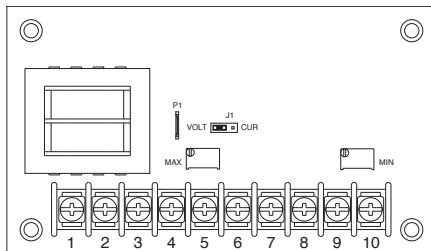


INSTALLATION AND OPERATING INSTRUCTIONS

MODEL KBSI-240D

Signal Isolator KB Part No. 9431



See Safety Warning on Page 1

The information contained in this manual is intended to be accurate. However, the Manufacturer retains the right to make changes in design which may not be included herein.

PENTA KB POWERTM

A COMPLETE LINE OF MOTOR DRIVES

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i. **SAFETY WARNING! Please read carefully:**

This product should be installed and serviced by a qualified technician, electrician, or electrical maintenance person familiar with its operation and the hazards involved. Proper installation, which includes electrical connections, mounting and adequate enclosure, fusing or other current protection, and grounding can reduce the chance of electrical shocks, and/or fires in this product or products used with this product, such as electric motors, switches, coils, solenoids, and/or relays. Do not use this drive in an explosion-proof application. Eye protection must be worn and insulated adjustment tools must be used when working with drive under power. This product is constructed of materials (plastics, metals, carbon, silicon, etc.) which may be a potential hazard. Proper shielding, grounding, and filtering of this product can reduce the emission of radio frequency interference (RFI) which may adversely affect sensitive electronic equipment. The input circuits of this drive may not be isolated from the AC line. Be sure to read and follow all instructions carefully. Fire and/or electrocution can result due to improper use of this product. The drive may contain electronic start/stop circuits, which are used for "Start" and "Stop" functions. However, these circuits are never to be used as safety disconnects since they are not fail-safe. Use only the AC line for this purpose. It is the responsibility of the equipment manufacturer and individual installer to supply this Safety Warning to the ultimate end user of this product. (SW 7/2009)



This product complies with all CE directives pertinent at the time of manufacture. Contact factory for detailed installation instructions and Declaration of Conformity.

I. INTRODUCTION

The KBSI-240D Signal Isolator is used to isolate, amplify and condition DC voltage and current signals from any source (motors, tachs and transducers) which will drive most variable speed motor controls with a voltage following input. The maximum output voltage of the isolator is 10 volts, which is a linear function of the input signal.

The KBSI-240D is versatile since it can accommodate a wide range of input voltages (0 - 25*, 0 - 120 and 0 - 550V DC) and, in addition, a wide range of input current signals (4 - 20 mA, 10 - 50 mA and 1 - 5 mA). The Voltage/Current ("VLT/CUR") jumper is used to change the KBSI-240D from a voltage to current input.

A built-in power supply enables the KBSI-240D to be controlled with a 5K Ω remote potentiometer (connect potentiometer to terminals "P1," "5" and "6" – see page 9). The potentiometer can also be wired for Auto/Manual Operation.

**The input range of 0 - 25V is the maximum voltage that can be applied to terminals "5" and "6". The minimum input voltage is 0 - 5 volts, which can achieve an output voltage of 0 - 10 volts. The unit is factory calibrated so that a 0 - 10V DC input yields a 0 - 10V DC output.*

II. MOUNTING

Mount the Signal Isolator using (4) 6-32 screws (not included). Use the Control Layout and Mechanical Specifications drawing on page 3 to locate the mounting holes. The unit is designed to be mounted in any position providing its components do not come in contact with grounded or live wiring.

FIGURE 1 – CONTROL LAYOUT & MECHANICAL SPECIFICATIONS (INCHES / [mm])
 (Illustrates Factory Setting of Jumpers and Approximate Trimpot Settings)

