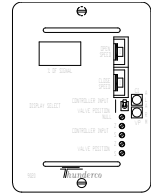


# Model 9020 I/H Controller Interface Module

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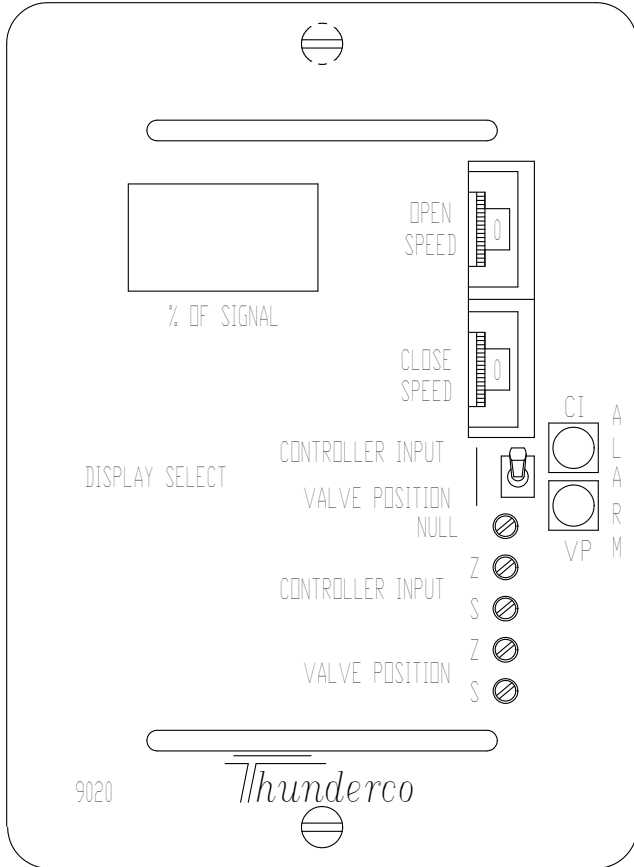
This document replaces all previous editions.

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## Model 9020 I/H Controller Interface Module

### Description



*Model 9020 I/H Controller Interface*

- Provides an interface between a typical process controller that can output a 4-20 mA control signal and the Thunderco HPA-series of electro/hydraulic control systems.
- Provides open/close speed control electronically.
- Provides a field selectable display of valve position or controller input signal.
- Provides valve position and controller input signal failure alarms.
- Provides failure to position selection when used with the accumulator option on the Model HPA-series.

