CE

P6000A/P5000

Input Options

Operator's Manual

MADE IN THE U.S.A.

NEWPORT Electronics, Inc.

Additional products from

NEWPORT Electronics, Inc.

Counters	Rate Meters
Frequency Meters	Timers
PID Controllers	Totalizers
Clock/Timers	Strain Gauge
Printers	Meters
Process Meters	Voltmeters
On/Off	Multimeters
Controllers	Soldering Iron
Recorders	Testers
Relative	pH pens
Humidity	pH Controllers
Transmitters	pH Electrodes
Thermocouples	RTDs
Thermistors	Thermowells
Wire	Flow Sensors

For Immediate Assistance

In the U.S.A. and Canada: 1-800-NEWPORT®
In Mexico: (95) 800-NEWPORT℠
Or call your local NEWPORT Office.

NEWPORTnet℠ On-Line Service	**Internet e-mail**
http://www.newportUS.com	info@newportUS.com

It is the policy of NEWPORT to comply with all worldwide safety and EMC/EMI regulations that apply. NEWPORT is constantly pursuing certification of its products to the European New Approach Directives. NEWPORT will add the CE mark to every appropriate device upon certification.

The information contained in this document is believed to be correct but NEWPORT Electronics, Inc. accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

WARNING: These products are not designed for use in, and should not be used for, patient connected applications.

⚠ This device is marked with the international caution symbol. It is important to read the Setup Guide before installing or commissioning this device as it contains important information relating to safety and EMC.

TABLE OF CONTENTS

The Input Options Manual is divided into three major sections. Each option board contains circuitry which is exclusive of the others. The main board assembly diagram is identical for all of the input options, however, and should be referred to when jumper configuring each option board. This illustration is located in Section 1.10 Drawings.

ISOLATED SIGNAL CONDITIONER OPTION

NON-ISOLATED SIGNAL CONDITIONER OPTION

ANALOG INPUT OPTION

ILLUSTRATIONS **PAGE**

1.1 GENERAL

The isolated signal conditioner options provide one or two low level, isolated amplifier channels. Each channel offers:

Adjustable trigger level by a multiturn potentiometer

Three levels of hysteresis, selectable by push-on jumpers

A one-shot (monostable multivibrator) with selectable time for debouncing purposes

Selectable RC filters for contact closure or low frequency applications

High sensitivity (±10 mV) and high protection level (260 V rms) inputs

The above features and the 12.4 V at 20 mA excitation output make this signal conditioner compatible with a wide range of signal sources such as: contact closure, NPN or PNP open-collector outputs, passive inductive pickups, and most active sensors including NAMUR standard types.

1.2 MECHANICAL INSTALLATION

The signal conditioner board is positioned as a mezzanine, supported by the rear panel and a slot on the display board (Figure 1-1).

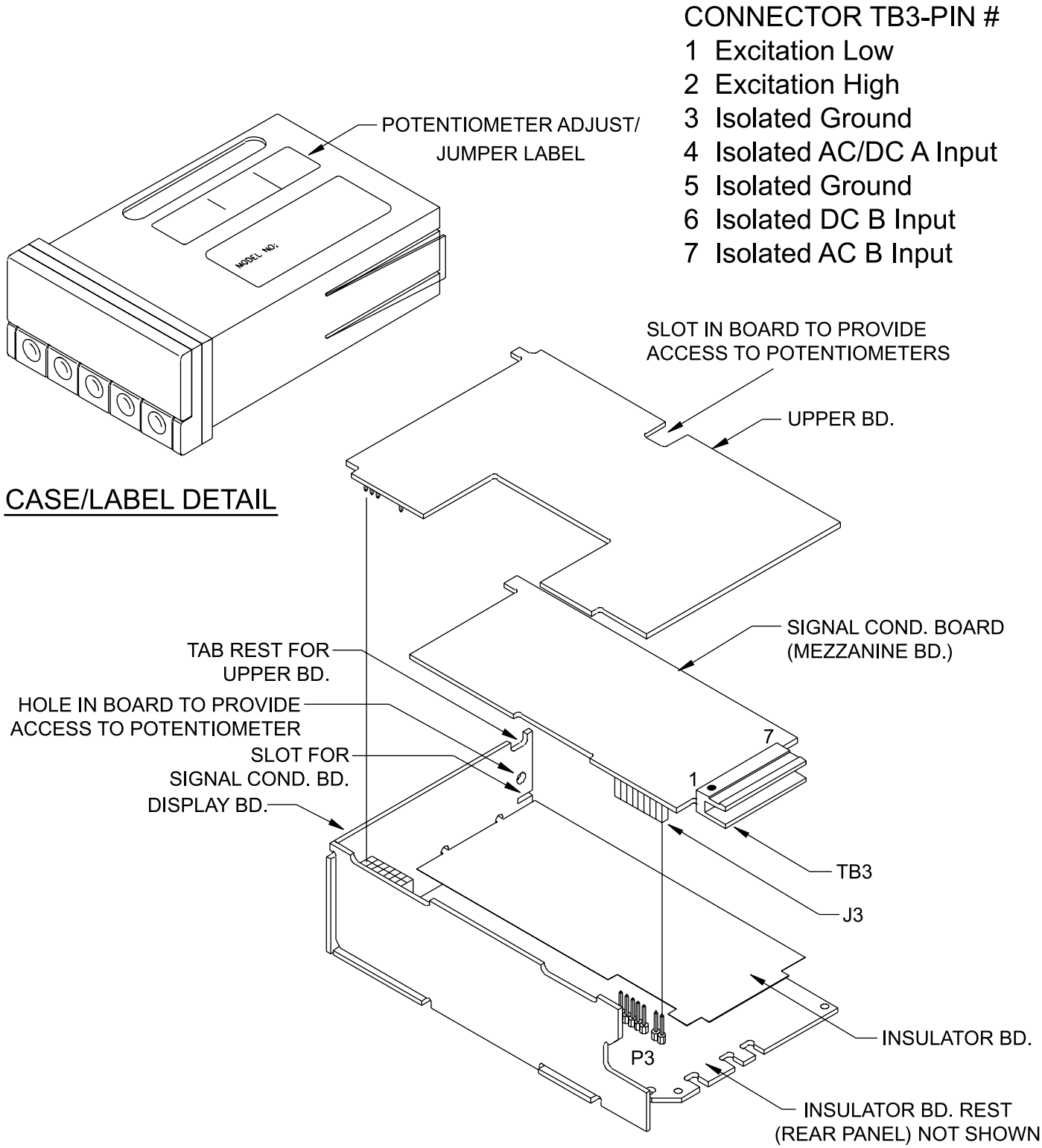


Figure 1-1 Exploded View with Power & Signal Connector

TO INSTALL:

IMPORTANT: Turn-off the power and input signals from the unit before proceeding. Failure to do so may result in injury!

CAUTION: The meter has no power-on switch; it will be in operation as soon as you apply power. To change the factory preset jumpers, disconnect the power from the unit. Failure to do so may result in injury! The jumpers must be changed by specially trained personnel.

1. When using a signal conditioning board with the meter, the main board must be jumper configured prior to installation. For single channel, install SA-I; for dual channel, install SA-I and SB-I (main board). Refer to Section 1.8 for jumper selection of input and output features.

2. The insulator board rests atop the lower rear panel, with the two tabs fitting into holes on the display board.

3. Insert the tab of the signal conditioning board into the slot provided on the display board.

4. Position J3, an 8-pin connector on the circuit side of the signal conditioner, to mate with the P3 pins on the main board. Press the board downward until the rear connectors rest on the lower rear panel.

5. Install the upper rear panel.

1.3 ELECTRICAL CONNECTIONS

Channels A and B of the signal conditioner work separately. The inputs are available on connector TB3 and are electrically isolated from the counter. The outputs are connected to the main board with connector J3.

