

IB ESX SERIES INTERFACE BOARDS

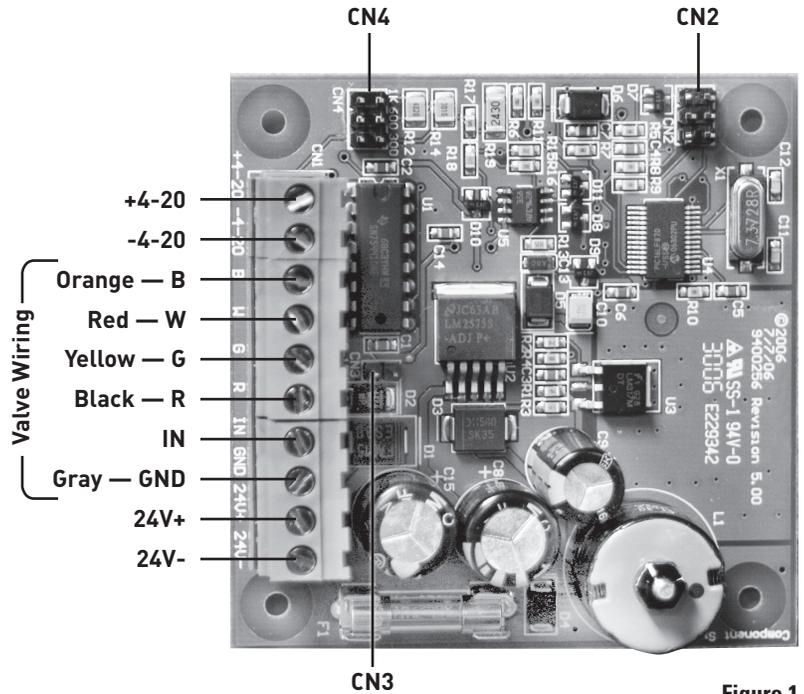


Figure 1
Connect the ESX wires to the IB-ESX as shown.

The IB-ESX (p/n 950002) interface board has been developed to allow the ESX Series electric expansion valves to be easily interfaced with third party controllers. The IB-ESX accepts 4-20 milliamp signals, at 300, 600 and 1,000 ohm impedances, as well as 0-10 volt DC signal.

CONFIGURE the BOARD

When used with a 0-10 volt input signal, a jumper should be placed on the pins labeled CN3 as shown in the Figure 1. This is the default jumper position. The impedance for this input is 40 k ohms.

When used with a 4-20 milliamp input, the board must be matched to the impedance of the external controller. Refer to the manufacturer’s literature and choose the jumper position on CN4 as shown Figure 1. Possible impedance selections on CN4 are 1,000 ohms (1k), 600 ohms, and 300 ohms.

The IB-ESX will run the ESX in the proper uni-polar mode and will initialize the valve with 512 closing steps at 50 steps per second. The valve will be driven closed whenever the incoming signal drops to 4.25 milliamps or 0.015 volts DC, to assure proper operation with varying signal tolerance.

Choose “Open on Rise” or “Close on Rise” operation using the middle two pins on jumper CN2. The jumper is stored on one pin only and will cause the valve to open as input signal rises, i.e. valve is closed at 0 volts or 4 milliamps and fully open at 10 volts or 20 milliamp input. By placing the jumper on both pins, the operation is reversed so that the valve will be fully open at 0 volts or 4 milliamps. Other pins on CN2 have been clipped at the factory and are not used for operation of the valve.

MOUNT the BOARD

The IB Series is based on a 3.0” x 3.0” circuit card with 0.125” mounting holes, 0.25” from each corner. If desired, these mounting holes may be used with customer supplied non-metallic standoffs. The IB Series does,

WIRING CONNECTIONS

From left to right when the board is oriented with the terminal strip across the bottom.

+4-20	connection for positive leg of a 4-20 milliamp or 0-10 volt signal
-4-20	connection for negative leg of a 4-20 milliamp or 0-10 volt signal
B	orange wire from valve
W	red wire from valve
G	yellow wire from valve
R	black wire from valve
IN	from external pumpdown switch or relay. See wiring instructions.
GND	gray wire from valve also use for external pumpdown switch or relay. See wiring instructions.
24V+	from 24 volt, 30 VA or 40 VA transformer. See wiring instructions.
24V-	from 24 volt, 30 VA or 40 VA transformer. See wiring instructions.

however, come supplied with a length of snap-in plastic track. The track should be mounted in the desired location and one side of the IB engaged in the upper groove in the track. The IB is then pushed down so that the opposite side of the board snaps into the uppermost groove in the opposite side of the track. The board may be mounted in the orientation most convenient for wiring. Location should be dry, protected and close to the 24 volt power supply and external controller.