### Specifications

**Supply voltage:** 24-40 VDC @1/4 Amp

**Control Input:** 4-20 mA

**Display:** 3-1/2 digit, 2 channel: 1-position feedback & 1- control signal

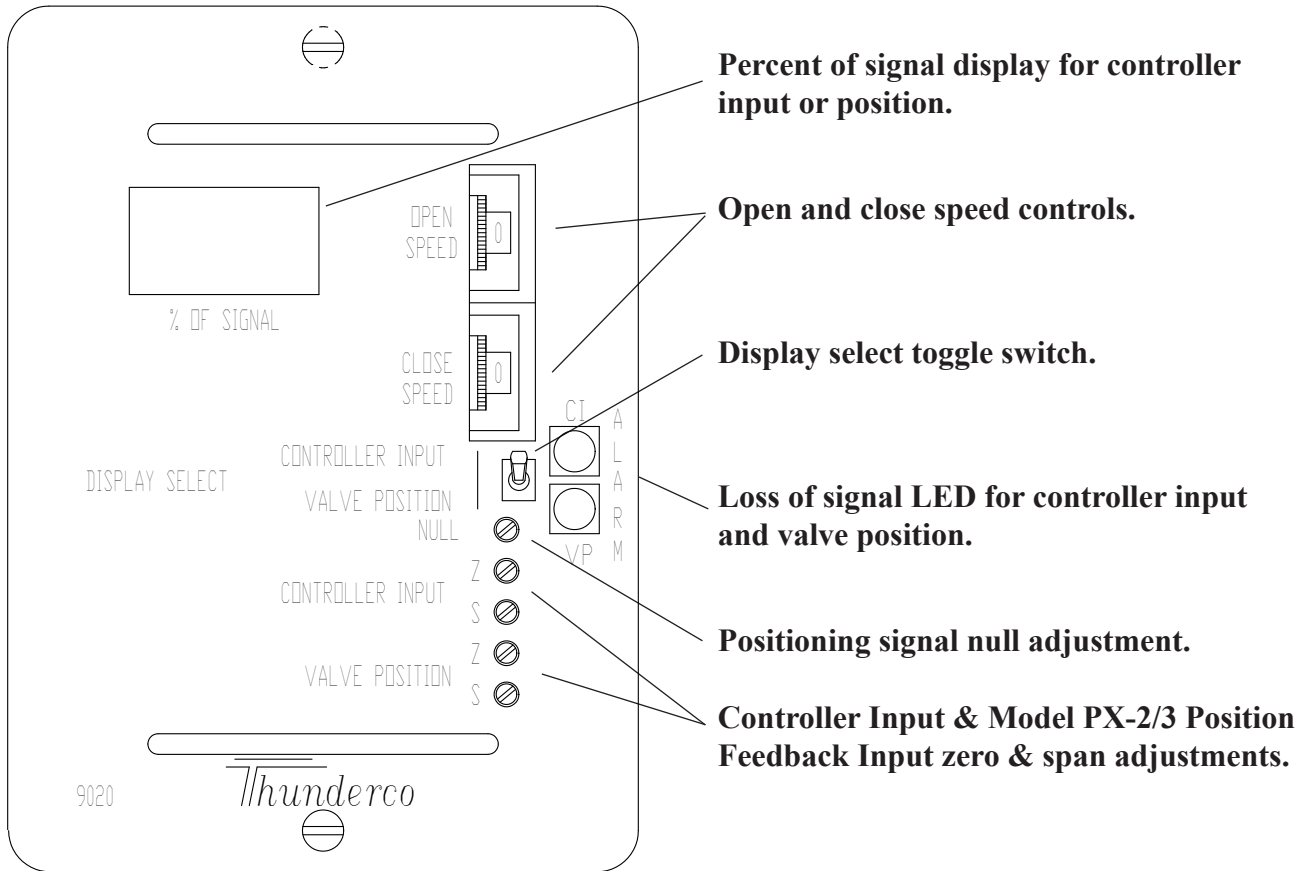
**Alarms:** loss of control input & loss of position feedback