TYPE	REQUIREMENTS	WIRING	ADJUSTMENTS
1 Passive Inductive Pickup	Voltage <260 V rms Voltage >±10 mV	Connect signal wires to TB3-pins 3 & 4. Remove S1, S2, S3, S5, S6, S7. S16 on DC position.	Select the hysteresis & adjust the trigger level for lowest input voltage (lowest frequency).
2 Active Transducer (inductive, OPTIC or capacitive) with NPN open-collector output.	Operating Voltage = 12.4 V Operating Current < 20 mA	Connect the positive and negative supply inputs of transducer to the EXC HI & EXC LO, respectively. Install S2-A, S3-A, S6-A, S7-A and S16-DC.	Select 700 mV hysteresis (Install S4-A & S8-A). Adjust the multiturn pot for 0 V trigger level.
3 Same as #2, but PNP open-collector output.	Same as #2	Same as #2, except install S2-A & S6-A, remove S3-A & S7-A.	Same as #2
4 TTL- or CMOS-compatible signal	----	Connect signal output to TB3- pin 4 and Ground to TB3- pin 3. Remove jumpers from S2, S3, S6 and S7.	Select 700 mV hysteresis and adjust the trigger level for 1 V.
5 Contact Closure (slow)	Off duration > 100 ms (less than 5 on/off per sec)	Connect the two ends of the contact to TB3-pins 2 and 4. Install S16-DC. Remove S2, S3, S6, S7.	Do the #4 adjustments. Install S1-A and S5-A. Select the debounce time if required.
6 Contact Closure (fast)	Off duration < 100 ms	Same as #5 except install S2-A & S6-A.	Same as #5
7 NAMUR type sensors (2-wire)	NAMUR standard	Connect the positive sensor input to TB3-pin 4 and the negative sensor input to TB3-pin 1. Install S2-A, S3-A, S6-A, S7-A and S16-DC.	Same as #2

Table 1-1 Wiring and Adjustments for Signal Sources

1.4 INPUTS AND OUTPUTS

INPUTS

Signal conditioning inputs and excitation outputs are available on TB3, a 7-position header (shown in Figure 1-1).

Refer to the block diagram in Figure 1-2. Channel A input is available on connector TB3–pin 4. Pins 6 and 7 are allocated to DC and AC inputs on Channel B. Pins 3 and 5 are isolated ground (signal return).

TB3 mates with two screw-clamp connectors: a 4-position, TB3J4, and a 3-position, TB3J3. The 4-position connector may be used with a single or dual-channel signal conditioner; the 3-position may be used only with a dual-channel signal conditioner.

The trigger level can be adjusted between -2 and +2 volts. When the input signal has a large DC level and does not cross the trigger level range, the AC input should be used. The AC input is coupled to the DC input with a 0.1 uF capacitor. The maximum non-destructive DC blocking voltage of this input is 250 V. This input should be left open when not used.

Sensitivity for a Square	**Frequency Response**	
Wave Input	DC Input	AC Input
±10 mV	DC - 1 kHz	5 Hz - 1 kHz
±25 mV	DC - 20 kHz	2 Hz - 20 kHz
±50 mV	DC - 100 kHz	2 Hz - 100 kHz

Table 1-2 Correlation of Sensitivity to Frequency Response

OUTPUTS

The outputs of the signal conditioner channels are connected to the main board through the J3 connector. These outputs can be connected to the A and B inputs of the meter (pins 1 and 2 of TB2) by installing push-on jumpers on the I positions of SA and SB (Figure 1-2). Each output can drive 10 LSTTL load (5 LSTTL when debounce monostable is bypassed) and is TTL / 5 V CMOS compatible.

In a single-channel signal conditioner (Channel A only), the output can be connected to either or both A and B outputs by installing jumpers on the appropriate positions of S9, S12 and S15 (see Figure 1-5). However, when a jumper is installed on A or B position of S15, the S9 jumper must be removed.

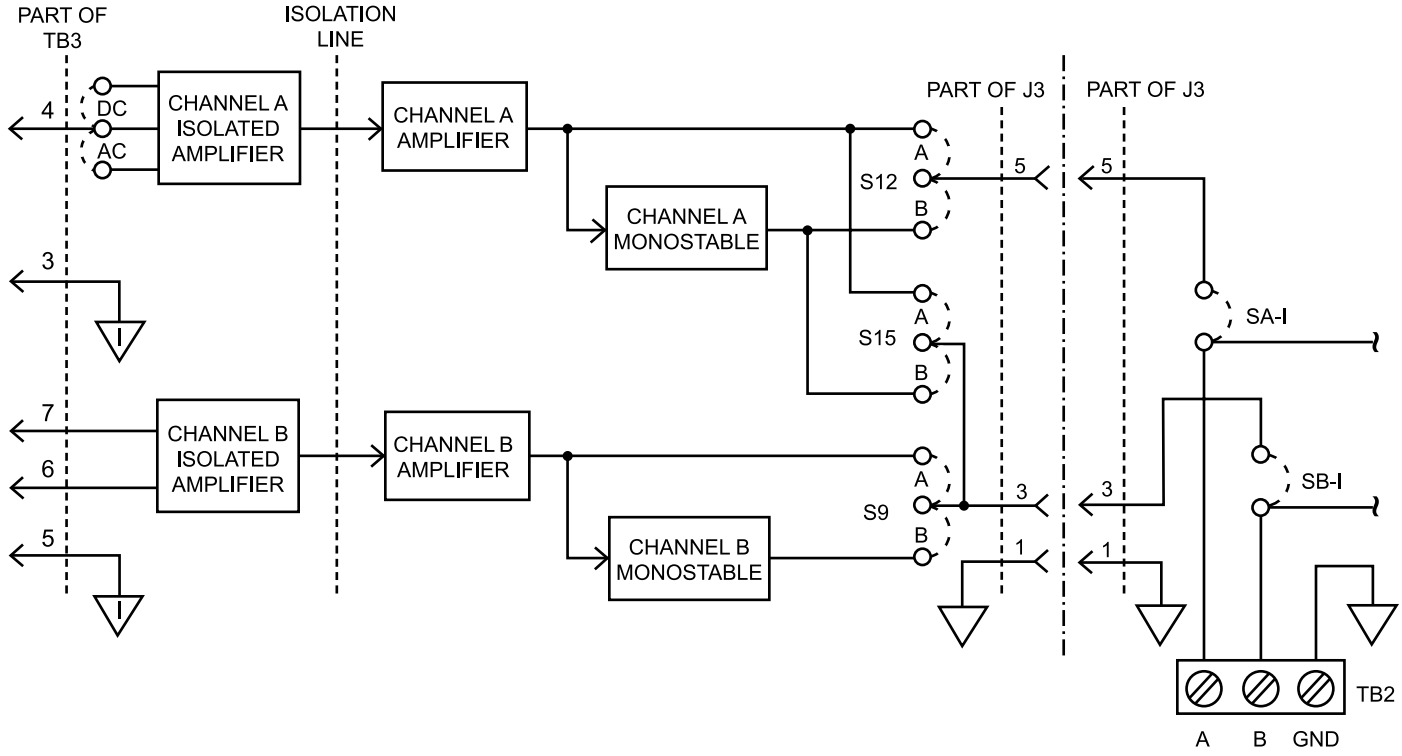


Figure 1-2 Simplified Block Diagram of the Signal Conditioner

EXCITATION OUTPUT

A 12.4 V regulated excitation voltage is available on pins 1 and 2 of TB3 (Figure 1-1). This voltage can be used to drive external transducers with operating currents up to 20 mA.

It should be noted that this voltage is isolated from the main board ground, not from the isolated ground. Excitation HI and Excitation LO are +6.2 and -6.2 V respectively referenced to isolated ground.

The EXC LO must not be connected to ISO GND

INPUT FILTER

Jumpers at S1 and S5 connect two .033 uF or .0022 uF capacitors to form an RC low-pass filter for each input. The time constants of these filters are about 2.5 and .17 milliseconds. When the input is a contact closure (between EXC HI and ISO DC input), the capacitor is discharged through a 1 MOhm resistor to ISO GND, providing a time constant of 33 milliseconds. In this case, the trigger level should be adjusted between 0 and +2 V.

1.5 TRIGGER LEVEL ADJUSTMENT

Two multiturn potentiometers in the Dual-Channel Signal Conditioner (P6A2A) or one multiturn potentiometer in the Single-Channel Signal Conditioner (P6A1A) are provided to adjust the trigger level of each channel independently. The P6A2A potentiometers are accessible through a hole on the top, left-hand side of the case, with the sleeve removed. The P6A1A has two potentiometers, each in a different location for easy access, depending on which meter you are using it with. In a P6000A/DPF6000 the potentiometer is accessible through a hole on the left-hand side of the display board, with the lens removed; S17-B jumper must be installed.* In a P5000/DPF5000 the potentiometer is accessible through a hole on the top, left-hand side of the case, with the sleeve removed; S17-A jumper must be installed. Refer to drawing below and Figure 1-1.