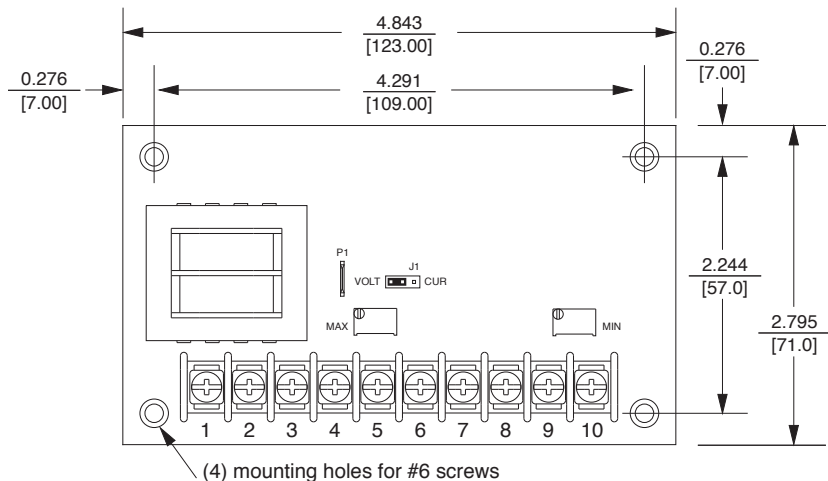


TABLE 1 – GENERAL PERFORMANCE SPECIFICATIONS

AC Power Requirements	115 or 208 - 230V AC, 50/60 Hz ⁽¹⁾
Signal Input Voltage ⁽²⁾	0 - 25, 0 - 120, 0 - 550V DC
Signal Input Current ⁽²⁾	1 - 5, 4 - 20, 10 - 50mA ⁽³⁾
Maximum Output Voltage	10 Volts
Maximum Output Current	10mA
Range of “MIN” Trimpot	± 3 Volts
Range of “MAX” Trimpot	0 to 2 times the input voltage with maximum of 10 Volts
Linearity ⁽⁴⁾	± 0.1%
Temperature Drift ⁽⁴⁾	4 mV per °C
Operating Temperature Range	0 - 40 °C / 32 - 104 °F

Notes:

1. To achieve full specifications input voltage must be within ± 10% of nominal.
2. Floating (non-grounded) or grounded input signal may be used.
3. See Section III-B-i, on page 6.
4. Specifications are based on an output of 10 volts.

III. WIRING.



Warning! Read Safety Warning on page 1 before attempting to use this control.

Warning! To avoid erratic operation do not bundle AC Line and motor wires with potentiometer, voltage following, enable, inhibit or other signal wiring. Use shielded cables on all signal wiring over 12" (30 cm) – Earth ground the shield on the drive side only.

- A.** AC Power – The KBSI-240D is powered with either 115 or 230V AC, 50/60 Hz by arranging the jumpers between terminals “1” to “4” properly. See figures 2A and 2B. Be sure unit is wired in accordance with the National Electric Code and other codes that may apply. It is recommended that a 1 amp fuse be installed in series with the AC line.
- B.** Input Terminals – A voltage or current signal from a microprocessor, tachometer, transducer, etc. is to be connected to terminals “5” through “8.” The selection of the proper terminal is based on the maximum level of the input signal. See figures 3 and 4.

FIGURE 2A – 115V CONNECTION

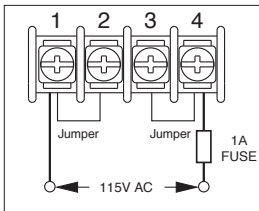
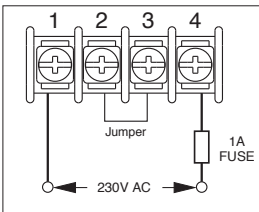


FIGURE 2B – 230V CONNECTION



i. Current Signal Input



Warning! Read Safety Warning on Page 1 before attempting to use this control.

The Signal Isolator accepts 4 – 20 mA DC input to provide 0 – 9 Volts DC output. Connect the current signal input common (–) to Terminal “5” and the positive (+) to Terminal “6”, as shown in Figure 3. Other current signal input ranges can also be used, as described below. Calibrate the Signal Isolator, as described below.

Note: Two resistors, for 10 – 50 mA and 1 – 5 mA inputs, are supplied in the hardware bag included with this kit.

4 – 20 DC Signal Input: No resistor required. Set Jumper J1 in “CUR” position.

10 – 50 mA DC Signal Input (Use Large Resistor with Color Code

“Brown–Green–Brown”): Install the 150Ω – 1W resistor across Terminals.

“5” and “6”. Set Jumper J1 in “CUR” position.

1 – 5 mA DC Signal Input (Use Small Resistor with Color Code

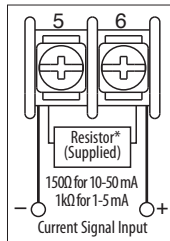
“Brown–Black–Red”): Install the 1kΩ – 1/4W resistor across Terminals “5” and “6”. Set Jumper J1 in “VOLT” position.