**Alarm Annunciation:** LED on faceplate, 5 volt low logic signal

**Speed Control:** Adjustable electronic speed controls. Separate speed for open & close

# Model 9020 I/H Controller Interface Module

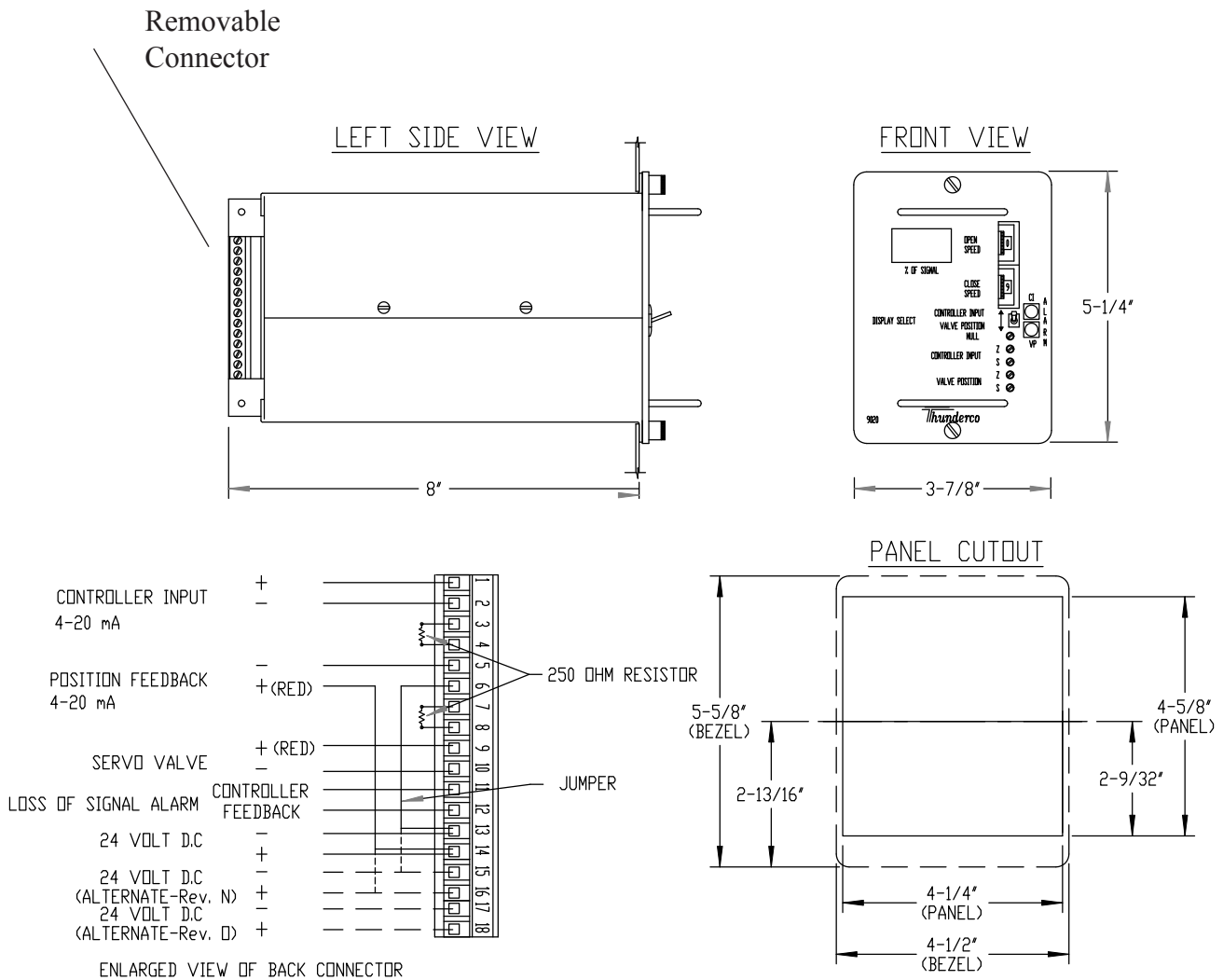
## Features



*Model 9020 I/H Controller Interface*

# Model 9020 I/H Controller Interface Module

## Mounting Dimensions



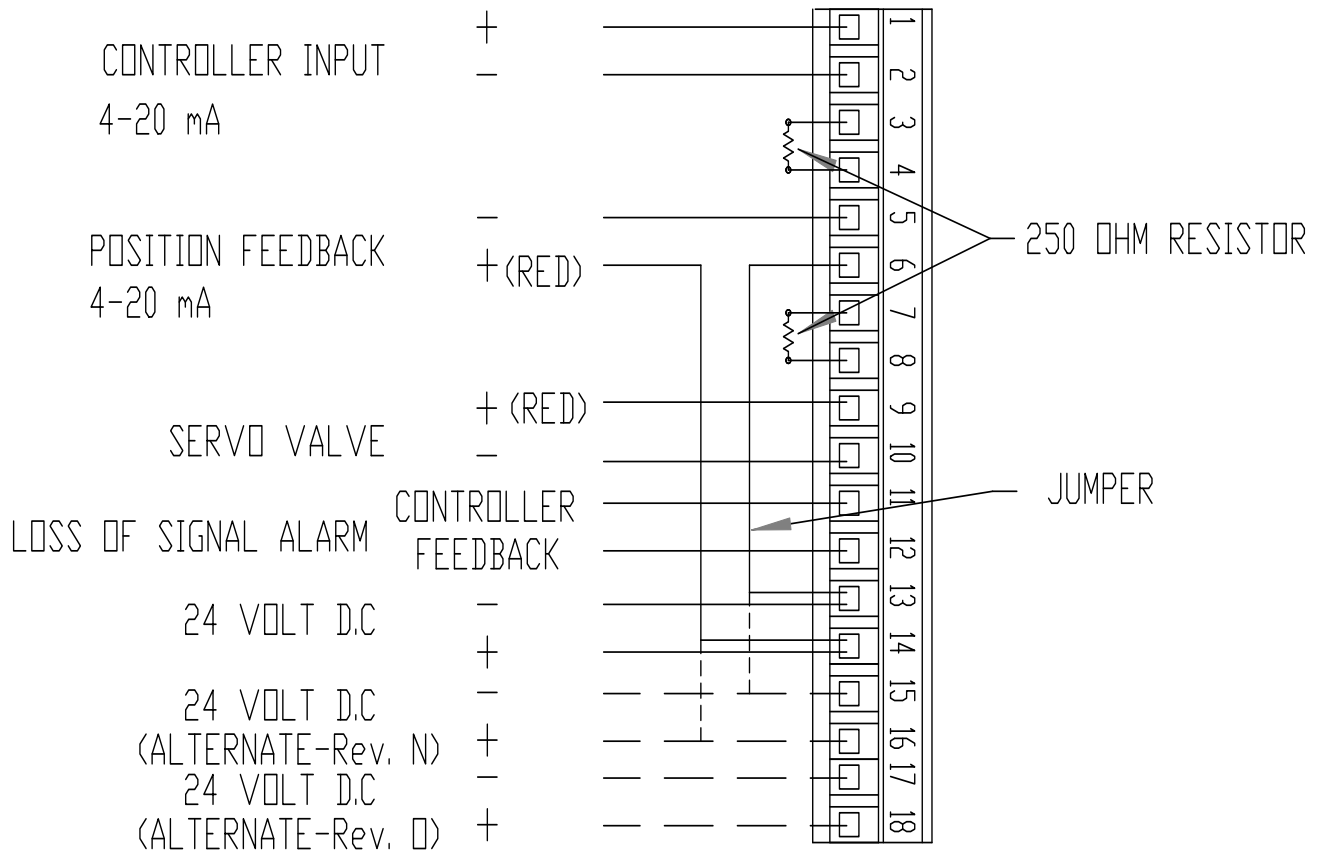
Note: On Model 020-0171-N and above additional power terminals were added so the wires on terminals 13 & 14 would not have to be doubled up. Terminals 17 & 18 added to allow for Model PX-4 Hall Affect position transmitter.

