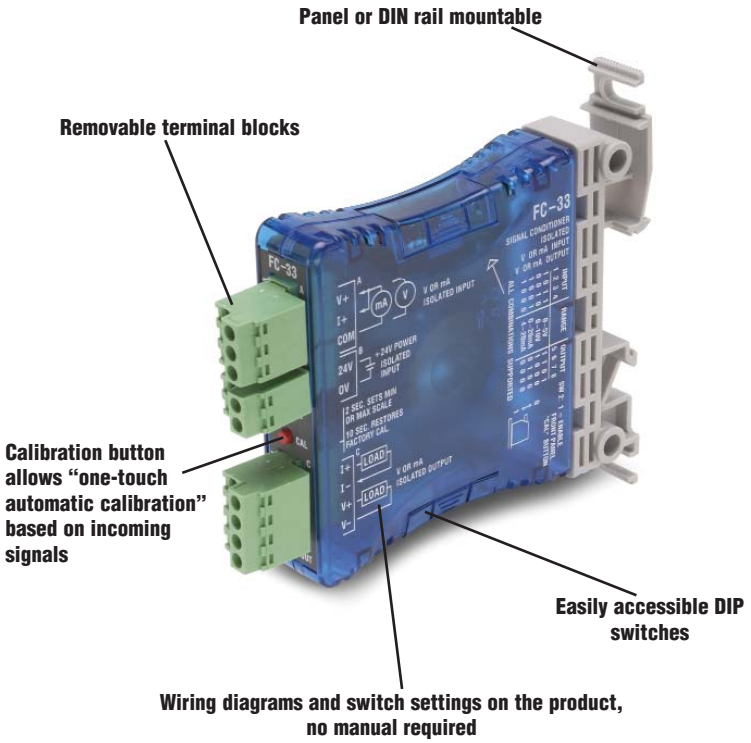
Note 3: Analog Output: 0-20 mA or 4-20 mA; 500Ω maximum load (for 0/1-5V output, add external 250Ω/0.1% shunt resistor). Analog Output function not available if Digital Input is used.

Table 3 - Selectable Input types	
Input Type	***Range***
Thermocouple J (1°C resolution)	-166 to 1400 °F (-110 to 760 °C)
Thermocouple K (1°C resolution)	-238 to 2498°F (-150 to 1370°C)
Thermocouple S (1°C resolution)	32 to 3200ºF (0 to 1760°C)
Thermocouple T (1°C resolution)	-256 to 752ºF (-160 to 400 °C)
RTD Pt100 (0.1°C resolution)	-199.9 to 986°F (-199.9 to 530°C)
RTD Pt100 (1°C resolution)	-328 to 986°F (-200 to 530°C)
4 to 20 mA	Tc. J linearization. programmable range: -166 to 1400°F (-110 to 760°C)
4 to 20 mA	Tc. K linearization. programmable range: -238 to 2498°F (-150 to 1370°C)
4 to 20 mA	Tc. T linearization. programmable range: -256 to 752°F (-160 to 400°C)
4 to 20 mA	Tc. S linearization. programmable range: 32 to 3200°F (0 to 1760°C)
4 to 20 mA	RTD Pt100 (0.1°C Resolution) Linearization programmable range: -328.0 to 986.0°F (-199.9 to 530.0°C)
4 to 20 mA	RTD Pt100 (1.0°C Resolution) Linearization programmable range: -328 to 986°F (-200 to 530°C)
0 to 50mV	Linearization programmable indication - 1999 to 9999
4 to 20 mA	Linearization programmable indication - 1999 to 9999
0 to 5 Volts	Linearization programmable indication - 1999 to 9999
4 to 20 mA	Square root extraction

Main dimensions and panel cutout



FC Series Signal Conditioners



Convert, isolate and transmit your process signals

Not all electrical signals are created equal. That's why the FC series signal conditioners are the perfect solution for converting process, temperature and other electrical signals into voltage or current signals for transmission or input to a PLC.

The FC series signal conditioners offer 1500V isolation between the input and output to help eliminate electrical noise. Features include easily accessible potentiometer adjustment of the output span and offset, (with the exception of FC-33), slim DIN-rail or side-mount cases and removable terminal blocks.

The FC series signal conditioners are ideal for use with PLCs, loop controllers, digital displays and any other applications requiring an isolated or analog signal.