Procedure to Calibrate the Signal Isolator When Using Current Signal Input:

1. Connect a DC voltmeter (a digital voltmeter is suggested) to Terminals “9” (–) and “10” (+).
2. Apply the minimum signal input current to Terminals “5” (–) and “6” (+).
3. Adjust the MIN Trimpot on the Signal Isolator to obtain an output voltage of 0 Volts DC.
4. Apply the maximum signal input current to Terminals “5” (–) and “6” (+).
5. Adjust the MAX Trimpot on the Signal Isolator to obtain an output voltage of 9 Volts DC.

Notes: 1. To achieve better accuracy, repeat steps 2 – 5. 2. If other than 0 Volts DC (minimum) and 9 Volts DC (maximum) is desired, use the MIN and MAX Trimpots on the Signal Isolator to adjust the output to the desired voltages in steps 3 and 5.

**FIGURE 3
CURRENT SIGNAL
INPUT CONNECTION**



*No resistor required for
4-20 mA.

ii. Voltage Input Signal



Warning! Read Safety Warning on Page 1 before attempting to use this control.

Note: The Voltage/Current (VLT/CUR) jumper must be in the VLT position (factory setting). The KBSI-240D is designed to accept a wide range of input voltage signals as follows:

TABLE 2 – VOLTAGE INPUT SIGNAL

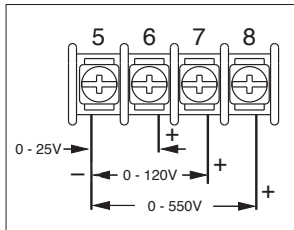
Input Terminals	Minimum Input Voltage Range	Maximum Input Voltage Range
5, 6	0 - 5	0 - 25
5, 7	0 - 25	0 - 120
5, 8	0 - 120	0 - 550

Connect input voltage signal to proper input terminals as indicated in figure 4.

1. Connect a 10V DC meter (digital meter is suggested) to terminals “9” (-) and “10” (+).
2. Apply the maximum input voltage that would be supplied from tach, transducer, etc.
3. Adjust the “MAX” trimpot to the desired output voltage.

Example: A follower motor is to follow the output of a main motor with an armature voltage range of 0 - 90V.

FIGURE 4 – VOLTAGE INPUT SIGNAL CONNECTIONS



- a) Connect the armature of the main motor to the SI input terminals “5” (-) and “7” (+).
- b) Set the armature voltage of the main motor to zero (0). Adjust the “MIN” trimpot so that the output at terminals “9” and “10” reads zero (0) volts.
- c) Reset the armature voltage of the main motor to 90V. Adjust the “MAX” trimpot so that the output voltage is 9V DC.

Notes:

1. When setting the output voltage using the “MIN” and “MAX” trimpots the voltage or speed of the driven motor can be read directly instead of using the output of the KBSI.
2. When readjusting the “MIN” and “MAX” trimpots, always set the minimum voltage first and then the maximum voltage.
3. Trimpots allow approximately 20 turns for the full range of adjustment. If during the adjustment procedure the output stops changing, try reversing the direction of rotation of trimpot.

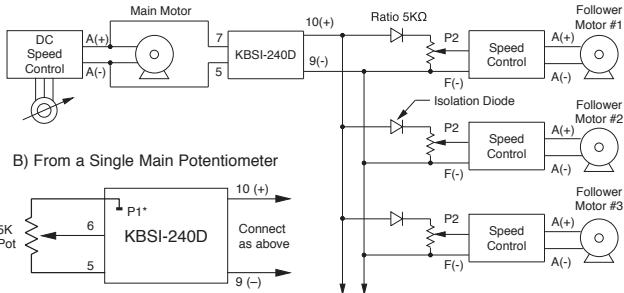
IV. OUTPUT SIGNAL

The output signal from the SI is obtained from terminals “9” (-) and “10” (+). Connect the output directly to the signal following input terminal of the speed control. For multiple follower motors, several controls can be driven from a single KBSI-240D. Be sure the AC line connections to the follower control are to the same phase (eg, L1 to L1 and L2 to L2 of all controls.)

The output from the KBSI-240D can be scaled to control the speed control over any desired speed range. Adjust the “MIN” trimpot to provide the desired minimum speed and the “MAX” trimpot to provide the desired maximum speed.

