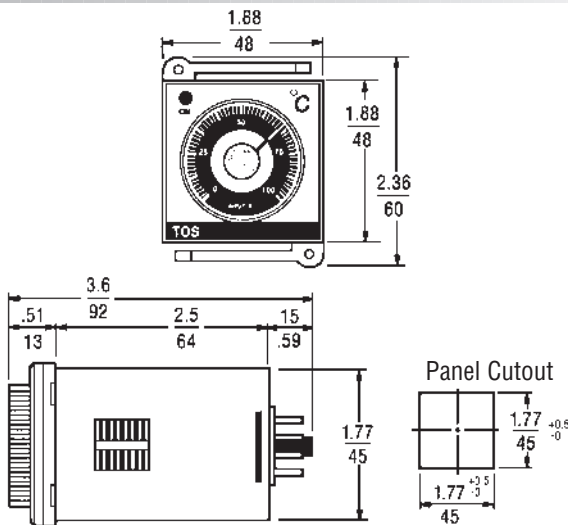


**OPERATION**

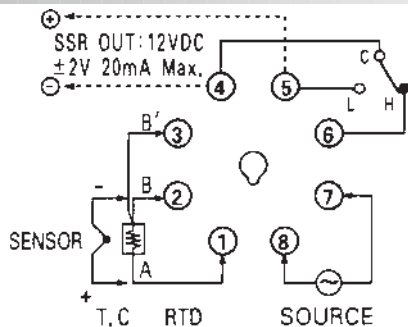
The 1/16 DIN TOS, is one of the most commonly used temperature controls because of its *low cost* and *operation simplicity*. Primarily employed in ON/OFF output applications, the unit is also available with proportional control if desired.

Operation of the TOS is simple. Set the dial to the required temperature and the control provides an output until the temperature setting is achieved. The unit has a hysteresis of 0.2 to 0.5% of full scale to provide fairly consistent control. Output can be ordered in either relay contact (2A @ 250VAC, Form C) or output for solid state relay (12VDC, 20mA). This output flexibility plus selection of J or K thermocouple input provides a range of models to satisfy application requirements.

**DIMENSIONS (INCHES/MILLIMETERS)**



**WIRING**



**SPECIFICATIONS**

INPUT	Thermocouple J or K RTD	
OPERATING VOLTAGE	100/240VAC, ±10%, 50/60 Hz	
POWER CONSUMPTION	2 VA @ 120 VAC	
SETTING METHOD	Dial Scale	
CONTROL MODES	ON/OFF/Proportional (Programmable)	
OUTPUT	Relay	SPDT, 2A @ 250 VAC
	SSR	12 VDC ±2V, 20 mA
MOUNTING	Front Panel (45mm <sup>2</sup> cut out)	
TERMINATION	8-Pin Plug-In	
WEIGHT	4 oz.	Shipping: 5 oz.



1/16 DIN Analog Temperature Controller

- Economical Control
- 1/16 DIN, Analog Setting
- Simple 8-Pin Plug-In Installation
- Front Panel LED Indicates Output Status
- J or K Thermocouple Input
- Relay or SSR Driver Output

MODEL NUMBER >>>>>	TOS	B	4		
		Output			
		Relay	R		
		SS Relay Driver	S		
		Sensor			
		J Thermocouple	J		
		K Thermocouple	K		
		RTD	P		
		Temperature Range*			
			0-200°F	2F	
			0-400°F	4F	
			0-600°F	6F	
			0-800°F	8F	
			0-100°C	1C	
			0-300°C	3C	
			0-400°C	4C	
			0-800°C	8C	
*Other Ranges Available — Consult Factory Sockets for TOS: 600-3-0011 For Panel Mount, 600-3-0013 For DIN Rail or Base.					

Temperature Controllers // TOS Series



OPERATION

The T3S, 1/16 DIN is a popular temperature control because it provides bold LED temperature readout and simple to set bidirectional push-button switches.

