

# INTECH Micro EXPO-3. Installation Guide.

16 Channel  
Programmable  
Multiplexer.

## Features.

- 16 Channel Multiplexer.
- Field Programmable Inputs.
- High Accuracy 0.1%.
- Compact DIN Rail Mount Enclosure.
- Easy to Install.
- Low Cost Expansion for PLCs.
- Solid State Switches for Reliability.



## Description.

The EXPO-3 can multiplex up to 16 inputs, into one output, selectable by a PLC or a Data Logging System. It uses solid state switches, making it extremely reliable and durable.

The PLC only requires two digital outputs and one analogue input to select and receive data from the EXPO-3. For each additional EXPO-3 added to the system only one more analogue input is required. (The typical fan-out for most PLC's digital outputs is eight EXPO-3s) The EXPO-3I, the EXPO-3R and the EXPO-3V are input programmable, on board.

The EXPO-3 is used extensively in industrial plants, with proven reliability and accuracy. It comes complete and ready to operate in a compact DIN rail mount enclosure.

## Ordering Information.

EXPO-3 -  -  -  -   
                   M      IR      OR      PS

Ranging Options of EXPO-3					
Input Model	M	Input Range - IR			Output Range - OR
		Standard	or Specify Within	Minimum <sup>1)</sup>	
mA	I	4~20mA	0~50mA	1mA	4~20mA
RTD	R	0~100C	-100~600C	20C	0~20mA
Thermocouple	T	K, 0~1200C	T\C Type & Range.	200C	0~10Vdc
mV & V	V	0~10Vdc	0~10Vdc	200mV	0~5Vdc
Digital	D	9Vdc	8~12Vdc	8Vdc	Specify

Note 1) Minimum Range = Signal High - Signal Low.

Power Supply	PS
230\115Vac 50\60Hz Linear Power Supply - <i>Standard Option</i>	<i>blank</i>
24Vac Power Supply	X
Standard Universal Power Supply: 24~270Vac and 20~380Vdc	S
Low Voltage Power Supply: 8~30Vac and 8~30Vdc	L

## Ordering Examples.

- 1/ EXPO-3I 4\20mA 4\20mA  
 2/ EXPO-3V 0\10V 0\20mA S

- 4~20mA Input; 4~20mA Output; Linear Power Supply.  
 0~10V Input; 0~20mA Output; Standard Universal Power Supply.

## Quality Assurance Programme.

The modern technology and strict procedures of the ISO9001 Quality Assurance Programme applied during design, development, production and final inspection grant long term reliability of the instrument.

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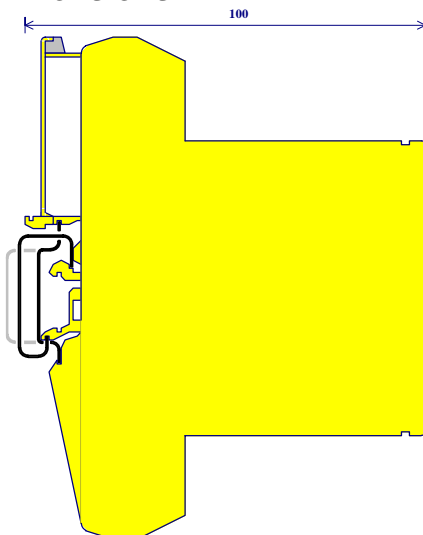
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## Common EXPO-3 Specifications.

Inputs	16 inputs. Refer next page for individual model specifications.		
Output	-Programmable	0~20mA	300Ω Load Maximum.
		4~20mA	300Ω Load Maximum.
	-Non-programmable	0~10mA	600Ω Load Maximum.
	(to be ordered)	2~10mA	600Ω Load Maximum.
		0~5Vdc	Maximum Output Drive = 5mA.
		1~5Vdc	Maximum Output Drive = 5mA.
		0~10Vdc	Maximum Output Drive = 5mA.
		2~10Vdc	Maximum Output Drive = 5mA.
		0~5Vdc	Maximum Output Drive = 5mA.
Power	-Standard Linear	230\115V, 50\60Hz.	
	-Low Voltage Linear	24±2Vac, 50\60Hz.	
	-Standard Universal	20~380Vdc and 24~270Vac; 50\60Hz; 4VA (32Vac min. if Tx. PVS used.)	
	-Low Voltage Universal	8~30Vdc and 8~30Vac; 50\60Hz; 4VA.	
	-Circuit Sensitivity	<±0.001%/V FSO Typical.	
Accurate to	<±0.1% FSO Typical.		
Linearity & Repeatability	<±0.1% FSO Typical.		
Channel Separation	<±0.1% FSO Typical.		
Ambient Drift	<±0.01%/C FSO Typical.		
Calibration	By DIP switches, and fine tuned by 20 turn Zero & Span potentiometers.		
Isolation Voltage	Input \ Output isolation is not provided. Isolation units are available. - Refer to the sections for the appropriate inputs if required.		
CLOCK and RESET pulse length	20msec. Min.		
CLOCK and RESET pulse amplitude	5~30Vdc.		
Settling time before reading	100msec.		
	600msec for EXPO-3T. - Multiple readings with averaging recommended.		
Operating Temperature	0~60C.		
Storage Temperature	-20~80C.		
Operating Humidity	90%RH Max. Non-Condensing.		
Housing	DIN & EN Rail Mount. L=182, W=127, H=100mm.		

## Dimensions.



## Individual EXPO-3 Model Specifications.

### EXPO-3I, mA Inputs

-Inputs	16 Single Ended Inputs. All -Ve Terminals Connected.
-Ranging	Field Programmable Within 0 to 50mAdc. Minimum Range = 1mA.
-Input resistance	100Ω.
	Maximum Over-range = 70mAdc Continuous.

### EXPO-3R, 3-wire RTD Inputs

-Inputs	16 Single Ended Inputs. All 2nd 'B' Terminals Connected. 3 Wire Pt100 RTD Standard Input.
-Ranging	Field Programmable Within -100C to 600C. Minimum Range = 20C.
-Sensor current	2mA Multiplexed.
-Lead resistance	10Ω/Lead Maximum Recommended. 100Ω/Lead Absolute Maximum.
	Other RTD input types available on request. (eg Ni100, Cu10, etc.)
	All temperature probes must be isolated from each other and earth.

