Bulletin 1370 SCH, SCM, SCL

Single Channel Isolator - High, Medium & Low Range Models

Description

The Single Channel Isolator Models 1370-SCH, SCM and SCL (Figure 1-1) convert either bipolar or unipolar inputs into one of the three types of output; Voltage, bipolar current or unipolar current. The outputs remain constant, with 3 Unipolar outputs and 2 Bipolar outputs for each model. The number of inputs vary from 3 to 5 depending on the model.

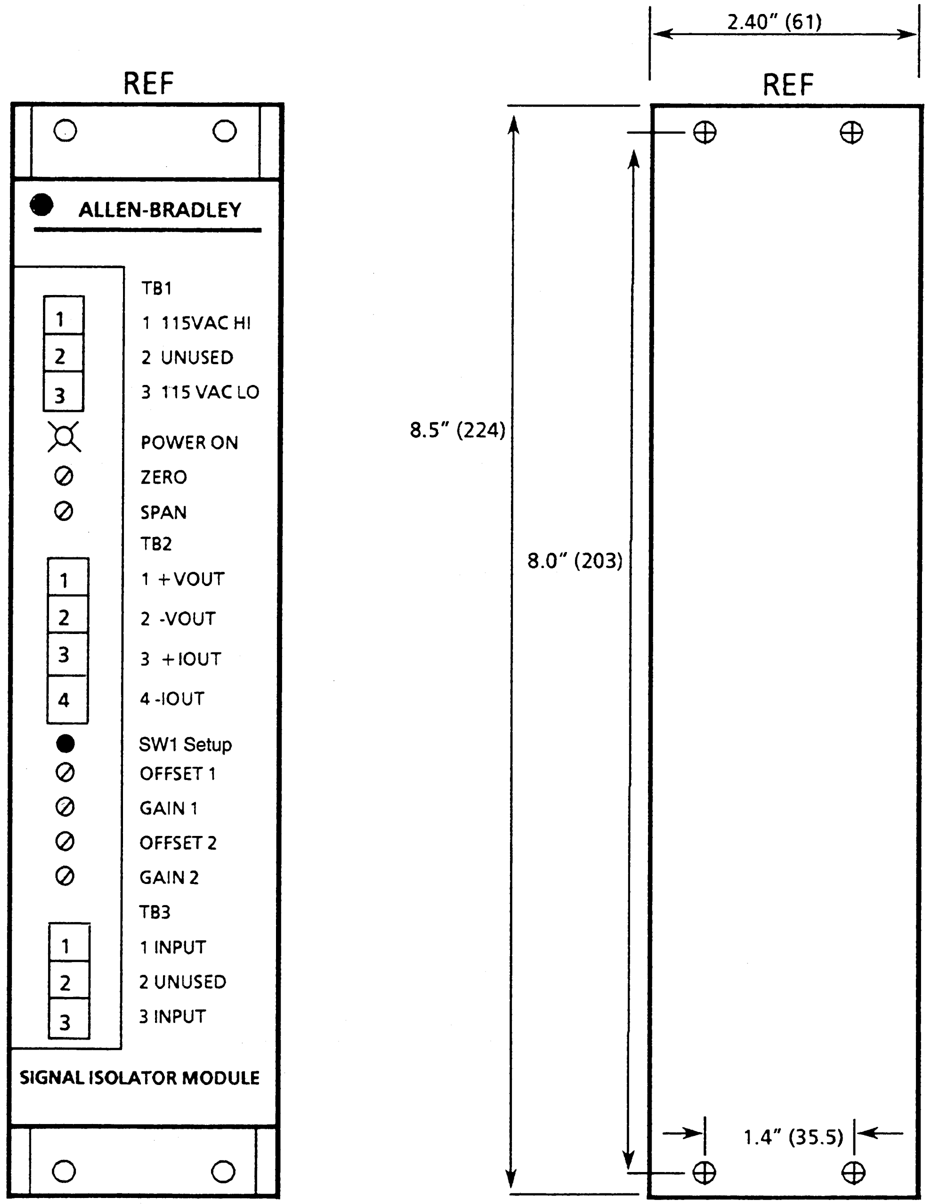


Figure 1-1. Single Channel Isolator 0-100mv DC, 1-50 ma, DC

Specifications

Line Voltage	115V AC, ±
Line Frequency	50/60Hz, ±3 Hz
Line Current	0.5A maximum
Inputs(*Jumper Selectable*)	100V DC Bipolar (High) 200V DC Bipolar (High) 300V DC Bipolar (High) 600V DC Bipolar (High) 1 to 5ma Unipolar (Medium) 4 to 20 ma Unipolar (Medium) 10 to 50ma Unipolar (Medium) 5V DC Bipolar (Medium) 10V DC Bipolar (Medium) 50mV DC Bipolar (Low) 100mV Dc Bipolar (Low)
Input Range "Limit"	115% of rated input
Input Characteristics: *High Range*	608.7 K ohms resistance 1000 volts Overvoltage capability 2.8K Hz Frequency response 119.5K ohms resistance
Medium Range	300 volts Overvoltage capability 3.1 K Hz Frequency response 66.8 K ohms resistance
Low Range	150 volts 3.3 K Hz 200 ohms, 60 ma max
Outputs (*Jumper Selectable)*	-1 to 0 to 1ma Bipolar (All Ranges) -5 to 0 to 5ma Bipolar (All Ranges) 1 - 5ma Unipolar 4- 20ma Unipolar 10 - 50 ma Unipolar ± 10 Vout
Output Current	Source 10mA minimum, 30mA typical Sink 20mA minimum, 47mA typical
Relative Humidity	5% to 95% non-condensing
Ambient Operating Temperature	0° to 60° C (32° to 140° F)
Relative Humidity (Non-Condensing)	5 to 95%
Altitude without derating	1000 meters (3200 feet)
Isolation *Input to Output*	2500V AC continuous isolation rating

Circuit Operation

The available jumper settings, and how they effect the Single Channel Isolator circuit are discussed here.