Operation of the T3S is simple since all that is required is to set the bidirectional switch to the required temperature and the control provides an output until the temperature setting is achieved. Output can be ordered in either relay contact (2A @ 250 VAC, Form C), output to drive a solid state relay (12 VDC, 20mA), or 4 to 20mA. This output flexibility plus selection of J, K thermocouple or RTD input provides a range of models to satisfy application requirements.

The economical T3S is versatile with features like universal input power (100 to 240 VAC, 50/60 Hz) and selectable ON-OFF or proportional control modes.

1/16 DIN Digital Temperature Controller

- Economical Digital Control
- 1/16 DIN, 48mm<sup>2</sup>
- ON-OFF or Proportional Control
- J, K Thermocouple or RTD Input
- Relay, SSR Relay Driver or 4-20 mA Output
- Bold LED Temperature Display
- Set Value Visible On Set Switches
- LED Output Indication
- Upscale Thermocouple Break

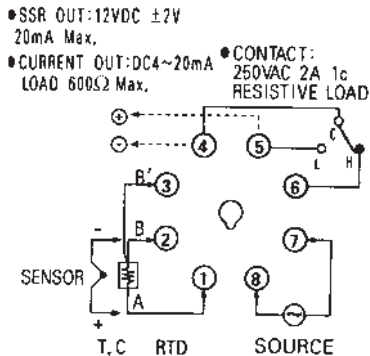
SPECIFICATIONS

INPUT	Thermocouple J or K RTD	
OPERATING VOLTAGE	100/240VAC, 50/60 Hz	
POWER CONSUMPTION	5 VA	
SETTING METHOD	Front Panel Push-button Switches	
CONTROL MODES	ON/OFF or Proportional -Selectable	
ON/OFF CONTROL	Hysteresis	0.5% ± 0.2%
	Full Scale Fixed	
OUTPUT	Relay	SPDT, 2A @ 250 VAC
	SSR	12 VDC ±2V, 20 mA Max.
PROPORTIONAL CONTROL	Current	4-20mA, 600 Max.
	Band	3% Full Scale Fixed
RESET FUNCTION	Period	20 Seconds Fixed
	Adjustable ±3% Full Scale	
DISPLAY	LED	
MOUNTING	Front Panel or Socket Mount	
TERMINATION	8-Pin Plug-In	
WEIGHT	NET: 6.4 oz. Shipping: 8 oz.	

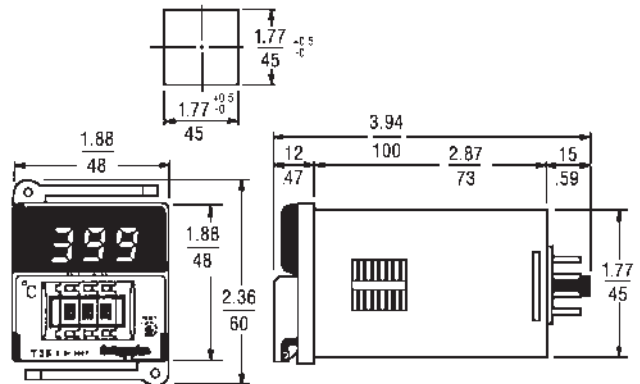
MODEL NUMBER >>>>>>	T3S	B	4		
		Output			
		Relay	R		
		SS Relay Driver	S		
		Current, 4-20mA	C		
		Input			
		RTD; Pt100Ω, 0 to 199°C		P2C	
		J Thermocouple, 0 to 399°F		J4F	
		J Thermocouple, 0 to 799°F		J8F	
		K Thermocouple, 0 to 799°F		K8F	

Sample Ordering Model Number: T3S-B4R]4F  
 Sockets for T3S: 600-3-0011 For Front Panel, 600-3-0013 For DIN Rail or Base.