## Installation

The Model 9020 control board and display slide into the 1-Slot mounting can that is mounted to the customer panel. See Installation diagram above. The bezel dimensions shown are the panel mounted card cage.

## Model 9020 I/H Controller Interface Module

### Wiring Diagram-Control Board #103-0140-F and greater



ENLARGED VIEW OF BACK CONNECTOR

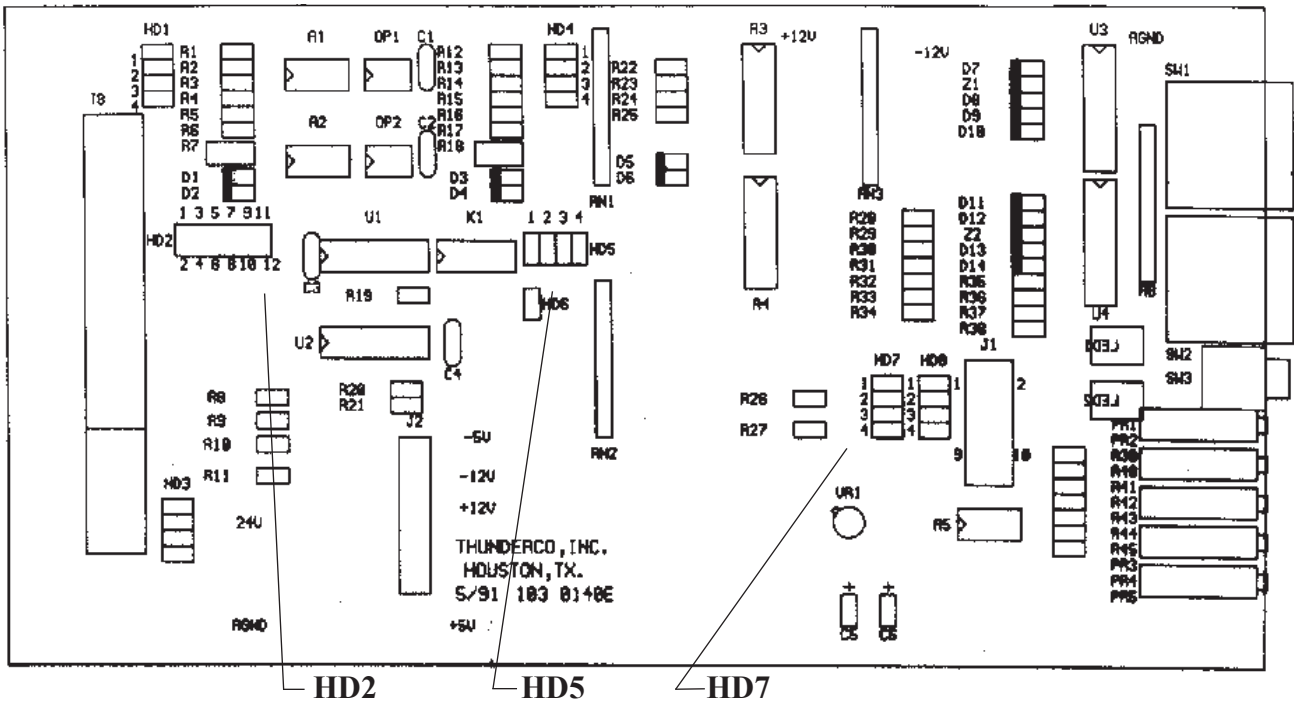
Note: □n Model 020-0171-N and above additional power terminals were added so the wires on terminals 13 & 14 would not have to be doubled up. Terminals 17 & 18 added to allow for Model PX-4 Hall Affect position transmitter.

