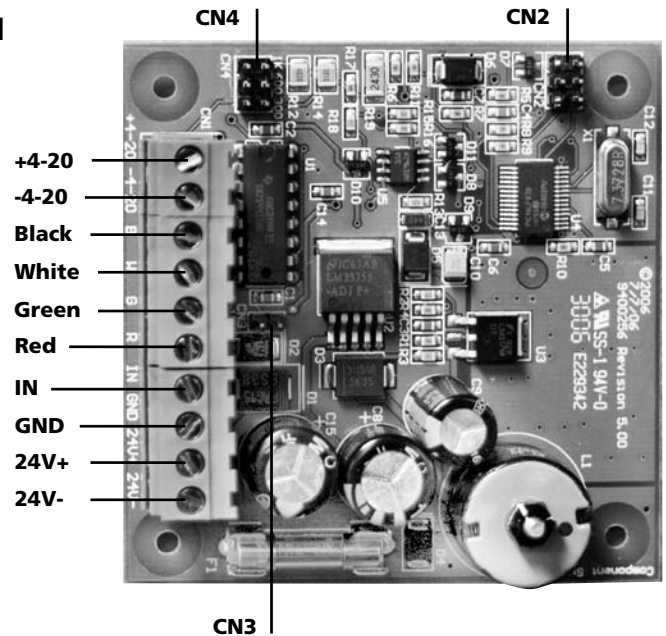


IB SERIES

INTERFACE BOARDS

The **IB Series** interface boards have been developed as economical compliments to the TCB temperature control boards. The **IB Series** is available in four basic models, IB1, IB2, IB3 and IB6, and each can accept 4-20 milliamp or 0-10 volt DC analog input signals. All are designed to allow externally supplied control signals to control one or two Sporlan step motor valves including CDS evaporator control valves, SDR electric discharge bypass valves and SEI/SER/SEH electric expansion valves.

Figure 1



The IB1 is programmed to control any Sporlan step motor valve having 1596 steps of resolution, the IB2 is used with valves having 2500 steps, the IB3 is used with valves having 3193 steps and the IB6 is used on valves with 6386 steps. “Q” denotes quick response for special applications. Please contact Sporlan for more information.

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. Note: Jumpers should never be on both CN3 and CN4.

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.



FOR USE ON REFRIGERATION and/or AIR CONDITIONING SYSTEMS ONLY

WIRING CONNECTIONS

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

- +4-20** connection for the 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** black wire from valve, or both valves when two valves are used
 - W** white wire from valve, or both valves when two valves are used
 - G** green wire from valve, or both valves when two valves are used
 - R** red wire from valve, or both valves when two valves are used
- IN** from external pumpdown switch or relay. See wiring instructions.
- GND** to external pumpdown switch or relay. See wiring instructions.
- 24V+** from 24 volt, 40 VA transformer. See wiring instructions.
- 24V-** from 24 volt, 40 VA transformer. See wiring instructions.

Note: Power supplied may be 24 volts AC or DC

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 as shown in Figure 2. If desired, these mounting holes may be used with customer supplied non-metallic standoffs. The **IB Series** does, 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 above 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 transformer not used for any other purpose. In addition, the secondary winding of the transformer must not be connected to chassis ground. A single transformer may be used to power multiple IB boards if wiring recommendations shown in Figure 3 are followed. A transformer that can supply a load of 30VA per board should be used. For example, a transformer of 90VA or more should be used if powering three IB Boards.
2. The primary input of the transformer should be protected by Metal Oxide Varister (MOV) surge suppressors, supplied with the IB. For protection from electrical transients, connect one MOV between one leg of the input voltage (high side) 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. Note: The

supplied MOVs may only be used with up to 240V supply voltage.

3. The pumpdown terminals, labeled IN and GND, must be supplied with a "dry" contact from a switch or relay. No external power should be applied to these terminals.

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 8 seconds for the IB1, 16 seconds for the IB2 and IB3 and 32 seconds for the IB6. The valve will not respond to input signals during this time.

The IB is supplied with an onboard fuse and one spare fuse. If a replacement fuse is not available, a 1 amp 250 volts delay fuse type GMC1 or equivalent may be used. The fuse is designed to prevent board damage from miswiring. If the fuse fails, correct wiring in accordance to all recommendations before restoring power.

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 250 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 or wire to the valve is severed, the valve will remain in its last position. On critical applications solenoid valves may be desired up stream of the step motor valve.

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 4.05 milliamps or 0.05 volts depending on the configuration.

The IB can power one or two valves. The valves will operate simultaneously and will open and close by the same number of steps. Both valve wires must be connected in the proper color sequence.

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 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.