FC-33

DC Selectable Signal Conditioner with 3-way isolation

Field configurable input and output ranges of 0-5V, 0-10V, 0-20 mA and 4-20 mA with 1500 VDC isolation between input and output, and 1500 VDC isolation from 24 volt power and input/output. LED indicates normal operation and is used in conjunction with the calibration pushbutton for the internal calibration process.

- 3-way 1500V isolation
- Push button calibration

FC-11

4-20 mA Isolated Signal Conditioner

Loop powered 4-20 mA input/output signal with 1500 VDC isolation between input and output.

- 1500V isolation
- Loop powered

FC-T1

Thermocouple/mV Isolated Signal Conditioner

Field configurable input for several different types of thermocouple or mV inputs with 1500 VDC isolation between input and output. Cold junction compensation and burnout detection. Alarm/run LED.

- 1500V isolation
- Cold junction compensation (CJC)
- Internal diagnostics (burnout detection or calibration errors)

FC-R1

RTD Input Signal Conditioner

Loop powered, non-isolated, 3-wire unit converts an RTD input to a linear 4-20 mA signal. User selectable CU10, PT100 or PT1000 input.

FC-33 DC Selectable Signal Conditioner

Overview

The FC-33 is a DIN-rail or side-mount, selectable input/output signal conditioner with 1500 VDC isolation between input and output, and 1500 VDC isolation between 24-volt power and input/output. The field configurable input/output types allow a wide ranging capability for 0-5V, 0-10V, 0-20 mA and 4-20 mA signals.

The FC-33 has built-in self-calibration, but also has OFFSET (zero) and SPAN (full scale) adjustments of the output signal. The OFFSET has an adjustment range of 0 to 25% of full scale input and the SPAN has an adjustment of 80% to 102%.

Level LED: The LED is a powerful tool when setting up the signal conditioner. During normal operation the LED will blink at a proportional rate to the selected input signal level. When performing field calibration the LED is used for indication of the internal calibration process.

CAL-Pushbutton: This pushbutton, along with various switch settings, allows you to calibrate the OFFSET and/or SPAN for your application or to restore factory default calibration.

Specifications	
Input Ranges	0-5 V, 0-10 V, 0-20 mA, 4-20 mA
Input Impedance	250 Ω, ±0.1% current input 200 KΩ / 400 KΩ Voltage input
Output Ranges	0-5 V, 0-10 V, 0-20 mA, 4-20 mA
Load Impedance	2 KΩ minimum, voltage output 0 Ω minimum, current output
Maximum Load / Current	550 Ω @ 24 VDC (sink/source)
Sample Duration Time	10 mS
Filter Characteristic	-3 dB @ 3 Hz, -6 dB/octave
Linearity Error	0.05% FSO maximum
Stability	0.05% FSO maximum
Accuracy vs. Temperature	0.005%/ °C, (50ppm/°C)
Input Power	24 VDC, ±10% @ 50 mA
Recommended Fuse	0.032 mA, Series 217, current inputs
Isolation	1500 VDC input - output* 1500 VDC power - input* 1500 VDC power - output* *applied for 1 second
Maximum Inaccuracy of Output	0.05% @ 25°C, FSO maximum 0.25% @ 0-60°C, FSO maximum
Output Current	21 mA maximum (for mA output)
Approx. Field Cal. Range	0 - 25% (0 - 1.5 V / 5 V mode) 80% - 102% (4 - 5.1 V / 5 V mode)
Operating Temperature	0-60°C (32 to 140°F)
Storage Temperature	-20 to 70°C (-4 to 158°F)
Relative Humidity	5 to 90% (non-condensing)
Vibration	ML STD 810C 514.2
Shock	ML STD 810C 516.2
Noise Immunity	NEMA ICS3-304