### EXPO-3T, Thermocouple Inputs

-Inputs	16 Differential Inputs.
-Recommended Sensor	Mineral Insulated With Isolated Junction Thermocouples. Types B, E, J, K, N, R, S, T. Minimum Range = 200C.
-Differential voltage	Maximum of 10Vpeak Between Any Thermocouples. ie Maximum of 10Vdc, 7Vac or 10Vpeak Sum of any Vac and Vdc.
-Connection	The EXPO-3T works in conjunction with the IN-TLI programmable thermocouple isolation transmitter. The EXPO-3T operates as a thermocouple multiplexer only. The output of the EXPO-3T is wired directly into the LPI-T, or PI-T, which is mounted adjacently. Refer to the LPI-T, or PI-T data sheets for further specifications.

#### -LPI-T {PI-T} (Brief)

	Isolating Thermocouple Transmitter.
-Cold junction comp.	0~70C.
-CJC Drift	<0.03C/C Typical.
-Sensor fail	Upscale Drive. (Downscale Selectable.)
-T\C Lead Resistance	100Ω Maximum.
-Input Resistance	1MΩ Minimum.
-Linearisation	<±0.25% for type J & K thermocouples. <±0.5% for all Other Types.
-Isolation Voltage	>2kVac\dc {1.6kVac\dc} Input to Output for 60sec.
-Operating Temperature	0~70C.

### EXPO-3V, Voltage Inputs

-Inputs	16 Single Ended Inputs. All -Ve Terminals Connected.
-Ranging	Field Programmable Within 0 to 10Vdc. Minimum Range = 200mV.
-Input resistance	200kΩ.

### EXPO-3D, Digital Inputs

-Inputs	16 Single Ended Inputs. All -Ve Terminals Connected.
-Ranging	The EXPO-3D is Non-rangable.
-Input resistance	330Ω.
-Applied voltage range	8~12Vdc.
-Typical current usage	20mA @ 9Vdc, With LED in Circuit. 29mA @ 12Vdc, With LED in Circuit.
-Connection	24Vdc may only be applied if a 560Ω, 0.6W resistor is placed in series with the input, as a current limiter.

Note 1. Contact INTECH INSTRUMENTS for more detailed programming information.

Note 2. Specifications based on Standard Calibration Units, unless otherwise specified.

Note 3. Due to ongoing research and development, designs, specifications, and documentation are subject to change without notification.

No liability will be accepted for errors, omissions or amendments to this specification.

### EXPO-3I Programming Tables.

**Notes:** (For ALL programming tables.) Switch Status: **0=OFF 1=ON** \*Other range combinations possible.  
**Important:** Once a range has been selected on the DIP switches the EXPO-3 should be checked using the appropriate signal levels. DIP switch settings will normally be accurate to 1%. (This can be greater for smaller ranges.) Use the Zero and Span trim pots in the EXPO-3 to finely calibrate the desired range. Using a small screwdriver turn the trim pots clockwise to increase the output, and anticlockwise to decrease the output.

**Table of DIP switch settings for mAdc Input Ranges, with 4~20mA Output.**

Input Range* mADC	ZERO DIP Switch										SPAN DIP Switch									
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
0~1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	
0~5	0	1	0	1	1	0	1	1	1	1	1	1	1	0	1	0	1	1	1	
0~10	1	1	1	1	0	1	0	1	1	1	1	1	0	1	0	1	1	1	1	
0~20	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0	1	1	1	1	
0~50	1	1	1	1	0	0	0	0	0	1	1	0	0	1	1	1	1	1	1	
0.2~1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	
1~5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	
2~10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	
4~20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	
10~50	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	

**Table of DIP switch settings for mAdc Input Ranges, with 0~20mA Output.**

Input Range* mADC	ZERO DIP Switch										SPAN DIP Switch									
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
0~1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	
0~5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	
0~10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	
0~20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	
0~50	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	
0.2~1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	0	0	0	0	0	
1~5	1	1	1	1	1	0	1	1	1	1	0	1	1	1	0	1	0	1	1	
2~10	1	1	1	1	1	1	0	1	1	1	0	1	1	1	0	1	1	1	1	
4~20	1	1	1	1	1	1	1	0	1	1	0	1	1	1	0	1	1	1	1	
10~50	1	1	1	1	1	0	1	0	0	0	1	0	1	1	1	1	1	1	1	

### EXPO-3R Programming Tables.

**Table of DIP switch settings for DIN Pt100 Input Ranges, with 4~20mA Output.**

Input Range* C (DIN Pt100)	ZERO DIP Switch										SPAN DIP Switch									
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
0~20C	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	
0~50C	0	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	
0~100C	0	1	1	0	1	0	1	1	1	1	1	1	1	1	1	1	0	1	1	
0~150C	0	1	0	1	1	1	0	1	1	1	1	1	0	1	1	0	1	1	1	
0~200C	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	0	1	1	1	
0~300C	1	1	1	1	0	1	1	0	1	1	1	0	0	1	0	1	1	1	1	
0~400C	1	1	1	1	1	0	1	1	0	1	1	1	1	1	0	1	1	1	1	
0~500C	1	1	1	1	0	1	0	1	0	1	1	1	1	0	1	1	1	1	1	
0~600C	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	
-10~10C	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	0	1	0	0	
-10~20C	0	1	1	1	1	0	1	1	1	1	1	1	0	0	1	0	1	1	0	
-10~40C	1	0	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	1	
-20~30C	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0	1	
-30~20C	1	1	1	1	0	1	0	1	1	1	1	1	1	1	1	1	1	0	1	
-40~40C	0	1	1	1	0	0	0	1	1	1	1	1	1	1	0	1	0	1	1	
-50~50C	1	1	1	0	1	1	1	0	1	1	1	1	1	1	1	1	0	1	1	
-100~100	0	0	0	1	0	0	0	1	0	1	1	1	1	1	1	0	1	1	1	
50~150C	1	1	1	0	1	0	1	1	1	0	1	1	1	1	1	1	0	1	1	
100~200C	0	0	0	1	1	1	1	0	1	0	1	1	1	1	1	1	0	1	1	

### EXPO-3R Programming Tables Cont.

**Notes:** (For ALL programming tables.) Switch Status: **0=OFF 1=ON** \*Other range combinations possible.  
**Important:** Once a range has been selected on the DIP switches the EXPO-3 should be checked using the appropriate signal levels. DIP switch settings will normally be accurate to 1%. (This can be greater for smaller ranges.) Use the Zero and Span trim pots in the EXPO-3 to finely calibrate the desired range. Using a small screwdriver turn the trim pots clockwise to increase the output, and anticlockwise to decrease the output.