WIRING



DIMENSIONS (INCHES/MILLIMETERS)



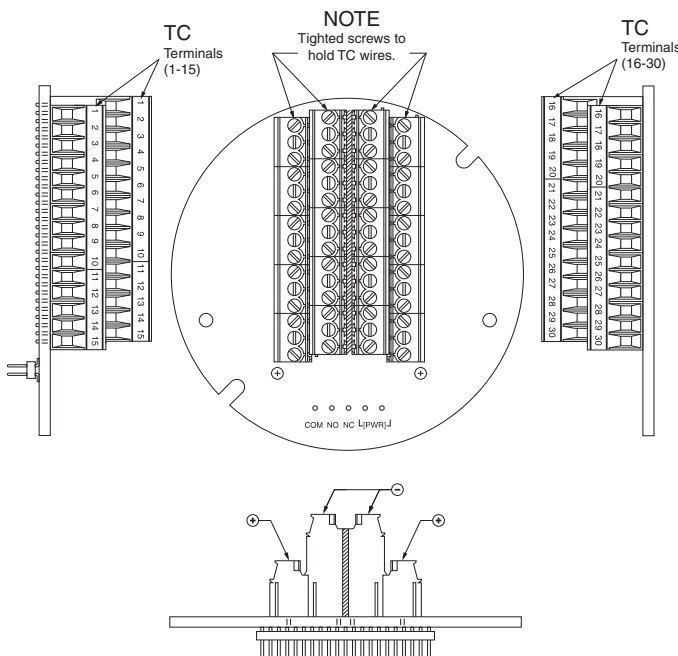
The **FDX-II** is a thermocouple input pyrometer. The unit can measure up to 30 inputs, based on thermocouple alloys J, K, T, or E. The FDX-II has an accuracy of  $\pm 3^{\circ}\text{F}$  ( $\pm 2^{\circ}\text{C}$ ). It is powered by a 9 V battery. The operator selects the channel to view, and uses the arrows to scroll through the additional channels. The FDX-II is designed to fit the footprint of the Model FDX, FA, or FAX for easy replacement.

The **FDX-SL** is a scanning pyrometer. It accepts thermocouple inputs for up to 30 channels. It can be set to Automatic or Manual modes. When in the Manual mode, use the Up and Down buttons to select the channel you would like to view. When in the Automatic mode, the FDX-SL will scroll between the enabled channels. Each channel has high and low alarm capabilities. The FDX-SL is powered on 9–48 VDC or 12-30 VAC, and has an accuracy specification of  $\pm 3^{\circ}\text{F}$  ( $\pm 2^{\circ}\text{C}$ ).

**SPECIFICATIONS**

SAMPLING TIME	500 milliseconds	
THERMOCOUPLE CHANNELS	30 common ground	
POWER SUPPLY	FDX-II	One 9V battery, type MN 1604 or equivalent Battery Life: 50 Hours
	FDX-SL	9 to 48 VDC; 12 to 30 VAC
THERMOCOUPLES	Type J, K, E, and T alloys (12 to 26 A.W.G.)	
RESOLUTION	1 degree, Fahrenheit or Centigrade	
TEMPERATURE	Range	32°F to 2502°F (0°C to 1372°C)
	Operating	32°F to 122°F (0°C to 50°C)
	Storage	-40°F to 150°F (-40°C to 65°C)
TEMPERATURE SCALE	Fahrenheit or Centigrade	
INPUT IMPEDANCE	>100 megohms	
DISPLAY	6 digit liquid crystal 0.5" (12.7 mm) height	
METER ACCURACY	$\pm 3^{\circ}\text{F}$ ( $\pm 2^{\circ}\text{C}$ )	
DIMENSIONS	6.5"H - 5.85"W - 3.75"D (165mm - 149mm - 95mm)	
WEIGHT	2.5 lbs. (1.1kg)	

**WIRING**



Multi-Point Temperature Indicators

**FDX-II**

- User-selectable global or individual alloy type
- Temperature scale
- Adjustable on-time
- Multi-point, multi-alloy thermocouple capability
- UL listed as intrinsically safe for use in Class 1, Groups C and D, Division 1 environments
- Automatic shut-off for battery conservation
- Panel template included
- Accessories: 9V battery type MN604 or equivalent