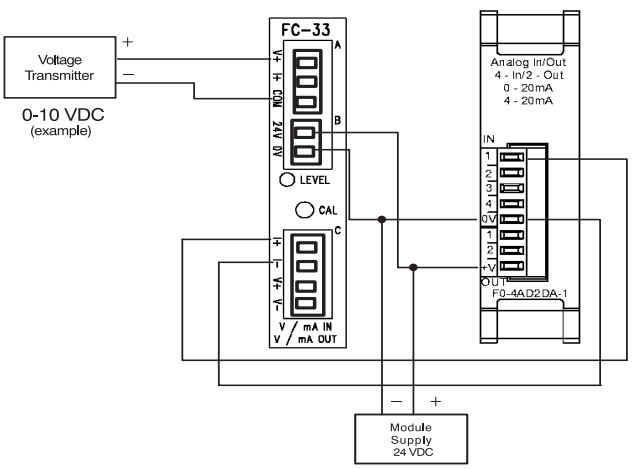
Application

The FC-33, field configurable isolated input/output signal conditioner, is useful in eliminating ground loops and interfacing sensors to PLC analog input modules. The FC-33 has 3-way isolation; this feature solves many types of configuration problems. For example, the signal conditioner can be configured for a sinking input and a sourcing output. It also allows signal translation from current input to voltage output or voltage input to current output.

This feature would be useful in a system design with a limited type and number of channels – for example: eight channels of 0-10 VDC, seven of which are used, and one 4-20 mA input transmitter.

See page 26–23 for signal conditioner dimensions.

Typical User Wiring



Voltage Input and Current Output (example)

FC-11 4-20mA Isolated Signal Conditioner

Overview

The FC-11 is a DIN-rail or side-mount, 4-20 mA Input/Output loop powered signal conditioner with 1500 VDC isolation between input and output.

The FC-11 has a user-selectable factory calibration. The output can also be calibrated with OFFSET (zero) and SPAN (full scale) adjustments. The OFFSET has an adjustment range of 0 to 25% of full scale input and the SPAN has an adjustment of 80% to 102%.

Application

The FC-11 isolated input/output signal conditioner is useful in eliminating ground loops and sinking/sourcing issues when interfacing to PLC analog input modules. The FC-11 design feature solves many types of configuration problems. For example, the signal conditioner can solve the problem of connecting a sinking input transmitter to a sinking analog input module.

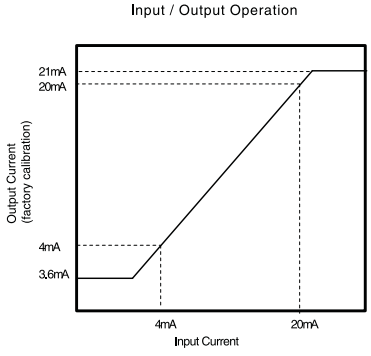
Specifications	
Input Ranges ***Extended Input range[1]***	4-20 mA 3.5 mA to 20.6 mA, ±1%
Input Burden Voltage[2]	6.8 VDC
Maximum Input Current	34 mA @ 9.7 VDC
Output Burden Voltage[3]	8.5 VDC minimum
Output Range ***Extended Output Range[1]***	4-20 mA 3.5 mA to 20.6 mA, ±1%
Maximum Load Impedance	650 Ω @ 24 VDC, 1000 Ω @ 29 VDC
Maximum Output Current	23 mA @ 29 VDC
Sample Duration Time	18 mS maximum
Filter Characteristic	-3 dB @ 200 Hz -6 dB / octave
Linearity Error	0.1% FSO maximum
Stability	0.1% FSO maximum
Accuracy vs. Temperature	±0.0065% / °C (65ppm / °C)
Maximum Inaccuracy of Output	0.05% @ 25°C, FSO maximum 0.3% @ 0-60°C, FSO maximum
Isolation	1500 VDC Input - Output
Operating Temperature	0-60°C (32 to 140°F)
Storage Temperature	-20 to 70°C (-4 to 158°F)
Relative Humidity	5 to 90% (non-condensing)
Vibration	ML STD 810C 514.2
Shock	ML STD 810C 516.2
Noise Immunity	NEMA ICS3-304

NOTES:

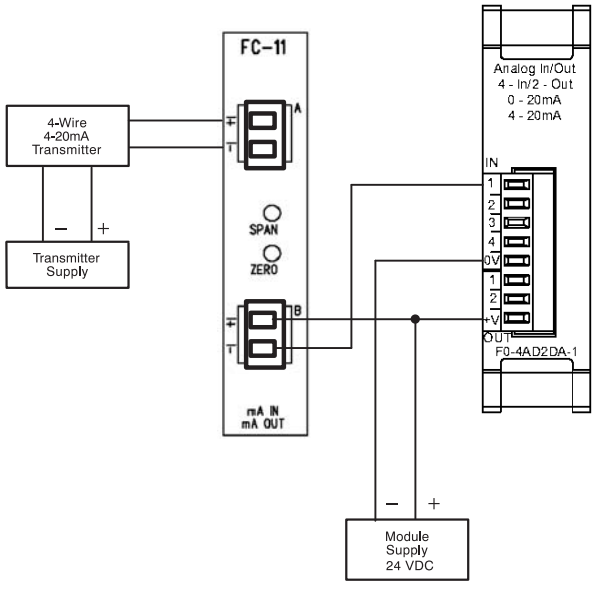
1. ***When adjusting SPAN and OFFSET potentiometer***
2. ***Voltage required to power internal circuitry***
3. ***Formula, [(output load) x 20 mA] + 8.5 V, i.e. 13.5 VDC @ 250 Ω***
4. ***Internal analog converter resolution is 12-bit***

See page 26–23 for signal conditioner dimensions.

Input / Output Operation



Typical User Wiring



4-20 mA Input Isolated to 4-20 mA Output (examp

FC-T1 Thermocouple/mV Input Isolated Signal Conditioner

Overview

The FC-T1 is a DIN-rail or side-mount thermocouple/mV input signal conditioner with 1500 VAC isolation between input and output.

The field configurable input allows a wide ranging capability for a type J, K, E, R, S, T, B, N and C thermocouple, or 0-156.25 mV and ±156.25 mV signals.

The FC-T1 has built-in self-calibration, but also offers OFFSET (zero) and SPAN (full scale) potentiometer for adjustment of the output signal.

The FC-T1 is also equipped with cold junction compensation (CJC) circuitry to provide an internal ice-point reference.

The temperature calculation and linearization are based on data provided by the National Institute of Standards and Technology (NIST).

ALARM and RUN LED: This LED is bicolor (red and green). A red LED indicates either power up, a fault with internal calibration, or a thermocouple burnout condition, while a green LED indicates normal operation.

Burnout Function: The output current can be selected to provide either upscale (20 mA) or downscale (4 mA) detection whenever thermocouple burnout occurs.

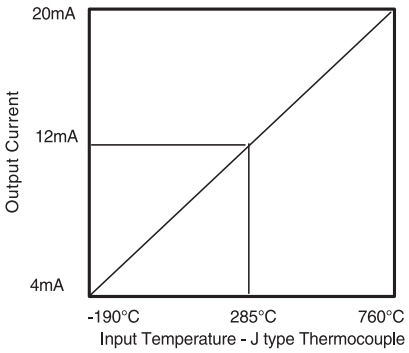
Specifications				
Input Ranges	***T/C***	***°C***	***°F***	***Resolution[1]***
	J	-190 to 760	-310 to 1400	0.23°C
	K	-150 to 1372	-238 to 2502	0.37°C
	E	-210 to 1000	-345 to 1832	0.295°C
	R	65 to 1768	149 to 3214	0.42°C
	S	65 to 1768	149 to 3214	0.42°C
	T	-230 to 400	-382 to 752	0.15°C
	B	529 to 1820	984 to 3308	0.315°C
	N	-70 to 1300	-94 to 2372	0.33°C
	C	65 to 2320	149 to 4208	0.55°C
	0 to 156.25 mV			0.038 mV
	-156.25 mV to +156.25 mV			0.076 mV
Output Range	4 to 20 mA			
External Power Supply	15 mA, 22 to 26 VDC			
Input Impedance	>5 MΩ			
Absolute Maximum Rating	Fault protected input ±50 V			
Maximum Inaccuracy	±3°C, Temperature Input ±0.01%, Voltage Input			
Linearity Error	0.1%			
Over Temperature Error	0.1 X 10^{-5}% (10 ppm)/°C			
Insulation Resistance	≥100 Mr with 500 VDC (Input to output power)			
Isolation	1500 VAC @ 1 Sec. (Input to output commons)			
Sample Duration Time	120 mS Voltage Input 250 mS Thermocouple Input			
Common Mode Rejection	-100 dB @ DC, -90 dB @ 50/60 Hz			
Input Filter (FIR)	-3 dB @ 15 Hz, -100 dB @ 50 Hz, -100 dB @ 60 Hz			
Broken Thermocouple	Up/Down Scale Red/Green LED			
Over Range	Up Scale			
Under Range	Down Scale			
Burnout Time	≤3 Seconds			
Cold Junction Compensation	Automatic			
Warm-up Time	30 min. typical ±1°C repeatability			
Operating Temperature	0 to 60°C (32 to 140°F)			
Storage Temperature	-20 to 70°C (-4 to 158°F)			
Relative Humidity	5 to 90% (non-condensing)			
Environmental Air	No corrosive gases permitted			
Vibration	ML STD 810C 514.2			
Shock	ML STD 810C 516.2			
Noise Immunity	NEMA ICS3-304			

Note:
[1] Internal analog converter resolution is 12-bit.