Meter	Jumper Position	Potentiometer Location
P6000A/DPF6000	S17-B*	Through hole in display board
P5000/DPF5000	S17-A	Through hole in top of case

Table 1-3 P6A1A Potentiometer Selection
* Factory default position

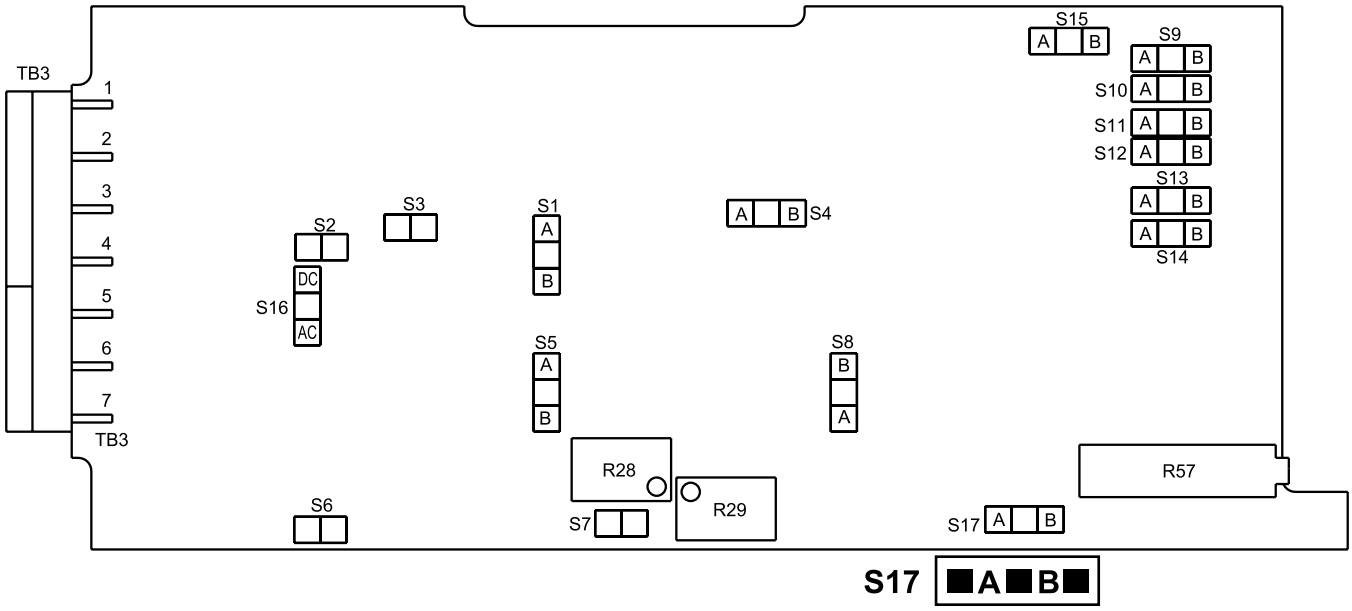


Figure 1-3 P6A1A Potentiometer/Jumper Locations

When these potentiometers are in their extreme right or left positions, the trigger level may exceed the maximum positive or negative working voltage of the amplifier.

To adjust the trigger level to about +1 V, turn to the extreme clockwise position of the pot. Then, turn the pot counter-clockwise six turns. Now the trigger level is about 1 V (1.0 ±.5 V). To adjust the trigger level to zero, turn the pot counter-clockwise 2.5 more turns.

The positive going trigger level is higher than the negative going trigger level by the selected hysteresis value.

1.6 HYSTERESIS SELECTION

The signal conditioner option offers three selectable hysteresis values for each channel.

The hysteresis may be higher than its nominal value when the trigger level is other than zero. For trigger levels out of the ±2 V range, the hysteresis becomes significantly larger than the nominal value.

1.7 DEBOUNCING MONOSTABLE CIRCUIT

Each channel contains a monostable circuit with jumper-selectable time constants. Trigger slope is also selectable. Refer to Section 1.8 Configuration for the jumper settings.

These retriggerable monostables can be used for debouncing a mechanical switch (Figure 1-4).

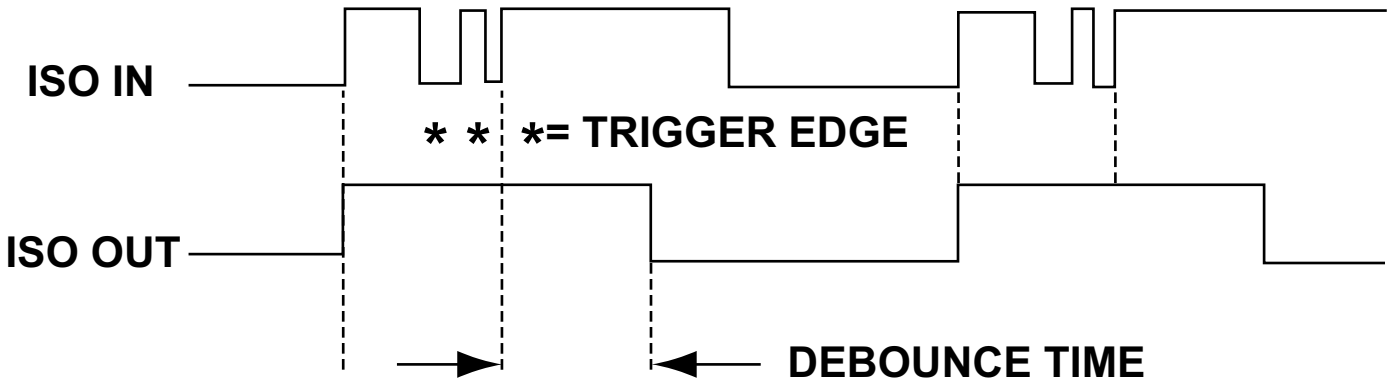


Figure 1-4 Debouncing a Mechanical Switch

1.8 JUMPER CONFIGURATION

FUNCTION	CHANNEL A		CHANNEL B	
	Install	Remove	Install	Remove
Input resistance = 1 MΩ pull-down to ISO GND, max input voltage = 260 V rms		S2, S3*		S6, S7*
Input resistance = 3 kΩ pull-down to EXC LO, max input voltage = +15/-20 V dc	S2-A	S3	S6-A	S7
Input resistance = 1 kΩ pull-up to +2 V ref to ISO GND max input voltage = +15/-10 V dc	S2-A, S3-A		S6-A, S7-A	
No filter		S1*		S5*
Low pass filter in circuit, time constant = 2.5 ms	S1-A		S5-A	
Low pass filter in circuit, time constant = .17 ms	S1-B		S5-B	
Hysteresis = 700 mV (use when input > 2 V)	S4-A		S8-A	
Hysteresis = 70 mV (use when .2 V < input < 2 V)		S4		S8
Hysteresis = 10 mV (use when input <.2 V)	S4-B*		S8-B*	
Monostable trigger on positive edge	S14-A*		S11-A*	
Monostable trigger on negative edge	S14-B		S11-B	
Monostable bypassed (no debounce time)	S12-A*		S9-A*	
Monostable in circuit	S12-B		S9-B	
Debounce time = 120 ms	S13-A*		S10-A*	
Debounce time = 22 ms		S13		S10
Debounce time = 1 ms	S13-B		S10-B	
Connects channel A output to channel B, monostable bypassed	S15-A			
Connects channel A output to channel B, monostable in circuit	S15-B*			
No Connection		S15		
Channel A, AC coupled	S16-AC*			
Channel A, DC coupled	S16-DC			

Table 1-4 Jumper Configuration

* Default position; changes may be required for some applications.

S15 is not supplied in the dual-channel signal conditioners.

1.9 SPECIFICATIONS

Input impedance (ISO DC INPUT)	Input < ±500 mV: 1 MΩ Input > ±500 mV: More than 70 kΩ
Frequency response for a square-wave input	Input = ±10 mV: 0-1 kHz (min) Input = ±25 mV: 0-20 kHz (min) Input = ±50 mV: 0-100 kHz (typ)
Maximum input voltage	260 V rms
Max Common Mode Voltage (ISO GND refer to GND)	350 V, peak
Max DC blocking voltage (ISO AC INPUT)	250 V dc
Hysteresis	10, 70 or 700 millivolts
Trigger level (nominal)	-2 to +2 V, adjustable
Monostable time constant	1, 22 or 120 milliseconds
Propagation delay (monostable bypassed)	6-10 microseconds (typ)