**Table of DIP switch settings for DIN Pt100 Input Ranges, with 0~20mA Output.**

Input Range* C (DIN Pt100)	ZERO DIP Switch										SPAN DIP Switch									
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
0~20C	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
0~50C	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0~100C	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1
0~150C	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1
0~200C	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1
0~300C	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1
0~400C	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1
0~500C	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1
0~600C	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1
-10~10C	1	0	1	1	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
-10~20C	1	0	1	1	0	1	1	1	1	1	1	1	1	0	1	1	0	0	1	0
-10~40C	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
-20~30C	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0
-30~20C	1	0	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0
-40~40C	1	1	1	0	1	1	0	1	1	1	1	1	1	0	1	0	0	1	1	1
-50~50C	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	1	0	1	1	1
-100~100	1	1	1	1	1	0	1	1	0	1	1	1	1	1	0	1	0	1	1	1
50~150C	1	1	1	1	1	0	0	1	1	0	1	1	1	1	1	0	1	0	1	1
100~200C	1	1	1	1	1	0	1	1	0	0	1	1	1	1	0	1	0	1	1	1

### EXPO-3V Programming Tables.

**Table of DIP switch settings for Vdc Input Ranges, with 4~20mA Output.**

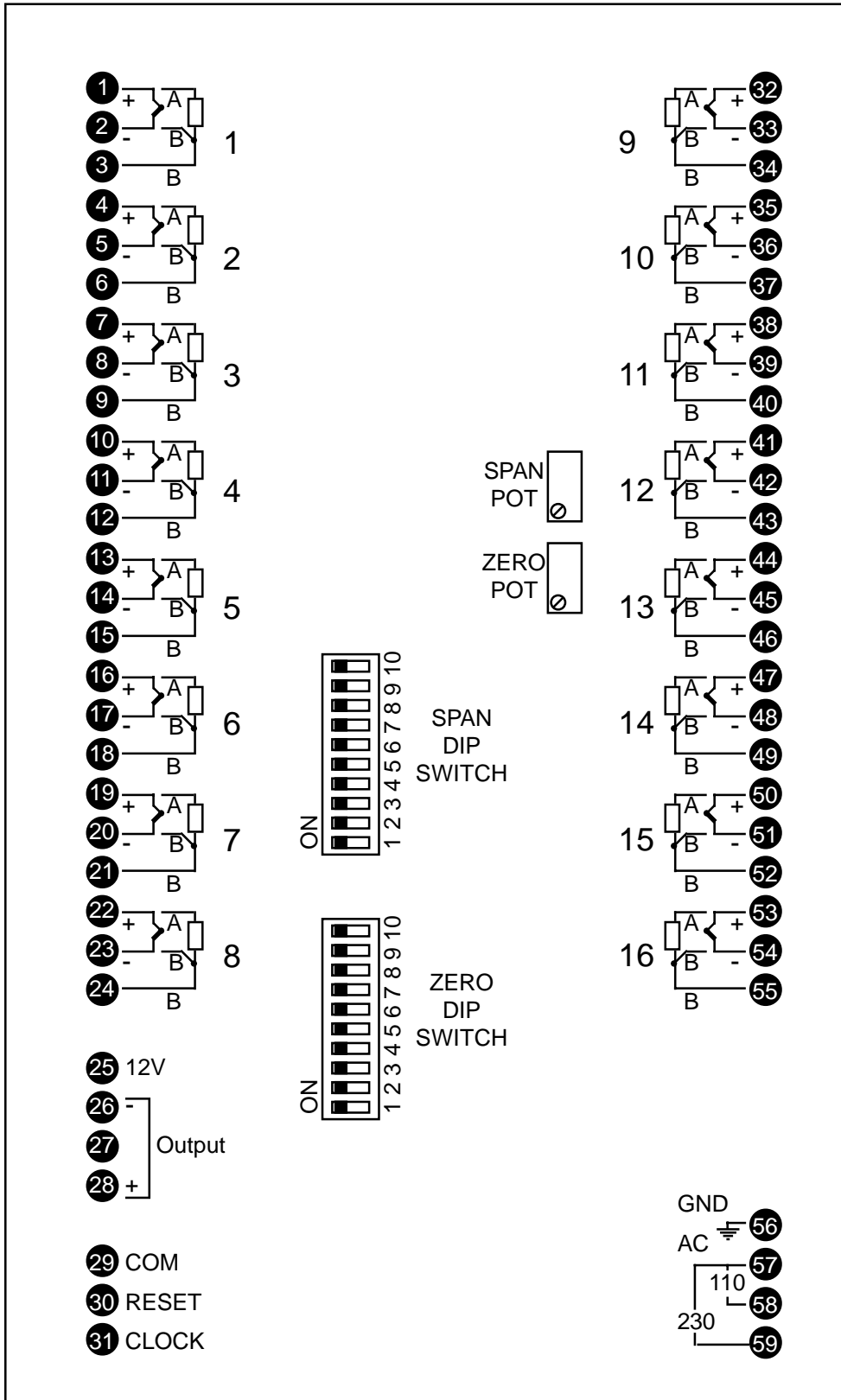
Input Range* VDC	ZERO DIP Switch										SPAN DIP Switch									
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
0~200mV	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0
0~500mV	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1
0~1V	0	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	0	1	1	1
0~2V	1	1	1	1	0	1	0	1	1	1	1	1	1	1	1	0	1	1	1	1
0~5V	0	1	0	1	1	0	1	1	0	1	1	1	1	1	0	1	1	1	1	1
0~10V	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
1~5V	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1
2~10V	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1