ORDERING INFORMATION

MODEL	PART#	STEPS	USED on VALVES
IB1	952955	1596	SEI or SER for discharge bypass
IB2	983188	2500	CDS-4, CDS-7
IB3	952956	3193	SDR-3, SDR-3X
IB6	952957	6386	CDS-9, CDS-16, CDS-17, SDR-4
IB1Q	952958	1596	SEI-.5 to SEI-11, SER-1.5 to SER-20
IB2Q	983189	2500	SERI-G, SERI-J, SERI-K
IB3Q	952959	3193	SEI-30
IB6Q	952960	6386	SEI-50, SEH

When a system component does fail, it is important to first determine whether the failure is the valve, the IB, 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.
2. Remove the valve leads from IB.
3. Measure the resistance between the black and white leads of the valve. For the SEI, SDR, SEH, CDS-9, CDS-16, and CDS-17 valves, the resistance should be 75 ohms with the valve at room temperature or approximately 65 ohms if the valve is at -40°F . For the SERI-G, SERI-J, SERI-K, CDS-4, and CDS-7 valves, the resistance should be 100 ohms at room temperature and approximately 76 ohms if the valve is at -40°F .
4. Measure the resistance between the green and red leads. This value should be within $\pm 5\%$ of the resistance between the black and white leads.
5. Measure the resistance from any lead to valve body. Resistance should be infinite, that is to say, open.

TEST THE IB

The flow charts on the following page are designed to assist in diagnosing a possible IB failure. All measurements should be made with a **Digital Multimeter**.