1.10 DRAWINGS

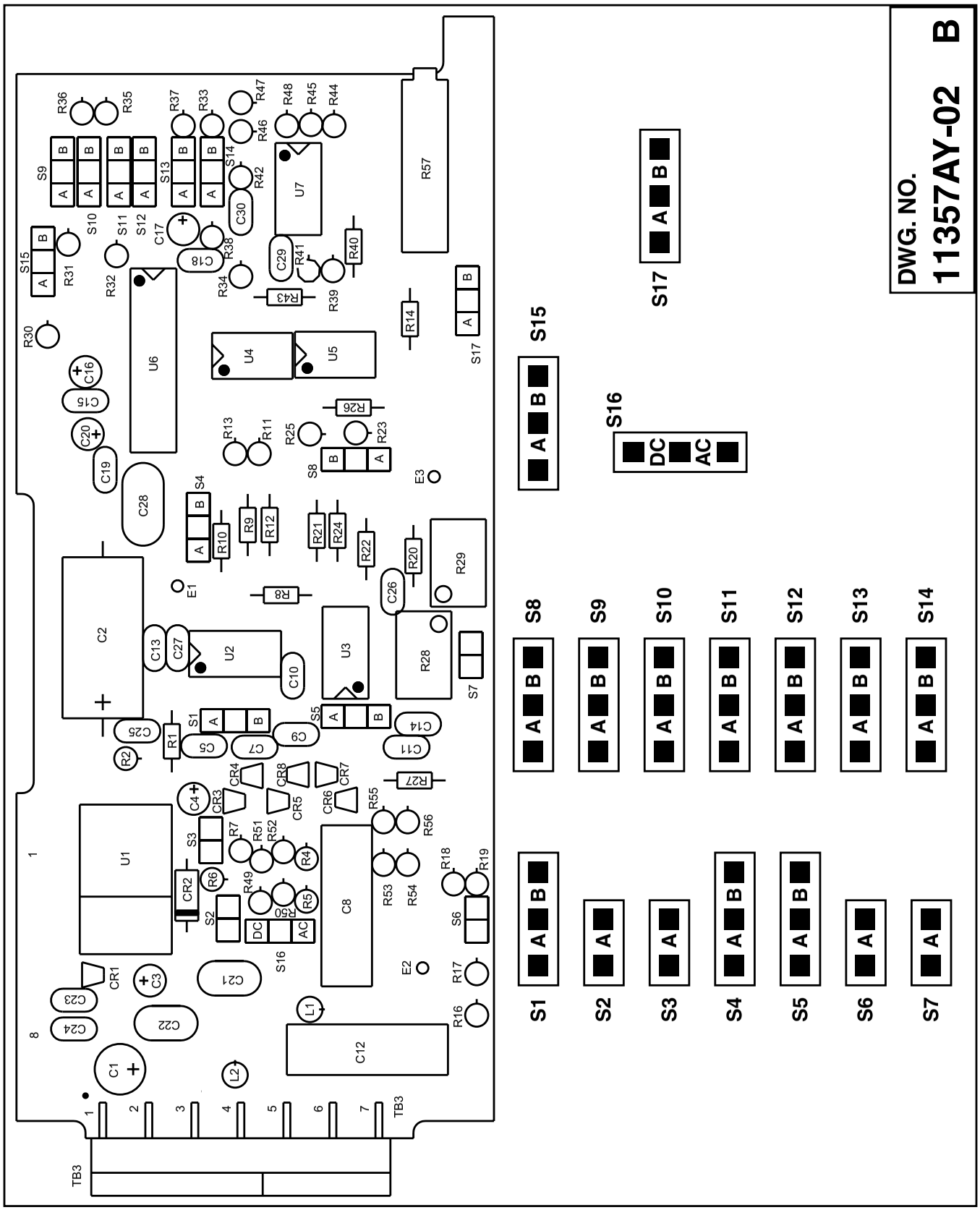


Figure 1-5 Isolated Signal Conditioner Assembly Diagram

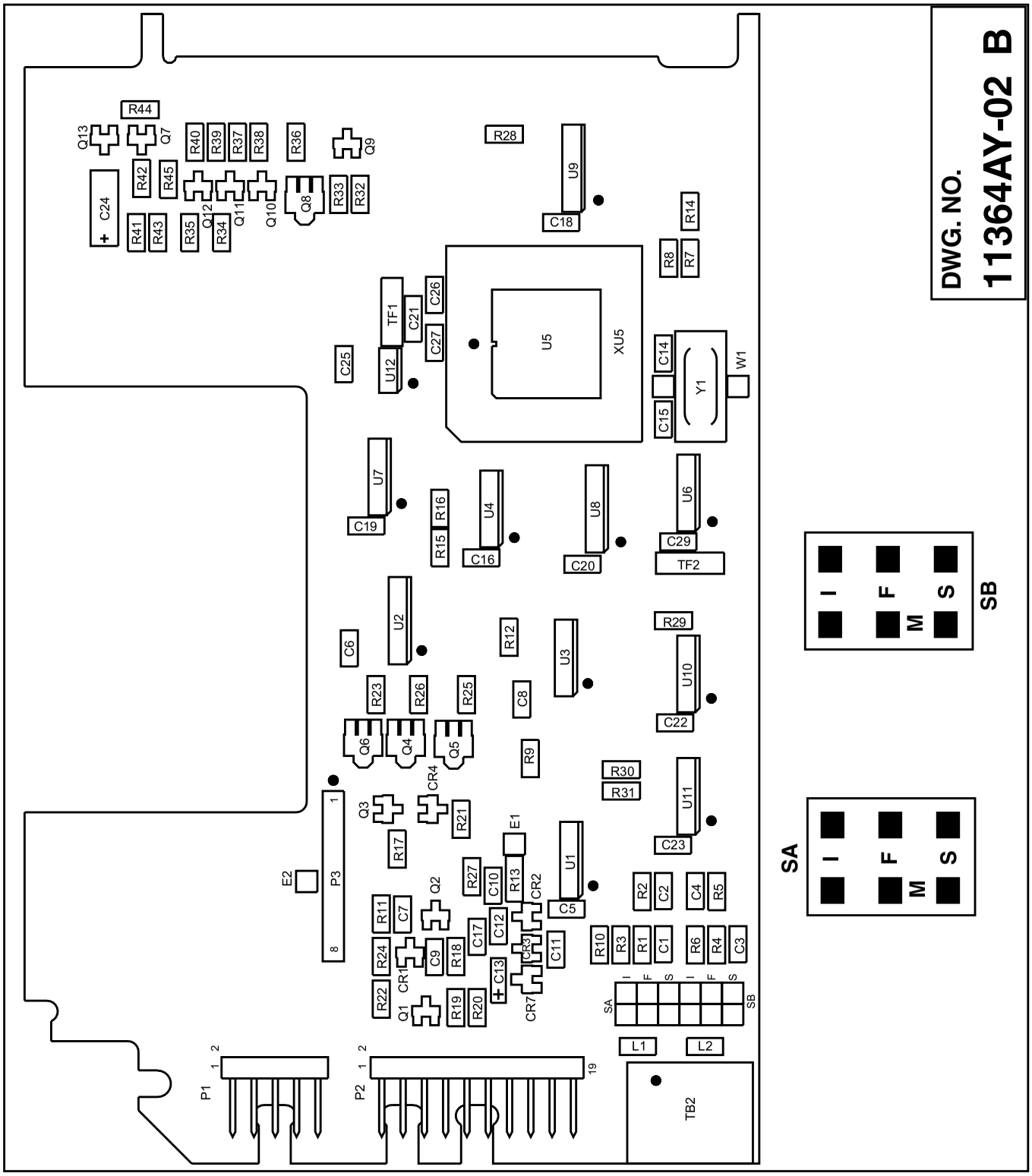


Figure 1-8 Main Board Assembly Diagram

2.1 GENERAL

This provides a non-isolated amplifier and a debouncing monostable that can be used to interface a wide range of signal sources to the meter, if isolation is not required. In addition, a 16 V / 25 mA excitation is available that can be used to power an external active sensor.

2.2 MECHANICAL INSTALLATION

The signal conditioning board is positioned as a mezzanine and is supported by the rear panel and P3-J3 header-connector. See Figure 2-1.

