

# High Resolution Servo Board

## POWER REQUIREMENTS

DHC-100: 117VAC 10%, 50/60 Hz  
 DHC-100A: 234VAC 10%, 50/60 Hz  
 DHC-100B: 24VAC 10%, 50/60 Hz  
 12 VA typical (not including output load)  
 Fuse Type: 5A TR5 Slo-Blo (replaceable)

## COMMAND SIGNAL INPUT

Input Impedance  
 20K ohms (1-5 VDC, 0-5 VDC, 0-10 VDC Input)  
 251 ohms 1% (4-20 mA Input)  
 Loss of Command threshold  
 < 0.75V or > 5.5V (1-5 VDC input)  
 < 3mA or > 22mA (4-20mA input)

## FEEDBACK SIGNAL INPUT

Input Voltage: 0 to 2.5 VDC  
 External Feedback Potentiometer: 1K ohm

## POWER SUPPLY OUTPUTS

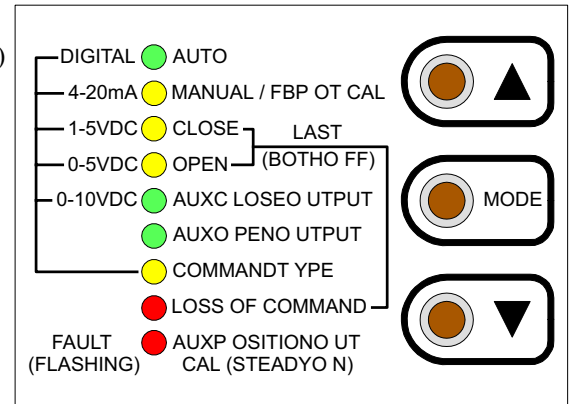
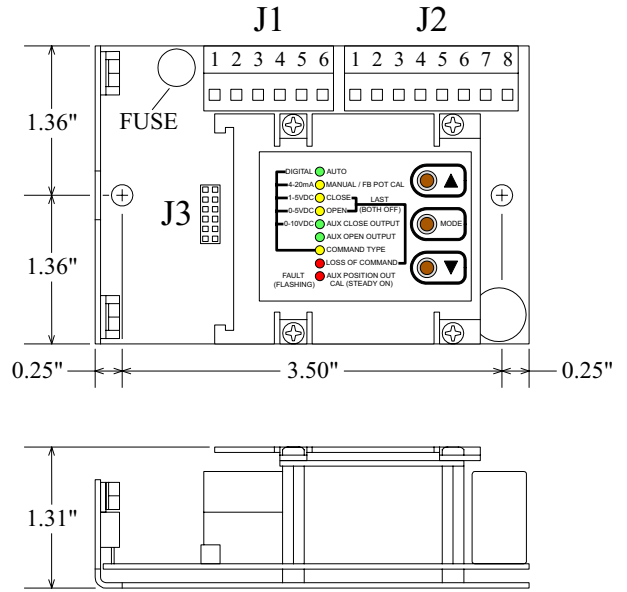
+15V OUT (J2-8): 125mA maximum (not including option module)  
 +5V OUT (J2-7): 5mA maximum  
**NOTE:** Do not connect these outputs to other power supplies.

## AC MOTOR OUTPUTS

Off-state Leakage Current: <15mA  
 Maximum Load Current @ 60 C: 5A

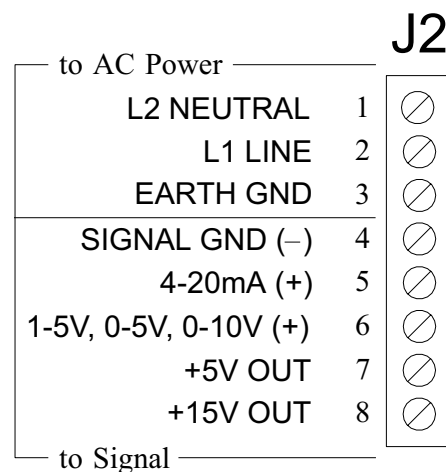
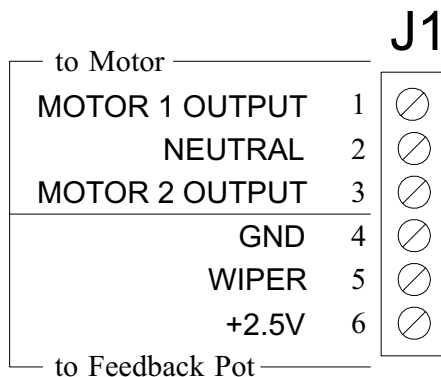
## ENVIRONMENTAL