*Enlarged view of the Model 9020 rear connector*

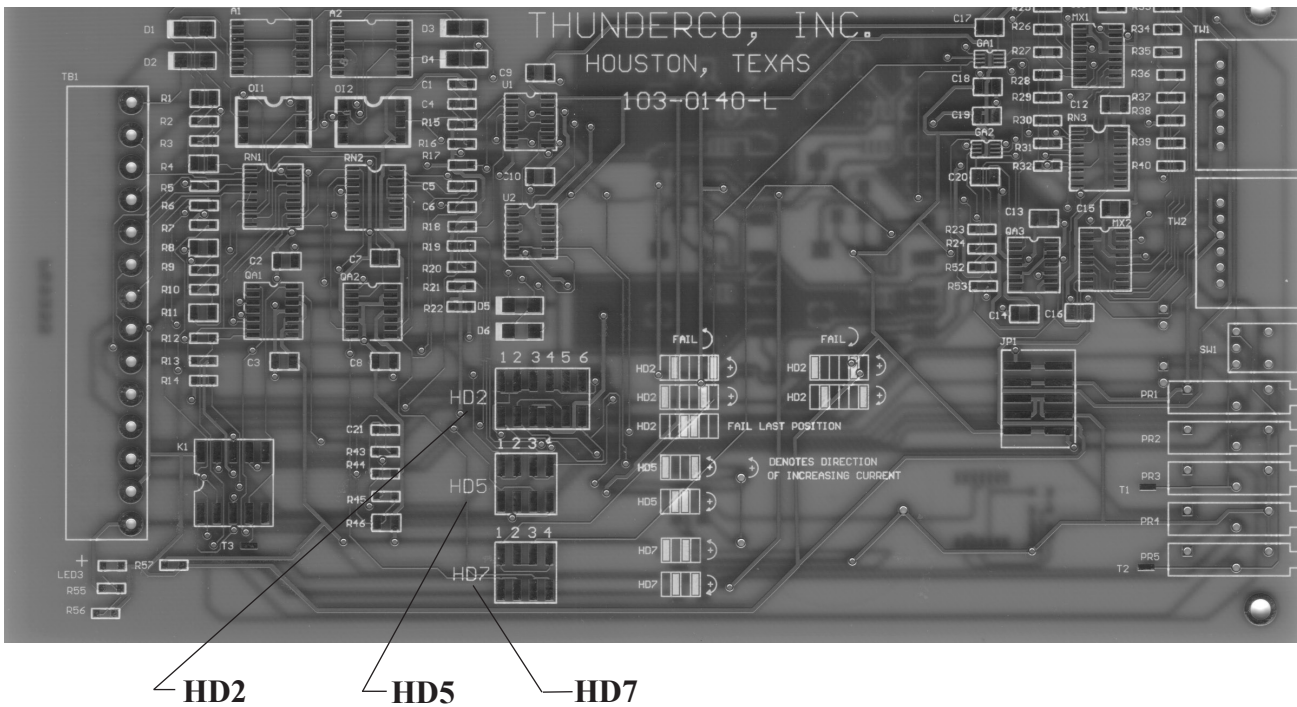
Note: The external 500 Ohm resistor that was required on earlier versions between terminals 9 & 10 has been moved onto the circuit card (Version 103-0140-D or later) and is no longer needed.

# Model 9020 I/H Controller Interface Module

## Programming Jumper Locations-Control Board #103-0140-F



## Programming Jumper Locations-Control Board #103-0140-L



## Model 9020 I/H Controller Interface Module

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### Signal Orientation-Control Board #103-0140-F and above

It is assumed that clockwise movement of the position transmitter represents valve closure or movement of the end-device clockwise by the hydraulic system.

