

Temperature Transmitters General Instructions

APPLICATION

TSP-8101 series electronic temperature transmitters are used for providing signals to 8000 controllers and temperature indication readouts.

TSP-8111 series electronic temperature transmitters are used for providing signals for temperature indication readouts.

SPECIFICATIONS

Input: Any 1000 ohm Balco TS-8000 series sensor without setpoint adjuster, except TS-8204.

Indication Readout Spans: By jumper selection for 50°F (28°C) or 200°F (110°C) spans. Fixed 300°F (167°C) span. See Table 1.

Indication, A 1 to 11 Vdc for indication readout. Output impedance is approximately 10 ohms. Load impedance of 3000 ohms or greater.

Control (TSP-8101 series only), Compatible (auxiliary bridge inputs) for direct and/or reverse acting operation of 8000 controllers.

Energy Management Systems, The 1 to 11 Vdc indication readout signals are compatible to most EMS systems whose voltage input characteristics have an impedance of 3000 ohms or greater.

Power Requirements: See Table 1.

Ambient Limits:

Shipping and storage Temperature, -40 to 160°F (-40 to 71°C).

Operating Temperature, 40 to 135°F (4 to 57°C).

Humidity, 5 to 95% R.H., non-condensing.

Connections: See Table 1.

Mounting: Any position. See Table 1.

Dimensions: See Table 1.

ACCESSORIES

All TSP-8XXX's

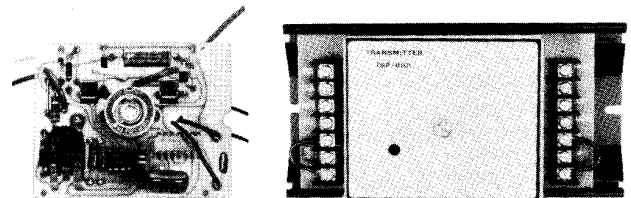
TS-8101	Room Sensor
TS-8131	Unitary (room button type) sensor
TS-8201	Duct/ immersion sensor
TS-8241	Diffuser sensor
TS-8261	Light fixture sensor
TS-8404	5' (1.5m) averaging sensor
TS-8422	22' (6.7m) averaging sensor
TS-8501	Outdoor sensor

All TSP-8XXX's (except TSP-8111-103)

ASP-521	Indication meter, dual scale 50 to 100°F (10 to 38°C)
ASP-522	Indication meter, dual scale 30 to 80°F (-1 to 26°C)
ASP-561	Indication meter, dual scale -40 to 160°F (-40 to 71°C)
ASP-562	Indication meter, dual scale 0 to 200°F (-17 to 93°C)
ASP-563	Indication meter, dual scale 40 to 240°F (4 to 116°C)
AT-221	Wall mounting kit

TSP-8101-103 Only

AD-8912	12" (305 mm) enclosure
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**TSP-8111
TSP-8111-103**

**TSP-8101
TSP-8101-103
TSP-8101-105**

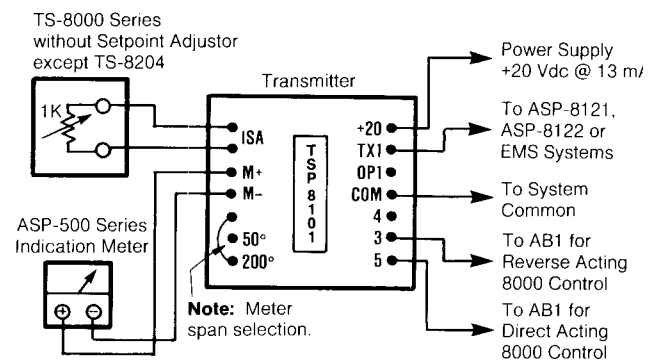


Figure-1 TSP-8101 Series Typical Wiring.

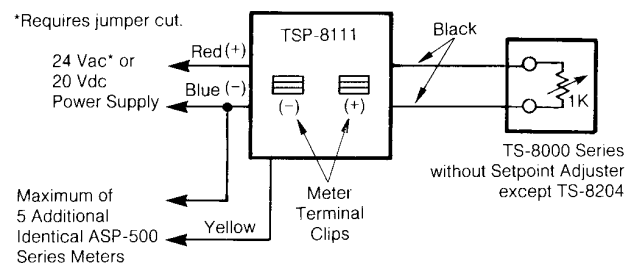


Figure-2 TSP-8111 Series Typical Wiring.

TSP-8101 Series Only

ASP-8121	Digital indication meter, -40 to 260°F
ASP-8122	Digital indication meter, -40 to 126°C 8000 controllers

TSP-8111 Series Only (except TSP-8111-103)

AD-8952	Adapter plate for track mounting
AD-8943	Mounting track
AT-221	Wall mounting kit

TSP-8111-103 Only

AD-8952	Adapter plate for track mounting
AD-8953	Mounting track
ASP-8121	Digital indication meter, -40 to 260°F
ASP-8122	Digital indication meter, -40 to 126°C

Table-1 Specifications.

Part Number	Output Signal		Power Req.	Wiring Conn.	Mounting			Dimen. in. (mm)		
	Controllers	Indication			Panel	Track	Remote	High	Wide	Deep
TSP-8101	For single output 8000 controllers. Typically CC-8111-XXX, CP-8102-XXX, CP-8502-XXX or CP-8X61-333 (AB3 input only)	<u>Meter Readout</u> ASP-500 series ^{ab} (except ASP-584)	20, ±1 Vdc @ 13 mA	Coded screw terminals	Shipped with vinyl track for panel mounting Note: Must be Mounted in same cabinet as 8000 controller	—	—	4 (120)	7-1/2 (190)	2-1/2 (63)
TSP-8101-103	For controllers with two direct acting outputs, Typically CP-8X61-333 (AB1 & AB2 inputs)									
TSP-8101-105	Using single sensor for multiple single output controllers up to six	Shipped with vinyl track for panel mounting			Order separately AD-8912 enclosure					
TSP-8111	—	ASP-500 series ^{ab} (except ASP-584)	20, ±1 Vdc @ 12 mA or 24 Vac ± 10% @ 20 mA	Color coded pigtail leads	Direct attachment to meter	Order separately AD-8952 adapter plate and AD-8953 track	Order separately AT-221 wall mounting kit	2-3/8 (60)	3 (76)	2-1/8 (54)
TSP-8111-103	—	ASP-8121 or ASP-8122 digital ^b			—	—				

^a Up to six meters can be controlled from one transmitter.

^b With switching, five TSP-81X1 series can control one meter readout or digital indicator.

DEFINITIONS

8000 Controller Modes of Operation

Direct-Acting (D.A.) Control: A temperature increase at the TS-8000 series sensor causes the 8000 controller output voltage (Vdc) signal (measured between OP1 and COM terminals) to increase.

Reverse-Acting (R.A.) Control: A temperature increase at the TS-8000 series sensor causes the 8000 controller output voltage (Vdc) signal (measured between OP1 to COM terminals) to decrease.

PRE-INSTALLATION

Inspection

Visually inspect the carton for damage. If damaged, notify the appropriate carrier immediately. If undamaged, open the carton and visually inspect the device for obvious physical defects. Return damaged or defective products.