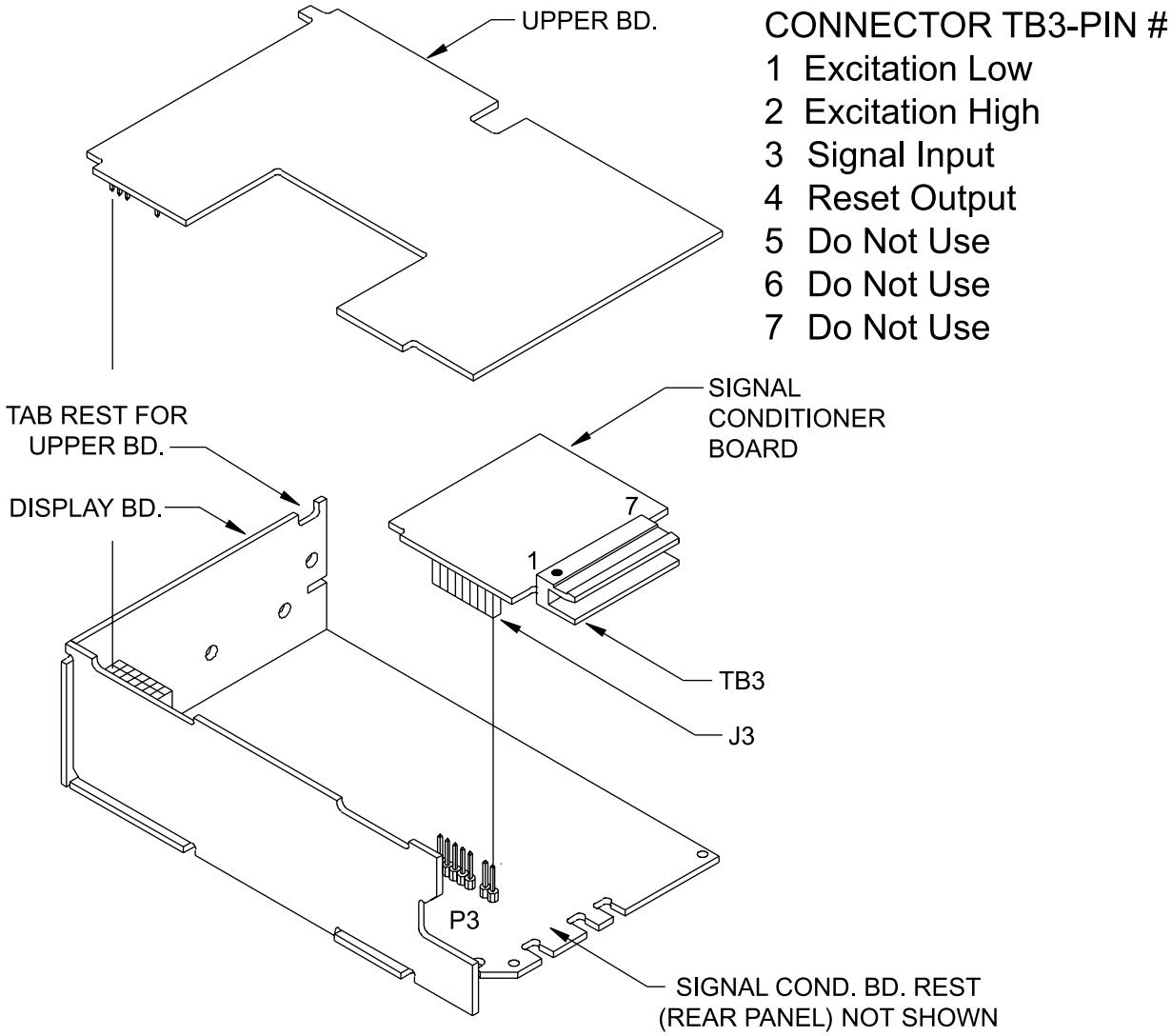


Figure 2-1 Exploded View with Power & Signal Connector

TO INSTALL:

IMPORTANT: Turn-off the power and input signals from the unit before proceeding. Failure to do so may result in injury!

CAUTION: The meter has no power-on switch; it will be in operation as soon as you apply power. To change the factory preset jumpers, disconnect the power from the unit. Failure to do so may result in injury! The jumpers must be changed by specially trained personnel.

1. When using a signal conditioning board with the meter, the main board must be jumper configured prior to installation. Install SA-I and SB-I (main board). Refer to Section 2.5 CONFIGURATION for jumper selection of input and output features.

2. Position J3, an 8-pin connector on the circuit side of the signal conditioner, to mate with the P3 pins on the main board. Press the board downward until the rear connectors rest on the lower rear panel.

3. Install the upper rear panel.

2.3 ELECTRICAL CONNECTIONS

The following table provides wiring and jumper configuration for commonly used signal sources. See Figure 2-2 below for a rear view of the meter. The exploded view and assembly diagram/schematics further illustrate parts affected, such as connector TB3 for signal inputs and outputs, jumper locations, or connector P2.

The main assembly diagram is identical for the isolated and non-isolated and non-isolated signal conditioners. This is located in Section 1.10, Figure 1-8.

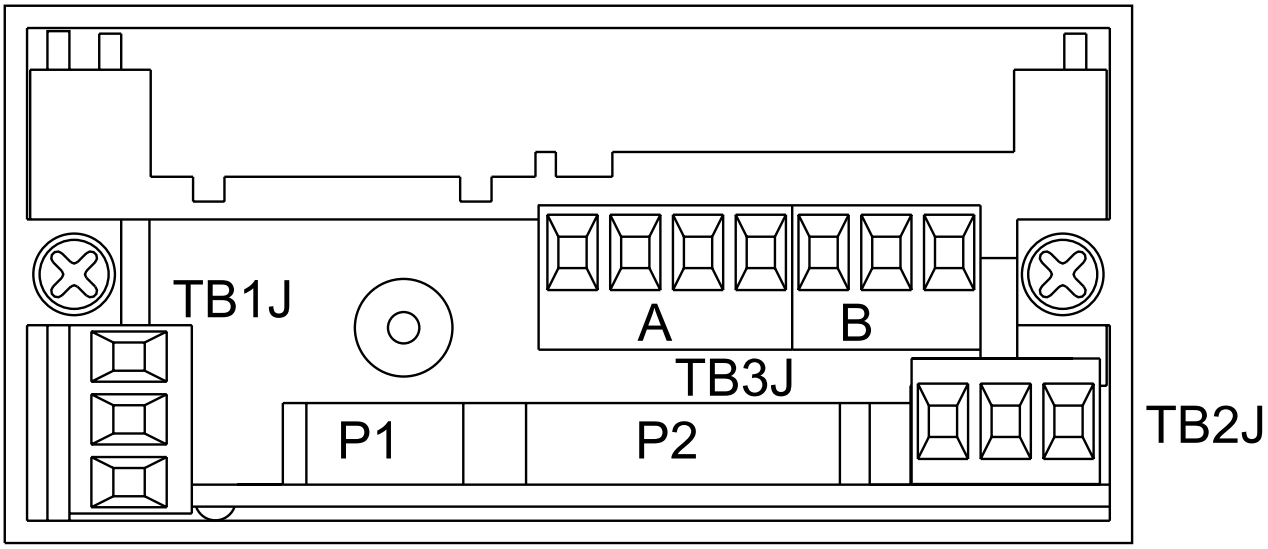


Figure 2-2 Rear View

Input Type	Input Requirement	Wiring	Jumper Position
Passive Inductor Pickup	Voltage < 60 V rms High level > 120 mV Low level < 20 mV	Connect the signal wires to SIG IN and EXC LO	Remove S4. Install S1, S2-A and S3-A.
Active Transducer (inductive, optic or capacitive), with NPN open-collector output	Operating Voltage = 16 V (Note 1) Operating Current < 25 mA	Connect EXC HI and LO to the positive and negative supply inputs of transducer. Connect the output to SIG IN.	Remove S1. Install S2-A, S3-A and S4-A.
TTL or CMOS-compatible signal	Signal source should be powered externally or with +5 V of the main board.	Connect the signal and GND to the SIG IN and EXC LO.	Remove S1. Install S2-A and S3-B. Install S4-A for TTL, remove S4-A for CMOS.
Contact closure (Slow)	Max of 10 actuation per second	Connect the contact wires to SIG IN and EXC LO.	Remove S1. Install S2-B, S3-A, and S4-A.
Contact closure (Fast)	Max of 70 actuation per second	Connect the contact wires to SIG IN and EXC LO.	Remove S1 and S2. Install S3-A and S3-4.
NAMUR	NAMUR standard	Connect the positive and negative inputs of sensor to EXC HI and SIG IN.	Remove S1. Install S2-A, S3-B, and S4-B.

Table 2-1 Required Wiring for Most Commonly Used Sensors

Note 1: For 8.2 V excitation, install S3-B; for 20 V excitation, remove S3-A & S3-B. (Maximum current is 16 mA.)

2.4 INPUTS AND OUTPUTS

Excitation outputs are available on the TB3 connector, EXC HI (positive) on pin 2 and EXC LO (negative) on pin 1.

(AC-powered units only)

Excitation Output	S3 Jumper Position
16 V at 25 mA	Install S3-A
8.2 V at 16 mA	Install S3-B
20 V at 16 mA	Remove jumper

Signal input, the input of the signal conditioner amplifier, is available on pin 3 of TB3.

RESET output is available on pin 3 of connector TB3. When the input is missing for more than 1.5 seconds, a negative true pulse is generated on this output that can be used to reset the meter. To do this, connect this output to the reset input of the meter, P2-pin 18.

Signal output is internally connected to the main board. SA-I must be installed. Refer to the drawings section.