Jumper J1 (Tables 1-2 & 1-3) determines whether the input signal is a current signal or voltage signal on Low & Medium range Single Channel Isolator Models. This is accomplished by placing 200 ohms resistance across the input when a current signal is desired. The J1 jumper is not used on high range models, as only voltage inputs are used on the high range model.

Jumper J2 (tables 1-1 through 1-3) is a four position jumper which determines the gain of the differential amplifier in the circuit.

Jumpers J3 through J5 are used to determine which one of three scaling circuits is used. When jumper J5 is placed in the "A" position, the scaling circuit is bypassed.

Jumper J6 determines whether the Unipolar to Bipolar conversion circuit has a voltage output (position A) or a current output (position B).

Jumper J7 determines which of four current feedback resistors is placed in the current output circuit. These settings determine which of five current ranges from 1 to 50mA are output. Refer to Tables 1-1 through 1-3 for specific ranges.

Jumper J8 is a two position jumper that determines whether a bipolar current (Position A) or a unipolar current (position B) is output.

Table 1-1: High Range Jumper Settings

Jumpers J1 & J2									
INPUT TYPE	**INPUT RATING**	**Jumper**	**J1**	**J2**					
Bipolar	100 V DC	Position	-	A					
Bipolar	200 V DC	Position	-	B					
Bipolar	300 V DC	Position	-	C					
Bipolar	600 V DC	Position	-	D					
Jumpers J3 thru J8									
DESIRED OUTPUT TYPE		**Position**	**J3**	**J4**	**J5**	**J6**	**J7**	**J8**	
Bipolar Voltage (Output)		Position	-	A	A	A	A	B	
Bipolar Current (Output)		Position	-	A	A	A	*	A	
Unipolar Current (Output)		Position	-	A	A	C	*	B	
*Bipolar, -1 to 0 to 1ma		Position	-				A		
*Bipolar, -5 to 0 to 5ma		Position					B		
*Unipolar, 1 - 5 ma		Position					B		
* Unipolar, 4-20 ma		Position					C		
* Unipolar, 10 - 50 ma		Position					D		

