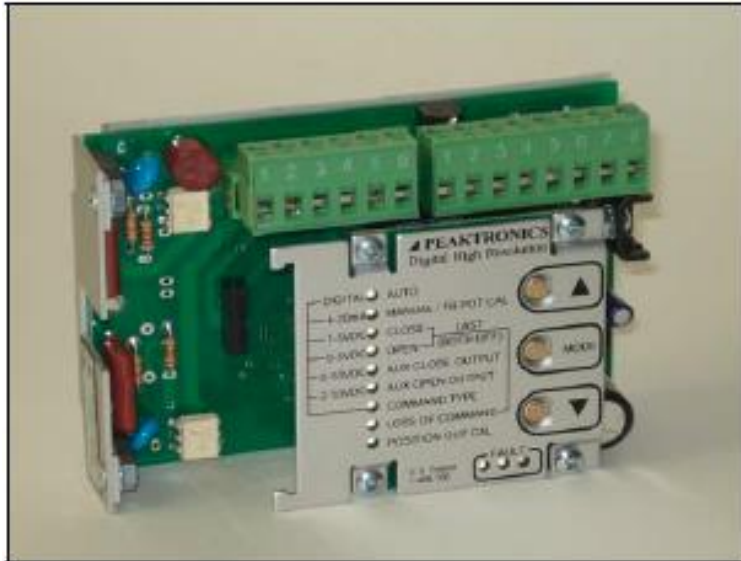


# Series 92 For A/C Modulating Service Gen II



## Installation, Operation and Maintenance Manual



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## DHC-100 Introduction

The second generation DHC-100 is a high performance digital positioner intended to control AC actuators, providing 450 points of resolution with quarter turn actuators ranging from 2 sec to 120 sec and rated for 25% duty or more. The DHC-100 has many automatic advanced features that will enhance any actuator while making it easy to install and set up.

The simple three button control is used to configure all parameters the unit needs for a wide variety of applications, and allows the *open* and *closed* positions to be easily set for direct or reversing acting without any rewiring. The unit can be configured for various command types (4-20mA, 1-5V, 0-5V, 0-10V, 2-10V or a digital command) and its default operation upon loss of command. The multicolor LED Fault indication displays different fault conditions.

Various option modules are easily plugged into the unit, providing other features such as a position feedback signal (current or voltage), auxiliary switches, fault relay contact, or digital communications. A wide range of data is accessible through a digital communications module, providing additional control or information.

The unit is of single solid construction and is easily mounted with two screws. The DHC-100 is interchangeable with the AMC and LRC standard size controllers, and can be used to upgrade performance for those applications.

## Features

- Positions to  $\pm 0.1^\circ$  with quarter-turn actuators ranging from 2 sec to 90 sec.
- **Adaptive Control** feature continuously adjusts for load and actuator conditions and eliminates calibration procedures and auto-cal operations.
- Three button control provides easy setup and eliminates the need for instrumentation.
- **Polarity Detection** feature allows direct or reverse acting operation without re-wiring.
- **Electronic Brake** feature can eliminate need for a mechanical brake in many applications, and extends mechanical brake life when used.
- **Stall Detection** feature protects actuator motor from a stall condition.
- Automatic **Duty Cycle Control** feature prevents shutdown of a process due to a thermal overload of the actuator motor, and allows actuators rated for 25% duty or more to be safely used.
- Operating temperature range of 0 to 60° F.

## **Series 92 Electric Actuator Introduction**

### **Description**

The Series 92 electric actuators feature a reversing ac motor, with a permanently lubricated gear train, and hardened steel spur gears. These actuators are equipped with independently adjustable limit switches, declutchable manual override, beacon position indication, thermally bonded powder coat finish with stainless steel trim, ISO mounting, and 2 (two) ½" NPT conduit entries.

Ac models are offered in 24 VAC, 120 VAC or 220 VAC, feature a NEMA Type 4X enclosure, and provide up to 2000 in-lbs. of output torque.

The DHC-100 is easily mounted with 2 screws and is equipped with removable screw terminals that provide for easy field wiring. The unit's size, mounting, and screw terminals are compatible with the AMC-101 and LRC-101 series controllers- the DHC-100 can be used as a direct replacement for those units in nearly any application.

A simple three button control allows the user to perform a complete set-up from the unit itself without the need for any instrumentation. The adaptive control feature of the DHC-100 eliminates the need for any calibration steps. In the simplest application, only the *closed* and *open* positions need to be set and the unit automatically and continuously sets all other parameters when placed in the AUTO mode.

**CAUTION:** These units are intended to be mounted in an appropriate enclosure to avoid electrical shocks and exposure to electrostatic charges. High voltages are present on the outside of the unit when power is applied. AC power should be disconnected and anti-static measures should be taken prior to any wiring of these units. A heater and thermostat should be used where condensation may occur.

### **Electrical Requirement**

**CAUTION:** Proper voltage must be supplied to actuator/positioner package or the result could be a damaged positioner, a damaged actuator, or both.

**NOTE:** To conform to various electrical codes, a green grounding screw has been installed (on the baseplate) inside of actuator.



**Installation**

**Electrical**

**Reference Drawing #289S92**

**Models S-92, A92, & B92**

1A. To gain access to terminal strip (Part #24) it is necessary to remove manual override knob (Part #18) by loosening slotted setscrew (Part #39). Remove 2 cover screws and cover; the remaining 6 cover screws are packaged inside the actuator.

**Model C92**

1B. To gain access to terminal strip it is necessary to remove manual override hand wheel (Part #18A) by loosening slotted setscrew (Part #39). Remove cam (Part #51) by loosening 2 set screws (Part #52). Remove 2 cover screws and cover; the remaining 6 cover screws are packaged inside the actuator.

**All Models**

2. Make electrical connections to terminal strip as shown on wiring schematic located inside the cover (per various electrical codes there is a green screw on the actuator base plate for grounding purposes). All units are completely calibrated prior to shipment, and no internal adjustments should be required.
  
3. Install 1/2" NPT conduit fitting(s) to actuator base. Please ensure that proper conduit fitting is used to maintain enclosure rating (weatherproof, explosion proof or combination weather proof/explosion proof).

**NOTE:** We recommend sealing conduit openings on units installed outdoors or exposed to large temperature swings (15°F or more).

We also recommend the heater and thermostat option in these applications.

4. Replace actuator (gasket if removed) cover, and install 8 cap screws supplied and tighten securely. For outdoor or wet locations it is recommended prior to replacing the cover that the top shaft seal be cleaned and coated with silicone grease. Also clean shaft and lightly coat seal area of shaft with silicone grease. Unit is now ready for operation.

Model	Torque (in/lbs)	120 Vac		220 Vac		24 Vac		Cycle Time per 90 Degrees (seconds)
		Amp Draw	Duty Cycle	Amp Draw	Duty Cycle	Amp Draw	Duty Cycle	
S92	400	0.5	100%	0.4	100%	3.0	75%	15
A92	700	0.8	75%	0.6	75%	3.0	75%	15
B92	1100	0.5	100%	0.4	100%	3.0	75%	32
C92	2000	1.0	50%	0.6	50%	3.0	75%	32

NOTE: Amp rating is considered locked rotor.  
Dutv cvcles are for ambient tempe

### **Type 21 Ball Valve**

Position the valve and the actuator to corresponding positions (either OPEN or CLOSED). The flats on the actuator shaft extension indicate valve position

#### **Type 21 Ball Valves (See Drawing #0107BV sizes ½" – 2")**

Install mounting bracket #3 to actuator #2 using bolts #8 and washers #9. Insert coupling #4 on stem of valve #1 and then bolt valve #1 to mounting bracket #3 using bolts #5, nuts #7, and washers #6.

**Note:** All bolts should be snug and not excessively over tightened.

#### **Type 21 Ball Valves (See Drawing #0113BV sizes 2-1/2" - 4")**

Install mounting bracket #3 to actuator #2 using bolts #8 and washers #9. Insert coupling #4 on stem of valve #1 and then bolt valve #1 to mounting bracket #3 using bolts #5, nuts #7, and washers #6.

**Note:** All bolts should be snug and not excessively over tightened.

### **Type 23 Ball Valve (3-way)**

Position the valve and the actuator to corresponding positions (either OPEN or CLOSED). The flats on the actuator shaft extension indicate valve position

#### **Type 23 Ball Valves (3-way): (See Drawing #0130BV, sizes ½" - 4")**

Install mounting bracket #3 to actuator #2 using bolts #8 and washers #9. Insert coupling #4 on stem of valve #1 and then bolt valve #1 to mounting bracket #3 using bolts #5, nuts #7, and washers #6.