HD5 & HD7 determine signal orientation dependent on position measurement increasing clockwise or counter-clockwise.

For the first case of 4 mA @full clockwise (valve closed) & 20 mA@full counter-clockwise (valve open), the shunts should be placed across pins 1 & 4 of HD5, and pins 1 & 3 of HD7.

For the second case of 4 mA@full counter-clockwise (valve open) & 20 mA@full clock-

wise (valve closed)Close, the shunts should be placed across pins 2 & 3 of HD5, and pins 2 & 4 of HD7.

Note that the PX-2/3 Valve Position Transmitter must be configured the same as the signal orientation. If you desire the valve to close with a control signal of 4 mA then likewise the Model PX-2/3 must also be configured to output 4 mA at the close position. If the control signal is to close the valve at 20 mA then the Model PX-2/3 must be configured to output 20 mA at the close position. See the section concerning the Model PX-2/3 Valve Position Transmitter for configuration information.

### Failure Alarms & Position Orientation

Failure position refers to the position that the valve is to be driven to upon loss of controller input signal, loss of PX-2/3 valve position feedback signal or loss of 24 VDC power supply.

#### Fail Open (Full counter-clockwise) HD2

Shunt pins 2 & 6 when 4mA=Close  
Shunt pins 1 & 5 when 4 mA=Open

#### Fail Close (Full clockwise) HD2

Shunt pins 1 & 5 when 4 mA=Close  
Shunt pins 2 & 6 when 4 mA=Open

#### Fail In Last Position HD2

Shunt pins 3 & 4

### Loss of Signal Alarms

The loss of signal alarms are intended to give a visual as well as a remote indication of either controller input signal or valve position feedback signal failures.

The loss of signal alarms are given visually by the annunciation of an associated LED on the faceplate of the Model 9020.

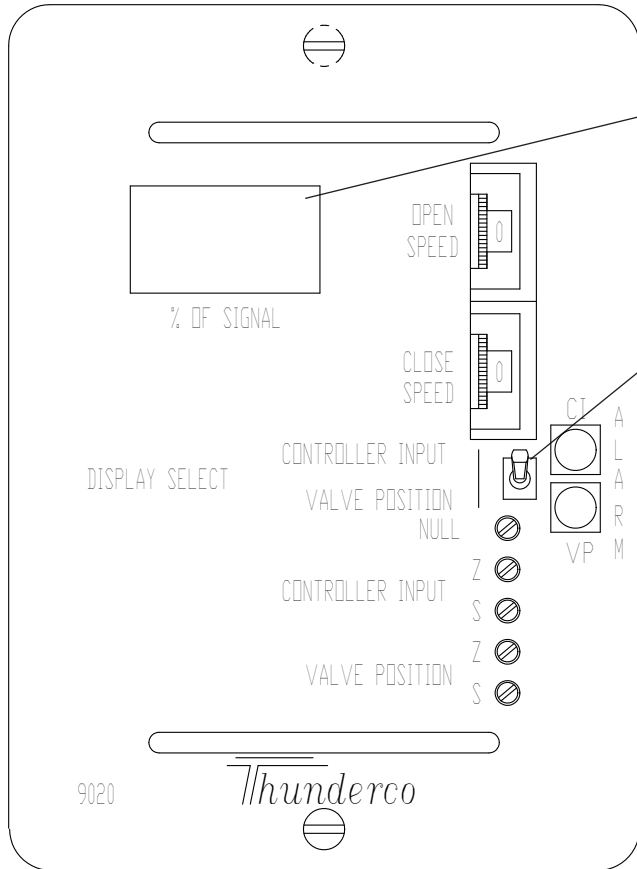
The loss of signal alarms are sensed remotely at terminals 11 & 12 by monitoring the voltage levels referenced to power supply ground. An in-

tact signal is indicated by a logical +5 volts. An alarm condition is indicated by a buffered logical 0 volts capable of sinking 20 mA. This signal is TTL and/or CMOS compatible.

0 volts at terminal 11 or 12 of the Model 9020 connector signals a loss of the respective input signal (factory set at anything less than 3.7 mA).

## Model 9020 I/H Controller Interface Module

### The Display



**3-1/2 Digit Display**

**Display Select Switch**

The Model 9020 has a 3-1/2 digit LCD display that can output the control valve or device position being transmitted by the Model PX-3 Valve Position Transmitter as well as the control signal being received by the Model 9020 from the process controller.