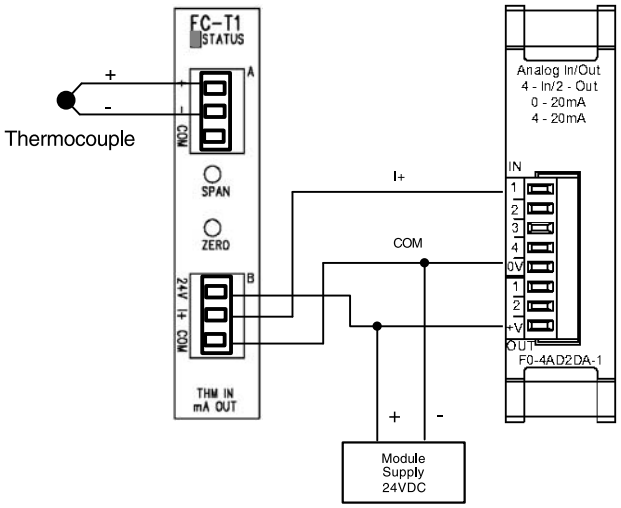
FC-T1 Thermocouple/mV Input Isolated Signal Conditioner

Application

The FC-T1, field configurable thermocouple/mV signal conditioner, is useful in eliminating ground loops and for interfacing to PLC analog input modules. If your requirements are only for one channel of temperature, you can add the signal conditioner to your 4-20 mA input module. Or, if your requirements are for a single millivolt signal source, you have the option of adding this input to your analog module.

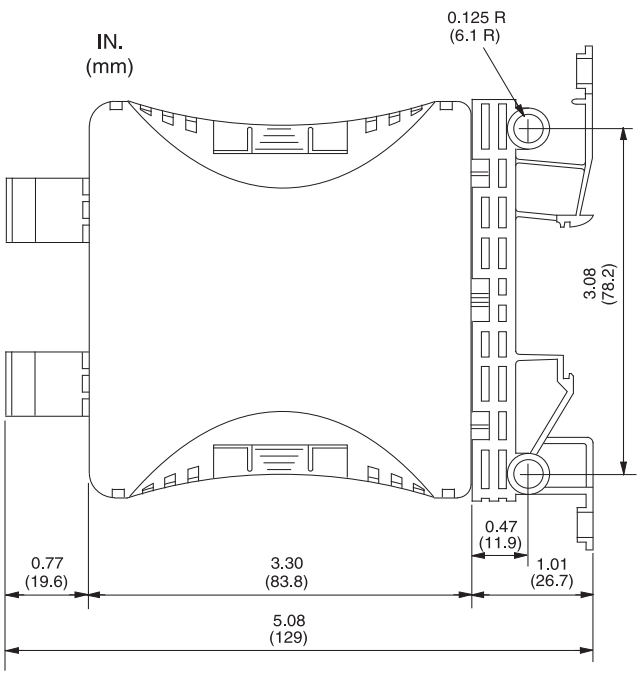


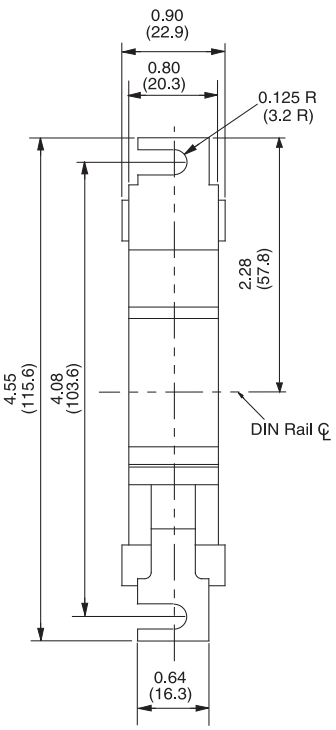
Typical User Wiring



Signal Conditioner Dimensions

These dimensions are typical for all of the signal conditioners. All dimensions are in inches (millimeters).