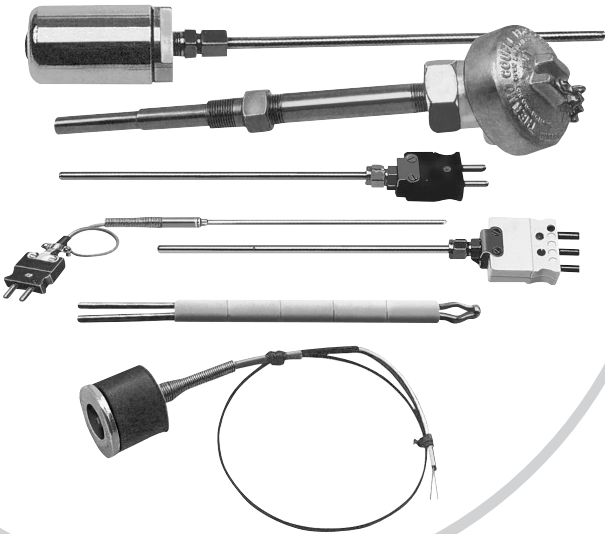
**FDX-SL**

- User-selectable global or individual alloy type
- Temperature scale
- Adjustable Scan Dwell Time
- Multi-point, multi-alloy thermocouple capability
- RS232 Output
- Panel template included
- Alarm Relay Output with Silence Feature

**ORDERING INFORMATION**

MODEL NUMBER	DESCRIPTION
605-500-020	FDX-II Temperature Indicator
605-500-030	FDX-SL Temperature Indicator

Direct replacement for types FA, FAX, FDX



## Thermocouples & RTD'S

### INTRODUCTION TO RESISTANCE TEMPERATURE DETECTORS (RTD'S)

Resistance Temperature Detectors have achieved a well deserved reputation in the industry for their superior stability and accuracy. The result makes these devices well suited for a wide variety of applications.

A Resistance Temperature Detector (RTD) senses heat based on the principle that a change in temperature results in a corresponding change in the resistance of a wire. When a small excitation current is passed along the element, the voltage is then measured and converted to units of temperature.

The RTD can be comprised of many different termination styles as seen on the following pages. The RTD element is manufactured by winding a wire or plating a film on a ceramic or glass core. The element is then hermetically sealed within a ceramic capsule.









### RTD AND THERMOCOUPLE SELECTION

Just as thermocouple selection is based on the intended application, RTD's are selected in the same manner. The response time and operating environment such as temperature and atmosphere are factors as well as the length of service.









### SPECIFICATIONS

	THERMOCOUPLE	RTD
ACCURACY	Limits of error wider than RTD	Limits of error much closer than thermocouples
RUGGEDNESS	Excellent, will not affect life expectancy of the probe	Somewhat sensitive to strain, vibration, shock and pressure
TEMPERATURE	-328° to 4200°F -200° to 2315°C	-50° to 1500°F -45° to 593°C
SIZE	Can be as small as .010" sheath diameter	Size limited to .062" sheath diameter
DRIFT	Should be calibrated periodically, higher than RTD's	0.01°C to 0.1°C per year, less drift than thermocouples
RESOLUTION	Must Resolve millivolts per degree, lower signal to noise ratio	Ohms per degree, much higher signal to noise ratio than thermocouple
COLD JUNCTION REFERENCE	Required	Not Required
LEAD WIRE	Must match lead wire calibration to thermocouple calibration	Can use copper lead wire for extension wire
RESPONSE	Can be made small enough for millisecond response time	Slower, Thermal mass results in a response time of seconds or more
SENSITIVITY	Can be made tip sensitive	Can not readily be made tip sensitive. Thermal mass prevents tip sensitive construction.
LINEARITY	Non-Linear	Linear over a wide operating range
COST	Relatively lower	Higher than thermocouples
WEIGHT	Consult Factory	Consult Factory