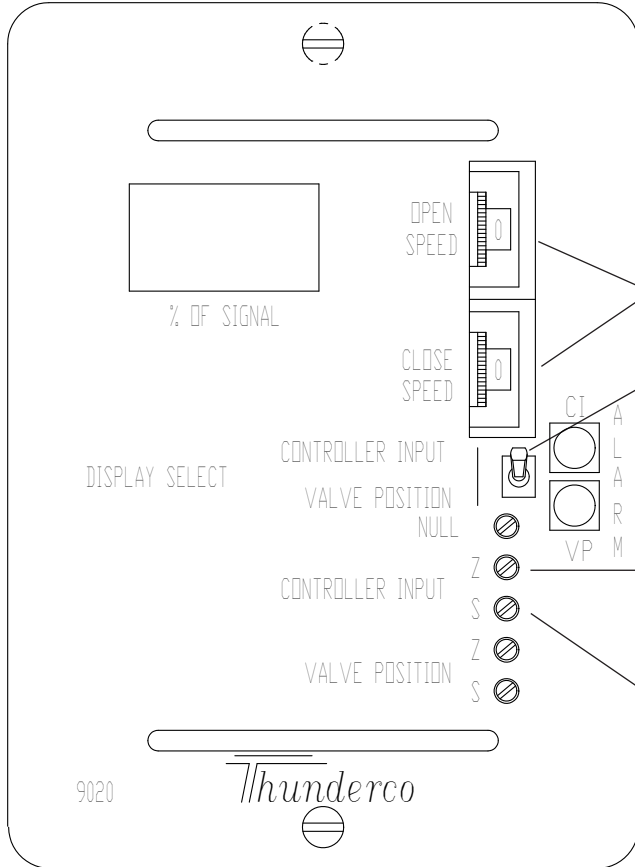
The signal being displayed is shown as a percentage of the 4-20 mA signal being received. A 4 mA signal is displayed as 0 % and a 20 mA signal is displayed as 100 %.

*Model 9020 I/H Controller Interface*

A toggle switch is provided on the front faceplate of the Model 9020 to switch from controller input display to valve position display. The switch is for display select only and does not affect the process.



## Calibration-Controller Input



Model 9020 I/H Controller Interface

Note: on version D boards I1 represents the controller input signal for direct acting control signals & I2 represents the controller input signal for indirect acting control signals.

**Set the speed control switches to the desired setting**

**Select the controller input display.**

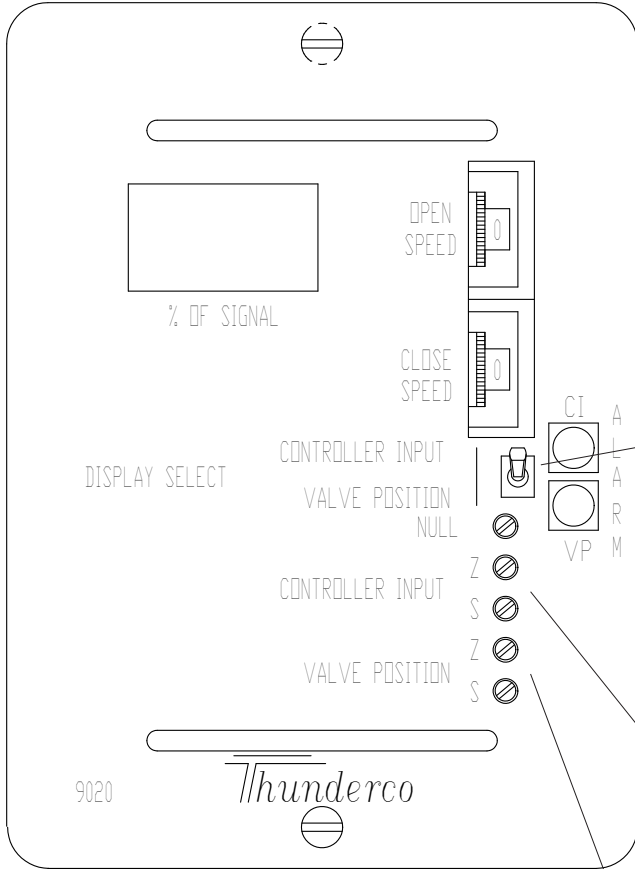
**Generate a 4 mA signal with the process controller or calibrator and adjust the appropriate controller input zero (Z) potentiometer until the display reads 0 %.**

**Generate a 20 mA signal with the process controller or calibrator and adjust the appropriate controller input span (S) potentiometer until the display reads 100 %.**

**Recheck & adjust if necessary @ 4 mA & 20 mA.**

# Model 9020 I/H Controller Interface Module

## Calibration-Valve Position



Model 9020 I/H Controller Interface

Calibrate the Model PX-3 position transmitter before this step is undertaken. Place the HPA-Series Auto/Manual Switch in Manual so the valve will not move during calibration.