Required Installation Items

- Wiring diagrams
- Tools (not provided):
DVM (digital volt-ohm meter)
Appropriate screwdriver for mounting screws and terminal connections
- Appropriate accessories
- Mounting screws (not provided)

INSTALLATION (General)

Caution:

1. Installer must be a qualified, experienced technician,
2. Make all connections in accordance with the wiring diagram, and in accordance with national and local electrical codes.
3. Avoid locations where excessive vibration, moisture, corrosive fumes or vapors are present.
4. Disconnect power supply before installation to prevent equipment damage.
5. Do not exceed ratings of the device.

WIRING (General)

Codes: Make all electrical connections in accordance with job wiring diagrams and in compliance with national and local electrical codes.

Minimum Requirements: No. 18 gauge insulated twisted (six turns per foot) wires up to 1000 foot runs. Class II low voltage wires suitable except as stated in the caution below.

Caution: Shielded cable must be used when it is necessary to install the leads in the same conduit with power wiring, or when it is known that high RFI/EMI generating devices are near. System ground the shield at the common terminal (-) or blue (-) lead only.
Use copper conductors only.

Sensor: Restrict element lead to shortest length practical (see Table 2 and 4)

MOUNTING (Accessories)

Dimensions in inches () mm

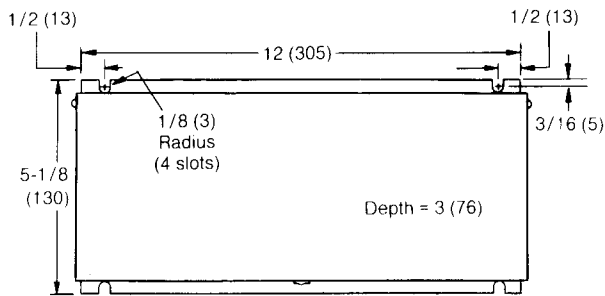


Figure-3 AD-8912 Enclosure Dimensions.

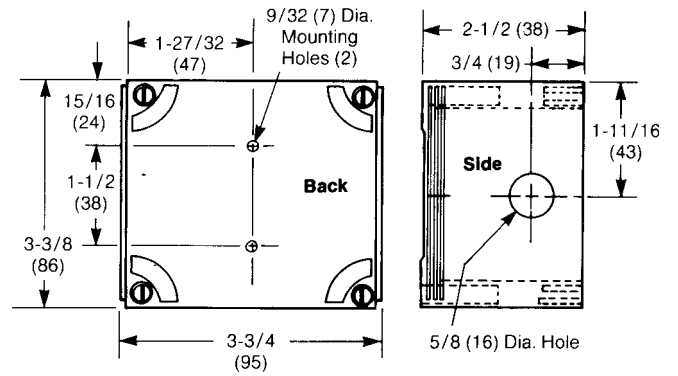


Figure-6 AT-221 Dimensions.

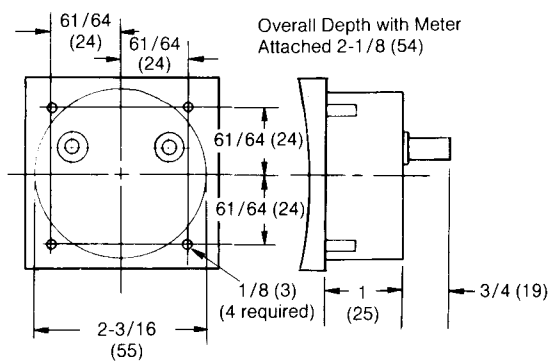


Figure-4 ASP-500 Series Dimensions.

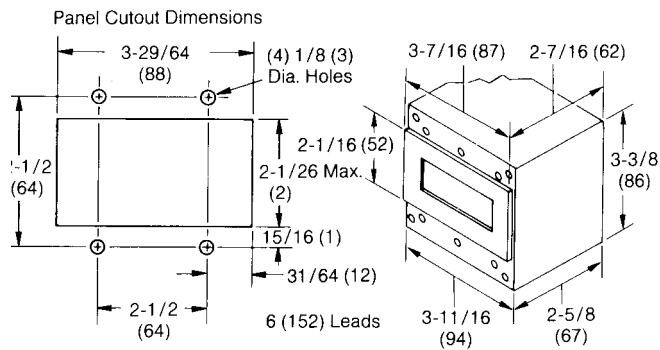


Figure-5 ASP-8121, ASP-8122 Dimensions.

TSP-8101 Series Temperature Transmitters for Indication and Control

MOUNTING

Location

TSP-8101 SERIES DIMENSIONS

Local or Central Control Panel Only

Mount track in panel using two #8 or #10 sheet metal screws.

Dimensions in inches () mm

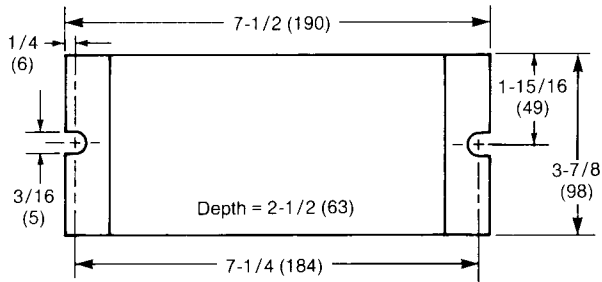


Figure-7 TSP-8101 Series Dimensions.

Accessories

TSP-8101-105 ONLY

Remote Mounting in AD-8912 Enclosure

Remove plastic track from printed circuit board and mount in AD-8912 enclosure. See General Instruction sheet for AD-8912 for installation instructions.

ASP-500 SERIES INDICATION METERS

Direct Mounting Housing on a Wall or Duct (requires AT-221 kit)

See Figures 4, 6 and 8.

1. Mount the housing on a wall or duct using two (2) mounting screws fastened to the back of the case.

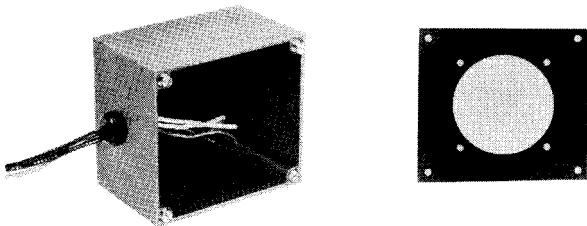


Figure-8 AT-221 Wall or Duct Mounting Enclosure.

2. Bring the wiring through the opening on the left side of the housing. A Heycon clamp (provided) will hold the wires in place.
3. Mount the ASP-500 series indication meter to the AT-221 face plate using the four (4) screws (on meter) and hardware provided.

4. Connect the two (2) wires to the ASP-500 series meter (hardware provided) matching wires to correct polarity of meter terminals.
5. Mount the ASP-500 series and AT-221 face plate assembly to the AT-221 housing using the four (4) screws provided.

WIRING

Table-2 LENGTH OF WIRE RUNS.

Wire Gauge	Length or Run in Feet			
	"TS" Sensor to "TSP" Series Transmitter	TSP-8101 Series to 8000 Series Controller (except TSP-8101-105)	TSP-8101-105 to 8000 Series Controller	"TSP" to Meter or Indicator
22	—	Should be in same panel as controller	—	—
18	1000		1000	1000
16	2250		—	2250
14	4000		—	4000

Minimum Requirements: No. 18 gauge insulated twisted (six turns per foot) wires up to 1000 foot runs. Class II low voltage wires suitable except as stated in the caution below.