## PRODUCT

300 SERIES STANDARD THERMOCOUPLE		<ul style="list-style-type: none"> <li>• 1/8" Diameter &amp; 1/4" Diameter</li> <li>• Mineral Insulation Enables Thermocouples To Be Used At Higher Temperatures</li> <li>• Industry Standard Color-Coded Quick Disconnect</li> <li>• Commonly Installed With Compression Fittings</li> <li>• High Strength Bendable Designs</li> </ul> <p>Note: 300 Series is available with mini polarized connector. Ideal for small spaces and applications requiring the sheath to support the connector at no extra charge.</p>
300HT SERIES STANDARD HIGH TEMPERATURE THERMOCOUPLE		<p>Sheath Material: Tantalum, Molybdenum, Inconel 600, Platinum 10% Rhodium. Thermocouple Type: R, S, B, C, D Consult Factory.</p> <ul style="list-style-type: none"> <li>• For High Temperature (2100°F And Greater) Applications</li> <li>• Industry Standard Color-Coded Quick Disconnect</li> <li>• Very Popular And Versatile Design</li> <li>• Commonly Installed With Compression Fittings (Adapter)</li> </ul>
303 SERIES RESISTANCE TEMPERATURE DETECTORS		<ul style="list-style-type: none"> <li>• Superior Stability, Repeatability and Accuracy</li> <li>• Vibration and Shock Resistant</li> <li>• Standard Resistance Value 100 Ohms at 0°C, Others Available</li> <li>• Standard Resistance Tolerance of <math>\pm 0.1\%</math> at 0°C</li> <li>• Standard Temperature Coefficient .00385/Ohms/Ohms/°C</li> </ul>
400 SERIES TRANSITION JOINT THERMOCOUPLE		<p>1/8" Diameter &amp; 1/4" Diameter</p> <ul style="list-style-type: none"> <li>• Mineral Insulation Enables Thermocouples To Be Used at Higher Temperatures</li> <li>• Industry Standard Color-Coded Quick Disconnect</li> <li>• Commonly Installed with Compression Fittings (Adapter)</li> </ul> <p>Note: 400 Series probe available with polarized miniature connector at no extra charge. Ideal as a replacement thermocouple for portable pyrometers.</p>
404A SERIES RESISTANCE TEMPERATURE SENSOR WITH LEAD LENGTH		<p>12" Lead Length</p> <ul style="list-style-type: none"> <li>• Superior Stability, Repeatability and Accuracy</li> <li>• Vibration and Shock Resistant</li> <li>• Industry Standard 3-Pin Quick Disconnect with Teflon Flexible Lead Wire</li> <li>• Standard Resistance Value 100 Ohms at 0°C, Others Available</li> <li>• Standard Resistance Tolerance of <math>\pm 0.1\%</math> at 0°C</li> <li>• Standard Temperature Coefficient .00385/Ohm/Ohm/°C</li> <li>• Commonly Installed with Compression Fittings (Adapter)</li> </ul>
5504A SERIES STANDARD THERMOCOUPLE		<ul style="list-style-type: none"> <li>• Bare Wire Element with Ceramic Insulators</li> <li>• May Be Used as a Replacement Thermocouple Element in Existing Thermowells and Protection Tubes</li> <li>• The Units are Available in all Calibrations and Meet Standard or Special Limits of Error (Special Limits of Error Must be Specified)</li> </ul>
5523 SERIES SPRING LOADED INJECTION MOLDING THERMOCOUPLE		<ul style="list-style-type: none"> <li>• Spring Rated for 800°F (425°C) Maximum Service</li> <li>• 304 Stainless Steel Sheath</li> <li>• Spring Loaded to Maximize Heat Transfer</li> <li>• All Stainless Construction with Fiberglass Insulated Wire</li> <li>• 800°F Maximum Operating Temperature</li> </ul>
5527 SERIES MAGNE-COUPLE		<p>Standard Connector-3" Pigtail</p> <ul style="list-style-type: none"> <li>• Magnet Holding Force is 16 lbs.</li> <li>• Rugged Assembly for Most Applications</li> <li>• Measures Temperature from any Ferrous Surface</li> <li>• Capable of use to 1000°F (535°C) without Degradation</li> <li>• The Powerful Alnico Magnet Forces the Spring Loaded Sensing Tip into Contact with the Sensor Surface</li> </ul> <p>Note: Sensor provides a means to secure a temperature from any ferrous surface. The sensor is very useful in applications such as heat treating, process investigations, and development programs where permanent attachment of a thermocouple is not desired.</p>