* Select One Optional Range

Table 1-2: Medium Range Jumper Settings

Jumpers J1 & J2									
INPUT TYPE	INPUT RATING	Jumper:	J1	J2					
Unipolar	1 to 5 ma	Position	A	A					
Unipolar	4 to 20 ma	Position	A	B					
Unipolar	10 to 50 ma	Position	A	D					
Bipolar	5 V DC	Position	B	C					
Bipolar	10V DC	Position	B	D					
Jumpers J# thru J8									
VOLTAGE INPUT									
DESIRED OUTPUT TYPE		Jumper:	J3	J4	J5	J6	J7	J8	
Bipolar Voltage (Output)		Position	A	A	A	A	A	B	
Bipolar Current (Output)		Position	A	A	A	B	*	A	
Unipolar Current (Output)		Position	A	A	C	B	*	B	
CURRENT INPUT									
DESIRED OUTPUT TYPE		Jumper:	J3	J4	J5	J6	J7	J8	
Bipolar Voltage (Output)		Position	A	A	A	A	A	B	
Bipolar Current (Output)		Position	A	A	A	B	*	A	
Unipolar Current (Output)		Position	A	A	C	B	*	B	
*Bipolar, -1 to 0 to 1ma		Position					A		
*Bipolar, -5 to 0 to 5ma		Position					B		
*Unipolar, 1 - 5 ma		Position					B		
* Unipolar, 4-20 ma		Position					C		
* Unipolar, 10 - 50 ma		Position					D		

Table 1-3: Low Range Jumper Settings

Jumpers J1 & J2									
INPUT TYPE	INPUT RATING	Jumper:	J1	J2					
Bipolar	50 mV DC	Position	B	A					
Bipolar	100 m V DC	Position	B	B					
Bipolar	+/- 1 ma	Position	A	C					
Jumpers J3 thru J8									
DESIRED OUTPUT TYPE		Jumper:	J3	J4	J5	J6	J7	J8	
Bipolar Voltage (Output)		Position	A	A	A	A	A	B	
Bipolar Current (Output)		Position	A	A	A	B	*	A	
Unipolar Current (Output)		Position	A	A	A	B	*	B	
*Bipolar, -1 to 0 to 1ma		Position	-				A		
*Bipolar, -5 to 0 to 5ma		Position					B		
*Unipolar, 1 - 5 ma		Position					B		
* Unipolar, 4-20 ma		Position					C		
* Unipolar, 10 - 50 ma		Position					D		

* Select One Optional Range

Calibration Procedures

Bipolar Input to Bipolar Voltage Output:

WARNING: Hazardous voltages are present when performing the following tests. Only Personnel familiar with the Bulletin 1370 Single Channel Isolator and the associated machinery should plan or implement the installation, start-up, testing and subsequent maintenance of the Drive. Failure to comply may result in personal injury and/or equipment damage.

1. Set input circuit jumpers for the desired bipolar input range: see Tables 1 through 3.

   Set the output jumpers for bipolar input to bipolar voltage output as shown in the tables.

2. Short the input terminals with an insulated jumper. Adjust OFFSET_1 for 0.000 ± 0.3mV at TP4 (V03) to TP3 (analog common). Adjust ZERO until Vout is equal to the desired voltage level (usually 0.000 ± 0.6mV).

3. Replace input short with positive (+) full scale input voltage or current. Adjust GAIN_1 until V03 (TP4) is -10.000 ± - 0.9mV. Adjust SPAN until Vout is equal to the desired full scale output ± 3.1mV.

   For optimum linearity, reverse polarity of full scale input and re-adjust these trimpots to minimize error between full scale positive and full scale negative output voltages.

Bipolar Input to Bipolar Current Output:

1. Set input circuit jumpers for the desired bipolar input range; see Tables 1 through 3.

   Set the output jumpers for bipolar input to bipolar current output as shown in row 2 of the output tables.

2. Short the input terminals with an insulated jumper. Adjust OFFSET_1 for 0.000 ± 0.3mV at TP4 (V03) to TP3 (analog common). Adjust ZERO until Iout is equal to the desired current level (usually 0.000mA).

3. Replace input short with positive (+) full scale input voltage or current. Adjust GAIN_1 until V03 (TP4) is -10.000 ± 0.9mV. Adjust SPAN until Iout is equal to the desired full scale output.

   For optimum linearity, reverse polarity of full scale input and readjust these trimpots to minimize error between full scale positive and full scale negative output currents.

Bipolar Input to Unipolar Current Output:

1. Set input circuit jumpers for the desired bipolar input range; see Tables 1 through 3.

   Set the output jumpers for bipolar input to unipolar current output.

2. Short the input terminals with an insulated jumper. Adjust OFFSET_1 for 0.000 ± 0.3mV at TP4 (V03) to TP3 (analog common). Adjust OFFSET_2 for -6.000 ± 0.5 mV at TP2 to TP3.