### **Type 56 Butterfly Valves**

**CAUTION:** If valve is in line, system must be shut down and have no line pressure before removing throttle plate and retaining washer.

Position the valve and the actuator to corresponding positions (either OPEN or CLOSED). The flats on the actuator shaft extension indicate valve position

#### **Butterfly Valves (See Drawing # 0200BF sizes 1-1/2" - 6")**

No specially machined stem or valve body drilling required. Remove handle (remove handle cap and hex head bolt) to expose throttle plate screws. Remove throttle plate and retaining washer to expose existing bolt pattern. Mount bracket #3 to actuator #2 with bolts #8 and washers #9 and tighten evenly. Insert coupling #4 into actuator #2. Install valve #1 onto mounting bracket #3 and align stem of valve to engage with coupling. (Line scribed on top of stem

indicates disc orientation). Install bolts #5, washers #6 and nuts #7 and tighten evenly. Flats on actuator shaft indicate valve position. (Disc Orientation)

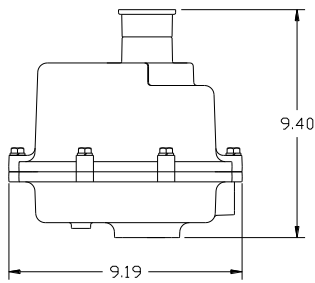
**Butterfly Valves (See Drawing #0168BF 8" size)**

No specially machined stem or valve body drilling required. Remove gear operator by removing 4 thru bolts in body of valve to gear operator and lift off. Mount bracket #2 to actuator #10 using bolts #7 and washers #8. Insert actuator shaft adapter #9 into actuator #10. Install valve #1 to mounting bracket #2 and align stem of valve to engage with coupling. (Line scribed on top of stem indicates disc orientation). Install bolts #3, washers #4 & #5 and nuts #6 and tighten evenly. Flats on actuator shaft indicate valve position. (Disc Orientation)

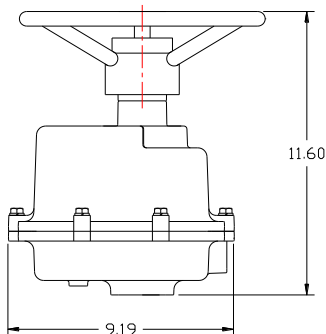
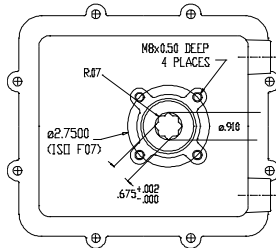
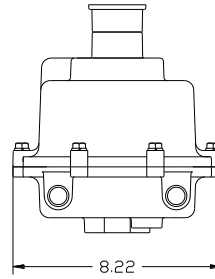


**CAUTION:** If mounted unit is installed other than straight up, the actuator should be supported independently to prevent side loading and loosening up of fasteners.

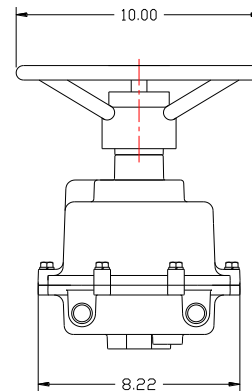
**Actuator Mounting Dimensions**



S92, A92, & B92



C92



## Operation

### Manual Override Operation Reference Drawing #289S92

#### Models S-92, A92, & B92

Pull up the declutching knob (Part #18) and apply a 5/8" open end wrench to exposed flats and rotate within labeled limits as indicated by arrows.

To re-engage simply rotate actuator shaft in the opposite direction until declutching knob drops back down into position.

#### Model C92

Push down on hand wheel (Part #18A) and rotate within labeled limits.

To re-engage simply rotate actuator hand wheel until it moves up and re-engages.

**CAUTION:** The manual override should only be used when there is no power applied to actuator. When power is restored the actuator will automatically resume normal operation.

### Setting Limit Switches Reference Drawing #289S92



## **Disconnect power!**

#### **Open Travel Limit Switch** (Top Switch Part #25):

Using declutchable manual override, move the valve approximately 2 degrees beyond the full open position. Then loosen set screws on top cam (Part #40) and rotate cam (CCW) into limit switch arm until a click is heard, this designates the switch circuit has opened and defines a full open position. Tighten 2 set screws (Part #40) on cam.

#### **Close Travel Limit Switch** (Bottom Switch Part #25):

Using declutchable manual override, move the valve approximately 2 degrees beyond the full closed position, loosen set screws on bottom cam (Part #40) and rotate cam (CW) into limit switch arm until a click is heard, this designates the switch circuit has opened and defines a full closed position. Tighten 2 set screws (Part #40) on cam.

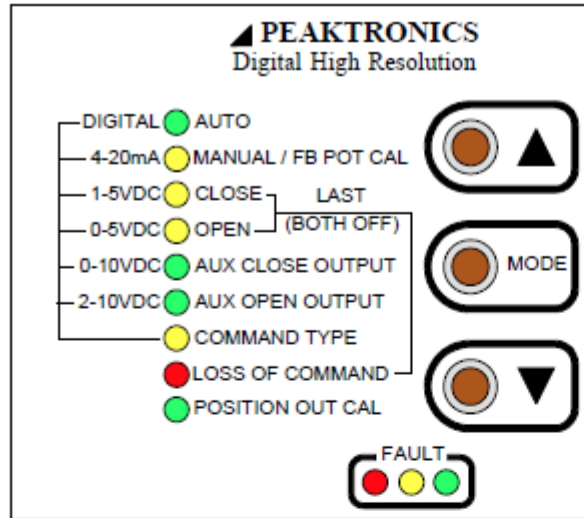
Manually position valve to midstroke. Reapply power to actuator and drive to open or closed position. Actuator motor will run. The shaft will not turn until drive pins (Part #7) reseat in drive gear. This could take up to 25 seconds.

**CAUTION:** The limit switches inside of the unit are for loss of signal conditions; NOT for normal operation of the modulating actuator.



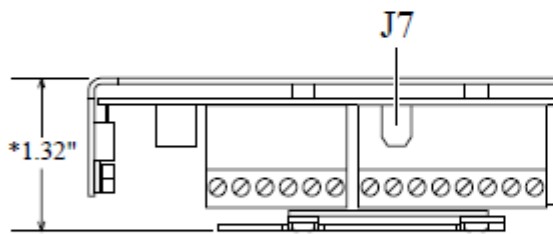
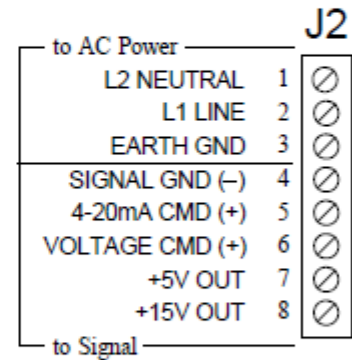
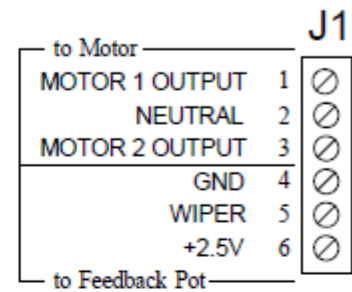
## Calibration

### Outline Diagram

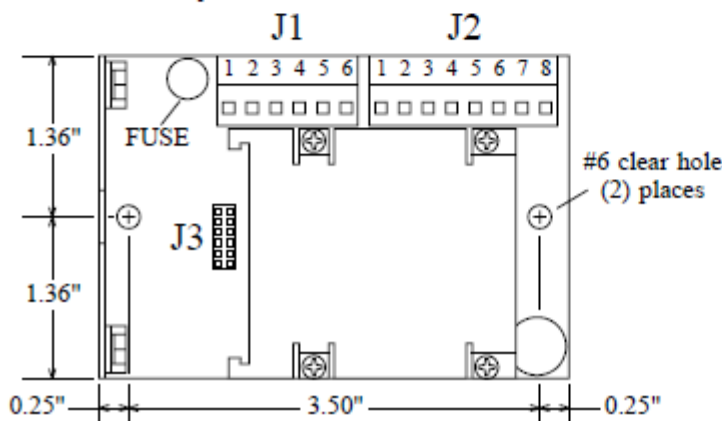


FRONT PANEL

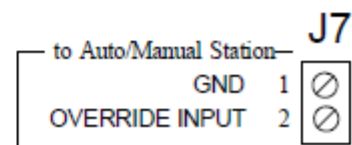
### ELECTRICAL CONNECTIONS



\* Add 0.04" when option module installed.



### J3 OPTION MODULE CONNECTOR



## QuickCal Procedure

The following is a quick calibration procedure. For more details regarding the calibration and features of your DHC-100, please see the pages following this procedure.