2.5 CONFIGURATION

FUNCTION	PIN GROUP	JUMPER POSITION
Excitation voltage = 16 V, max current = 25 mA	S3*	A
Excitation voltage = 8.2 V, max current = 16 mA	S3	B
Excitation voltage = 20 V, max current = 16 mA (AC powered units only)	S3	None
7.5 k pull-up to +5 V input	S4	A
1 k pull-down to EXC LO input	S4	B
160 k pull-down to EXC LO	S4*	None
Debounce time = 15 µsec	S2*	A
Debounce time = 80 msec	S2	B
Debounce time = 10 msec	S2	None
Hysteresis = 40 mV, High threshold = 85 mV Low threshold = 45 mV	S1*	Installed
Hysteresis = 1.4 V, High threshold = 2.8 V Low threshold = 1.4 V	S1	Removed

* Default Position

Table 2-2 Jumper Configuration

Unless otherwise specified, factory settings are:

16 volts excitation
160 k pull-down to EXC LO
15 microseconds debounce time
40 millivolts hysteresis; high threshold 85 mv, low threshold 45 mv

2.6 SPECIFICATIONS

Input impedance:	More than 50 kOhms
Operating frequency:	DC to 10 kHz
Hysteresis:	40 mV or 1.4 V, jumper-selectable
Operating input voltage: (S4 removed)	0 - 120 mV min; 60 V rms max

2.7 DRAWINGS

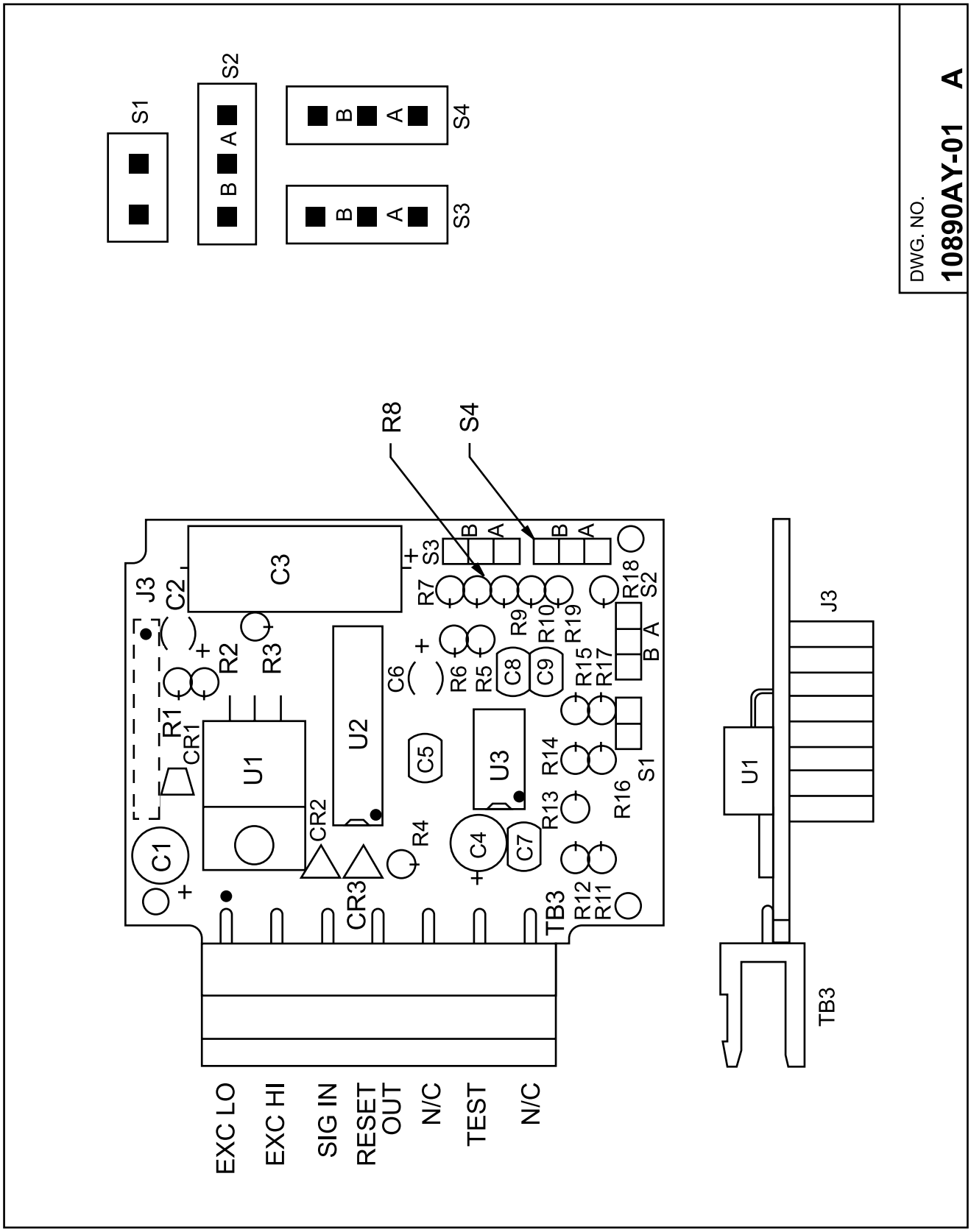


Figure 2-3 Non-Isolated Signal Conditioner Assembly Diagram

3.1 GENERAL

The P6A5B analog input board allows the meter to serve as a process meter or as a totalizer for process signals. For instance, it can display watts or totalized kilowatt-hours based on the 0-1 mA signal from a watt transducer. It can display flow rate in gallons per minute or totalized gallons based on the 4-20 mA signal from a flow transducer.

The P6A5B converts an input voltage or current to a frequency using a V/F converter. This frequency can then be processed by the host meter in either the Frequency or Totalize modes.

The P6A5B can be configured to operate in one of the ranges shown in Table 3-2. The factory default range setting is 4-20 mA.

3.2 MECHANICAL INSTALLATION

The analog input board is positioned as a mezzanine inside the case. It is supported by the rear panel and a slot on the display board.

NOTE: Before installing the Analog input board, install push-on jumpers SA-I and SB-I on the main board.

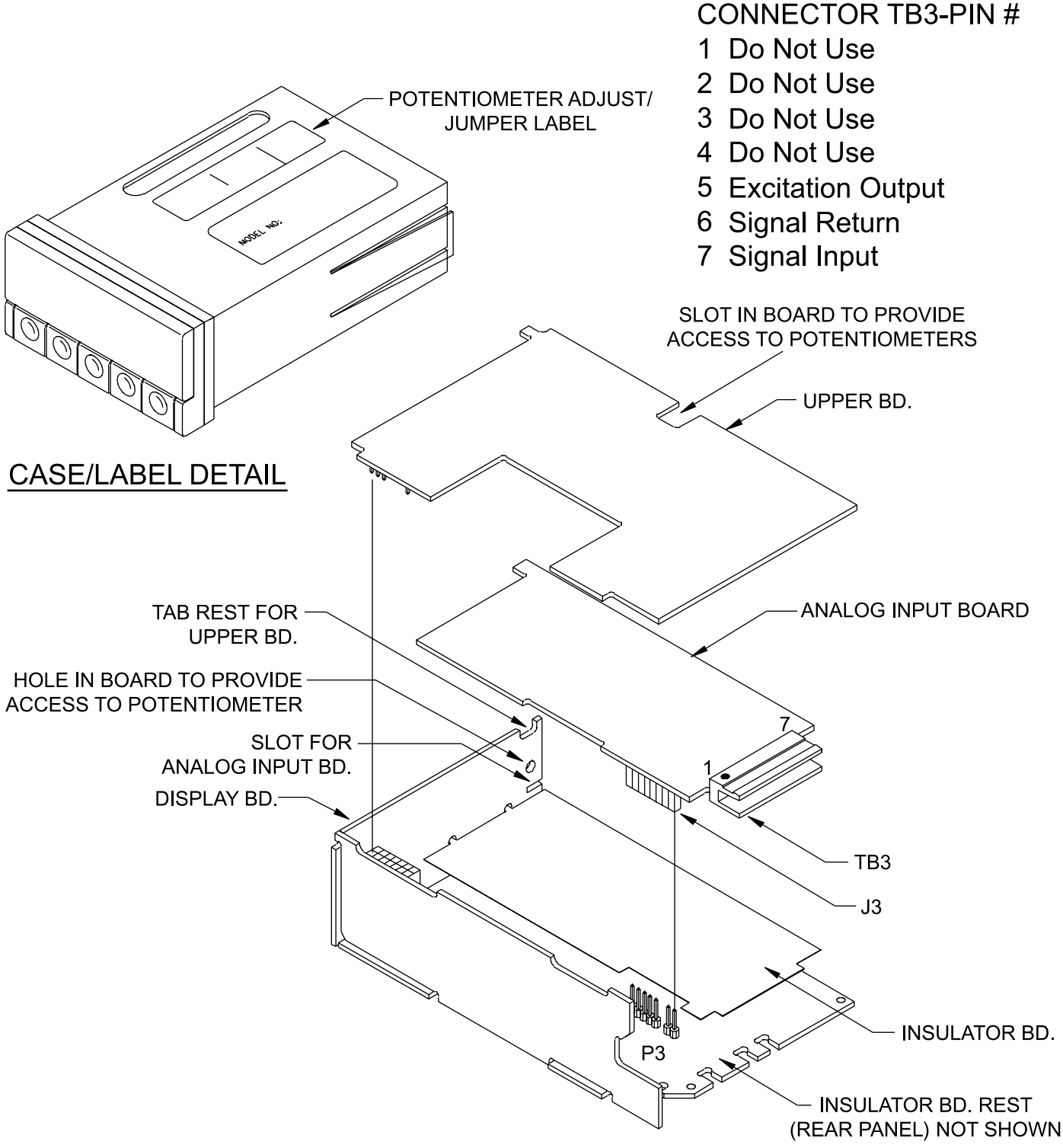


Figure 3-1 Exploded View with Power & Signal Connector

TO INSTALL:

IMPORTANT: Turn-off the power and input signals from the unit before proceeding. Failure to do so may result in injury!