**Table of DIP switch settings for Vdc Input Ranges, with 0~20mA Output.**

# Needs large Span adjustment.

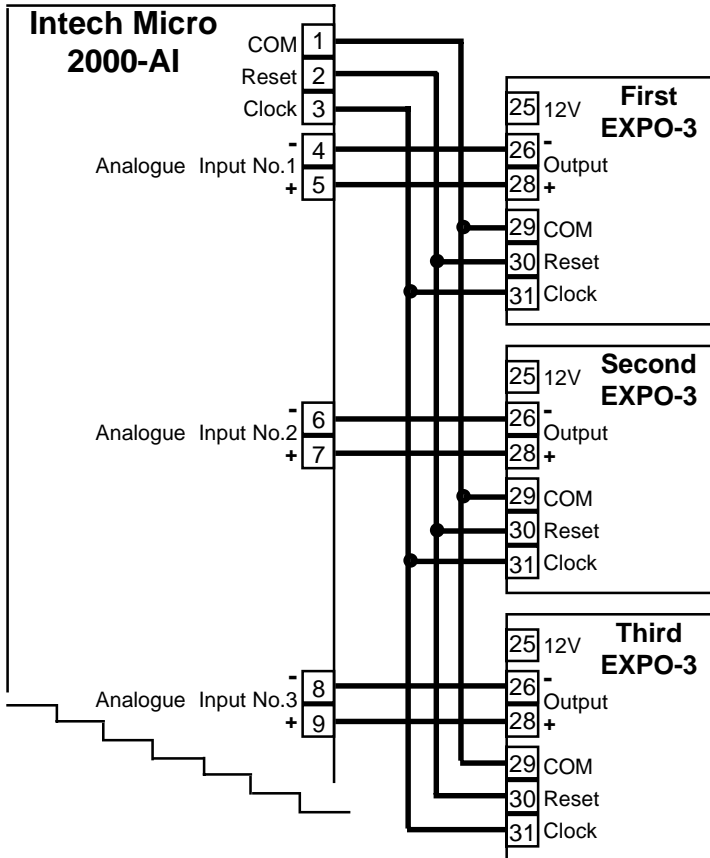
Input Range* VDC	ZERO DIP Switch										SPAN DIP Switch									
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
0~200mV	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
0~500mV	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0~1V	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1
0~2V	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1
0~5V	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1
0~10V	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1
1~5V	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	1	1	1	1	1
2~10V#	1	1	1	1	1	0	1	0	0	0	1	1	1	1	1	1	1	1	1	1

**EXPO-3 Terminals and Layout.**



Notes: The universal power supply connections are terminals 57 & 58, for both the standard and low voltage power supplies.  
 DC power supplies can be connected with either polarity.

**Connection Diagram of EXPO-3 Output Signal & Control Lines Used With an IN-2000-AI Remote Station.**



Note 1. Up to 3 EXPO-3 multiplexers can be connected to one IN-2000-AI.

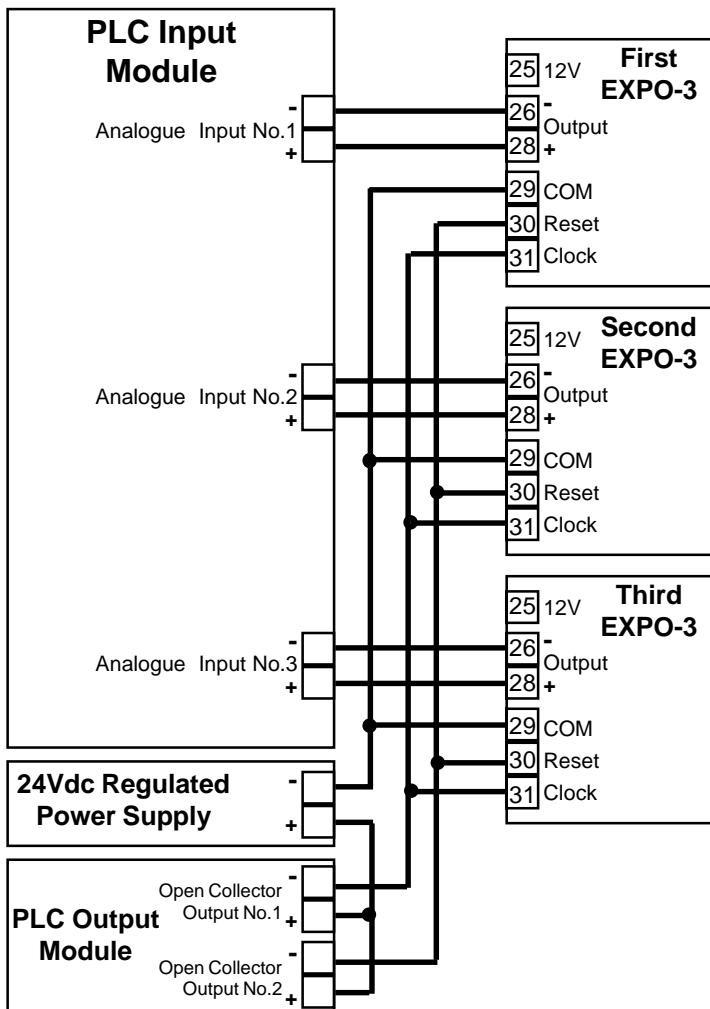
Note 2. The remaining IN-2000-AI inputs (4 to 8) can be used for normal 4~20mA input signals.

Note 3. All cables must be screened, and the screen earthed at one end only

**Important:** Do not use the EXPO-3 power supply to power up any transmitter or other equipment. An external power supply must be used for this purpose. The 12V supply is for the Clock and Reset only.

**Connection Diagram of EXPO-3 Output Signal & Control Lines Using an External Power Supply.**

Connection of an EXPO-3 to a PLC using an external power supply to drive the Reset and Clock lines.



Note 1. In this configuration the EXPO-3 COM, Reset and Clock inputs are isolated from the EXPO-3 inputs and outputs. The 24V external power supply can therefore be used to power transmitters connected to the EXPO-3 inputs.

Note 2. There is no limit to the number of EXPO-3s that can be connected, except the power supply and open collector outputs must be able to handle the load.