### General

The MODE button selects a particular function, or mode, and the indicator for the selected mode turns on steady. Pushing the MODE button saves any new setting of the current mode before switching to the next mode. The adjust up (▲) and adjust down (▼) buttons are used to make adjustments to current mode.

1. Apply power to the actuator on Connector J2: terminal #1 (neutral), terminal #2 (line), and terminal #3 (earth). There is no need for a signal connection during calibration.
2. Push the MODE button until the yellow “MANUAL/FB POT CAL” LED is illuminated. The LED may be flashing (at different speeds) through the next several steps. This is expected and will be explained.
3. Use the adjust buttons (▲ and ▼) to move the actuator and verify that the limit switches are set past the desired open and closed positions; then move the actuator to mid stroke.
4. If LED is solid, proceed to step 7.
5. If LED is flashing, loosen the gear on the actuator shaft and rotate the potentiometer gear until the LED is no longer flashing, but on solid - this indicates the center of the potentiometer’s travel. Note that the LED will flash at a slower rate the farther away from the mid position it gets. Once the LED is on solid tighten all gears.
6. Push the MODE button until the “CLOSE” LED is illuminated. Use the adjust buttons (▲ and ▼) to drive the actuator to the desired closed position. Ensure that the close limit switch does not engage.
7. Push the MODE button until the “OPEN” LED is illuminated. Use the adjust buttons (▲ and ▼) to drive the actuator to the desired open position. Ensure that the open limit switch does not engage.
8. Please skip to **Aux Open/Close Setup** if optional Transmitter with Relays is installed; otherwise continue to the next step.
9. Push the MODE button until the “COMMAND TYPE” LED is illuminated. Use the adjust buttons (▲ and ▼) to select appropriate input signal (4-20mA, 1-5VDC, 0-5VDC, 0-10VDC, 2-10VDC or Digital). If 0-5VDC or 0-10VDC is

selected, the LOSS OF COMMAND feature is not available, so proceed to step 12.

10. Push the MODE button until the “LOSS OF COMMAND” LED is illuminated; this sets the actuator to a predetermined position upon loss of command. Use the adjust buttons (▲ and ▼) to select appropriate position (OPEN, CLOSE, or LAST POSITION).
11. Please skip to **Aux Position Setup** if optional Transmitter, or optional Transmitter with Switches is installed, otherwise continue to the next step.
12. Push the MODE button until the “AUTO” LED is illuminated. Your calibration is now **COMPLETE**. Connect the command signal wires to connector J2: terminal #4 (signal ground) and terminal #5 (mA input) **OR** terminal #6 (voltage input), depending on the application. If a signal input was already connected, the actuator should have moved to that position.

### **Aux Open/Close Option Setup**

1. Push the MODE button until the “AUX CLOSE OUTPUT” LED is illuminated. Use the adjust buttons (▲ and ▼) to drive the actuator to the desired auxiliary close position.
2. Push the MODE button until the “AUX OPEN OUTPUT” LED is on. Use the adjust buttons (▲ and ▼) to drive the actuator to the desired auxiliary open position.
3. Continue with Step 9 in the **Quick Calibration Procedure** (see above).

### **Aux Position Option Setup**

1. Push the MODE button until the green “AUX POSITION OUT CAL” LED illuminates **while** the “CLOSE” LED flashes.
2. Use the adjust buttons (▲ and ▼) to set the desired output voltage or current (mA) on the option module output for the closed position.
3. Push the MODE button so the “AUX POSITION OUT CAL” LED remains steady **while** the “OPEN” LED flashes. Use the adjust buttons (▲ and ▼) to set the desired output voltage or current (mA) on the option module output for the open position.
4. Continue with Step 12 in the **Quick Calibration Procedure** (see above).

***Please read the following pages to ensure that ALL of the selectable features are understood and selected if required.***

### **Power / Signal (J2)**

Power is connected to pins 1, 2, & 3 as shown in the wiring schematic. The fuse installed on the unit is rated for maximum output current that can be safely delivered by the AC outputs. Replacement fuses must not exceed the maximum rating to prevent damage to the unit. Smaller fuse sizes can be used with smaller motors – consult the factory for appropriate fuse size and type.

An appropriate command signal, either 0-5V, 0-10V, 1-5V, 2-10V or 4-20mA, should be connected to pin 5 or 6 (as shown in the Block Diagram) while using pin 4 as the return *signal ground*. The DHC-100 must be configured for the type of command signal that is to be used (see COMMAND TYPE).

Pin 7 of J2 provides an auxiliary +5V output which can be used to connect a command potentiometer. By connecting one end of a potentiometer to pin 7, the other end to pin 4, and the wiper to pin 6, a local control knob can be implemented. Pin 8 provides an auxiliary +15VDC output which can be used to power an input or output 4-20mA transmitter.

### **Actuator (J1)**

The actuator motor and feedback potentiometer are connected to J1 as shown in the wiring schematic. The motor neutral wire must be connected to pin 2, while one motor winding is connected to pin 1 and the other winding is connected to pin 3. The feedback potentiometer wiper must be connected to pin 5, while one end is connected to pin 4 and the other end is connected to pin 6. The **Polarity Detection** feature of the DHC-100 automatically determines which motor winding to control based on where the *open* and *closed* positions are set; this feature also eliminates the need to rewire the unit for direct or reverse acting applications.

When the ▲ and ▼ buttons are used to control the actuator, the ▲ button will turn on the motor winding connected to pin 1, while the ▼ button will turn on the motor winding connected to pin 3. See MANUAL/FB POT CAL for more details.

### **Override (J7)**

J7 provides a simple 2-wire connection that can override the DHC-100 to perform a variety of external control functions. Using an appropriate interface module, commonly used auto/manual station switches are easily implemented with low voltage/low current switches. The factory-installed jumper between pins 1 and 2

enables normal operation of the DHC-100 and must be installed if the external override functions are not used.

### **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). When the OVERRIDE mode is enabled (see OVERRIDE MODE), the MODE button is disabled and the Manual/Pot Cal indicator will turn on steady.

### **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. Also, the adjust buttons are disabled in the OVERRIDE mode.

### **Override Mode**

The OVERRIDE mode is not selected by the MODE button and can be enabled at anytime by connecting a resistance greater than 250 ohms to the Override Input (J7 pin 1 and pin 2). While the OVERRIDE mode is enabled, the MODE button and adjust buttons are disabled, and the Manual/Pot Cal indicator will turn on steady to indicate that the unit is being controlled by the Override Input. Shorting J7 pin 1 to pin 2 returns the unit to normal operation and the previously selected mode.

Controlling the DHC-100 from the Override Input is accomplished by connecting a specific resistance to select a specific operation. The table below defines the operations and their associated resistance.

<b>RESISTANCE</b>	<b>OPERATION</b>
> 4.3K ohms	OFF
3.3K ohms ±5%	LATCH
2K ohms ±5%	OPEN
1.2K ohms ±5%	CLOSE
510 ohms ±5%	STOP

The OPEN function will operate the motor in the *open* direction as set by the OPEN mode, while the CLOSE function operates the motor in the *closed* direction as set by the CLOSE mode. The LATCH function will maintain the previously selected function; this allows momentary switches to be used for the OPEN and CLOSE functions. The OFF and STOP functions turn the motor off, which also unlatches the OPEN or CLOSE functions.

Note that the OPEN and CLOSE functions may work in reverse until the *open* and *closed* positions are set by the OPEN and CLOSE modes. The DHC-100 will automatically turn the motor off when the *open* or *closed* positions are reached. However, if a feedback fault occurs (see FAULT INDICATOR), the motor will be turned on for a period of 15 minutes in the selected direction. For this reason, limit switches should be used when using the OVERRIDE mode, and should be set to a position acceptable for the application. The 15 minute period can also be terminated using the OFF or STOP function.

The motor is also turned off if the DHC-100 detects a stall (see STALL DETECTION). An OPEN or CLOSE operation can be attempted again after switching to the OFF, LATCH, or STOP functions first.

### 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), 2V (for 2-10V 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 5V, 10V, 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, 2-10V, or 4-20mA command, the command signal should be connected to the appropriate pin on J2. 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.

### **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. Whether the actuator moves toward the *open* or *closed* position depends on which motor wire is connected to J1-1 and J1-3.

The FB 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.

### **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-400 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, 2V, 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 associate a command signal input of 5V, 10V, 20mA, or 100% to the *open* position.