   Push and hold SW1 in while adjusting ZERO trimpot to desired output offset current level. Note: If Iout is to be 4.0 to 20.0mA, then adjust Iout to 0.000mA. If Iout is 6 to 22 mA, adjust Iout to 2.000 mA.

3. Release SW1 and replace input short with positive (=) full scale input voltage or current. Adjust GAIN_1 until V03 (TP4) is -10.000 ± 0.9mV. Adjust GAIN_2 until the voltage at TP2 is -10.000 ± 0.2mV. Adjust SPAN until Iout is equal to desired full scale output.

   Apply negative (-) full scale input voltage or current and observe the following:

   Voltage at TP4 is +10.000

   Voltage at TP2 is -2.000

   Current at Iout is at scale minimum; 4.00 mA for the 4 to 20 mA range.

   Replace the input signal with a short using an insulated jumper and observe the following:

   Voltage at TP4 is 0.000

   Voltage at TP2 is -6.000

   Current at Iout is at 1/2 scale; 12.00 mA for the 4 to 20 MA range.

Unipolar Current Input to Bipolar Voltage Output:

1. Set input circuit jumpers for the desired unipolar input range; see Tables 1 through 3.

   Set the output jumpers for unipolar input to bipolar voltage output.

2. Short the input terminals using an insulated jumper. Adjust OFFSET_1 for 0.000 ± -0.3 mV at TP4 (V03) to TP3 (analog common). Replace short with mid-scale current input (12.000mA on 4 to 20 mA range). Adjust OFFSET_2 for 0.000V at TP2 to TP3.

   Push and hold SW1 in while adjusting ZERO trimpot to desired output offset voltage level.

3. Release SW1 and replace input short with rated high input current, this would be 20 mA for a standard 4 to 20 mA input.

   Adjust GAIN_1 until V03 (TP4) is -10.000 ± 0.9 mV

   Adjust GAIN_2 until the voltage at TP2 is -10.000 ± 2.7 mV.

   Adjust SPAN until Vout is equal to desired full scale output.

   Apply rated low input current and observe the following:

   Voltage at TP4 is -2.000

   Voltage at TP2 is +10.000

   Voltage at Vout is at negative (-) full scale level.

   Replace the input signal with mid-scale input current; this would be 12 mA for a standard 4 to 20 mA input. Observe the following:

   Voltage at TP4 is -6.000

   Voltage at TP2 is 0.0

   Voltage at Vout is 0.0

Unipolar Current Input to Bipolar Current Output:

1. Set input circuit jumpers for the desired unipolar input range; see Tables 1 through 3.

   Set the output jumpers for unipolar current input to bipolar current output.

2. Short the input terminals using an insulated jumper. Adjust OFFSET_1 for 0.000 ± 0.3 mV at TP4 (V03) to TP3 (analog common). Adjust OFFSET_2 for +6.000 ± 0.5mV at TP2 to TP3.

   Push and hold SW1 in while adjusting ZERO trimpot to desired output offset current level.

3. Release SW1 and replace input short with rated high input current, this would be 20 mA for a standard 4 to 20mA input.

   Adjust GAIN-1 until V03 (TP4) is -10.000 ± 0.9 mV.

   Adjust GAIN_2 until the voltage at TP2 is -10.000 ± 2.7 mV.

   Adjust SPAN until Vout is equal to desired full scale output.

   Apply rated low input current and observe the following:

   Voltage at TP4 is -2.000
   Voltage at TP2 is +10.000
   Voltage at Vout is at negative (-) full scale level.

   Replace the input signal with mid-scale input current; this would be 12 mA for a standard 4 to 20 mA input. Observe the following:

   Voltage at TP4 is -6.000
   Voltage at TP2 is 0.0
   Voltage at Iout is 0.0

Unipolar Current Input to Unipolar Current Output:

1. Set input circuit jumpers for the desired unipolar input range; see tables 1 through 3.

   Set the output jumpers for unipolar input to unipolar current output.

2. Short the input terminals using an insulated jumper. Adjust OFFSET_1 for 0.000 ± 0.3 mV at TP4 (V03) to TP3 (analog common). Adjust ZERO until Iout is equal to desired output offset level. NOTE: If Iout is to be 4.0 to 20.00 mA, then adjust Iout to 0.000 mA. If Iout is to be 6 to 22mA, adjust Iout to 2.000 mA.

3. Replace input short with range high input current.

   Adjust GAIN_1 until V03 (TP2) is -10.000 ± 0.9 mV.