Note: on version D boards I2 represents the Model PX-2/3 valve position signal for direct acting control signals & I1 represents the Model PX-2/3 valve position signal for indirect acting control signals.

Select the valve position display.

Place the valve in the appropriate position using the manual override controls so that the Model PX-3 position transmitter generates 4 mA. Leave the manual override valve in the "open" or "close" position so the valve will not drift.

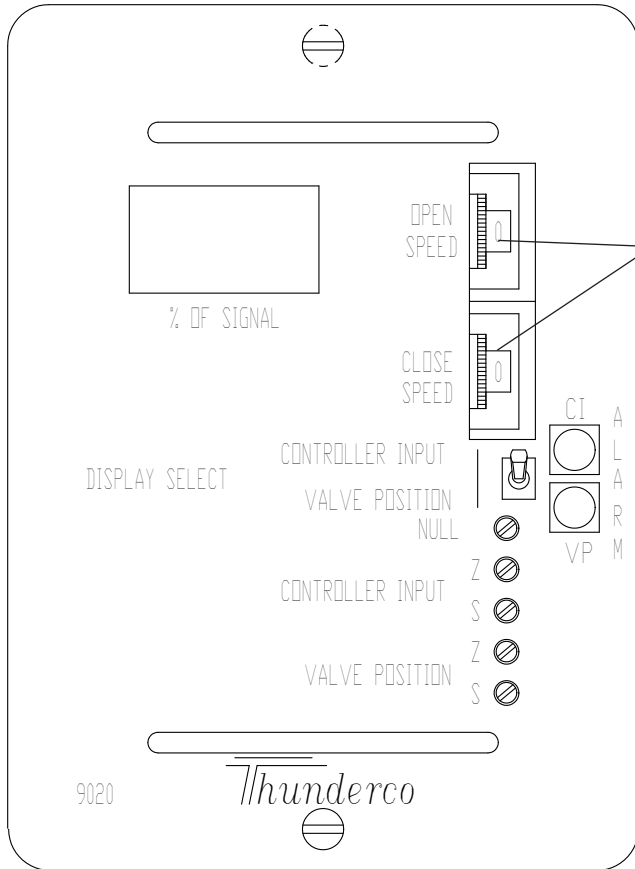
Adjust the valve position zero (Z) potentiometer until the display reads 0 %.

Place and lock the valve in the opposite position as above so that the Model PX-3 position transmitter generates 20 mA.

Adjust the valve position span (S) potentiometer until the display reads 100 %.

Recheck & adjust if necessary @ 4 mA & 20 mA.

## Calibration-Speed Controls



**Set the open & close speed controls to their desired settings. 0 is the slowest speed and 7 is the fastest. It is recommended to keep both at 7 if no speed control is desired.**

Note: Speed control changes affect the gain of the unit and may disturb the Model 9020 "Null" adjustment. It is advisable to recheck the "Null" adjustment after speed control changes are made.

*Model 9020 I/H Controller Interface*

## Model 9020 I/H Controller Interface Module

### Calibration-Null

Note: Mechanically null the servo valve and calibrate the Model PX-3 Position Transmitter prior to this procedure. Refer to appropriate sections of the T-9000 Operating and Maintenance Manual.

The Model 9020 outputs a corrective signal to the servo valve that is proportional to the error between the controller positioning signal and the valve position sensed by the Model PX-3 position transmitter. When these two signals are equal the Model 9020 should output close to 0 mA representing a null or stationary state.

Place the Auto/Manual switch at the HPA-Series hydraulic unit in "Auto".

Manually generate a 50% signal (12 mA) with the process controller or calibrator connected to the control input pins 1 & 2 of the Model 9020.

Observe the valve position by placing the display switch in the down position. Adjust the null potentiometer until the valve position signal matches the controller input signal of 50%.

Check positioning at 8 mA (25%) and 16 mA (75%). The valve should track the varying controller input signals.