PRODUCT

<p>7000 MODEL METAL PROTECTION TUBES</p>		<p>1/2" Schedule 40 &amp; 3/4" Schedule 40</p> <ul style="list-style-type: none"> <li>• Protection Tubes Help Insure Longer Life and Continued Accuracy</li> <li>• Protects Against Physical Damage, Corrosion, and Contamination</li> <li>• Generally Less Expensive than Thermowells</li> </ul>
<p>7100 MODEL CERAMIC AND ALUMINUM OXIDE PROTECTION TUBES</p>		<ul style="list-style-type: none"> <li>• Manufactured Under Rigid Controls to Maintain High Quality</li> <li>• Provides Protection at High Temperatures</li> <li>• Aluminum 3450°F</li> <li>• Ceramic 3100°F</li> <li>• Silicon Carbide 3000°F</li> </ul>
<p>808 SERIES RESISTANCE TEMPERATURE SENSOR BARE LEADS</p>		<ul style="list-style-type: none"> <li>• Bare Leads Provided for Termination of Your Choice</li> <li>• Replacement RTD Element</li> <li>• Close Interchangeability</li> <li>• Standard Resistance Value 100 Ohms at 0°C, Others Available</li> <li>• Standard Resistance Tolerance of ±0.1% at 0°C is Standard</li> <li>• Standard Temperature Coefficient .00385/Ohm/Ohm/°C</li> </ul>
<p>900 MODEL MINIATURE HEAD THERMOCOUPLE 1/4" DIAMETER</p>		<ul style="list-style-type: none"> <li>• Supplied with a Lightweight Miniature Screw-Cover Head</li> <li>• Waterproof Cover Available</li> <li>• High Strength Bendable Design</li> <li>• Mineral Insulation Enables Thermocouples to be Used at Higher Temperatures</li> </ul>
<p>909A MODEL RESISTANCE TEMPERATURE SENSOR WITH LIGHTWEIGHT COVERHEAD</p>		<ul style="list-style-type: none"> <li>• Superior Stability, Repeatability and Accuracy</li> <li>• Vibration and Shock Resistant</li> <li>• Supplied with a Lightweight Miniature Screw Coverhead</li> <li>• Waterproof Cover Available</li> <li>• Standard Resistance Value 100 Ohms at 0°C, Others Available</li> <li>• Standard Resistance Tolerance of ±0.1% at 0°C</li> <li>• Standard Temperature Coefficient .00385/Ohm/Ohm/°C</li> </ul>
<p>1910 MODEL INDUSTRIAL THERMOWELL THERMOCOUPLE UNIWELL</p>		<ul style="list-style-type: none"> <li>• Compression Fitting is Provided on this Series</li> <li>• Conductors Protected from Environment by Dense – Pack MgO and 446 SS Heavy Wall Sheath</li> <li>• Simplicity of Installation</li> <li>• Lower Conduction Losses</li> <li>• Long-Life, 14 Gauge Nominal Size Conductors</li> <li>• Elimination of Spring-Loading</li> </ul>
<p>16000 MODEL STANDARD THERMOWELL ASSEMBLY</p>		<ul style="list-style-type: none"> <li>• Thermowell has Step-Down Design</li> <li>• Complete Thermocouple/Thermowell Assembly</li> <li>• Supplied with a Threaded Thermowell (.260 Bore)</li> <li>• Explosion Proof Head is Standard</li> </ul>
<p>26000 MODEL STAINLESS STEEL RTD THERMOWELL 1/4" DIAMETER</p>		<ul style="list-style-type: none"> <li>• Complete RTD/Thermowell Assembly</li> <li>• Supplied with an Explosion Proof Cast Head</li> <li>• Supplied with a Threaded .260 Bore Thermowell</li> <li>• Resistance Value 100 Ohms at 0°C Standard, Others Available</li> <li>• Resistance Tolerance of ±0.1% at 0°C is Standard</li> <li>• Temperature Coefficient .00385/Ohm/Ohm/°C Standard</li> </ul>

Thermocouples & RTD's //