



6 Control Signal

Depending upon the mode of operation, the control signal may be either a 4-20 mA analog, a discrete voltage, a dry contact or main power (ESD).

A ½" NPT connection port is provided on the back of the control compartment to allow feed through of the signal cable.

6.1 ANALOG CONTROL

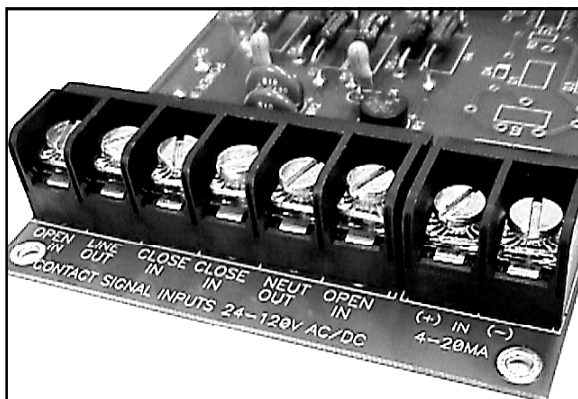
The **Mpac** may be configured for modulation in response to a continuous 4-20 mA control signal. The two wire loop connections are made to the 4-20 mA input terminals located on the multiple input auxiliary board located atop the base circuit board (figure 6.A). The load resistance for this loop is 225 Ohms.

The contact input terminals are only used if the remote auxiliary controls (Section B.2.2) are specified.

6.2 MANUAL

The connections for manual operation are made to the contact terminals located on the multiple input auxiliary board located atop the base circuit board (Figure 6.A, p.20). The input can be either a dry contact or a wide range of AC or DC voltages. Since the control signal is separate from actuator power, only a low power signal is required. This may be supplied directly from a controller or DCS without the need for an interposing relay or contactor.

The analog input terminals are not used for manual operation.

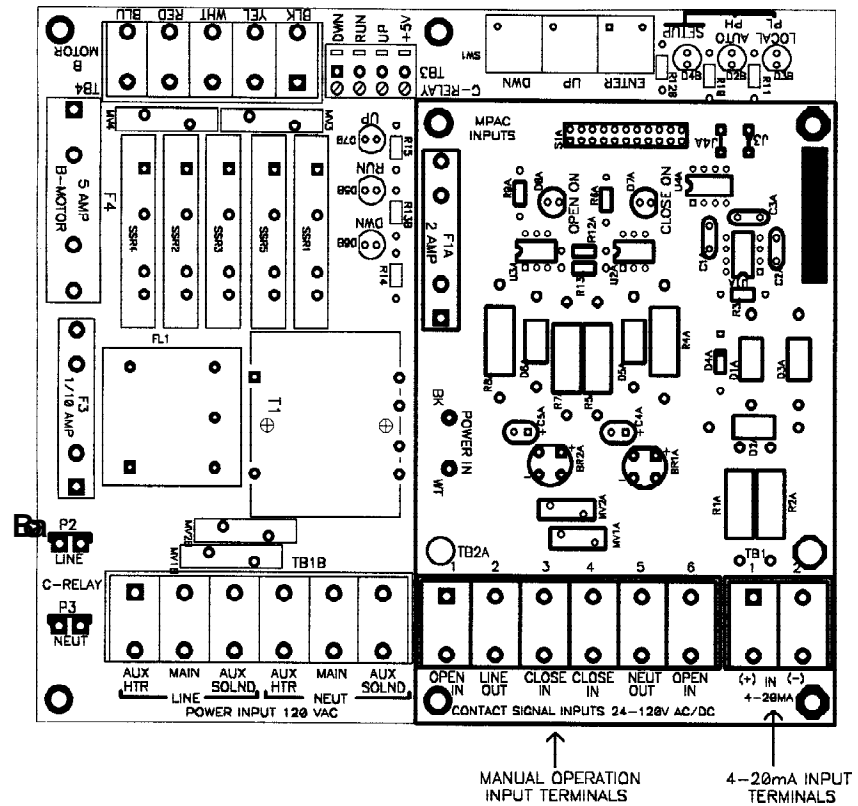


Input Board



The *closed* or *open* terminals can move the actuator in either direction; that is, extend or retract for a linear unit or clockwise or counterclockwise for a rotary unit. The actual direction is established during actuator stroke setup (Section 7.3).

Figure 6.A Multiple Input Auxiliary



6.2.1 Dry Contact Signal

As shipped from the factory, the contact signal inputs contain a 3-position jumper that connects NEUT OUT to CLOSE IN and OPEN IN terminals. This jumper provides actuator power (115 vac or 24 vdc) bias to the control signal inputs. Do not remove this jumper.

Connections for the dry contacts should be made across the remaining three free terminals, OPEN IN, CLOSE IN and LINE OUT (figure 6.A). Connect the close contacts across the CLOSE IN and LINE OUT; connect the open contacts across the OPEN IN and the LINE OUT.



6.2.2 Voltage Signal

The input terminals are not polarity sensitive.

Input Range

Voltage: OFF: 0 to 8 vac or vdc

ON: 22 to 120 vac or vdc

Undefined: 8 to 22 vac or vdc

Current: OFF: less than 1 mA

ON: 1.8 mA to 10 mA (proportional to voltage)

Impedance: 12K ohms

Switching Device (low current consideration)

Most electromechanical or solid state switching devices may be used to activate the control signal. The following points should be observed.