Caution: Shielded cable must be used when it is necessary to install the leads in the same conduit with power wiring, or when it is known that high RFI/EMI generating devices are near. System ground the shield at the common terminal (-) or blue (-) lead only.
Use copper conductors only.

TSP-8101 ADJUSTMENTS

See photo on page 1 and Figure 1.

Span Selection Jumper: Terminals are located on left side of transmitter. Move one jumper end to 50°F (28°C) terminal if meter span is required.

Meter Zero Adjustment: Use single slotted screwdriver (TOOL-10) to turn calibration potentiometer, through hole on cover, to zero meter.

TSP-8101 CHECKOUT

See Figure 1.

1. Check wiring diagram against actual wiring.
2. Measure +20 Vdc (± 1) using a DVM between +20 and COM of the TSP-8101. If proper voltage is not present, check power source to assure proper voltage.
3. The span of the transmitter must match the ASP-500 series indication meter.

Note: The meter span jumper must be at the proper terminals.

4. Disconnect the TS-8XXX sensor from ISA terminals. Measure the voltage across terminals M+ and M-. The measured voltage must be greater than 11 Vdc. Measure the voltage across terminals TX1 and COM. The measured voltage must be greater than 11 Vdc.

5. Short together the two (2) ISA terminals of the transmitter. Measure the voltage across terminals M+ and M-. The measured voltage must be less than 1 Vdc. Measure the voltage across terminals TX1 and COM. The measured voltage must be less than 1 Vdc.
6. If the transmitter is operating properly but the indication meter is not reading within $\pm 2\%$ scale range, recalibrate the meter.
5. Adjust calibration potentiometer in the transmitter until the reading of the indication meter is within 2% of the temperature measured at the sensor with the thermometer.
6. The meter is calibrated.
7. Connect transmitter's control output signal (terminal 3 or 5) to 8000 controller input terminal (AB1 or AB2) per wiring diagrams. Calibrate the 8000 controller using standard procedures as outlined in the General Instructions for the individual device.

CALIBRATION

See Figure 1 and Table 2.

1. Wire a TS-8XXX temperature sensor, indication meter and transmitter to the TSP-8101.
2. Set the span jumper to match the indication meter span.
3. Apply +20 Vdc to terminals +20 and COM of the TSP-8101.
4. Measure temperature at sensor with an accurate thermometer. The temperature must be within the range of the indication meter.

MAINTENANCE

Regular maintenance of the total system is needed to assure sustained optimum performance.

Field Repair

Transmitters are not field repairable. Replace defective transmitter with functioning unit.

Factory repair of transmitter is available.

Table-3 TSP-8101 Operating Characteristics.

TSP-8101 TX1 Output	M+ and M- Terminals					Transmitter's Output (Vdc)
	30 to 80	50 to 100	-40 to 160	0 to 200	40 to 240	
-40	30	50	-40	0	40	1
-10	35	55	-20	20	60	2
20	40	60	0	40	80	3
50	45	65	20	60	100	4
80	50	70	40	80	120	5
110	55	75	60	100	140	6
140	60	80	80	120	160	7
170	65	85	100	140	180	8
200	70	90	120	160	200	9
230	75	95	140	180	220	10
260	80	100	160	200	240	11

(300°F SPAN)	(50°F SPAN)	(50°F SPAN)	(200°F SPAN)	(200°F SPAN)	(200°F SPAN)	Transmitter (mV's/°F)	Sensitivities (V/°F)	Calibration Vdc at 70°F
						50	.05	2.5
						50	.05	4.5
						50	.05	6.5
						200	.2	5.0
						200	.2	9.0
						33-1/3	.033-1/3	4.66-2/3

TYPICAL APPLICATIONS

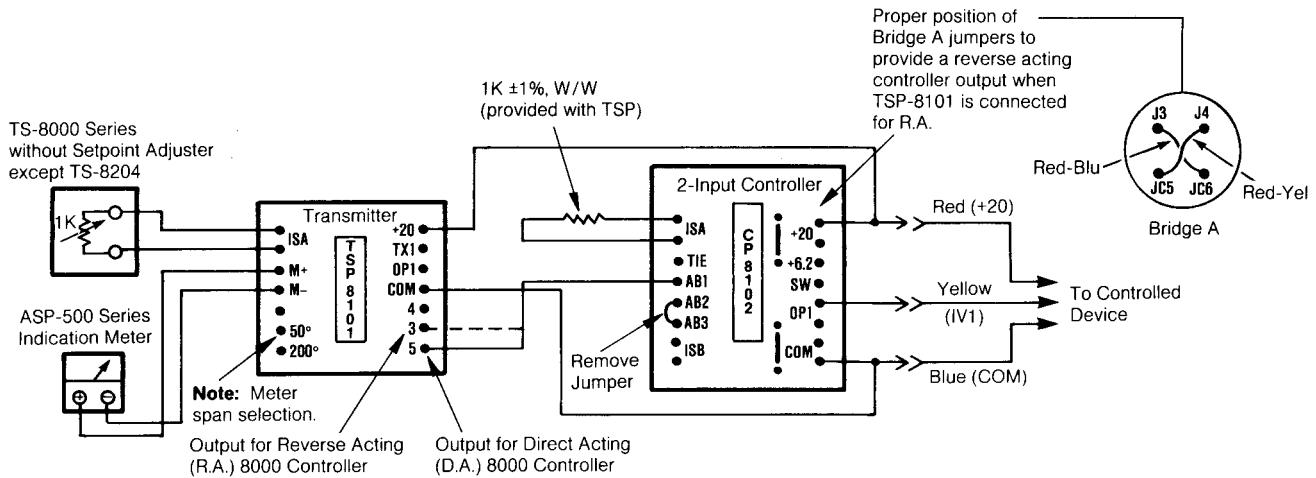


Figure-9 CP-8102 Controller with Single TSP-8101 Transmitter Input.

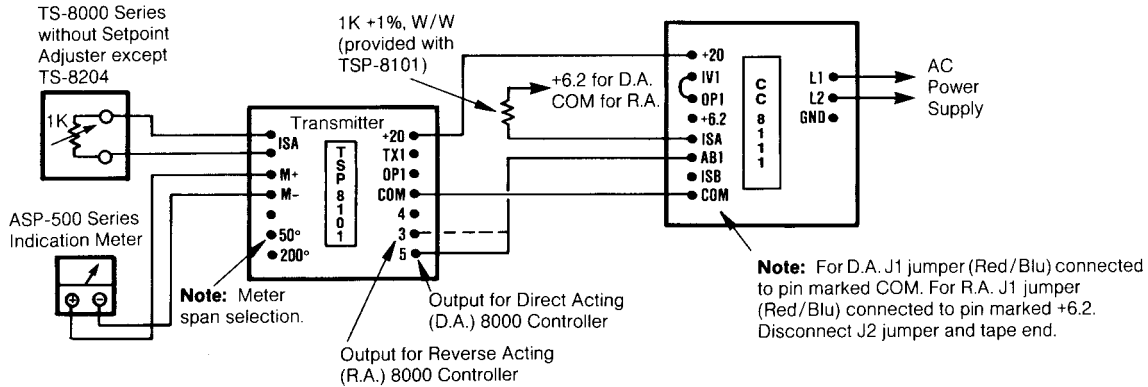


Figure-10 CC-8111-XXX or CP-8502-XXX with Single TSP-8101 Transmitter Input.