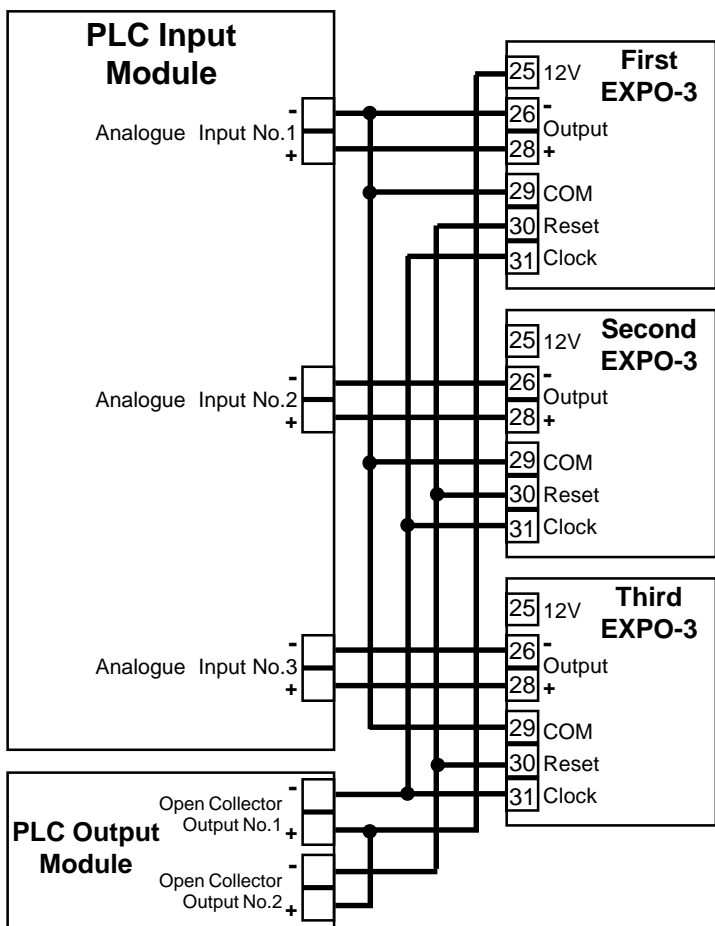
Note 3. Each Reset and each Clock input draws 10mA at 24Vdc.

Note 4. All cables must be screened, and the screens earthed at one end only.

**Important:** Do not use the EXPO-3 power supply to power up any transmitter or other equipment. An external power supply must be used for this purpose. The 12V supply is for the Clock and Reset only.

### Connection Diagram of EXPO-3 Output Signal & Control Lines Using the EXPO-3 Internal Power Supply.

Connection of an EXPO-3 to a PLC using the internal power supply of the first EXPO-3 to drive the Reset and Clock lines.



Note 1. **This diagram does not apply to EXPO-3T.**

Note 2. Up to 8 EXPO-3's can be connected in this configuration, provided the open collector outputs can handle the load.

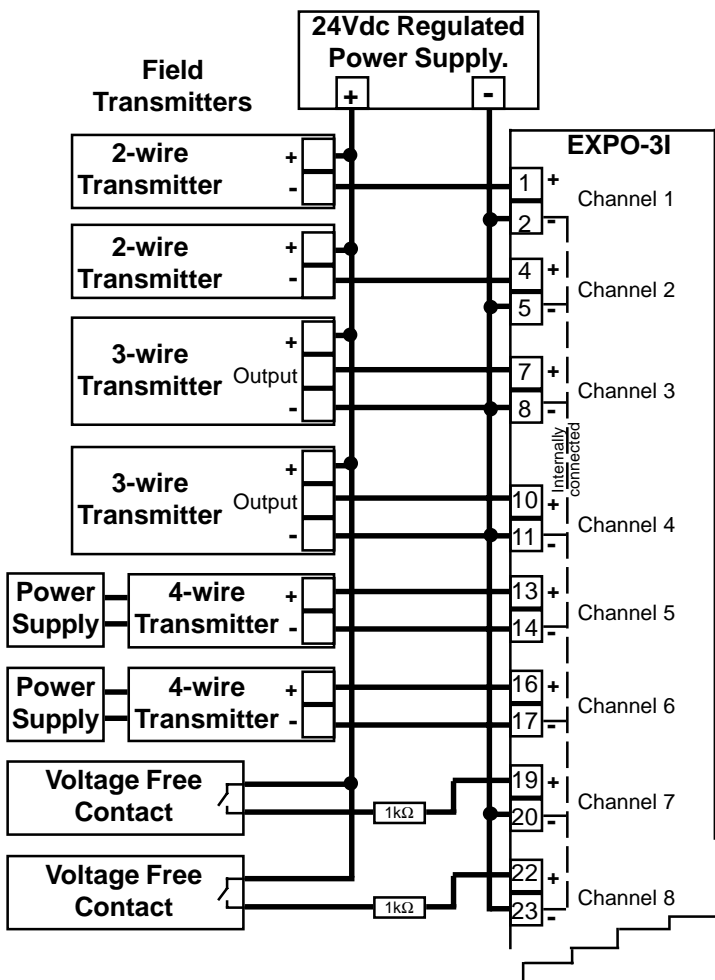
Note 3. Each Reset and each Clock input draws 5mA at 12Vdc.

Note 4. All cables must be screened, and the screens earthed at one end only.

**Important:** Do not use the EXPO-3 power supply to power up any transmitter or other equipment. An external power supply must be used for this purpose. The 12V supply is for the Clock and Reset only.

### EXPO-3I Input Connection Diagram for 4~20mA Inputs.

Connection configuration for 2 wire, 3 wire and 4 wire transmitters, and digital inputs.



Note 1. All EXPO-3I inputs are single ended. (ie, all negative inputs are internally connected).

Note 2. Inputs can be used as digital inputs for sensing a clean, voltage free, field contact.