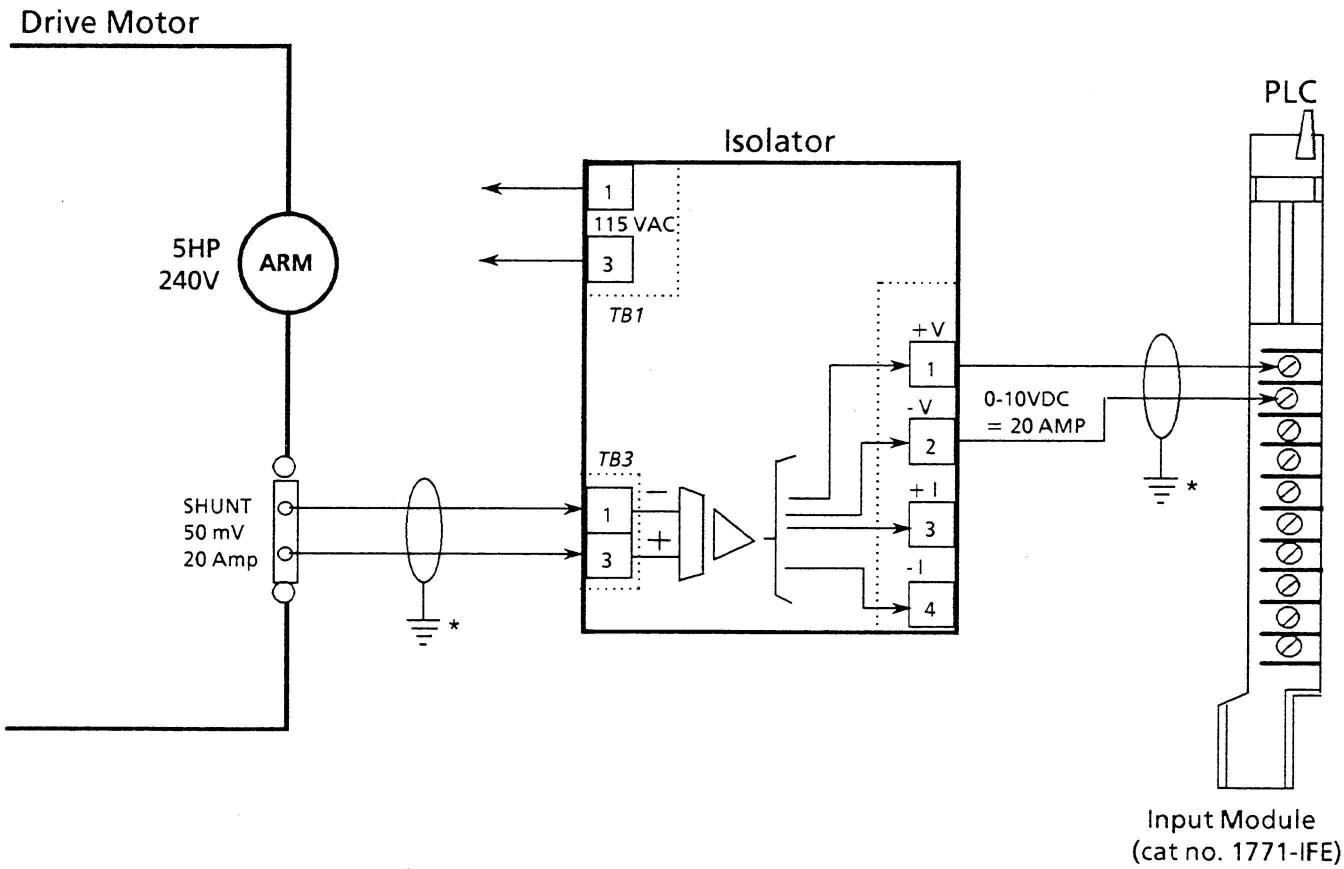
   Adjust SPAN until Iout is equal to desired full scale output.

   Apply rated low input current and observe the following:

   Voltage at TP2 is -2.000
   Current at Iout is at desired low output current; this would be 4 mA for a standard 4 to 20 mA output.

   Replace the input signal with mid-scale input current; this would be 12 mA for a standard 4 to 20 mA input. Observe the following:

   Voltage at TP2 is -6.000
   Current at Iout is at mid-scale output.