ON state:

Most AC and many DC solid state switching devices require a minimum current flow in order to remain in the on state. If this minimum current requirement exceeds the input signal current of the actuator, the current flow through the switching device may be increased by adding a shunt resistor across the input signal terminals of the actuator.

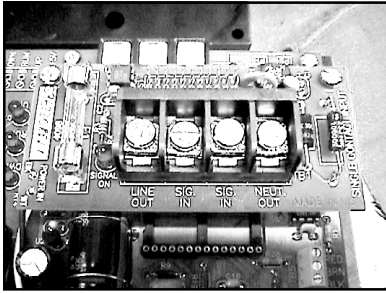
OFF state:

The Off state leakage current must be less than 1 mA. Diode clamps or RC snubber networks placed across mechanical relays and the semiconductor junctions of solid state switches will pass some current in the OFF state. If this leakage exceeds 1 mA, a shunt resistor added across the input signal terminals will reduce the current into the actuator's input.

Connections

The input terminals are not polarity sensitive.

As shipped from the factory, the contact signal inputs contain a 3-position jumper that connects NEUT OUT to CLOSE IN and CLOSE OUT terminals. This jumper must be removed for a voltage input signal. Connect the open signal across the two OPEN IN terminals and the closed signal across the two CLOSE IN terminals (figure 6.A). The negative side of each signal may be common for a three wire input.



Single Input Board

6.3 TWO POSITION

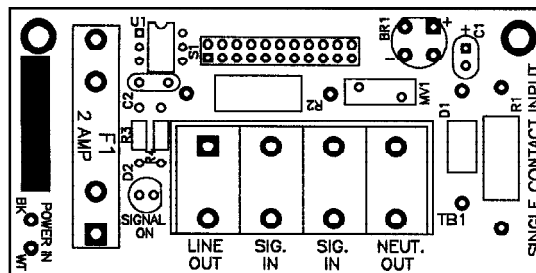
The connections for Two Position operation are made to the single contact input board located atop the base circuit board (figure 6.B). The input can be either a dry contact or a wide range of AC or DC voltages. Since the control signal is separate from actuator power, only a low power signal is required. This may be supplied directly from a controller or DCS without the need for an interposing relay or contactor.

Two position operation requires a single input signal. When it is present, the actuator is at one limit; when absent, the actuator is at the other limit. The actual direction is established during actuator stroke setup (Section 7.3).

6.3.1 Dry Contact Signal

As shipped from the factory, the single contact input contain a 2-position jumper which connects the NEUT OUT to one of the SIG IN terminals. This jumper provides actuator power (115 vac or 24 vdc) bias to the input signal. Do not remove this jumper. Connections for the dry contact are made across the remaining two free terminals, SIG IN and LINE OUT (figure 6.B).

Figure 6.B Two Position Single Input Board



6.3.2 Voltage Signal

Input Range

Voltage: OFF: 0 to 8 vac or vdc
 ON: 22 to 120 vac or vdc
 Undefined: 8 to 22 vac or vdc

Current: OFF: less than 1 mA
 ON: 1.8 mA to 10 mA; proportional voltage
 Impedance: 12K ohms

The input terminals are not polarity sensitive.



Switching Device (low current consideration)

Most electromechanical or solid state switching devices may be used to activate the control signal. The following points should be observed.

ON state:

Most AC and many DC solid state switching devices require a minimum current flow in order to remain in the on state. If this minimum current requirement exceeds the input signal current of the actuator, the current flow through the switching device may be increased by adding a shunt resistor across the input signal terminals of the actuator.

OFF state:

The Off state leakage current must be less than 1 mA. Diode clamps or RC snubber networks placed across mechanical relays and the semiconductor junctions of solid state switches will pass some current in the OFF state. If this leakage exceeds 1 mA, a shunt resistor added across the input signal terminals will reduce the current into the actuator's input.

Connections

As shipped from the factory, the single contact input contains a 2-position jumper that connects the NEUT OUT to the SIG IN terminals. This jumper must be removed for a voltage input signal. Connect the signal across the two SIG IN terminals (figure 6.B).

The input terminals are not polarity sensitive.

6.4 EMERGENCY SHUTDOWN (ESD)

115 vac Main Power

The controls for ESD operation are simple and reliable. The main power supply is routed to the motor via the contact side of a solid state relay. Input to the relay is also the main power that has been routed through a Normally Closed position switch. The power also energizes a Normally Open hydraulic solenoid.

When power is applied, the spring failure solenoid closes and the motor moves the actuator to the limit switch position. The limit switch cuts the power to the relay and shuts off the motor. The integral hydraulic valving holds the actuator in place without operation of the motor. Removal of the electric power opens the solenoid and the spring moves the stem to the failure position.



Only a simplified base circuit board is required for operation of the 115 vac ESD version **Mpac**. Electrical connection is made in the same manner as a single input power (Section 5.1). Depending upon the application, it may be necessary to supply separate power for the solenoid (Section 5.2) or for the heater (Section 5.3).

24 vdc Main Power

The motor for 24 vdc power requires the standard electrical controls for ESD operation. Although the circuitry is more sophisticated, the reliability is retained. The motion is still controlled by the main power and Emergency Shutdown by a spring and Normally Open solenoid.

Main input power is factory connected to the control signal. Only electrical power connection to the single input power (Section 5.1) is required. Depending upon the application, it may be necessary to supply separate power for the solenoid (Section 5.2) or for the heater (Section 5.3).