FIGURE 5 – LEADER/MULTIPLE FOLLOWER VOLTAGE FOLLOWING SYSTEM

A) From a Single Main Motor



B) From a Single Main Potentiometer



*Connect high side of potentiometer to terminal "P1" (1/4" QD)

A 10K ratio potentiometer is used to control up to ten (10) follower motors.

If a 5K ratio potentiometer is used, up to five (5) follower motors can be controlled.

WARNING! If Signal Isolator is connected to multiple speed controls;

- 1) Multiple controls must be powered from the same phase of AC line.
- 2) The positive input terminal to each speed control must be installed with a 1 amp, 600V (1N4005) isolation diode as shown.
- 3) Multiple speed controls can not be used with PWM, Regenerative or Variable Frequency Drives (Inverters).

FIGURE 6A – LEADER/FOLLOWER VOLTAGE FOLLOWING SYSTEM

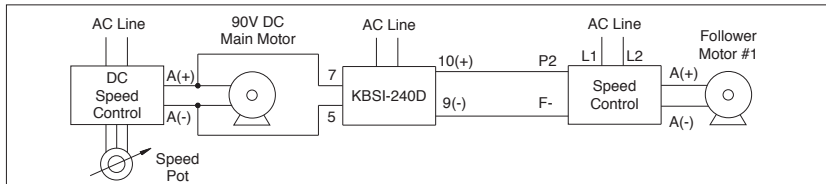


FIGURE 6B – PROCESS CONTROL WITH AUTO/MANUAL SWITCH

The KBSI-240D can be wired in an Auto/Manual mode which will allow manual override of an automatic process. See figure 6B.

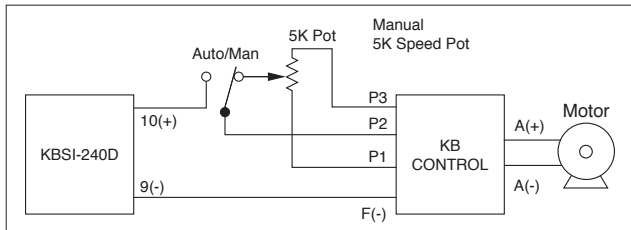


FIGURE 6C – PROCESS CONTROL WITH AUTO (RATIO POT)/MANUAL SWITCH

The following circuit provides for dual purpose usage of the speed pot. In the “AUTO” mode it is used for ratio control and in the “MAN” mode it is used for manual speed adjustment.

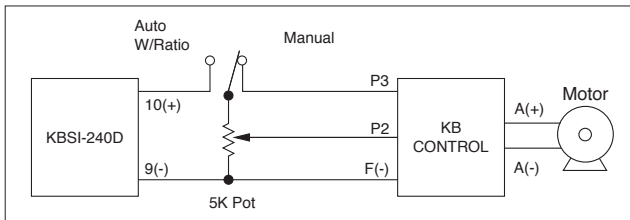
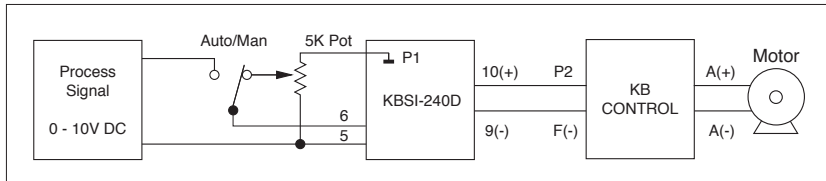


FIGURE 6D – AUTO/MANUAL OPERATION WITH POTENTIOMETER ON KBSI INPUT



Note: The preceding circuit provides for the speed pot to be used in “MAN” mode only. In “AUTO” mode, the process control signal is supplied directly to the signal isolator.

- NOTES -

- NOTES -

V. LIMITED WARRANTY

For a period of 18 months from the date of original purchase, KB Electronics, Inc. will repair or replace, without charge, devices which our examination proves to be defective in material or workmanship. This warranty is valid if the unit has not been tampered with by unauthorized persons, misused, abused, or improperly installed and has been used in accordance with the instructions and/or ratings supplied. The foregoing is in lieu of any other warranty or guarantee, expressed or implied. KB Electronics, Inc. is not responsible for any expense, including installation and removal, inconvenience, or consequential damage, including injury to any person, caused by items of our manufacture or sale. Some states do not allow certain exclusions or limitations found in this warranty and therefore they may not apply to you. In any event, the total liability of KB Electronics, Inc., under any circumstance, shall not exceed the full purchase price of this product.

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