FC-R1 RTD Input Loop Powered Signal Conditioner

Overview

The FC-R1 is a DIN-rail or side-mount Resistive Temperature Detector signal conditioner. It is a non-isolated signal conditioner which converts a 3-wire RTD to a linearized 4-20 mA current loop signal.

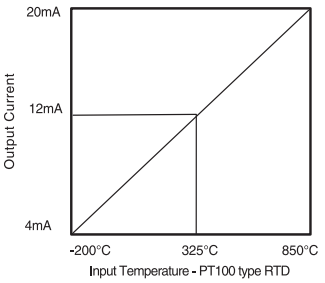
The FC-R1 has a user selectable CU10 (10 Ohm copper), PT100 (100 Ohm platinum) or PT1000 (1000 Ohm platinum) RTD input, and also offers OFFSET (zero) and SPAN (full scale) adjustments of the output signal. The OFFSET has an adjustment range of 0 to 25% of full scale output and the SPAN has an adjustment of 80% to 102%.

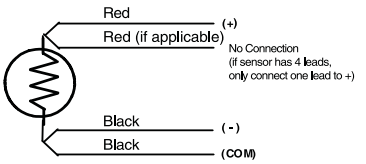
Specifications			
Input Ranges	CU10	-200°C to 260°C	-328°F to 500°F
	PT100	-200°C to 850°C	-328°F to 1562°F
	PT1000	-200°C to 595°C	-328°F to 1103°F
RTD Excitation Current	CU10, PT100 500 µA ±50 µA PT1000 80 µA ±20 µA		
Common Mode Range	0 - 3.5 VDC		
Output Range	4-20 mA (linearized)		
Maximum Inaccuracy	0.35% FSO / CU10 0.2% FSO @ 25°C / PT100 & PT1000 0.26% FSO @ 60°C / PT100 & PT1000		
Maximum Loop Supply	30 VDC		
Load Impedance	0 Ω minimum		
Maximum Load/Power Supply	203 Ω / 12 V, 745 Ω / 24 V		
Linearity Error	0.35% FSO / CU10 0.2% FSO / PT10 & PT1000		
Output Slew Rate	1% @ 20 mS		
Filter Characteristics	105 dB @ DC, 60 dB @ 10 Hz, 40 dB @ 60Hz		
Stability	0.05% FSO maximum		
Operating Temperature	0 to 60°C (32 to 140°F)		
Storage Temperature	-20 to 70°C (-4 to 158°F)		
Relative Humidity	5 to 90% (non-condensing)		
Environmental Air	No corrosive gases permitted		
Vibration	ML STD 810C 514.2		
Shock	ML STD 810C 516.2		
Noise Immunity	NEMA ICS3-304		

See page 26–23 for signal conditioner dimensions.

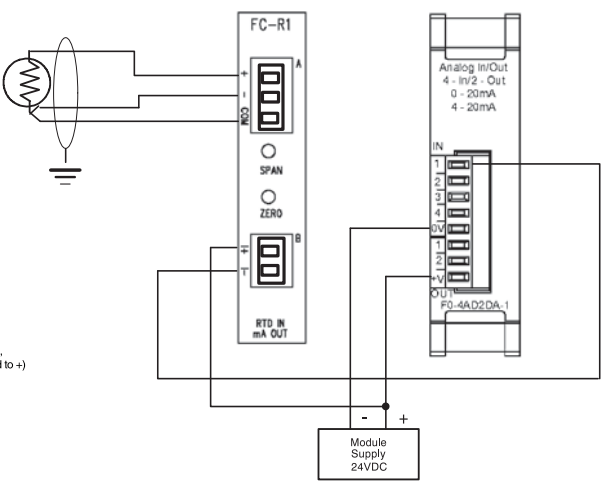
Application

The FC-R1 field configurable input signal conditioner is useful for interfacing RTD sensors to PLC analog current input modules. It is recommended that shielded RTD's be used whenever possible to minimize noise on the input signal.





Typical User Wiring



RTD Signal Conditioner to 4-20 mA DL05/06 analog module
Only use three wire and four wire RTDs.