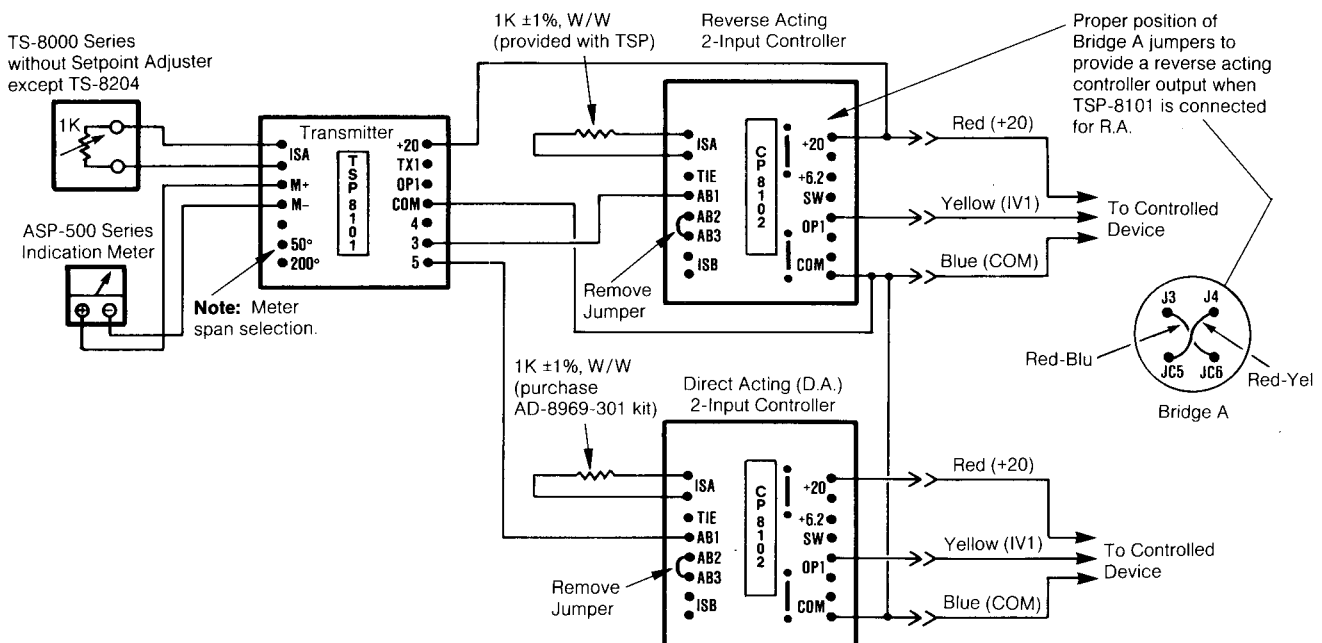


Figure-11 Operation of Two CP-8102's with Single TSP-8101 Transmitter.

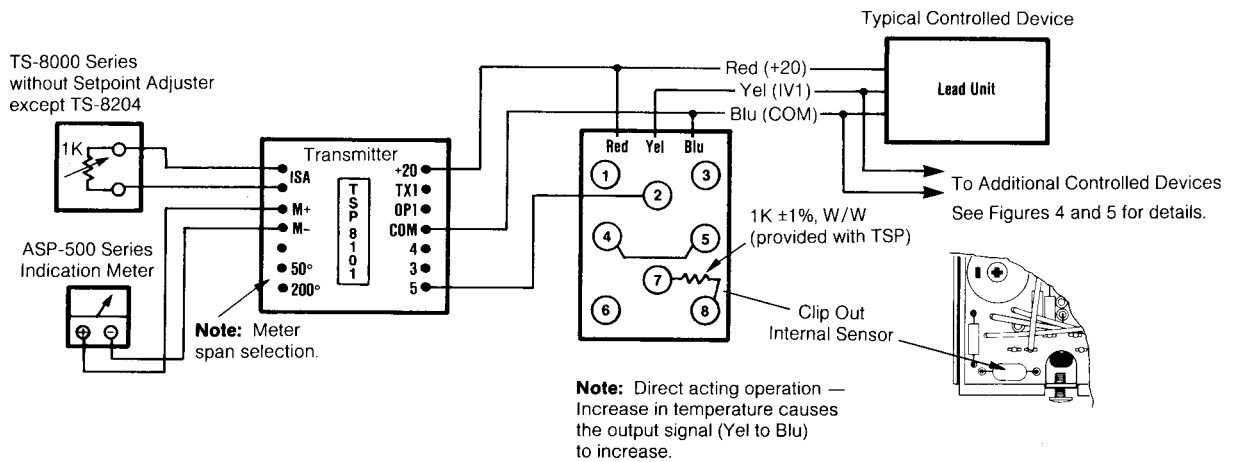


Figure-12 Direct Acting TP-810X with Single TSP-8101 Transmitter Input.

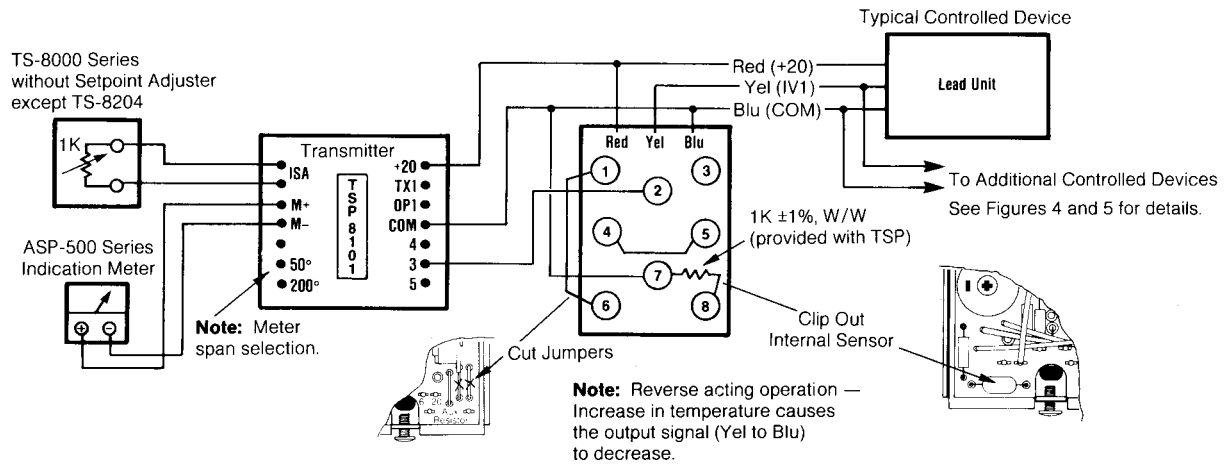


Figure-13 Reverse Acting TP-810X with Single TSP-8101 Transmitter Input.