### **Auxiliary Close Output**

The AUX CLOSE OUTPUT function is used to set an optional output setting that is associated with the *closed* position - an appropriate relay option module is required to use this output. The adjust buttons are used to set the actuator to a desired position. Whenever the actuator position falls between the defined *closed* position and the Aux Close position, the Aux Close Output indicator will flash. Additionally, the DHC-100 will turn on a relay output on the optional relay module - the output can be used to drive an alarm or merely act as an auxiliary limit switch. Relay is rated for 1 amp @ 24VDC or .5 amp @ 115VAC.

Upon selecting the AUX CLOSE OUTPUT function, the DHC-100 will begin moving the actuator to the previously set position. It is not necessary to make an adjustment if the unit has been previously set to the desired position.

### **Auxiliary Open Output**

The AUX OPEN OUTPUT function is used to set an optional output setting that is associated with the *open* position - an appropriate relay option module is required to use this output. The adjust buttons are used to set the actuator to a desired position. Whenever the actuator position falls between the defined *open* position and the Aux Open position, the Aux Open Output indicator will flash. Additionally, the DHC-100 will turn on a relay output on the optional relay module - the output can be used to drive an alarm or merely act as an auxiliary limit switch. Relay is rated for 1 amp @ 24VDC or .5 amp @ 115VAC.

Upon selecting the AUX OPEN OUTPUT function, the DHC-100 will begin moving the actuator to the previously set position. It is not necessary to make an adjustment if the unit has been previously set to the desired 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, 2-10V, 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 (▲ and ▼) 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, 2-10V, 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 (for 1-5V input), 1.5V (for 2-10V input), or 3mA, or if the input is connected backwards. An out of range condition is detected whenever the input becomes greater than 5.25V (for 1-5V input), 10.5V (for 2-10V input), or 21mA. If the DHC-100 detects a loss of command, a fault will be indicated (see FAULT INDICATORS), 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 ▲ and ▼ 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 TYPE), the MODE button will not select the LOSS OF COMMAND function. However, the DHC-100 can detect when a 0-5V or 0-10V command signal is out of range (i.e., greater than 5.25V or greater than 10.5V), or connected backwards. When an out of range condition is detected for a 0-5V or 0-10V input, the motor is turned off (leaving the actuator in its "last position") and a fault will be indicated (see FAULT INDICATORS).

## Position Out Cal

The POSITION OUT CAL function is used to calibrate an optional feedback transmitter output. An appropriate transmitter option module is required to use this feature. When the POSITION OUT CAL function is first selected (by pressing the MODE button while in the LOSS OF COMMAND function), the CLOSE indicator will flash, and the voltage or current associated with the *closed* position will appear at the option module output. If desired, the output can be adjusted (using the adjust buttons ▲ and ▼) to any value from 0-10V (for a voltage output) or 4 to 20mA (for a current output). The new setting is then saved when the MODE button is pressed.

Pressing the MODE button again will leave the unit in the POSITION OUT CAL function except that the OPEN indicator will flash, and the output voltage or current associated with the *open* position will appear at the option module output. Like the *closed* setting, the output can be adjusted to any voltage (from 0-10V) or current (from 4-20mA), and the new setting is then associated with the *open* position.

**Fault Indicators**

The DHC-100 detects various fault conditions that prohibit the unit from controlling the actuator. A combination of the three Fault indicators (red, yellow, and green) will turn on or flash to indicate a specific detected fault. If an appropriate relay option module is installed, the Fault relay output on the option module will turn off (indicating a fault) when any of the Fault indicators turn on or flash. A communications option module can also read the specific conditions causing a fault. Note that a fault condition DOES NOT disable the motor outputs when manually controlling the actuator with the adjust buttons; while useful in troubleshooting, care should be exercised when operating the motor under a fault condition. The OVERRIDE mode can also operate the motor when a fault condition exists – see OVERRIDE MODE for details.

Note that the indicators may not indicate ALL the fault conditions that may exist. This means that when the indicated fault is corrected, the unit may display another fault that has not been corrected. The table below provides a summary of the Fault indications which is followed by a description of each fault.

<b>RED</b>	<b>YEL</b>	<b>GRN</b>	<b>FAULT</b>
ON	flash	OFF	Motor 1 No Motion (stall)
ON	OFF	flash	Motor 2 No Motion (stall)
On	flash	flash	Double No Motion (stall)
OFF	OFF	flash	Feedback Alarm
OFF	flash	OFF	Loss of Command
OFF	ON	OFF	Command out of Range
OFF	flash	flash	Feedback Alarm and Loss of Command
OFF	ON	flash	Feedback Alarm and Command out of Range

**Motor 1 No Motion (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 No Motion (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).

### **Double No Motion (stall)**

If the DHC-100 detects no actuator motion in either direction, both motor outputs will be disabled. The command signal cannot clear this condition; only manual operation or a mechanical override can clear the fault. Alternatively, the DHC-100 can be powered off and then on to temporarily clear the fault; however, this practice should be avoided without permanently correcting the cause of such a fault.

### **Feedback Alarm**

A fault condition is detected whenever the feedback signal is out of range (that is, less than 5% of 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.

### **Loss of Command**

If the command signal is disconnected, the fault indication will remain on until the signal is reconnected. See LOSS OF COMMAND for details.

### **Command Out of Range**

If the command signal goes out of range, the fault indication will remain on until the signal is back in range. See LOSS OF COMMAND for details.

### **Stall Detection Feature**

The **Stall Detection** feature of the DHC-100 (see FAULT INDICATORS) essentially performs a similar function as commonly used torque switches; however, the differences should be considered before eliminating torque switches. The DHC-100 feature does not measure torque, but rather motion; if the load is sensitive to excessive torque, the torque switches may be desirable. Since common torque switches are mechanical devices, they can provide a fail safe feature in the event of electrical failures (such as shorted wires or damage to the DHC-100).

The **Stall Detection** feature is useful for detecting when any of the motor wires become disconnected. However, limit switches employed in actuators essentially disconnect one of the motor windings. The DHC-100 will detect this as a motor

stall. To avoid this condition, the limit switches must be set outside of the operating range set by the CLOSE and OPEN functions.

### **Electronic Brake Feature**

The **Electronic Brake** feature of the DHC-100 provides highly reliable and accurate braking of the motor, and it is a key element in achieving high resolution. A mechanical brake can still be implemented without interfering with the DHC-100 operation. A mechanical brake can still be implemented without interfering with the DHC-100 operation. Mechanical brakes can be useful for providing a holding brake in the event power to the actuator is lost.

Since the **Electronic Brake** feature provides the primary braking of the motor, the life of a mechanical brake is dramatically extended. Additionally, the **Adaptive Control** feature of the DHC-100 automatically compensates for changes in the mechanical brake's performance due to temperature or age.

Note that the actuators limit switches should be set outside of the operating range set by CLOSE and OPEN functions. The **Electronic Brake** feature degrades in performance if a limit switch is engaged. Limit switches exhibit wide variations, and the DHC-100 can position the actuator more precisely at *closed* and *open* than the limit switches. A limit switch serves better as a fail safe device to protect against electrical failures in the actuator.