WIRING INSTRUCTIONS and CAUTIONS

Use the chart at left as a guide for wire connections. Certain precautions must be taken in wiring and operation of the IB Series.

1. The 24 volts must be supplied by a 30 VA or 40 VA transformer not used for any other purpose. In addition, the secondary winding of the transformer must not be connected to chassis ground. The IB-ESX will only power one ESX valve. However, a single transformer may be used for multiple IB-ESX boards. If this feature is used, one leg of the 24 volt supply must be connected to all of the IB-ESX boards at the 24+ terminal. The other leg of the 24 volt supply must be connected to all of the IB-ESXs at the 24- terminal. Please refer to Figure 2.

Incorrect wiring will cause the fuse to fail, a spare fuse is included and may be replaced with any 1 amp 250 volts delay fuse type GMC1 or equivalent. Wiring should be corrected before replacing the fuse.

2. The primary input of the transformer should be protected by Metal Oxide Varister (MOV) surge suppressors, supplied with the IB-ESX. For protection from electrical transients, connect one MOV between one leg of the input voltage of the 24 VAC transformer and earth ground. Connect a second MOV between the other leg of the input voltage of the 24 VAC transformer and earth ground. See Figure 2. The supplied MOVs are applicable up to 240V incoming voltage.

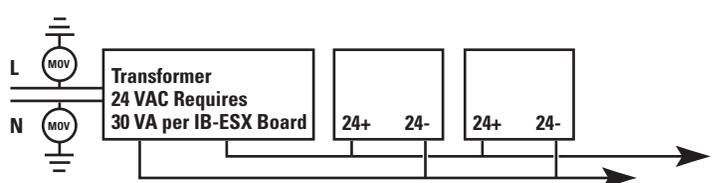
3. The pumpdown terminals must be supplied with a “dry” contact from a switch or relay. No external power should be applied to these terminals.

Note: The terminals are labeled IN and GND. The GND terminal is shared with the gray ESX wire.

OPERATION and TROUBLESHOOTING

When properly configured and installed the IB Series requires no maintenance. They incorporate a number of operational features to assure trouble free service. On power-up the board will initialize by giving the valve a large number of steps to assure that the valve is fully shut. The routine will require approximately 11 seconds for the IB-ESX. The valve will not respond to input signals during this time.

Figure 2



If the valve is required to shut during operation, the pumpdown terminals should be used. When given a pumpdown signal, the board will shut the valve immediately and overdrive by 50 steps to reset valve position. On removal of the pumpdown signal the valve will resume position as dictated by the external control signal.

If power is lost to the IB-ESX or power wire to the valve severed, the valve will remain in its last position. Solenoid valves may be desired, before the step motor valve, on critical applications.

To force the valve shut during operation for test purposes, simply remove the jumper from CN4 or CN3, depending on configuration. To resume normal operation, replace the jumper.

To allow for component tolerances, the IB will shut the valve when the input signal reaches 4.25 milliamps or 0.015 volts depending on the configuration.

If a step motor is suspected to have failed, a simple resistance check may be made of the motor windings, however, actual winding failures are rare. Therefore Sporlan developed a diagnostic instrument, the SMA-12, to test our step motors. The SMA-12 is a step motor actuator that will operate all 12 volt DC bipolar step motor valves, as well as test the continuity of

the valve wiring and motor. The step rate can be selected at 1, 50, 100 or 200 steps-per-second. At the one step-per-second rate the SMA-12 LED's will indicate the continuity of the valve wiring and motor by lighting in turn. The SMA-12 can also be used to manually open, position, or shut the valve should the controller fail. If contaminants are suspected, the SMA-12 can be used to drive the valve fully open to purge the foreign material.

When a system component does fail, it is important to first determine whether the failure is the valve, the IB-ESX, or the external controller.