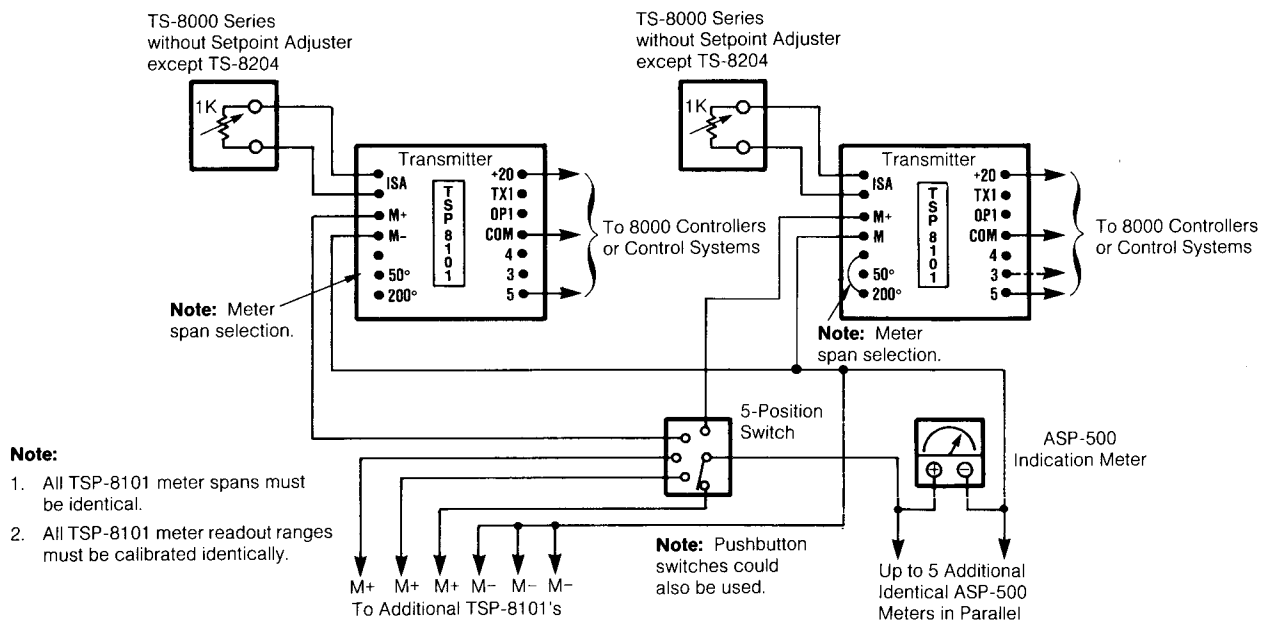


Figure-14 Single ASP-500 Series Indicators Switched between Multi TSP-8101-XXX Transmitters.

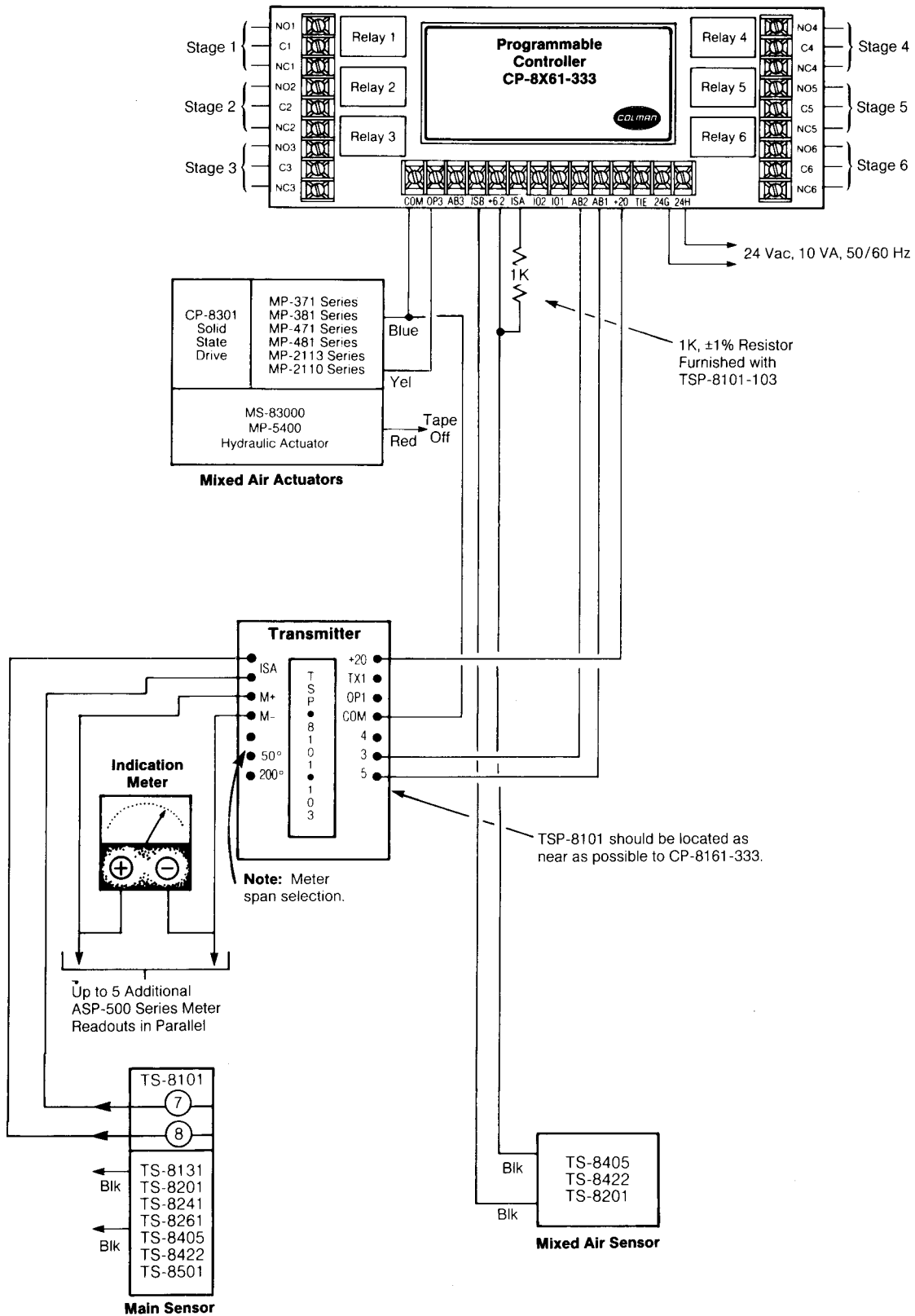
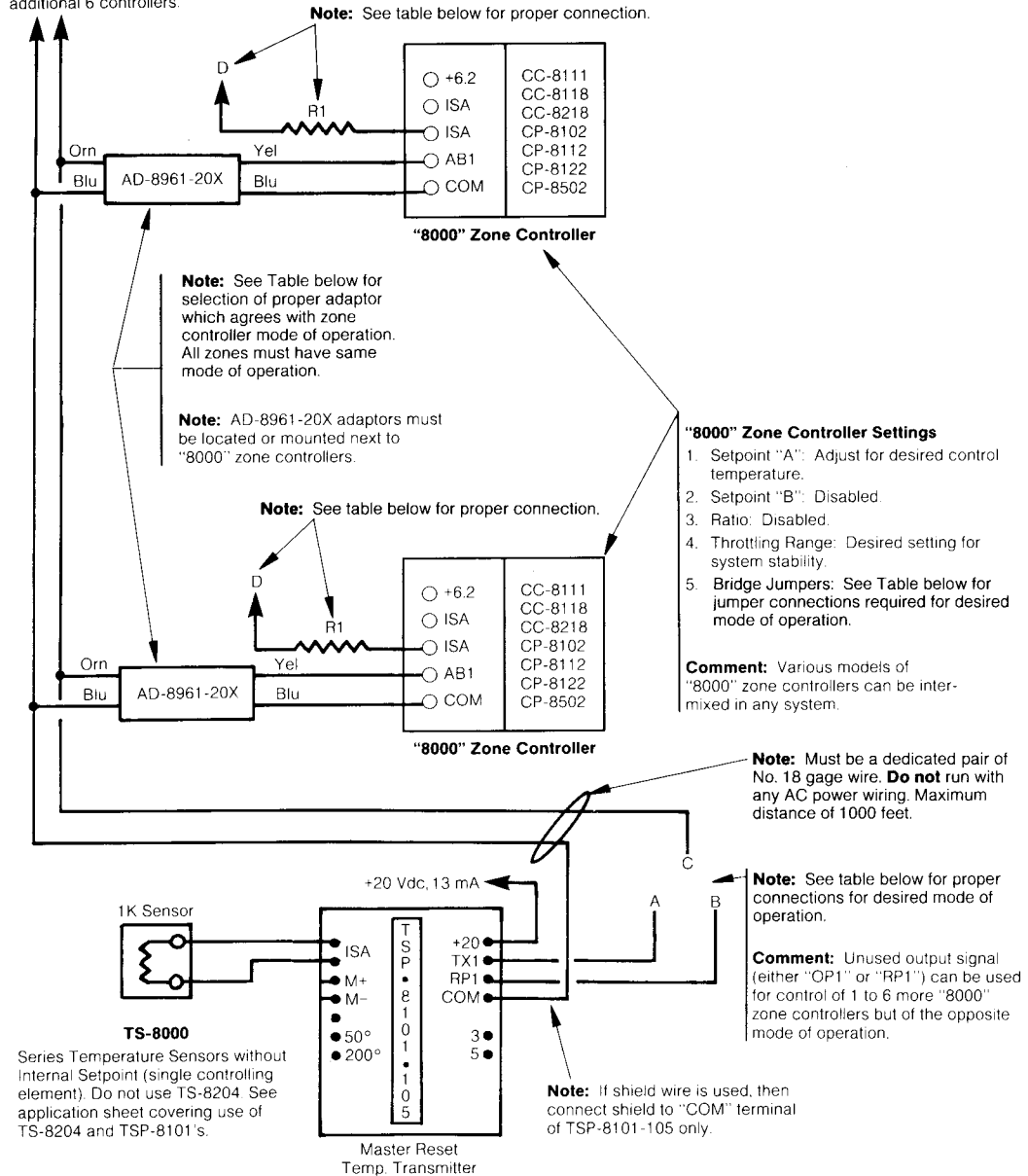