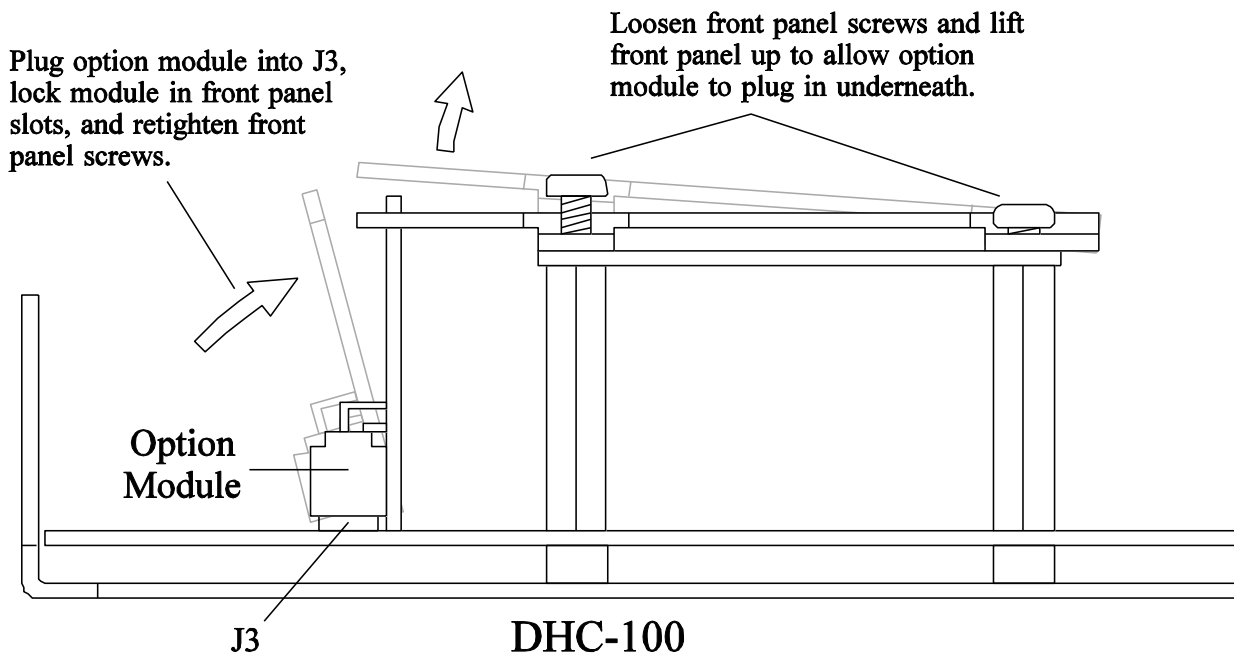
### **Duty Cycle Control**

The **Duty Cycle Control** feature of the DHC-100 allows actuators rated at 25% duty or more to be safely used in automated valve applications. The DHC-100 accurately monitors the relative heating of the motor and automatically duty cycles the unit at a safe level when a process becomes unstable, or if a control loop is not properly set. While the thermal switch in the motor protects the motor from overheating, thermal switches can shut down the actuator for ten minutes or more. Further, typical thermal switches do not activate until temperatures inside the actuator become too high for other components in the actuator.

The **Duty Cycle Control** feature allows continuous operation of the motor until it detects an excess heat buildup in the motor (usually well below the limit of the thermal switch). At that time, duty cycle operation is automatically enabled and continues until the motor cools enough to resume continuous operation. The duty cycle period is approximately 2 seconds with an on time that automatically varies depending on the heating of the motor. While this operation slows down the actuator's operation, it does not impact the resolution performance of the DHC-100, and it prevents disruption of a process due to a thermal switch shutdown.

## Option Modules

Various option modules can be plugged into the DHC-100 option module connector, J3. Option modules provide additional features such as position feedback signals, auxiliary switch outputs, or digital communications. Contact the factory for the latest available modules. Refer to the diagram below for instructions on installing an option module.



**Series 92 Options Codes for Serial # Tags**

M2	2 extra limit switches
HT	Heater & thermostat
P	Feedback potentiometer
C1	4-20 mA Positioner
M	Mechanical brake
C3	4-20mA Output Transducer
XW	UL1203 ExProof Enclosure

Example 1: S92**HTPW**  
 NEMA Type 4X enclosure, heater & thermostat and feedback potentiometer installed.

Example 2: **AM92C1XW**  
 UL1203 Explosion Proof enclosure, mechanical brake and 4-20mA positioner installed.

**Specifications**

**DHC-100 Specs**

**POWER REQUIREMENTS**

DHC-100: 117VAC  $\pm 10\%$ , 50/60 Hz  
 DHC-100A: 234VAC  $\pm 10\%$ , 50/60 Hz  
 DHC-100B: 24VAC  $\pm 10\%$ , 50/60 Hz  
 12 VA typical (not including output load)  
 Fuse Type: 6.3A TR5 Time delay (replaceable)

**COMMAND SIGNAL INPUT**

Input Impedance  
     20K ohms (VOLTAGE COMMAND (+) Input)  
     251 ohms  $\pm 1\%$  (4-20 mA CMD (+) Input)  
 Loss of Command threshold  
     < 0.75V (1-5 VDC input)  
     < 1.5V (2-10VDC input)  
     < 3mA (4-20mA input)  
 Command Out of Range Threshold  
     >5.24V (0-5VDC, 1-5VDC input)  
     >10.5V (0-10VDC, 2-10VDC input)  
 >21mA (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): 100mA maximum (not including option module)

+5V OUT (J2-7): 20mA maximum

**NOTE:** *Do not* connect these outputs to other power supplies.

### **AC MOTOR OUTPUTS**

Off-state Leakage Current: <15mA

Maximum Load Current @ 150°F: 5A

### **ENVIRONMENTAL**

Operating Temperature Range: 32 °F to 150 °F

Storage Temperature Range: -40 °F to 185 °F

Relative Humidity Range: 0 to 90 % (noncondensing)

## **Series 92 Specs**

### **MOTOR**

Brushless Capacitor Run

CE Compliant AC Motors

### **GEAR TRAIN**

Permanently Lubricated

Rockwell Hardened

### **MOUNTING CONFIGURATION**

ISO Bolt circle (F07)

ISO Output Drive: 17mm

### **MANUAL OVERRIDE**

Fully De-clutchable

### **ENCLOSURE**

NEMA Type 4X, or optional Hazardous Locations

Stainless Steel Trim

2 (Two) ½" FNPT Conduit Entries

### **POSITION INDICATION**

Beacon Position Indicator

### **TEMPERATURE**

150° F maximum Ambient Temperature


### Troubleshooting

PROBLEM	POSSIBLE CAUSES	REMEDIES
No response from unit, and no response from the adjust (▲ and ▼) or Mode buttons. (Manual/FB POT CAL light is lit solid)	Jumper wire on J-7 terminal block is missing.	Install jumper wire on J-7 terminal block.
	Auto/Manual station is improperly wired.	Check wiring on Auto/Manual station: see "Override Mode" in manual.
Actuator rotates valve backwards	Actuator or valve is mounted incorrectly on coupling.	Remount actuator as necessary.
	Actuator needs to be reverse acting.	Refer to "Close" and "Open" modes in manual.
Actuator does not respond to input signal (all FAULT indicators off)	Closed and open positions are set to the same position.	Set "Close" and "Open" positions; refer to "Close" and "Open" modes in manual.
Motor 1 or 2 No Motion (Stall) FAULT indicators flash after actuator reaches the fully closed or open position.	Closed or open switches set inside of the operating range.	Adjust limit switch cams; refer to "Close" and "Open" modes in manual.
	Torque switches trip due to mechanical end stops set inside the operating range.	Adjust mechanical end stops; refer to "Close" and "Open" modes in manual.
AUX CLOSE OUTPUT or AUX OPEN OUTPUT indicators flash,  If an OTR-100 or OTR-101 option module is not installed, no remedy is required.	Actuator position is near closed or open.	If an OTR-100 or OTR-101 option module is installed, set AUX Close and AUX Open positions; refer to "AUX Close Output" and "AUX Open Output modes in manual".
Actuator hunts for position	Sloppy gear tooth engagement.	Adjust feedback potentiometer gears for tight engagement.
	No motor brake or brake slipping.	Install or repair motor brake.
	Unstable command input signal from PID control loop.	Adjust PID parameters for stable command signal.



PROBLEM	POSSIBLE CAUSES	REMEDIES
<p>Triac output failure (motor buzzes and overheats)</p> <p>Perform appropriate remedy, then <u>replace</u> the unit.</p>	<p>Exposure to water from conduit entrance.</p> <p>Exposure to water from unsealed actuator housing.</p> <p>Exposure to moisture from condensate.</p> <p>Corrosion from exposure to salts or acids.</p> <p>External power applied to motor connections at J1-1 or J1-3.</p> <p>Motor capacitor defective, or has incorrect voltage rating.</p> <p>Lightning or power surge.</p>	<p>Install drip loop at conduit entrance.</p> <p>Inspect and/or replace actuator housing gasket; use actuator with proper sealing.</p> <p>Use heater and thermostat and/or desiccant packets.</p> <p>Use corrosion inhibitors and desiccant packages.</p> <p>Remove connector J1 prior to applying external power.</p> <p>Replace motor capacitor.</p> <p>Replace unit.</p>

### ATEX Requirements

 II 2 G  
Ex d IIB T4

### **Service/Maintenance/Inspection Requirements Translation Requirements**

Above directive for hazardous location service electric actuators, for use throughout the European Union.

All electric actuators are to be used for remote operation of a valve to open or closed positions. Any other uses are not approved by Asahi/America, Inc.

Every 250,000 cycles or 10 years whichever comes first, the actuator must be removed from service and sent back to Asahi/America, Inc. for inspection of wear of bearings as they relate to joints and gaps in accordance with above directive. Any units not within normal tolerances will need to be re-built or replaced at the user's expense.