Figure 3

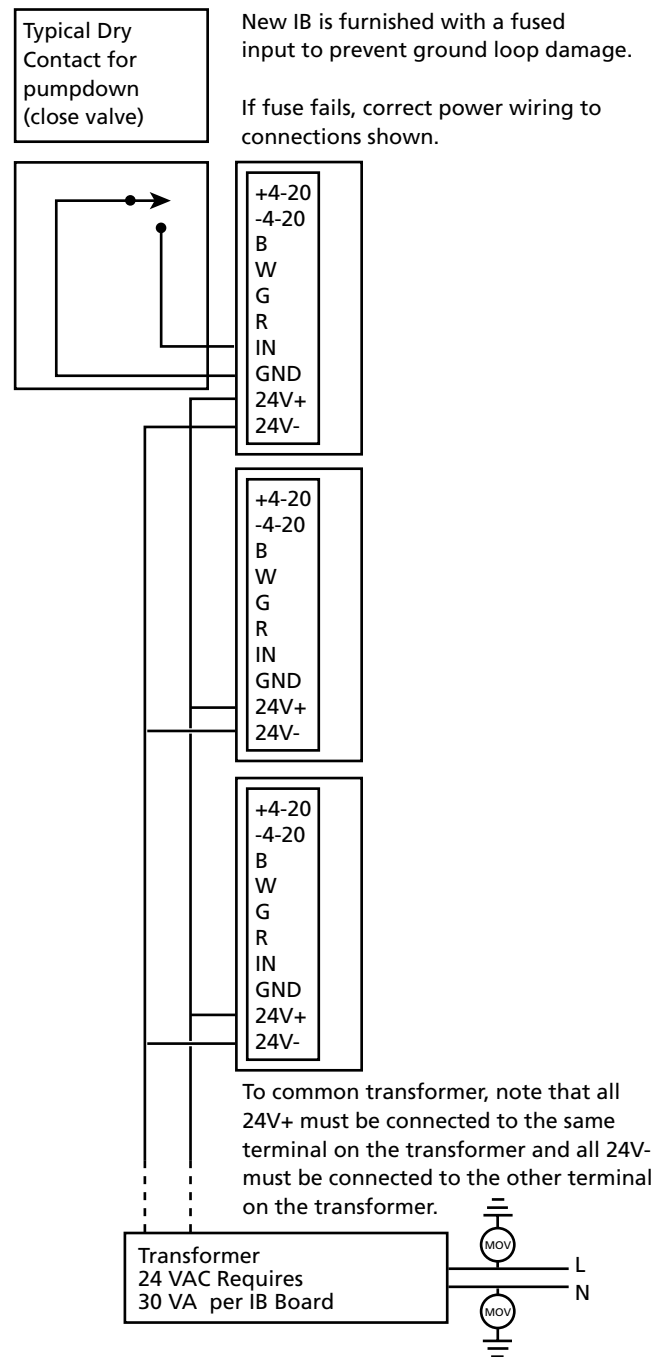
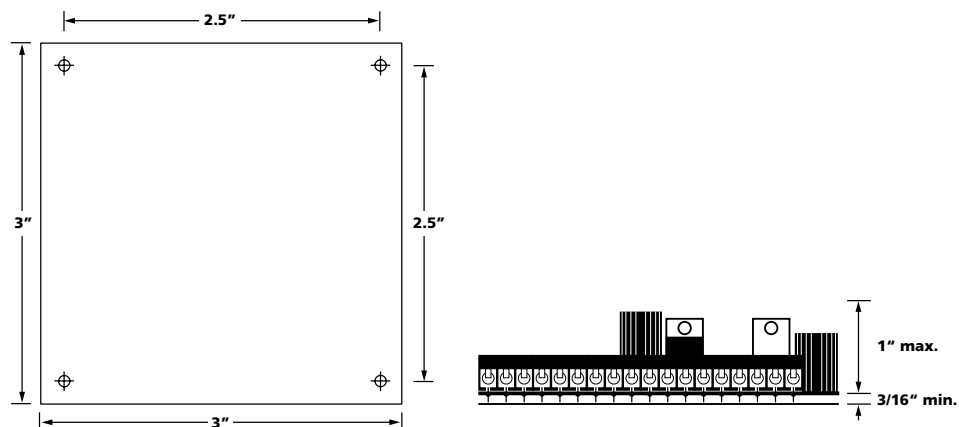
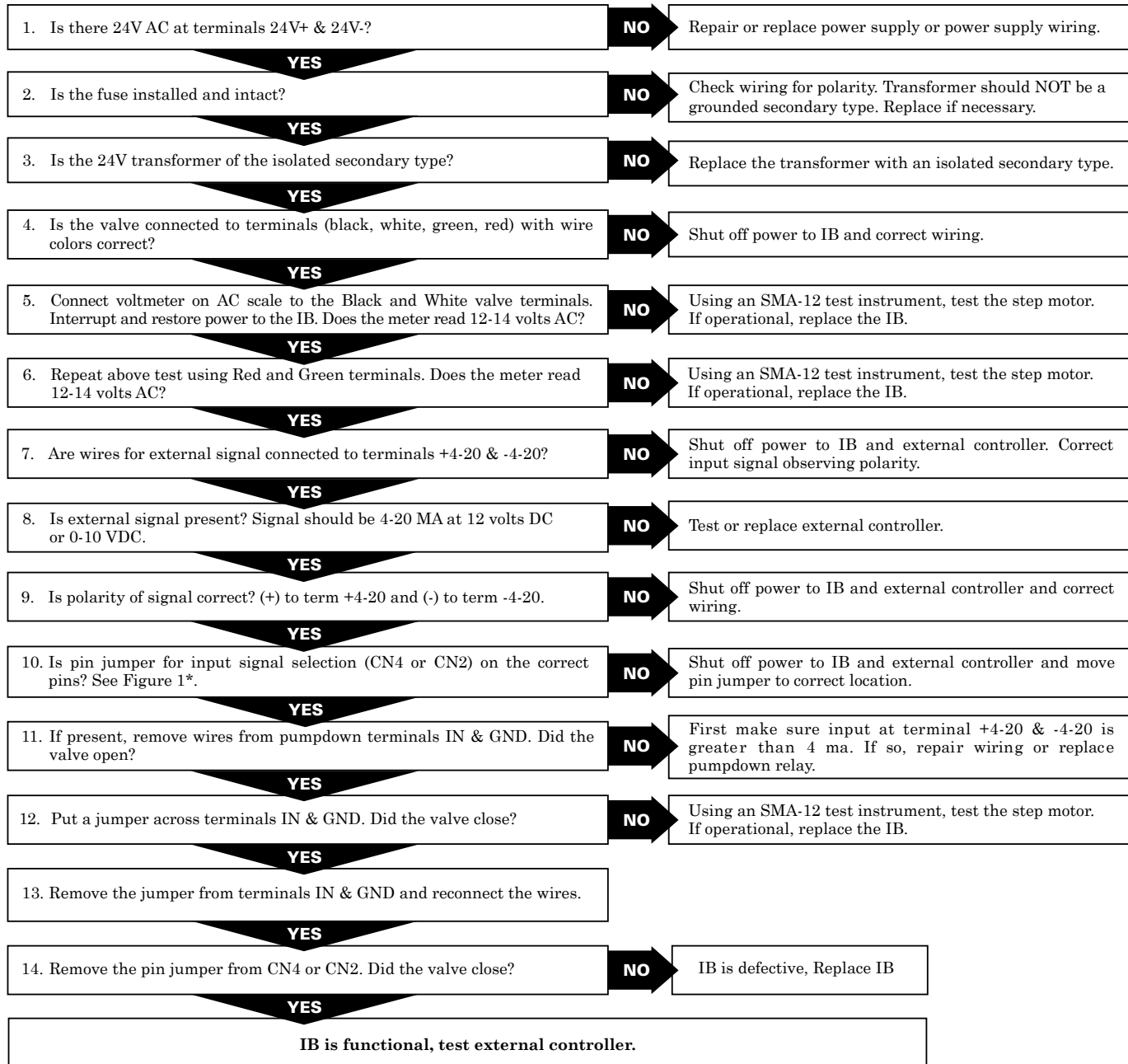


Figure 2



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


Note: Before testing the IB, make certain the valve is operating. See “Test the Valve” instructions.