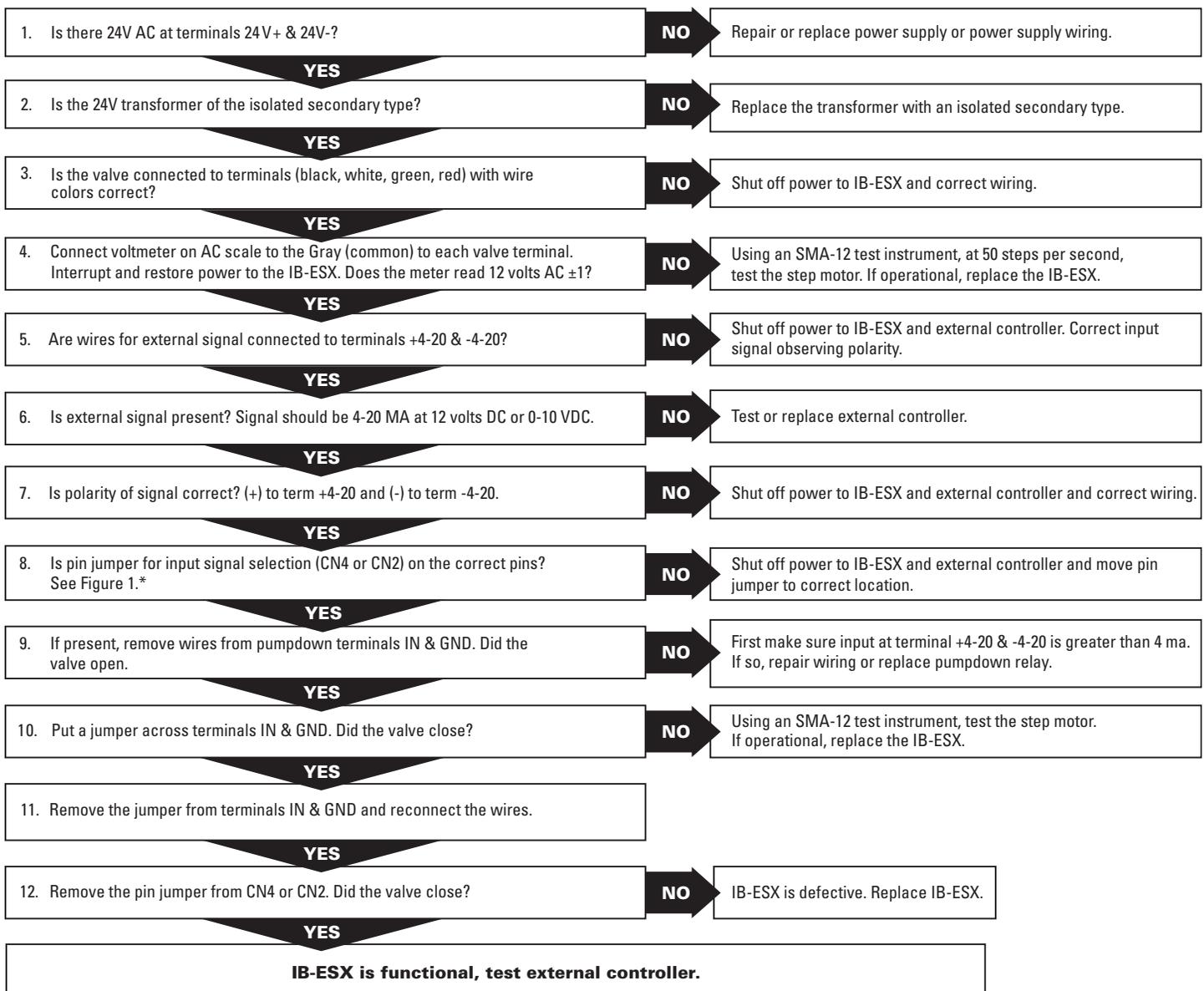
TEST THE VALVE

The resistance of the motor winding may be tested without opening the system.

1. Remove power from the external controller and/or IB-ESX.
2. Remove the valve leads from IB-ESX.
3. Measure the resistance between any colored lead and gray should be 46 ± 4 ohms. Differences of more than 10% between phases indicate a defective motor. Resistance between any lead and piping should be infinite or "open". Any resistance reading will indicate a shorted winding and the valve will need to be replaced.
4. Measure the resistance from any lead to valve body. Resistance should be infinite, that is to say, open.

TROUBLE SHOOTING GUIDE – IB-ESX Operating on External Signal (4-20 ma or 0-10 VDC)

Note: Before testing the IB-ESX, make certain the valve is operating. See "Test the Valve" instructions.



***Note:** CN4 provides 3 levels of input impedance to match external controller outputs. Be sure controller output and IB-ESX inputs are matched. Refer to controller manufacturer literature for more information.