CAUTION: The meter has no power-on switch; it will be in operation as soon as you apply power. To change the factory preset jumpers, disconnect the power from the unit. Failure to do so may result in injury! The jumpers must be changed by specially trained personnel.

1. Install SA-I and SB-I jumpers on the main board. If not factory-configured, install or remove jumpers as indicated in Section 3.3.

2. The insulator rests atop the lower rear panel, with the two tabs fitting into holes on the display board. Insert the tab of the analog input board into the slot provided on the display board.

3. Position J3, an 8-pin connector on the circuit side of the signal conditioner, to mate with the P3 pins on the main board. Press the board downward until the rear connectors rest on the lower rear panel.

4. Install the upper rear panel.

3.3 ELECTRICAL CONNECTION AND CONFIGURATION

The input signal is applied across TB3-7 (SIG HI) and TB3-6 (SIG LO). A 24 V excitation voltage is available at TB3-5. To use the excitation supply to power the current loop, use TB3-5 for "+" and TB3-7 for the return (see Table 3-2).

The output frequency of the P6A5B module is internally connected to the A input, TB2-1 of the main board via the SA-I jumpers of the main board.

If the P6A5B did not come installed in the meter, the proper ranging/configuring jumpers need to be installed. Choose the proper range from Table 3-2. The factory calibrates the module to 4-20 mA = 0-10,000 counts by adjusting the offset pot for zero at 4 mA input and writing the required meter SCALE factor for 10,000 counts on the back of the board. If a different range is required the scale factor will be different (see Section 3.7, CALIBRATION).

ZERO ADJUSTMENT

If the P6A5B is to be used in a totalizing application, the multiturn potentiometer must be adjusted for proper reading when the output frequency of the P6A5B module is low but not zero. The P6A5B has two potentiometers, each in a different location for easy access, depending on which meter you are using it with. In a P6000A/DPF6000 meter the zero offset potentiometer is accessible through a hole on the left-hand side of the display board, with the lens removed; S3-B jumper must be installed*. In a P5000/DPF5000 meter, the zero offset potentiometer is accessible through a hole on the top, left-hand side of the case, with the sleeve removed; S3-A jumper must be installed. Refer to drawing below and Figure 3-1.

Meter	Jumper Position	Potentiometer Location
P6000A/DPF6000	S3-B*	Through hole in display board
P5000/DPF5000	S3-A	Through hole in top of case

Table 3-1 P6A5A Potentiometer Selection
* Factory default position

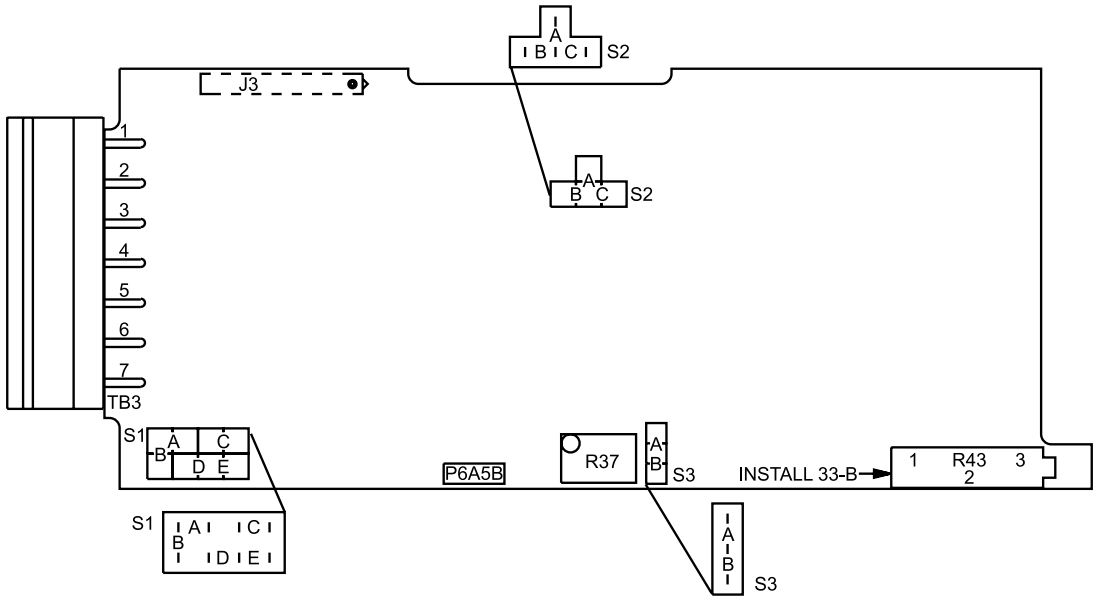


Figure 3-2 P6A5A Potentiometer/Jumper Locations

If the P6A5B is to be used in a **non-totalizing application**, the zero offset can be adjusted via the potentiometer, or programmed digitally. In case of programming, it is better to turn the multiturn potentiometer counter-clockwise to generate an output frequency when the input is minimum (e.g., 4 mA in 4-20 mA range). This offset, can then be cancelled with a negative digital offset when the meter is in Frequency mode. This method improves the display update rate at low frequencies. It also ensures that the frequency output of the P6A5B module is above the cut-off limit (Section 3.4).

SPAN ADJUSTMENT

Span is adjustable by programming the meter Scale Factor. No potentiometer is provided.

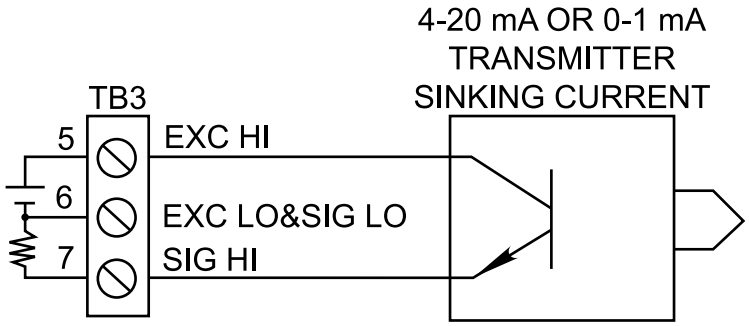
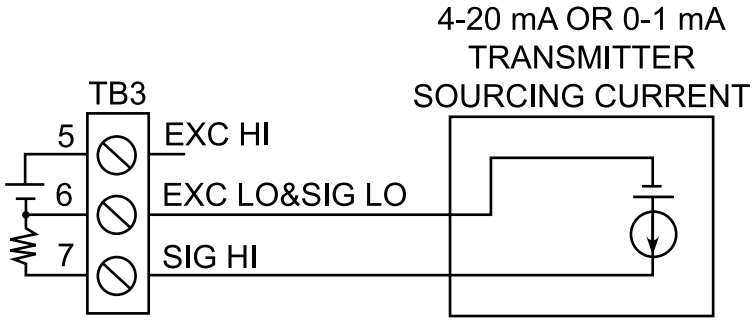
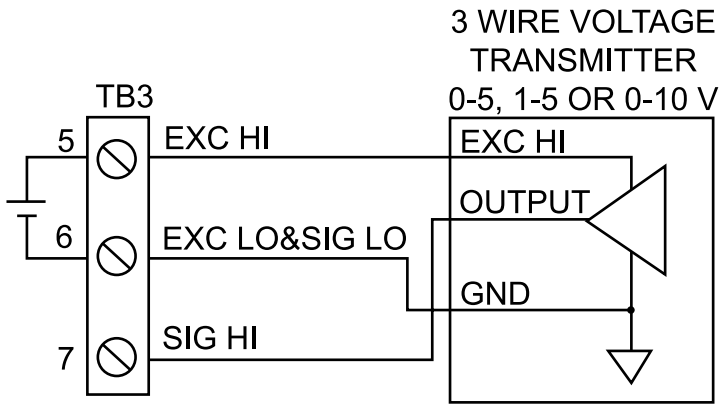
INPUT	RANGE SELECTION JUMPERS	TB3 WIRING
4-20 mA (Default)	S1-A, S1-C, S1-D	
0-1 mA	S1-B, S1-C, S1-E	
0-5 V	S1 Removed	
1-5 V	S1-D	
0-10 V	S1-E	

Table 3-2 Jumper Positions and Input Wiring for Different Ranges

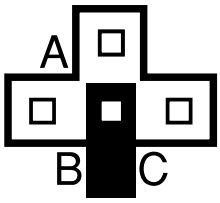
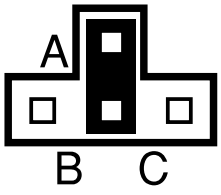
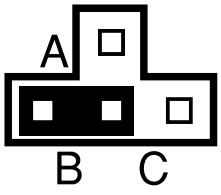
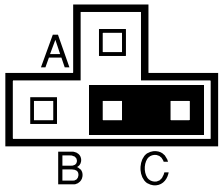
S2 POSITION	STORAGE	S2-A	S2-B	S2-C
				
CUTOFF FREQUENCY	NO CUTOFF (DEFAULT)	200-300 Hz	40-60 Hz	8-12 Hz

Table 3-3 Cutoff Frequency Selection

3.4 LOW FREQUENCY CUTOFF

In some applications, it is desirable to cut off the output frequency below a certain limit to prevent accumulating a leakage over a long period of time. Table 3-2 lists the cutoff frequency for different positions of S2.