Figure-15 TSP-8101-103 Temperature Transmitter for Temperature Control Plus Temperature Indication Used with CP-8X61-333 Programmable Controller.

Max. of 4 additional zones. If more zones, add an AD-8101 per additional 6 controllers.



Table

Zone Controller Operation				Internal & External Zone Controller Connections										
Mode*	Adaptor Part No.	TSP-8101-105 Connection	R1 Resistor & B-C Part No.	CP-8102			CC-8118 Series CC-8218 Series			CC-8111 Series, CP-8112, CP-8122 CP-8502 Series				
				Sensor Input			Sensor Input			Sensor Input				
				No.	Connect.	"D" to	No.	Connect.	"D" to	No.	Connect.	"D" to		
Direct Acting Output	AD-8961-205	"B" to "C"	Description 1K Ohms, ±1%, 2 Watt Wire Wound with TC = 20 ppm/°C	A	J3 J5	J4 J6	ISA Term.	A	J3 J5	J4 J6	ISA Term.	A	Jumper J1 to COM Pin (Factory)	+6.2 Term.
				B	Disabled, Jumper between AB2 & AB3 Disconn.		B	Jumpers J5 & J6 Disconn. & Each End Taped		B	Jumper J2 Disconn. & End Taped			
Reverse Acting Output	AD-8961-202	"A" to "C"	Part No. AD-8969-301	A	J3 J5	J4 J6	ISA Term.	A	J3 J5	J4 J6	ISA Term.	A	Jumper J1 to +6.2 Pin	COM Term.
				B	Disabled, Jumper between AB2 & AB3 Disconn.		B	Jumpers J5 & J6 Disconn. & Each End Taped		B	Jumper J2 Disconn. & End Taped			

Figure-16 TSP-8101-105 Temperature Transmitter for Operation of Two to Six 8000 Controllers from One TS-8000 Series Temperature Sensor.

TSP-8111 Series Temperature Transmitters for Indication Only

MOUNTING

TSP-8111 SERIES DIMENSIONS

Dimensions in inches () mm

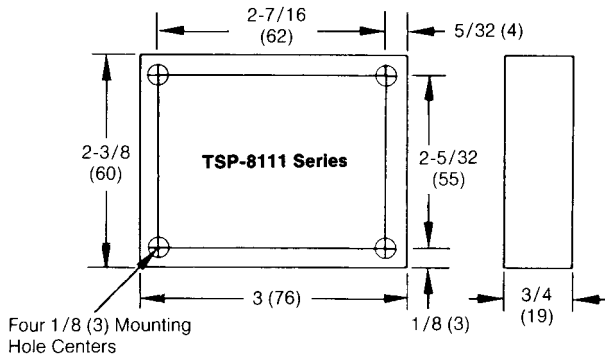


Figure-17 TSP-8111 Series Dimensions.

TSP-8111 SERIES PANEL MOUNTED (requires AD-8952 adaptor plate and AD-8953 plastic track)

1. Mount the TSP-8111 to the AD-8952 adaptor plate mounting studs using the four (4) #4-40 x 5/16" round head screws.
2. Install the AD-8953 plastic track in a panel using field supplied #8 or #10 sheet metal screws.
3. Insert the AD-8952, with the TSP-8111 secured, into the plastic track slots.

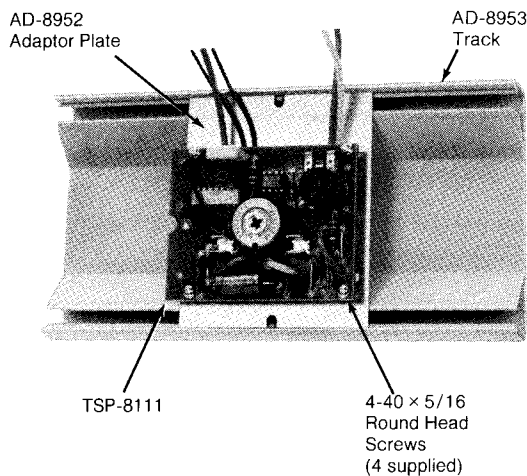


Figure-18 TSP-8111 Series Panel Mounted.