Translations are in effect for the Atex product. If the ATEX actuator is to be used in any 1 of the 26 EU countries where English is not the primary language, it is

the responsibility of the furnishing distributor to provide translated copies of this O & M manual

## Maintenance

### **Disconnect power!**



### ***NEVER REMOVE ACTUATOR COVER WHILE CIRCUITS ARE LIVE!***

**CAUTION:** It is imperative for reducing the chance of electrical shock, and to prevent ignition of hazardous atmospheres that you

### **Disconnect power**

**before** any maintenance or repairs are performed.

Series 92 actuators are virtually maintenance free. We do however, recommend that periodic checks are made to ensure that all fasteners are tight and properly torqued to extend the life of the actuator and valve.

Series 92 Actuators are manufactured with factory lubricated grease in the gear case and gearbox. In most cases, this lubricant should never have to be replenished, however if deemed necessary, we recommend using Aeroshell Grease #17, mfg. by Shell Oil Co.

Consult our technical department before replenishing lubricant.

For outdoor or wet locations keep top and bottom seals coated with a silicone based grease.

## Spare Parts

### **Reference Drawing #289S92**

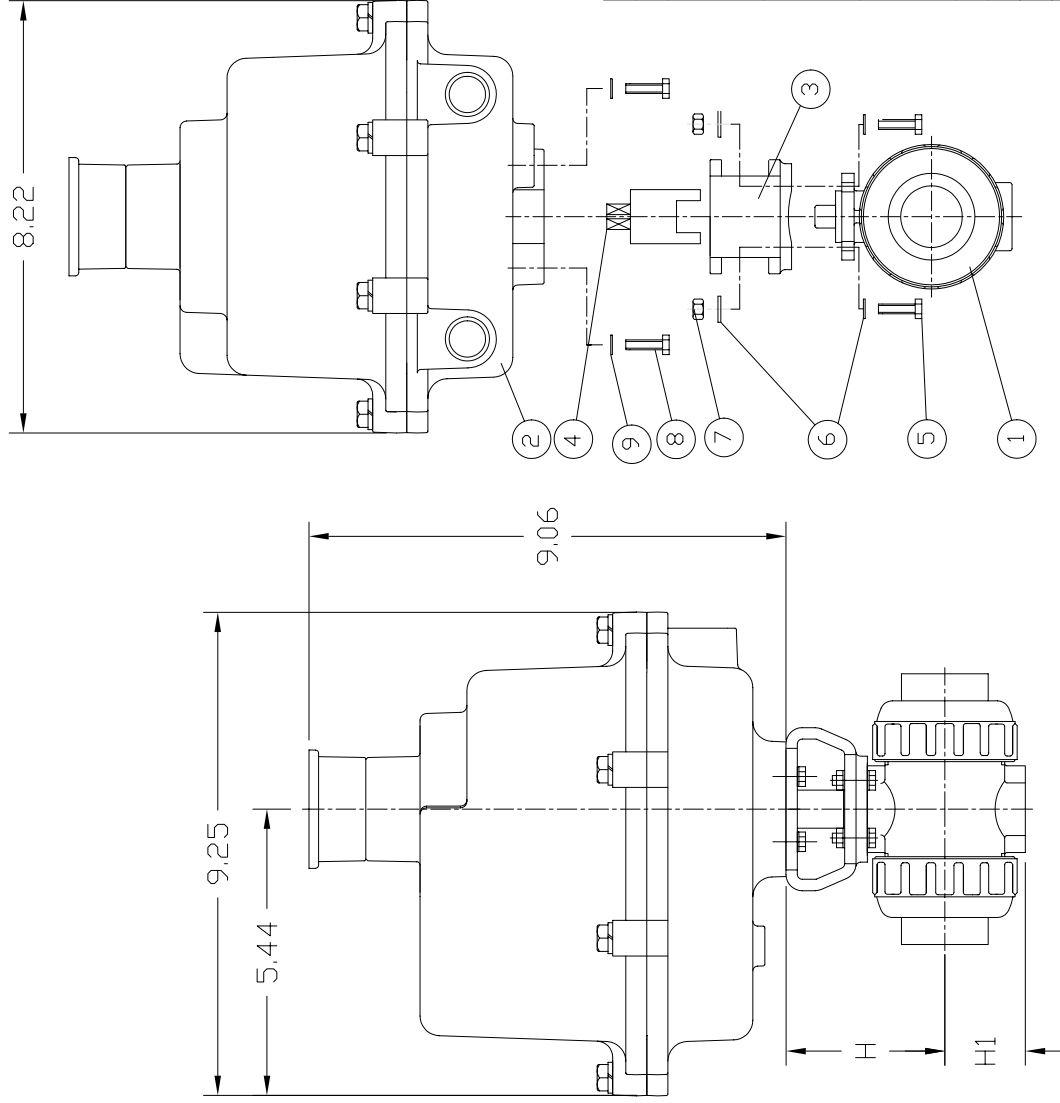
We recommend that the following be kept on hand as spare parts.

- 1 --- Limit Switch (Part #25)
- 1 --- Capacitor (Part #27 or #28)

**NOTE:** When ordering replacement motor parts and/or options specify model number, serial number, and supply voltage.

### **Attachments:**

8 drawings: 0107BV, 0113BV, 0130BV, 0168BF,  
0200BF, 289S92, M00EL381, M00EL382



UNIT: INCH

VALVE SIZE	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
H	2.76	3.01	3.29	3.64	3.98	4.43
H1	1.14	1.38	1.54	1.85	2.17	2.60

NOTE: The shape and appearance of assembly differ a little with nominal size compared to this drawing.

ITEM	DESCRIPTION	MATERIAL	QTY
9	FLAT WASHER (M8.0)	STAINLESS STEEL	4
8	BOLT (M8.0x1.25-16LG)	STAINLESS STEEL	4
7	NUT (FOR 1/2" THRU 1-1/4" : M5.0x8) (FOR 1-1/2" THRU 2" : M6.0x1)	STAINLESS STEEL	4
6	FLAT WASHER (FOR 1/2" THRU 1-1/4" : M5.0) (FOR 1-1/2" THRU 2" : M6.0)	STAINLESS STEEL	8
5	BOLT (FOR 1/2" THRU 1-1/4" : M5.0x8-16LG) (FOR 1-1/2" THRU 2" : M6.0x1-20LG)	STAINLESS STEEL	4
4	COUPLING	STAINLESS STEEL 303	1
3	MOUNTING BRACKET	PPG	1
2	ACTUATOR SERIES 92	EPOXY COATED ALUMINUM	1
1	BALL VALVE TYPE 21	PVC,CPVC,PP,PVDF	1

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NAME	DATE
DR DAN CAMERON	8/02/01
APPD DAVE HURLEY	8/2/01
PROD LEO LESTER	8/2/01
WO#/CO#	
FILE	