Operating Temperature Range: 0 C to 60 C  
 Storage Temperature Range: -40 C to 85 C  
 Relative Humidity Range: 0 to 90 % (noncondensing)



FRONT PANEL

## ELECTRICAL CONNECTIONS



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## MODE

The MODE button is used to select the desired function of operation. When the MODE button is pressed, the unit will switch to the next function and the appropriate LED indicator will turn on to let the user know which function is selected. Except for the MANUAL/FB POT CAL mode, the associated mode indicator will be steady on; for some of the modes other indicators will flash to indicate specific settings associated with the mode. Each of the modes are described in more detail in the following sections.

If a 0-5V or 0-10V command signal is used, the LOSS OF COMMAND function cannot be used. The MODE button will skip over the LOSS OF COMMAND mode when the unit is configured for a 0-5V or 0-10V command signal (see COMMAND TYPE).

## ADJUST UP (▲) and ADJUST DOWN (▼)

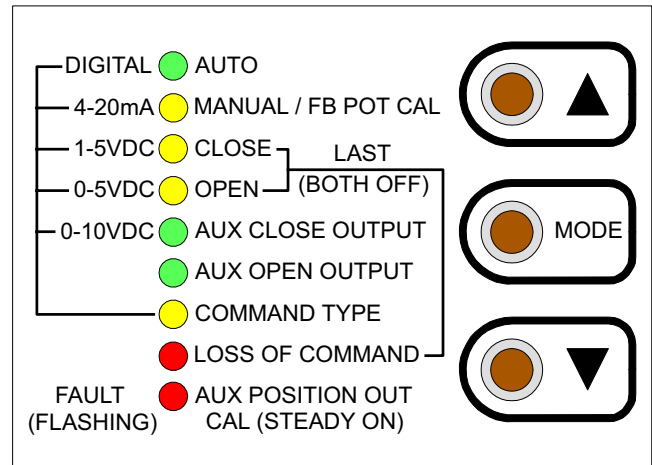
The adjust up (▲) and adjust down (▼) buttons are used to adjust the setting of any given function. When a function is selected by the MODE button, the adjust buttons will affect that function only. Note, that the AUTO mode does not have any adjustable settings, and therefore, the adjust up (▲) and adjust down (▼) buttons have no effect.

## AUTO

The AUTO function is the normal mode of operation for the DHC-100; all the other functions are used to set up the unit. While in AUTO, the unit can be controlled by various external signals, some of which can be selected by the COMMAND INPUT function. When the unit is not in the AUTO mode, all external controls described below will be disabled.

Once the *open* and *closed* positions have been set, the AUTO mode will control the position of the actuator according to the command input signal. For an input signal of 0V (for 0-5V or 0-10V input), 1V (for 1-5V input), 4.0 mA (for 4-20mA input), or 0% (for a digital input), the DHC-100 will position the actuator to the *closed* position as set by the user. Conversely, an input of 10V, 5V, 20mA, or 100% will position the actuator to the defined *open* position.

When the DHC-100 is configured to use a 0-5V, 0-10V, 1-5V, or 4-20mA command, the command signal should be connected to the appropriate pin on J2 - note that the unused input pin must be left unconnected. When the DHC-100 is configured for a Digital command type, an appropriate communications option module must be installed. A communications module may be installed when using one of the analog command types and can be used to override the analog command. The AUTO indicator will flash whenever the unit is being controlled by the communications module.



FRONT PANEL

## MANUAL/FB POT CAL

The MANUAL/FB POT CAL function allows manual operation of the actuator by using the adjust buttons (▲ and ▼) without affecting any other settings within the DHC-100. When the ▲ button is pressed, the motor winding connected to J1-1 is turned on while the ▼ button turns on the J1-3 winding. Whether the actuator moves toward the *open* or *closed* position depends on which Motor winding is connected to J1-1 and J1-3.

The POT CAL feature provides an indication of the feedback potentiometer's setting. When the MANUAL/POT CAL function is selected, the Manual/Pot Cal indicator will turn on - it may flash or be on steady, depending on the actuator position. The indicator will be on steady whenever the DHC-100 detects that the feedback potentiometer is at midrange of its rotation. As the actuator moves, causing the feedback potentiometer to move away from midrange, the indicator will begin to flash, and the indicator will flash at a decreasingly slower rate as the actuator moves further away from midrange.

By using the adjust buttons to position the actuator to midstroke (half way point between the desired *open* and *closed* positions), the feedback potentiometer can then be adjusted until a steady light occurs. This insures that the feedback potentiometer has maximum range to reach the *open* and *closed* positions.