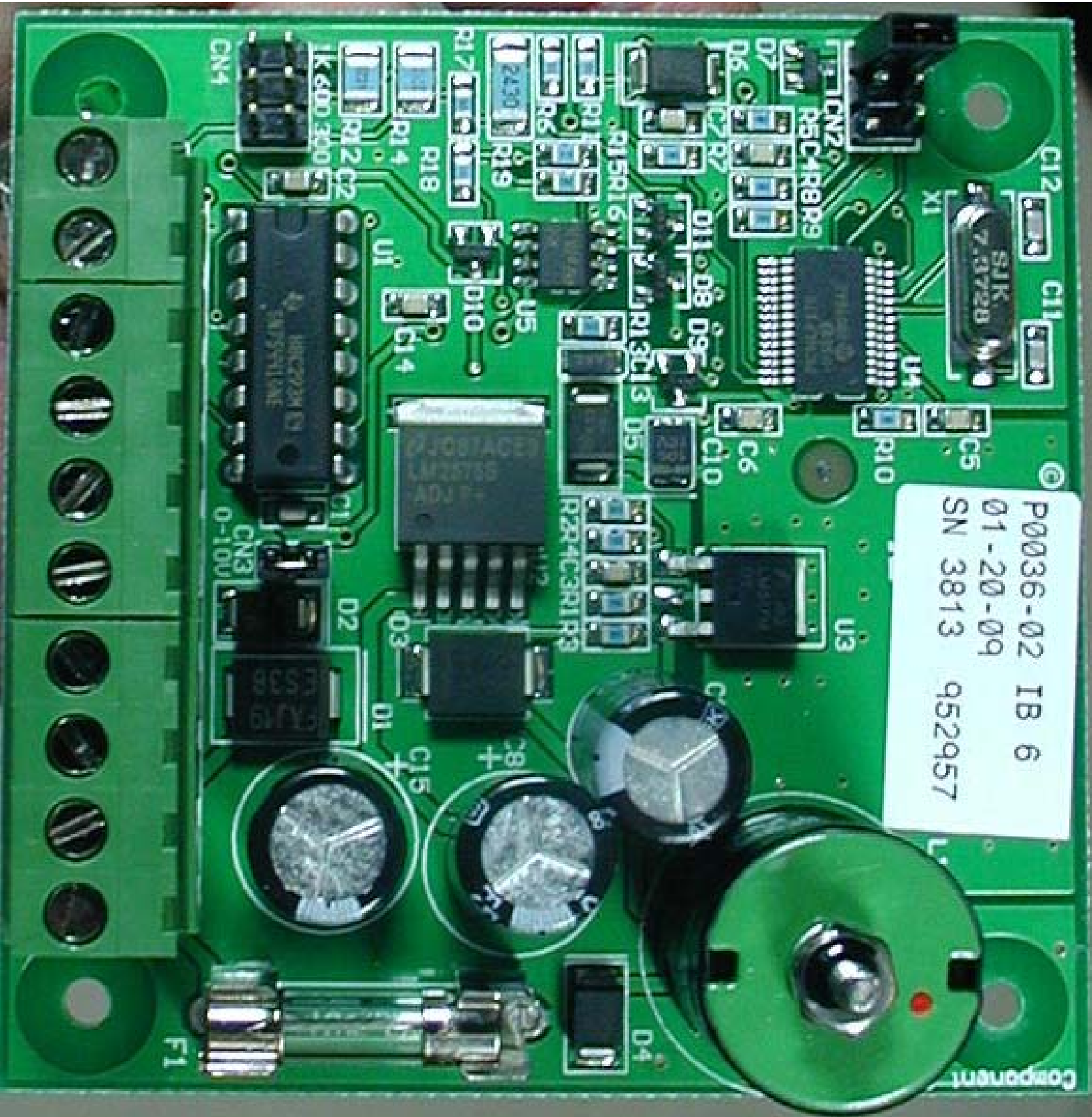


*Note: CN4 provides 3 levels of input impedance to match external controller outputs. Be sure controller output and IB inputs are matched. Refer to controller manufacturer literature for more information.



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Component