**ASAHI/AMERICA**

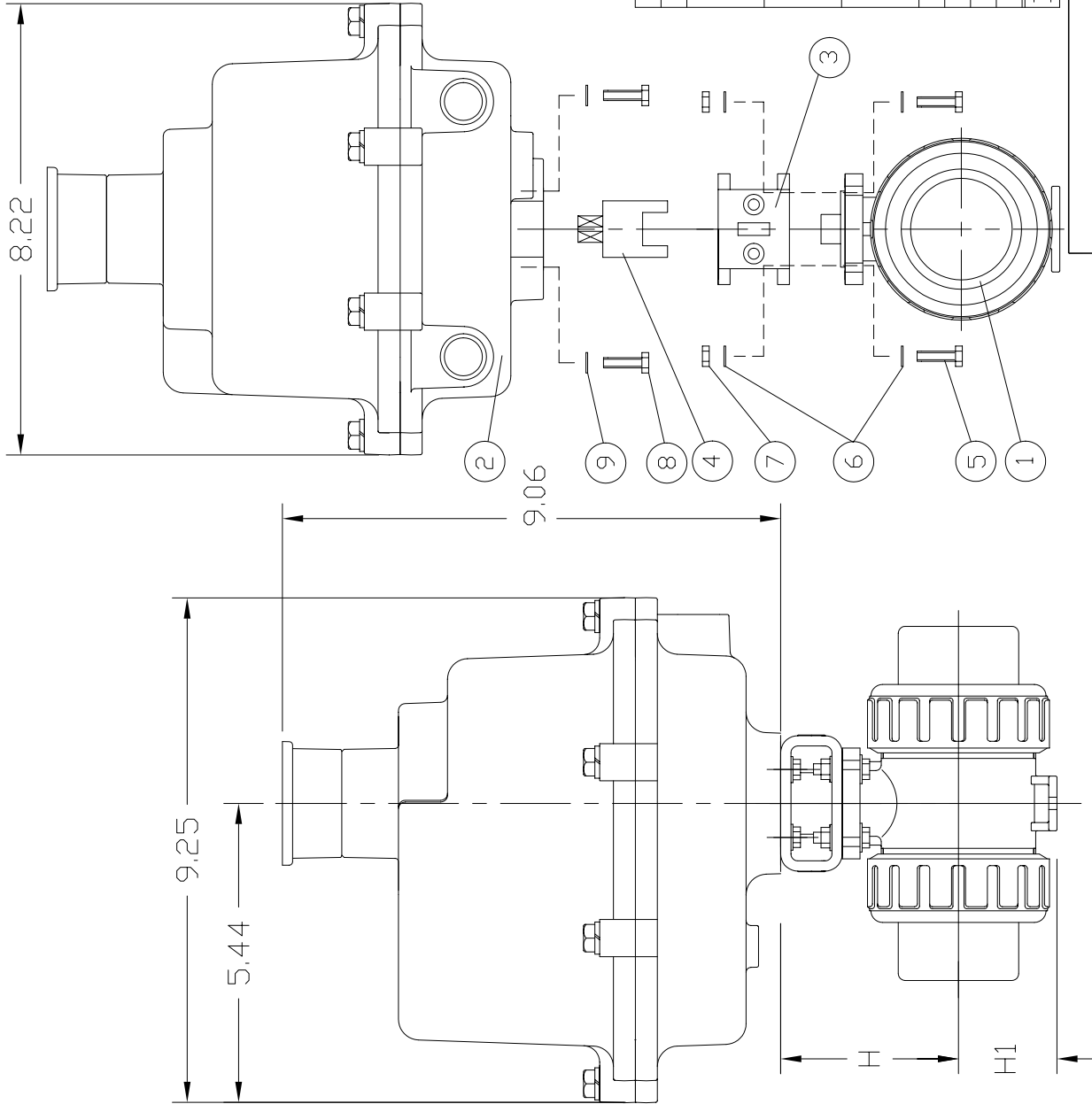


ISO 9001 CERTIFIED  
35 GREEN STREET, P.O. BOX 653, MALDEN, MA.

BALL VALVE TYPE21  
SERIES92 ELECTRIC ACTUATOR  
1/2" THRU 2"

SIZE	A	DWG. NO.	0107BV	REV	A
SCALE	NTS	SHEET	1	OF	1

**FOR REFERENCE ONLY**  
**ASAHI/AMERICA**



UNIT: INCH

VALVE SIZE	2-1/2"	3"	4"
H	5.12	5.47	6.97
H1	2.83	3.35	4.33

NOTE. The shape and appearance of assembly differ a little with nominal size compared to this drawing.

ITEM	DESCRIPTION	MATERIAL	QTY
9	FLAT WASHER (M8.0)	STAINLESS STEEL	4
8	BOLT (M8.0x1.25-16LG)	STAINLESS STEEL	4
7	NUT (FOR 2-1/2" AND 3" : M8.0x1.25) (FOR 4" : M10.0x1.50)	STAINLESS STEEL	4
6	FLAT WASHER (FOR 2-1/2" AND 3" : M8.0) (FOR 4" : M10.0)	STAINLESS STEEL	8
5	BOLT (FOR 2-1/2" AND 3" : M8.0x1.25-35LG) (FOR 4" : M10.0x1.50-40LG)	STAINLESS STEEL	4
4	COUPLING	STAINLESS STEEL 303	1
3	MOUNTING BRACKET	PPG	1
2	ACTUATOR SERIES 92	EPOXY COATED ALUMINUM	1
1	BALL VALVE TYPE 21	PVC,CPVC,PP,PVDF	1

**ASAHI/AMERICA**  
 ISO 9001 CERTIFIED  
 35 GREEN STREET, P.O. BOX 653, MALDEN, MA.

BALL VALVE TYPE21  
 SERIES92 ELECTRIC ACTUATOR  
 2-1/2" THRU 4"

SIZE	A	DWG. NO.	0113BV	REV	A
SCALE	NTS	SHEET 1	OF 1		

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NAME	DATE
DR KENICHI MIYAZAKI	8/14/01
APPD DAVE HURLEY	8/14/01
PROD LED LESTER	8/14/01
WO#/CO#	
FILE	

**FOR REFERENCE ONLY**  
**ASAHI/AMERICA**

DIMENSIONS TABLE

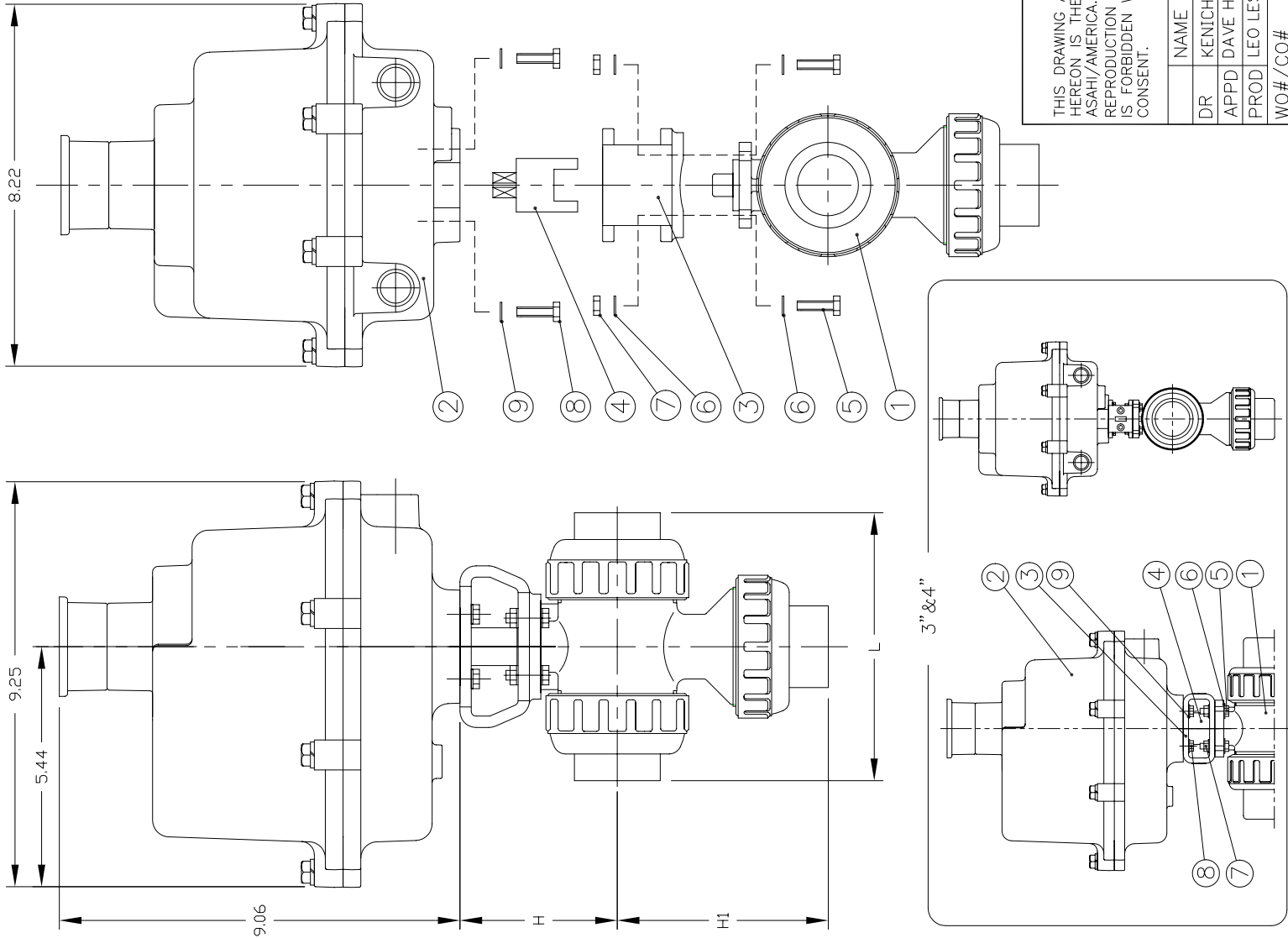
UNIT: inch

NOMINAL SIZE	FLANGED			THREADED			SOCKET			SPOOT (BUTT END)			
	H	H1	L	H1	L	L	PVC, CPVC	PP, PVDF	(DIN)		PP, PVDF	(IPS)	
1/2" 15mm	2.76	3.70	5.63	2.89	4.02	3.08	4.45	2.80	3.90	3.09	4.45	3.27	4.88
3/4	3.01	4.50	6.77	3.48	4.72	3.56	5.08	3.27	4.49	3.61	5.08	3.90	5.67
1	3.29	5.24	7.36	4.13	5.16	4.32	5.75	3.94	4.84	4.37	5.75	4.53	6.06
1 1/2	3.98	6.50	8.35	5.53	6.42	5.71	7.24	5.16	5.83	5.85	7.24	6.02	6.85
2	4.43	7.34	9.21	6.61	7.76	6.66	8.23	6.06	6.93	6.76	8.23	7.01	8.82
3	5.47	10.06	11.97	9.25	10.39	9.59	11.10	8.82	9.88	11.10	11.10	9.69	11.61
4	6.97	12.01	14.65	11.77	14.17	11.58	13.90	10.98	12.20	14.37	14.37	11.85	12.72

NOTE; 1) THE SHAPE AND APPEARANCE OF ASSEMBLY DIFFER A LITTLE WITH NOMINAL SIZE COMPARED TO THIS DRAWING.