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## CLOSE

The CLOSE function is used to set the desired *closed* position; however, prior to doing this, the feedback potentiometer should be checked for optimum position (see MANUAL/POT CAL), and the limit switches should be set outside of the operating range (see STALL DETECTION FEATURE). In the CLOSE function, the adjust buttons are used to set the actuator to any desired position, and upon pressing the MODE button (to select the next function, OPEN), the DHC-100 will retain the setting as the defined *closed* position.

Upon selecting the CLOSE function, the DHC-100 will begin moving the actuator to the previously set *closed* position; it is not necessary to make an adjustment if the unit has been previously set to the desired position. A command signal input of 0V, 1V, 4mA, or 0% automatically corresponds to the defined *closed* position.

## OPEN

The OPEN function works the same way as the CLOSE function with the exception that the adjust buttons are used to set the desired *open* position. As with the CLOSE function, upon selecting the OPEN function, the actuator will move to the previously set *open* position. Once the desired position is set, the DHC-100 will automatically correspond a command signal input of 10V, 5V, 20mA, or 100% to the *open* position.

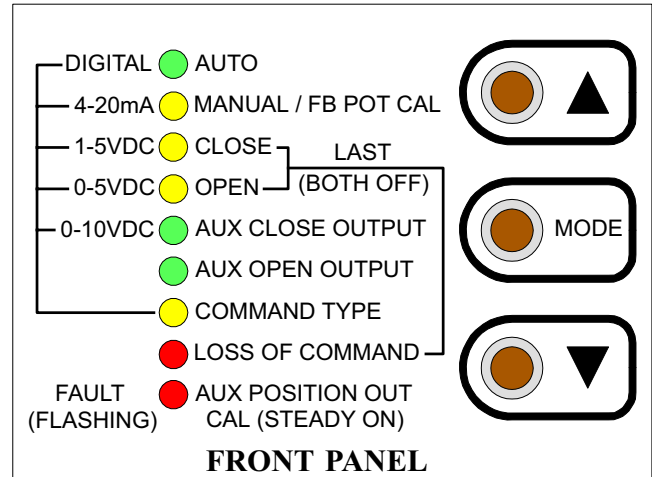
## COMMAND TYPE

The COMMAND TYPE function is used to configure the command signal input for either 4-20mA, 1-5V, 0-5V, 0-10V, or digital so as to match the type of command signal being used. Upon selecting the COMMAND TYPE function, the Command Input indicator will turn on steady, while the indicator for the selected type will flash.

Use the adjust buttons (▲ or ▼) to select the desired input type. The selection will be saved when the MODE button is pressed, which will also advance the unit to the LOSS OF COMMAND function.

## LOSS OF COMMAND

When using 1-5V, 4-20mA, or a Digital input type for the command signal, the DHC-100 will detect when the command signal is lost or out of range. A loss of command condition is detected whenever the input is disconnected, the input becomes less than 0.75V or 3mA, or the input becomes greater than 5.5V or 22mA. If the DHC-100 detects a loss of the command signal, the Fault indicator will flash and the actuator will be moved to one of three preset positions: the *open* position, the *closed* position, or the position last attained prior to losing the command signal. The LOSS OF COMMAND function is used to set the desired default position.



When the LOSS OF COMMAND function is selected, the adjust buttons are used to set the default position. The DHC-100 indicates the selected default setting by flashing the Open function indicator for the *open* default position, or it will flash the Close function indicator for the *closed* default position. When neither indicator is on, then the "last position" default is selected.

When a 0-5V or 0-10V command signal is used, a loss of command signal cannot be detected. Therefore, if the unit is configured for a 0-5V or 0-10V command signal (see COMMAND INPUT), the MODE button will not select the LOSS OF COMMAND function.

## FAULT INDICATOR

The DHC-100 detects various fault conditions that prohibit the unit from controlling the actuator. When any of these conditions are detected, the Fault indicator will flash, and the motor outputs are turned off until all fault conditions have been corrected. If an appropriate relay option module is installed, the Fault relay output on the option module will also turn off. A communications option module can read the specific condition(s) causing the fault. Note that a fault condition DOES NOT disable the motor outputs when manually controlling the actuator with the the adjust buttons; while useful for troubleshooting, care should be exercised when operating the motor under a fault condition. The various fault conditions are described below:

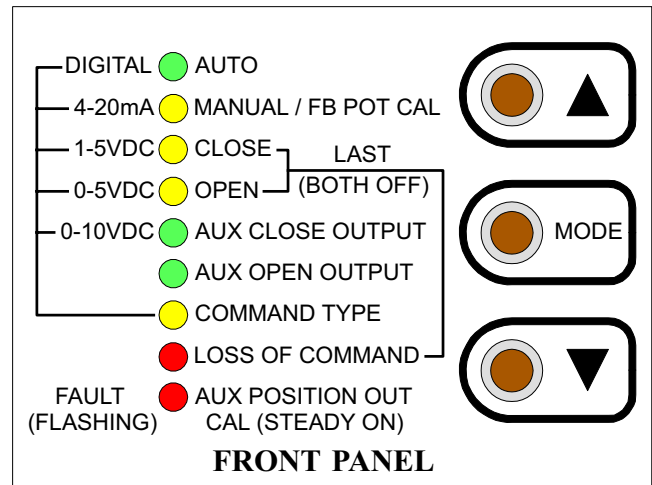
**LOSS OF COMMAND** - If the command signal is disconnected or out of range, the fault indicator will remain on until the signal is reconnected or back in range.

**FEEDBACK POT FAULT** - A fault condition is detected whenever the feedback signal is out of range (that is, less than 5% of the potentiometer value or more than 95% of the potentiometer value), or when any of the potentiometer connections are broken. Normal operation resumes when the potentiometer is reconnected or back in range.

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**MOTOR 1 STALL** - A fault condition is detected when no actuator motion is detected while the Motor 1 output is turned on. The fault condition will disable the Motor 1 output only, and the fault is cleared when the DHC-100 detects a motion greater than 1.5 in either direction. The fault can be cleared if 1) the command signal commands a Motor 2 operation, 2) manual operation with the adjust buttons results in a motion greater than 1.5, or 3) a mechanical manual override forces the 1.5 motion, provided the mechanical motion is monitored by the feedback pot.

**MOTOR 2 STALL** - A fault is detected when no actuator motion is detected while the Motor 2 output is turned on. The fault can be cleared in the same manner as a Motor 1 Stall (see above).



## Quick Calibration

- Board starts in AUTO position. The board light will indicate the AUTO position. (NOTE: The lights will change from top to bottom in sequence by pressing the MODE button.
- Finding the MID POINT  
Push the mode button. The board is now in the Manual/FB Pot Cal position. The yellow indicator light will be flashing. Use the (▲) and (▼) buttons on the servo to position the actuator to the mid point position. Loosen the set screw on the pot gear. Turn the gear until the yellow light stops flashing. The closer you get to the mid point of the 1K pot the faster the light will flash. When you have found the mid point the yellow light will stay on. Once the mid point position is found tighten the Set screw on the pot. Press the mode button to go to the next set up.
- Set the CLOSED Position  
Use the (▼) button to close the valve to the desired position. Press the mode button to go to the next set up. (Note: If you only need to set the closed position then you are finished when you press the mode button 7 times to make the Digital/Auto button light up.
- Set the OPEN Position  
Use the (▲) button to open the valve to the desired position. Press the mode button to go to the next set up. (Note: If you only need to set the open position then you are finished when you press the mode button 6 times to make the Digital/Auto button light up.
- Set the CLOSED Auxiliary Output (Optional)  
This is an optional feature, press the mode button to skip.
- Set the OPEN Auxiliary Output (Optional)  
This is an optional feature, press the mode button to skip.
- Set the Command Type  
With the Command Type light and 4-20 ma light illuminated you are now setting the command signal. Use the (▲) and (▼) buttons to select 4-20 ma, 1-5 VDC, 0-5 VDC, 0-10 VDC input signal. Press mode to go to the next set up.
- Set the Fail Mode  
With the Loss of command light and closed light illuminated you can now set loss of command signal, this can only be used for 4-20 ma and 1-5 VDC. Use the (▲) and (▼) buttons to illuminate the Closed or Open light. Press mode to go to the next set up.
- Set the AUX Position Out Close Mode (Optional)  
With the Aux Position Out command light and closed light illuminated you are now setting AUX position closed, used to calibrate the feedback transmitter. Use the (▲) and (▼) buttons to calibrate with your handheld meter. Press mode to go to the next set up.
- Set the AUX Position Out Open Mode (Optional)  
With the Aux Position Out command light and open light illuminated you are now setting AUX position open, used to calibrate the feedback transmitter. Use the (▲) and (▼) buttons to calibrate with your handheld meter. Press mode to go to the next set up.
- Now the servo is back to the auto position.  
Set up is complete!