TSP-8111 SERIES (except TSP-8111-103)

Direct Attachment to an ASP-500 Series Meter that is Mounting to a Panel Face

1. Mount the ASP-500 series meter to the panel face. See Figure 4 for meter mounting dimensions.
2. Match the polarity of the meter connection clips with the terminal posts of the ASP-500 series meter. See Figure 20 for polarity of meter mounting clips.

3. Remove the adhesive backing from the meter mounting pad of the TSP-8111.
4. Push the meter connection clips on the transmitter firmly onto the terminal posts of the ASP-500 meter.

Direct Mounting of Transmitter and Meter on a Wall or Duct (requires AT-221 kit)

1. Mount the housing on a wall of duct using two (2) mounting screws fastened to the back of the case.
2. Bring the sensor and power wiring through the opening on the left side of the housing. A Heycon clamp (provided) will hold the wires in place.
3. Mount the ASP-500 series indication meter to the AT-221 face plate using the four (4) screws (on meter) and hardware provided.
4. Wire the TSP-8111 per instructions.
5. Match the polarity of the meter connection clips with the terminal posts of the ASP-500 series meter. See Figure 20 for polarity of meter mounting clips. Connect ASP-500 series meter to TSP-8111.
6. Mount the ASP-500 series and AT-221 face plate assembly to the AT-221 housing using the four (4) screws provided.

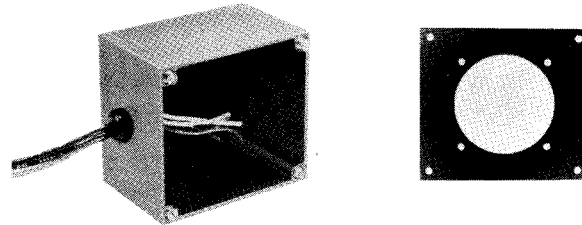


Figure-19 AT-221 Wall or Duct Mounting Enclosure.

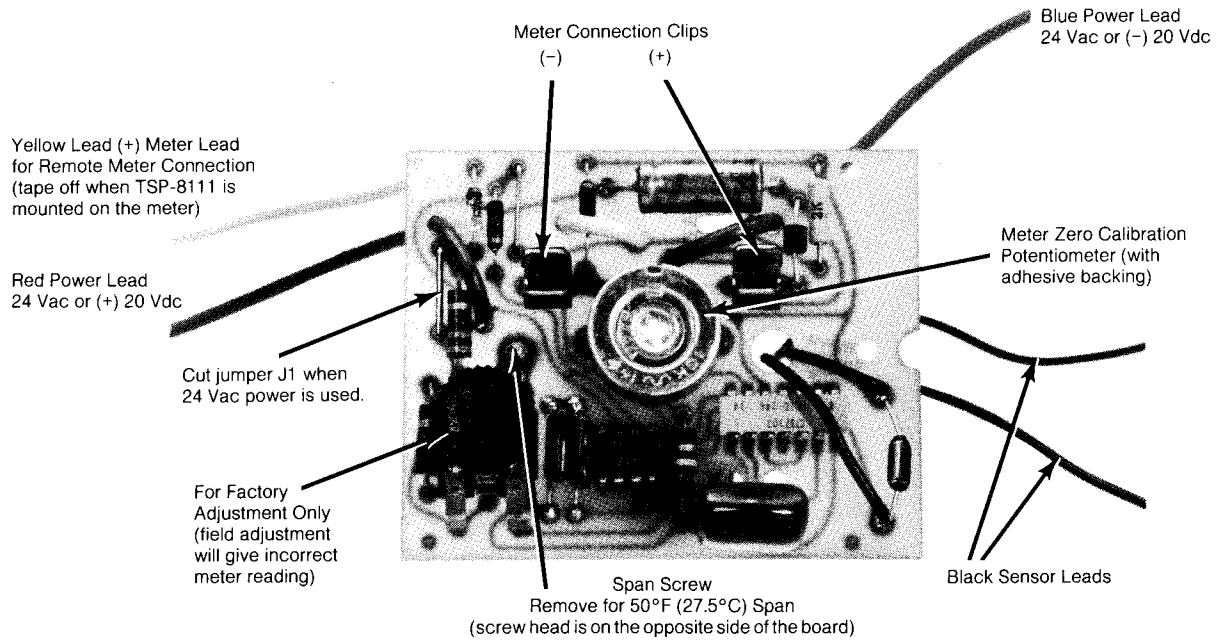


Figure-20 TSP-8111 Series Connections and Adjustments.

WIRING

Table-4 LENGTH OF WIRE RUNS.

Wire Gauge	Length or Run in Feet	
	"TS" Sensor to "TSP" Series Transmitter	"TSP" to Meter or Indicator
22	—	—
18	1000	1000
16	2250	2250
14	4000	4000

Minimums Requirements: No. 18 gauge insulated twisted (six turns per foot) wires up to 1000 foot runs. Class II low voltage wires suitable except as stated in the caution below.

Caution: Shielded cable must be used when it is necessary to install the leads in the same conduit with power wiring, or when it is known that high RFI/EMI generating devices are near. System ground the shield at the common terminal (-) or blue (-) lead only.

Use copper conductors only.

TSP-8111 SERIES ADJUSTMENTS

See Figure 20.

Span Selection Screw: Remove span screw to obtain 50°F (28°C) meter span if required by meter.

Meter Zero Adjustment: Use single slotted screwdriver (TOOL-10) inserted in calibration potentiometer to zero meter.

20 Vdc/24 Vac Power Jumper: Cut jumper J1 when 24 Vac power is used.

TSP-8111 SERIES CHECKOUT

See Figure 20.

1. Check wiring diagram against actual wiring
2. Apply +20 Vdc (± 1) or 24 Vac ($\pm 10\%$) power to red and blue leads.

Note: Jumper J1 must be cut when 24 Vac power is used.

If proper voltage is not present, check power supply and assure proper voltage.

3. The span of the transmitter must match the span of the meter.

Note: The span screw and washer must be securely in place for 200°F (110°C) span meters. Both screw and washer must be removed for 50°F (28°C) span meters.

4. Disconnect the TS-8XXX sensor. Measure the voltage across the meter clips (or blue and yellow leads). The measured voltage must be greater than 11 Vdc.
5. Short the two (2) black sensor leads of the transmitter. Measure the voltage across the meter clips (or blue and yellow leads). The measured voltage must be less than 1 Vdc.
6. If the transmitter is operating properly but the meter is not reading within $\pm 2\%$ of meter scale range, recalibrate the meter.

TSP-8111 SERIES CALIBRATION

See Figure 20 and Table 4.

1. Wire temperature sensor, indication meter and transmitter.
2. Apply +20 Vdc or 24 Vac power to red and blue leads.
3. Measure temperature at sensor with accurate thermometer. The temperature must be within the range of the indication meter.
4. Adjust calibration potentiometer in transmitter (may be adjusted by a single slotted screwdriver through the back of the board) until the reading of the indication meter is between 2% of the temperature measured at the sensor with the thermometer.
5. The meter is calibrated.