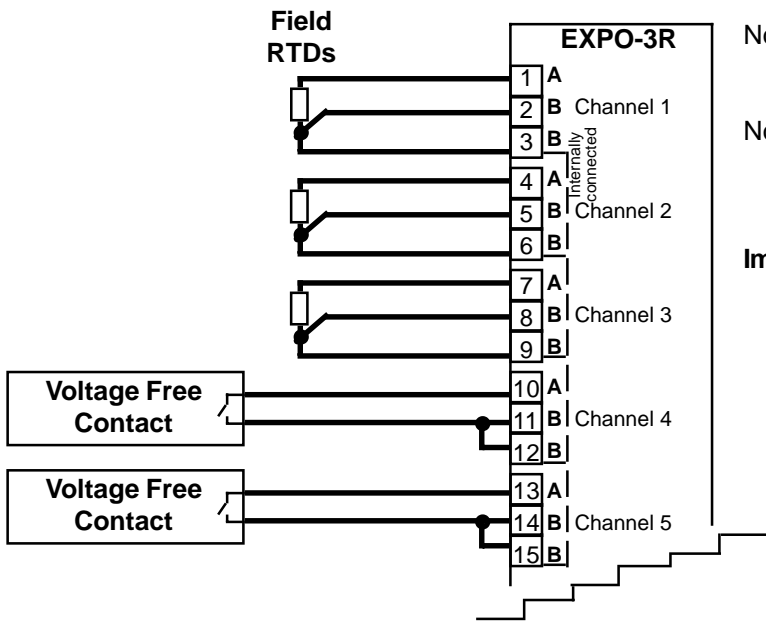
Note 3. All cables must be screened, and the screens earthed at one end only.

**Important:** Do not use the EXPO-3 power supply to power up any transmitter or other equipment. An external power supply must be used for this purpose. The 12V supply is for the Clock and Reset only.



### EXPO-3R Input Connection Diagram for RTD Inputs.

Connection configuration for 3 wire RTDs and digital inputs.

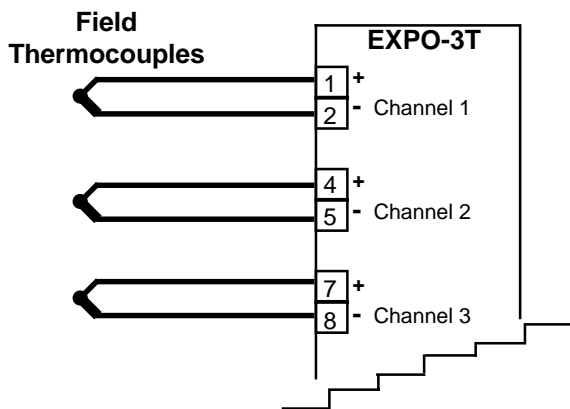


Note 1. Inputs can be used as digital inputs for sensing a clean, voltage free, field contact.

Note 2. All RTD cables must be screened, and the screens earthed at one end only.

**Important:** All EXPO-3R inputs are single ended. ie all the 2nd 'B' terminals are internally connected.

### EXPO-3T Input Connection Diagram for Thermocouple Inputs.



Note 1. Used in conjunction with an LPI-T or PI-T thermocouple transmitter.

Note 2. Maximum permissible voltage between thermocouple inputs is 10Vpeak.

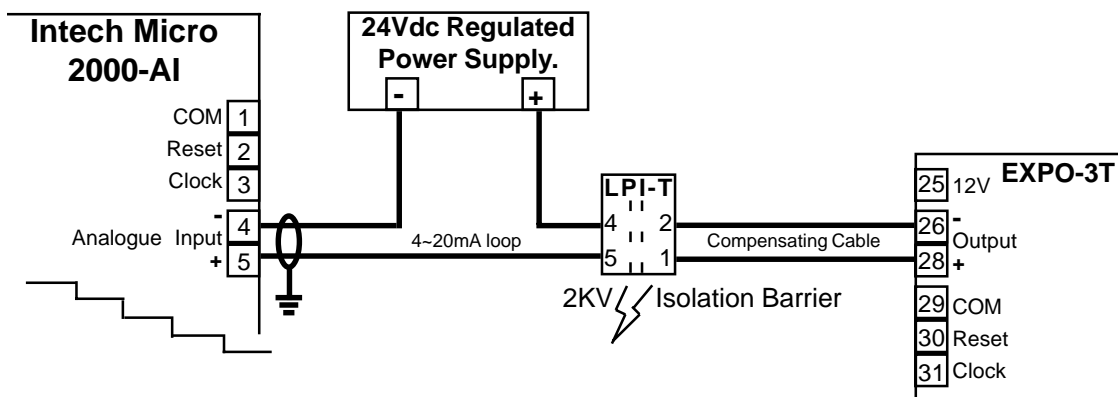
Note 3. Isolated junction, mineral insulated thermocouple recommended.

Note 4. There are no adjustments in the EXPO-3T.

**Important:** The '+' and '-' of any unused inputs must be shorted together.

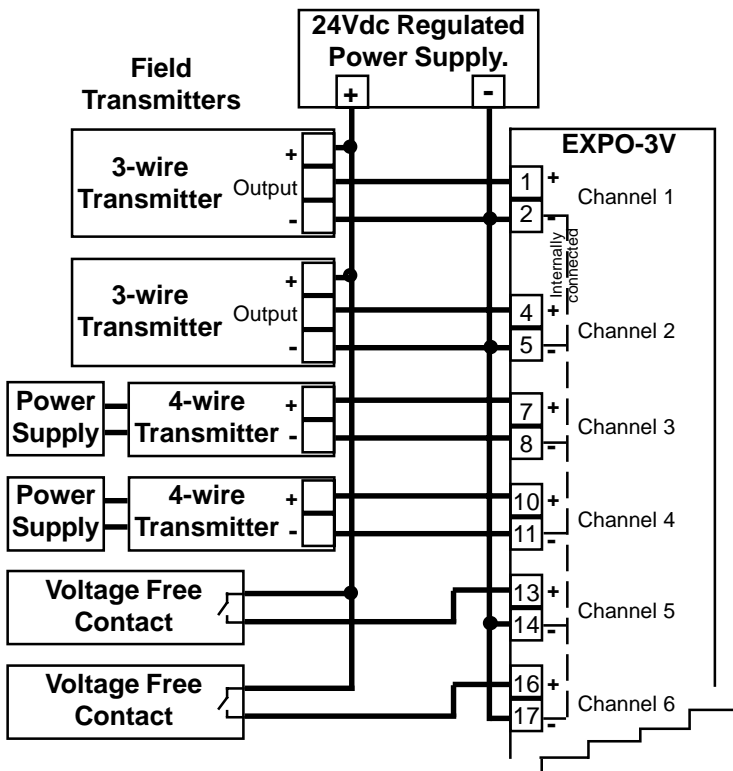
### Connection Diagram of EXPO-3T Remote Station and an LPI-T Thermocouple Transmitter.