* Wire with insulated shield is required. Shield is to be grounded at the controller only. Wires interconnecting these terminals may be run in a common conduit. This conduit must not contain power, AC or field conductors.

Figure 1-2. Example #1, Typical Isolator Connection in System

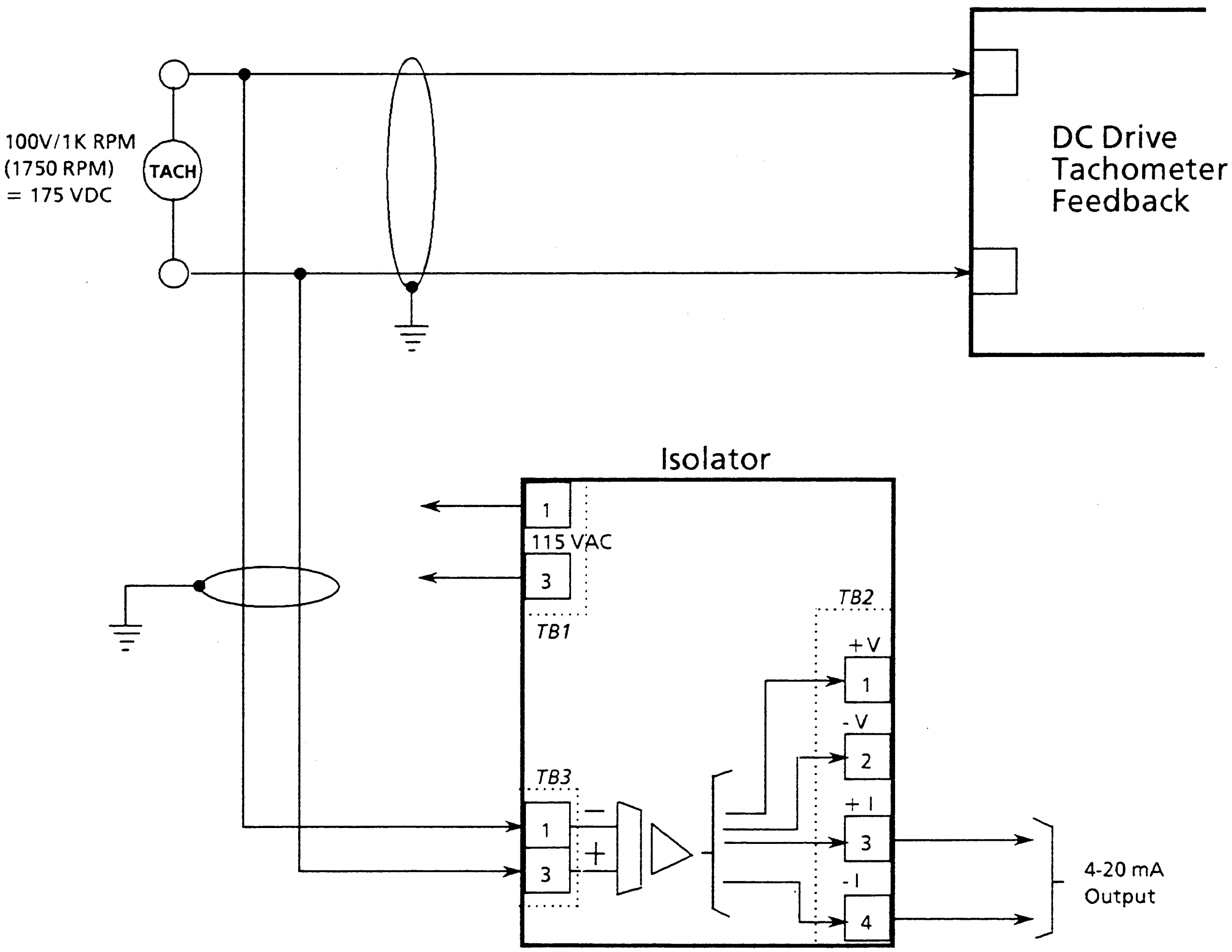


Figure 1-2. Example #2, Typical Isolator Connection in Tach Feedback Drive

NOTES:

World Headquarters, Allen-Bradley, 1201 South Second Street, Milwaukee, WI 53204 USA, Tel: (1) 414 382-2000 Fax: (1) 414 382-4444

Publication 1370-5.1.6 – November, 1993
Supersedes November, 1990

P/N 155854