MAINTENANCE

Regular maintenance of the total system is needed to assure sustained optimum performance.

FIELD REPAIR

Transmitters are not field repairable. Replace defective transmitter with functioning unit.

Factory repair of transmitter is available.

Table-5 TSP-8111 Operating Characteristics.

TSP-8111 -103	TSP-8111 Ranges (°F)					Transmitter's Output (Vdc) (Yel to Blue)
	30 to 80	50 to 100	-40 to 160	0 to 200	40 to 240	
-40	30	50	-40	0	40	1
-10	35	55	-20	20	60	2
20	40	60	0	40	80	3
50	45	65	20	60	100	4
80	50	70	40	80	120	5
110	55	75	60	100	140	6
140	60	80	80	120	160	7
170	65	85	100	140	180	8
200	70	90	120	160	200	9
230	75	95	140	180	220	10
260	80	100	160	200	240	11

(300°F SPAN)	(50°F SPAN)	(50°F SPAN)	(200°F SPAN)	(200°F SPAN)	(200°F SPAN)	Transmitter (mV's/°F)	Sensitivities (V/°F)	Calibration Vdc at 70°F
						50	.05	2.5
						50	.05	4.5
						50	.05	6.5
						200	.2	5.0
						200	.2	9.0
						33-1/3	.033-1/3	4.66-2/3

TYPICAL APPLICATIONS

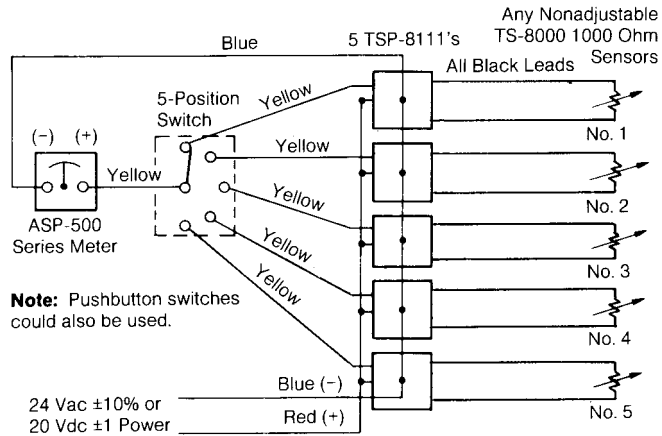


Figure-21 TSP-8111's Used for Multi-point Temperature Indication.

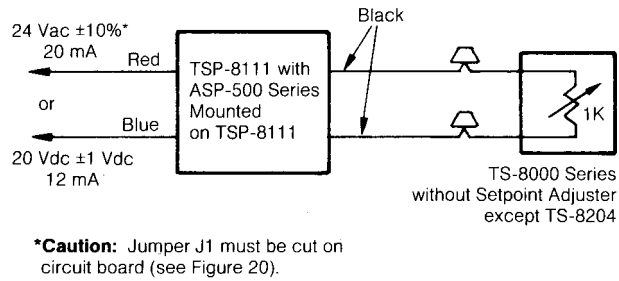
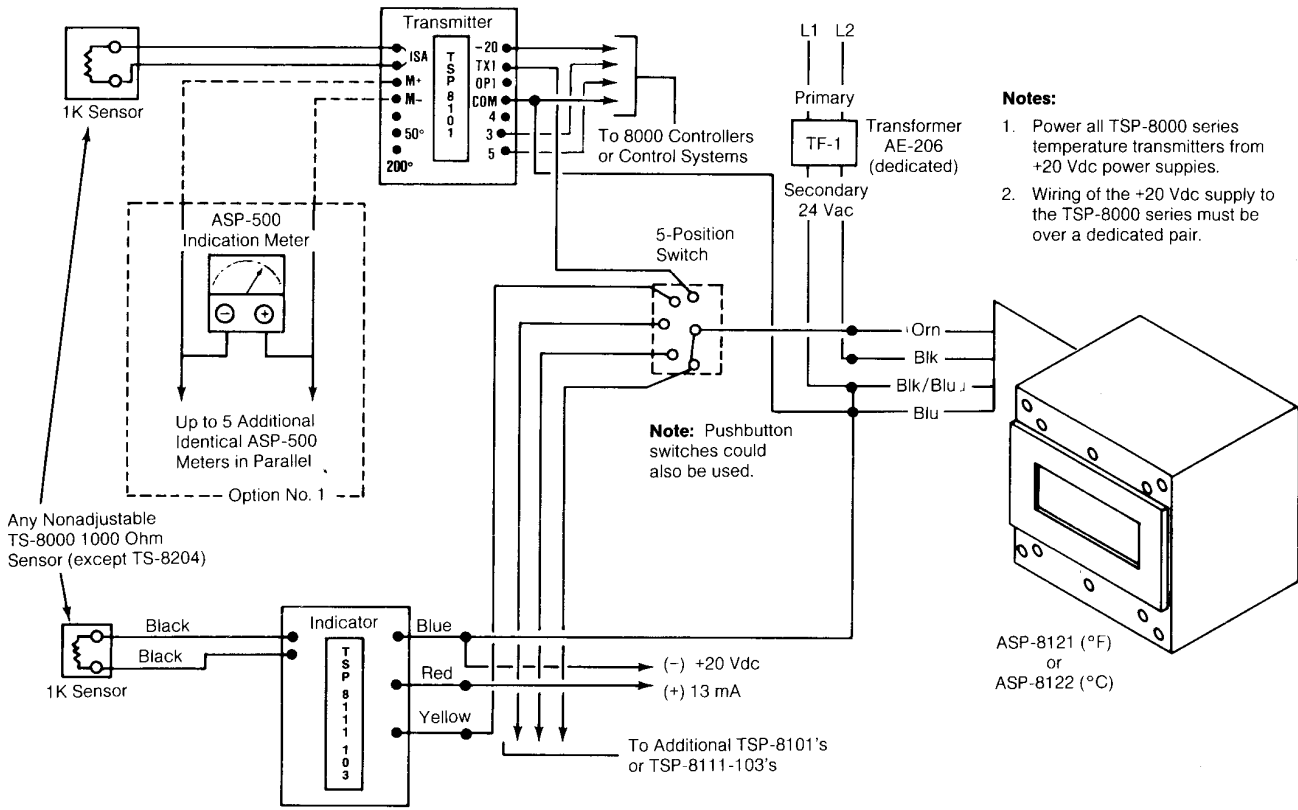


Figure-22 Typical Wiring for TSP-8111.



- Notes:**
1. Power all TSP-8000 series temperature transmitters from +20 Vdc power supplies.
 2. Wiring of the +20 Vdc supply to the TSP-8000 series must be over a dedicated pair.

Note: Pushbutton switches could also be used.

Figure-23 Multi-Temperature Digital Indication.

On October 1st, 2009, TAC became the Buildings business of its parent company Schneider Electric. This document reflects the visual identity of Schneider Electric, however there remains references to TAC as a corporate brand in the body copy. As each document is updated, the body copy will be changed to reflect appropriate corporate brand changes.

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