The EXPO-3T works in conjunction with the model LPI-T programmable thermocouple isolating transmitter. The EXPO-3T operates as a thermocouple multiplexer only.



## EXPO-3V Input Connection Diagram for Voltage Inputs.

Connection configuration for 3 wire and 4 wire transmitters, and digital inputs.



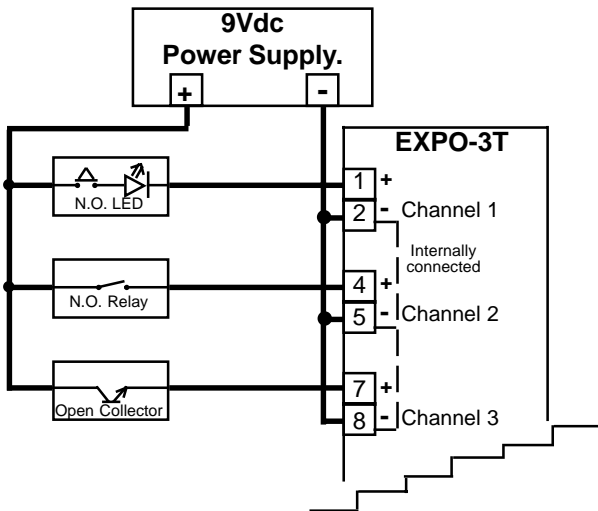
Note 1. All EXPO-3V inputs are single ended. (ie, all negative inputs are internally connected).

Note 2. Inputs can be used as digital inputs for sensing a clean, voltage free, field contact.

Note 3. All cables must be screened, and the screens earthed at one end only.

**Important:** Do not use the EXPO-3 power supply to power up any transmitter or other equipment. An external power supply must be used for this purpose. The 12V supply is for the Clock and Reset only.

## EXPO-3D Input Connection Diagram for Digital Inputs.



Note 1. The clocking and reading time for all 16 channels and the Reset must be less than 10 seconds. Please refer to the description below.

Note 2. All EXPO-3D inputs are single ended. (ie, all negative inputs are internally linked).

## EXPO-3D Operation when used in a Night Watchman Installation.

A series of push-buttons are located around an industrial plant. As the Night Watchman makes his way around the plant in a set pattern he pushes the push-buttons. If the next push-button in the sequence is not pushed within a certain time frame, the PLC interrogating the EXPO-3D will bring up an alarm. This not only protects the Night Watchman from any mishap, but increases the security of the plant.

When a push-button is pressed and released, a voltage appears on that input representing an FSO of 20mA. This decays over approx. 10 Seconds, to 12mA, and keeps falling back to 4mA. So above 12mA constitutes 'ON' and below 12mA constitutes 'OFF'. The Clocking and reading time for all 16 channels and the Reset must be less than 10 seconds.

## EXPO-3 and PLC installation Guide.

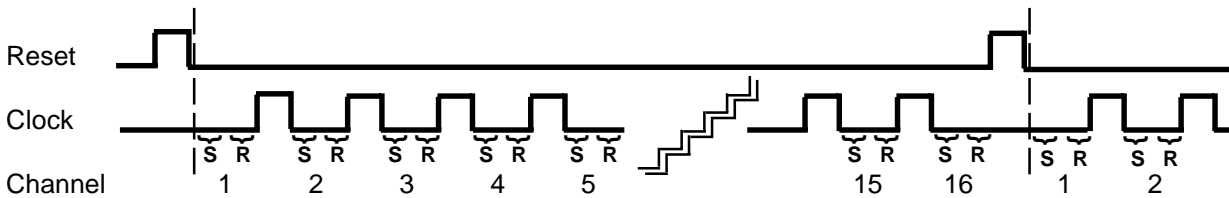
### Specifications.

Clocking speed	-Reset pulse length	20msec.
	-Clock pulse length	20msec.
Settling times before reading	-All models (except EXPO-3T)	100msec. (Multi readings with
	-EXPO-3T	600msec averaging recommended.)
Reset & Clock pulse magnitude	-All models	5~30Vdc.

Note: For an EXPO-3D the complete time cycle for all 16 channels must be greater than 10sec.

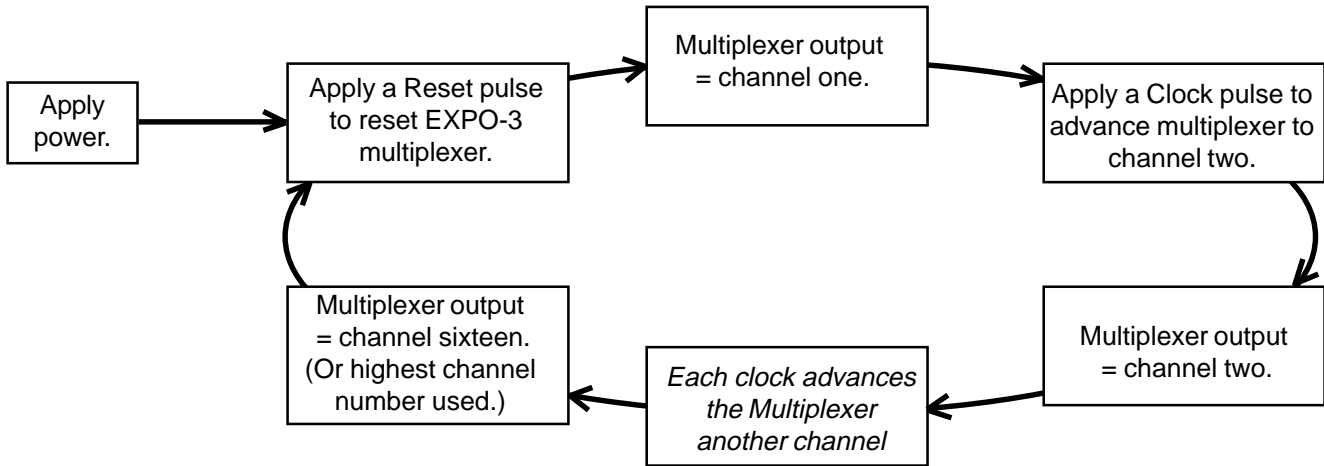
## EXPO-3 and PLC installation Guide Cont.