An active low logic signal is provided on TB3-1 when the output frequency is cut off. This signal is referenced to Digital GND (TB2-3) and is electrically isolated from the input.

3.5 OPEN CIRCUIT INDICATION

The cutoff signal (available on TB3-1) can be used to show an open current loop in the 4-20 mA range in rate indication applications. To make sure that the output remains above the cutoff limit under normal conditions:

1. Turn the offset adjustment pot counter-clockwise until display reads more than 350 counts with 4 mA input and write down the reading.

2. Program the meter offset to the negative of the above value. The display then shows zero for 4 mA input.

3.6 POWER

The P6A5B board is powered by the host meter. A 24 V regulated excitation voltage is available on TB3-5. A maximum of 25 mA may be drawn from this output.

3.7 CALIBRATION

If the meter is ordered as a configured unit with this option (P6XX4A/P5XX4), the push-on jumpers and the offset pot are configured for the 4-20 mA range (default). The meter's scale factor* is set for a 10,000 reading at full scale input (20 mA). The offset can be adjusted by the multiturn potentiometer, see section 3.3 for location.

If a different full scale value is all that is desired, simply modify the meter scale factor as follows:

$$\text{Required Scale Factor} = \frac{\text{Desired Full Scale}}{10{,}000} \times \text{Present Scale Factor}$$

* This scale factor is also written on the back side of the board.

To calibrate the analog input board <u>in any range</u>:

1. Put the meter in the Frequency mode, remove the S2 jumper, and apply a high input (close to full scale), and write down the reading.

2. Apply a low input, about 10% of the input span (e.g., 5.6 mA for 4-20 mA input), and write down the reading.

3. Calculate and modify the scale factor (A .SC) using this formula:

$$\text{Scale Factor} = \frac{DH - DL}{PH - PL}$$

Where:
DH = Desired reading with high input
DL = Desired reading with low input
PH = Present reading with high input
PL = Present reading with low input

4. While a low input is applied, adjust the offset using the multiturn potentiometer for the desired reading, see section 3.3 for location.

In a non-totalizing application (Frequency mode), the meter digital offset can be programmed instead of adjusting the potentiometer.

Meter's Offset = Desired Reading - Present Reading

3.8 SPECIFICATIONS

Signal Ranges	4-20 mA	0-1 mA	0-5 V	1-5 V	0-10 V
Resolution	1.6 µA	0.1 µA	0.5 mV	0.4 mV	1.0 mV
Input Resistance	24.3 Ω	381 Ω	>10 MΩ	>10 MΩ	>10 MΩ
Bias Current	-	-	10-50 nA	10-50 nA	10-50 nA
Absolute Maximum Input	80 mA	20 mA	130 V	130 V	130 V

Table 3-4 Analog Input Signal Range Specifications

Excitation output	23.5 ± 2 V at 25 mA max.
CMR	More than 100 db, DC to 60 Hz
NMR	Gate Time = 00.20 sec: 56 db, min Gate Time = 00.50 sec: 64 db, min
Response Time (to 99.9% of span)	Gate Time = 00.20 sec: .45 - .65 sec Gate Time = 00.50 sec: .75 - 1.25 sec
Accuracy at 25°C (RH 25-75%)	99.95% of the span
Nonlinearity	.02% of full scale, maximum
Typical Temperature stability of the span, % of FS	0-1 mA ±.010% / °C 4-20 mA: ± .005% / °C 0-5 V, 1-5 V, 0-10 V ± .005% / °C
Temperature stability of the offset	Less than 0.1 Hz / °C (1 Hz / 10°C)
Warm up to rated accuracy:	30 minutes
Full-scale reading	Programmable by meter's scale factor
Full-scale output frequency	6.5 KHz ± 20%
Overrange capability	10% above full scale, minimum
Offset adjustment	with multiturn pot: 5% of span, typ. with meter's offset: -99,999 to 999,999
Isolation	350 V dc between output and input (output is connected to main board)
Operating temperature	0-60°C
Humidity	5-95% non-condensing, 0-40°C

Warranty/Disclaimer

NEWPORT Electronics, Inc. warrants this unit to be free of defects in materials and workmanship for a period of **one (1) year** from the date of purchase. In addition to NEWPORT's standard warranty period, NEWPORT Electronics will extend the warranty period for **one (1) additional year** if the warranty card enclosed with each instrument is returned to NEWPORT.

If the unit should malfunction, it must be returned to the factory for evaluation. NEWPORT's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by NEWPORT, if the unit is found to be defective it will be repaired or replaced at no charge. NEWPORT's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of being damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of NEWPORT's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

NEWPORT is pleased to offer suggestions on the use of its various products. However, NEWPORT neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by NEWPORT, either verbal or written. NEWPORT warrants only that the parts manufactured by it will be as specified and free of defects. NEWPORT MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive and the total liability of NEWPORT with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall NEWPORT be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by NEWPORT is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, or used on humans, or misused in any way, NEWPORT assumes no responsibility as set forth in our basic WARRANTY / DISCLAIMER language, and additionally purchaser will indemnify NEWPORT and hold NEWPORT harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

Return Requests/Inquiries

Direct all warranty and repair requests/inquiries to the NEWPORT Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO NEWPORT, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM NEWPORT'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting NEWPORT:

1. P.O. number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult NEWPORT for current repair charges. Have the following information available BEFORE contacting NEWPORT:

1. P.O. number to cover the COST of the repair,
2. Model and serial number of product, and
3. Repair instructions and/or specific problems relative to the product.

NEWPORT's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

NEWPORT is a registered trademark of NEWPORT Electronics, Inc.

For immediate technical or application assistance please call:

1-800-6397678®
1-800-NEWPORT

Newport Electronics, Inc.
2229 South Yale Street • Santa Ana, CA • 92704 • U.S.A.
TEL: (714) 540-4914 • FAX: (203) 968-7311
Toll Free: 1-800-639-7678 • www.newportUS.com • e-mail:info@newportUS.com
ISO 9001 Certified

Newport Technologies, Inc.
976 Bergar • Laval (Quebec) • H7L 5A1 • Canada
TEL: (514) 335-3183 • FAX: (514) 856-6886
Toll Free: 1-800-639-7678 • www.newport.ca • e-mail:info@newport.ca

Newport Electronics, Ltd.
One Omega Drive • River Bend Technology Centre
Northbank, Irlam • Manchester M44 5BD • United Kingdom
Tel: +44 161 777 6611 • FAX: +44 161 777 6622
Toll Free: 0800 488 488 • www.newportuk.co.uk • e-mail:sales@newportuk.co.uk

Newport Electronics B.V.
Postbus 8034 • 1180 LA Amstelveen • The Netherlands
TEL: +31 20 3472121 • FAX: +31 20 6434643
Toll Free: 0800 0993344 • www.newport.nl • e-mail: info@newport.nl

Newport Electronics spol s.r.o.
Frystatska 184, 733 01 Karviná • Czech Republic
TEL: +420 59 6311899 • FAX: +420 59 6311114
Toll Free: 0800-1-66342 • www.newport.cz • e-mail: info@newport.cz

Newport Electronics GmbH
Daimlerstrasse 26 • D-75392 Deckenpfronn • Germany
TEL: 49 7056 9398-0 • FAX: 49 7056 9398-29
Toll Free: 0800 / 6397678 • www.newport.de • e-mail: sales@newport.de

Newport Electronique S.A.R.L.
11, rue Jacques Cartier • 78280 Guyancourt • France
TEL: +33 1 61 37 29 00 • FAX: +33 1 30 57 54 27
Toll Free: 0800 466 342 • www.newport.fr • e-mail: sales@newport.fr

Mexico and Latin America
FAX: 001 (203) 359-7807
En Español: 001 (203) 359-7803

NEWPORTnet℠ On-Line Service	**Internet e-mail**
www.newportUS.com	info@newportUS.com

NEWPORT Electronics, Inc.