### Operation.



Key: S = Settling time.  
R = Read value.

### Sequence.



### Allen Bradley PLCs.

For Allen Bradley PLCs it is recommended that the clocking and reset control is done using the Allen Bradley Output Module 17460B8. If using this module, use the connection information supplied with it, and not the information supplied with the EXPO-3.

## EXPO-3 Wiring and Installation.

### EXPO-3 Mounting.

- (1) Mount in a clean environment in an electrical cabinet on DIN or EN mounting rail.
- (2) Do not subject to vibration or excess temperature or humidity variations.
- (3) Avoid mounting in cabinets with power control equipment.
- (4) To maintain compliance with the EMC Directives the EXPO-3s are to be mounted in a fully enclosed steel cabinet. The cabinet must be properly earthed, with appropriate input \ output entry points, filtering, and cabling.

### EXPO-3 Wiring.

- (1) All cables should be good quality overall screened INSTRUMENTATION CABLE with the screen earthed at one end only.
- (2) Signal cables should be laid a minimum distance of 300mm from any power cables.
- (3) For 2 wire current loops, 2 wire voltage signals or 2 wire current signals, Austral Standard Cables B5102ES is recommended. For 3 wire transmitters and RTDs Austral Standard Cables B5103ES is recommended.
- (4) It is recommended that you do not ground current loops and use power supplies with ungrounded outputs.
- (5) Lightning arrestors should be used when there is a danger from this source.
- (6) Refer to diagrams for connection information.

### EXPO-3R RTD'S.

- (1) Avoid locating the RTD where it will be in a direct flame.
- (2) Locate it where the average temperature will be measured. It should be representative of the mass.
- (3) Immerse the RTD far enough so that the measuring point is entirely in the temperature to be measured; nine to ten times the diameter of the protection tube is recommended. Heat that is conducted away from the measuring point causes an error in reading.

## **EXPO-3 Wiring and Installation Cont..**

### **EXPO-3T THERMOCOUPLES.**

- (1) Avoid locating the thermocouple where it will be in a direct flame.
- (2) Never insert a porcelain or refractory tube suddenly in a hot area. Pre-heat gradually while installing.
- (3) Locate it where the average temperature will be measured. It should be representative of the mass. If necessary use several thermocouples to obtain the average temperature.
- (4) Immerse the thermocouple far enough so that the measuring junction is entirely in the temperature to be measured: nine to ten times the diameter of the protection tube is recommended. Heat that is conducted away from the hot junction causes a lower reading.
- (5) If the thermocouple is mounted horizontally and the temperature is above the softening point of the tube, a support should be provided to prevent the tube sagging. Otherwise install the tube vertically.
- (6) Keep the junction head and cold junction in the approximation of the ambient temperature. Especially in the Noble Metal Class.

### **EXPO-3T EXTENSION WIRE.**

- (1) Use the correct thermocouple extension or compensation cable. i.e. Thermocouple type, insulation type, correct colour coding.
- (2) If possible install extension or compensation cable in a grounded conduit by themselves. Never run electrical wires in the same conduit.
- (3) All wires that must be spliced should be soldered, or a proper thermocouple termination block used.
- (4) Lightning arrestors should be used if there is a chance from this source.

### **EXPO-3 Commissioning.**

1. a) Check that the EXPO-3 has been set up to the right input and output ranges, and that it's new ranges have been calibrated accurately and checked. DIP switch settings will normally be accurate to 1%. (This can be greater for smaller ranges.)  
b) Use the Zero and Span trimpots in the EXPO-3 to finely calibrate the desired range. Using a small screwdriver turn the trimpots clockwise to increase the output, and anticlockwise to decrease the output.
2. Once all the above conditions have been met, and the wiring checked, apply power to the EXPO-3, the loops or sensors, and the IN-2000AI or PLC etc. controlling the EXPO-3. Allow a 5 minute warm-up period.
3. Check that the red LEDs on the EXPO-3 are flashing. The LED next to the Clock terminal (31) should flash 16 times faster than the LED next to the Reset terminal (30). For each Clock or Reset pulse received the respective LED on the EXPO-3 will go from ON to OFF to ON. If a Clock or Reset line is held high, the respective LED will remain OFF. If a Clock or Reset line is held low, the respective LED will remain ON.
4. Take a reading of the value being measured on each channel, and ensure that this agrees with the level being indicated by the IN-2000-AI, Data Logger, or PLC, for that channel. Adjust for any differences in the software of the system, unless there is a constant error shift in each channel. In which case the Zero and Span trimpots on the EXPO-3 can adjust for the constant error.

Note 1. EXPO-3R: A small error can occur due to differences in cable resistance in the RTD legs, and errors in the RTD itself. (Usually less than 0.5C). To check the variable being measured use a calibration standard RTD at the same immersion depth.

Note 2. EXPO-3T: Due to the limits of error in a standard thermocouple probe, and standard extension wire and compensating wire, an error can occur. For example in a type K thermocouple installation an error of 2.2C or 0.75% FSO (whichever is greater) can occur. To check the variable being measured use a calibration standard thermocouple at the same immersion depth.

### **EXPO-3 Maintenance.**

#### **EXPO-3I and EXPO-3V.**

- 1} Repeat (4) of commissioning.
- 2} Do it regularly - at least once every twelve months.

#### **EXPO-3R.**

- 1} Repeat (4) of commissioning.
- 2} Do it regularly - at least once every six months.
- 3} Replace defective protection tubes - even if they look good they may not be air or gas tight.
- 4} Check cables entering the RTD sensor head.

#### **EXPO-3T.**

- 1} Repeat (4) of commissioning.
- 2} Do it regularly - at least once a month.
- 3} Replace defective protection tubes - even if they look good they may not be air or gas tight.
- 4} Check extension and compensating cable circuits.
- 5} Do not use the same chromel-alumel (Type K) thermocouple below 540C if it was used above 860C.