2) FOR DETAILED VALVE DIMENSIONS, REFER TO DWG. NO. 0126BV, 0127BV, 0128BV. L-PORT : DWG. NO. 0126BV DOUBLE L-PORT : DWG. NO. 0127BV CROSS PORT : DWG. NO. 0128BV

FOR REFERENCE ONLY  
ASAHI/AMERICA



ITEM	DESCRIPTION	MATERIAL	QTY
9	FLAT WASHER (M6.0)	STAINLESS STEEL	4
8	BOLT (M6.0x1-16LG)	STAINLESS STEEL	4
7	NUT (FOR 1/2" THRU 1-1/4" : M5.0x8) (FOR 1-1/2" THRU 2" : M6.0x1) (FOR 3" : M8.0x1.25) (FOR 4" : M10.0x1.50)	STAINLESS STEEL	4
6	FLAT WASHER (FOR 1/2" THRU 1-1/4" : M5.0) (FOR 1-1/2" THRU 2" : M6.0) (FOR 3" : M8.0) (FOR 4" : M10.0)	STAINLESS STEEL	8
5	BOLT (FOR 1/2" THRU 1" : M5.0x8-16LG) (FOR 1-1/2" THRU 2" : M6.0x1-20LG) (FOR 3" : M8.0x1.25-35LG) (FOR 4" : M10.0x1.50-40LG)	STAINLESS STEEL	4
4	COUPLING	STAINLESS STEEL 303	1
3	MOUNTING BRACKET	PPG	1
2	ACTUATOR SERIES 92	ZYTEL	1
1	MULTI-PORT BALL VALVE TYPE23	PVC, CPVC, PP, PVDF	1

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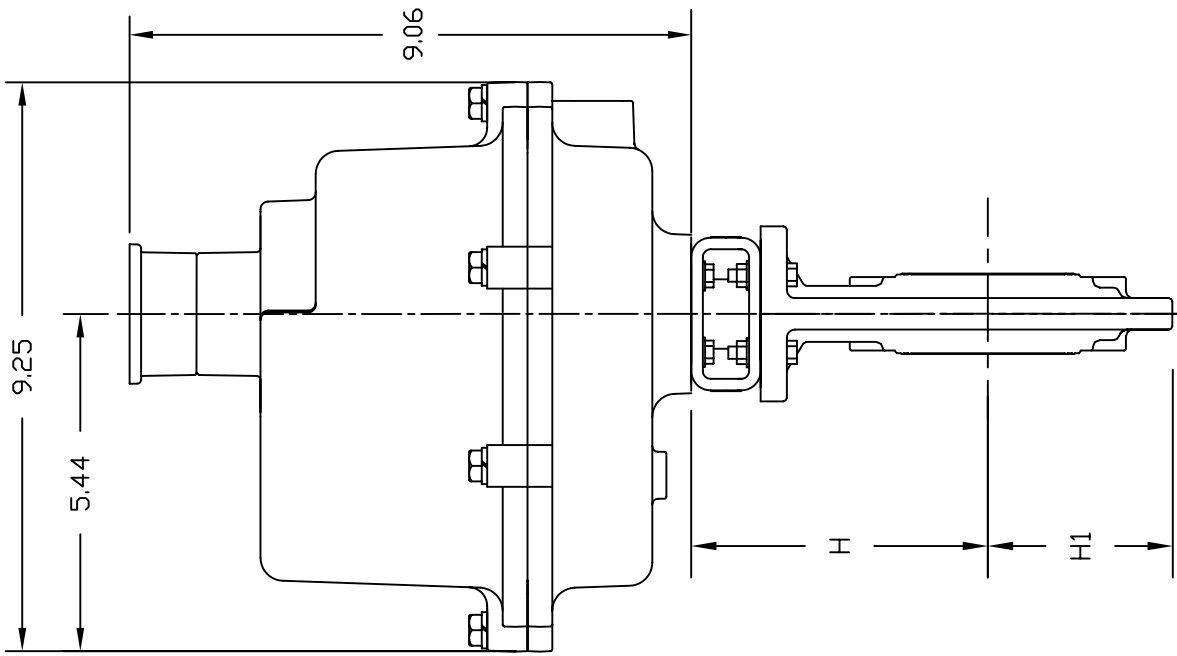
NAME	DATE
DR KENICHI MIYAZAKI	1/28/03
APPD DAVE HURLEY	1/28/03
PROD LEO LESTER	1/28/03
WO#/CO#	
FILE	

**ASAHI/AMERICA**  
ISO 9001 CERTIFIED  
35 GREEN STREET, P.O. BOX 653, MALDEN, MA.



MULTI PORT BALL VALVE  
TYPE23 WITH SERIES92 ACT.  
1/2" THRU 4"

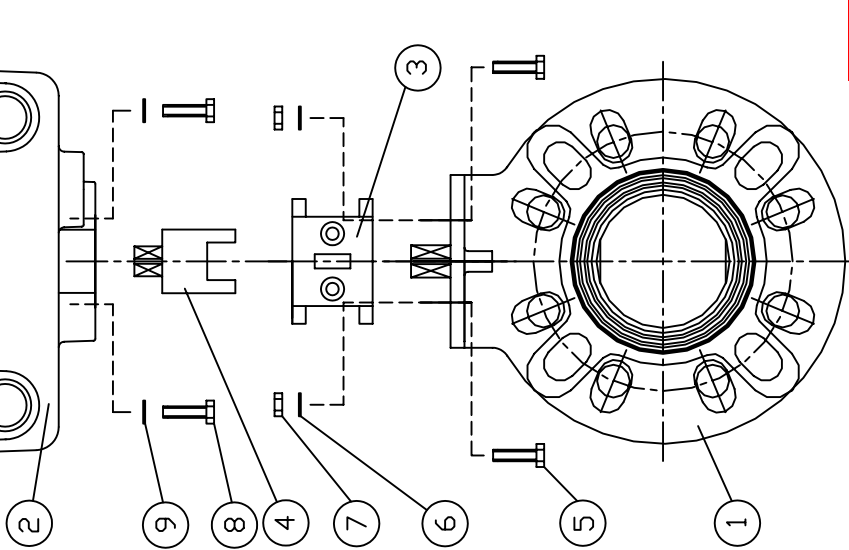
SIZE	DWG. NO.	REV
A	0130BV	A
SCALE	NTS	SHEET 1 OF 1



UNIT: INCH

VALVE SIZE	1-1/2"	2"	2-1/2"	3"	4"	5"	6"
H	5.51	5.75	6.18	6.46	7.16	8.46	8.97
H1	2.95	3.27	3.66	3.94	4.53	5.00	5.63

NOTE: 1. The shape and appearance of assembly differ a little with nominal size compared to this drawing.  
 2. For 1-1/2" thru. 4" Mounting Bracket : F7 x F05,F07  
 For 5" and 6" Mounting Bracket : F10 x F07,F10



ITEM	DESCRIPTION	MATERIAL	QTY
9	FLAT WASHER (M8.0)	STAINLESS STEEL	4
8	BOLT (M8.0x1.25-16LG)	STAINLESS STEEL	4
7	NUT (FOR 1-1/2" THRU. 4" : M8.0x1.25) (FOR 5" AND 6" : M10.0x1.50)	STAINLESS STEEL	4
6	FLAT WASHER (FOR 1-1/2" THRU. 4" : M8.0) (FOR 5" AND 6" : M10.0)	STAINLESS STEEL	8
5	BOLT (FOR 1-1/2" THRU. 4" : M8.0x1.25-35LG) (FOR 5" AND 6" : M10.0x1.50-40LG)	STAINLESS STEEL	4
4	COUPLING	STAINLESS STEEL 303	1
3	MOUNTING BRACKET	PPG	1
2	ACTUATOR SERIES 92	EPOXY COATED ALUMINUM	1
1	BUTTERFLY VALVE TYPE 57	U-PVC,PP,PVDF	1

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NAME	DATE
DR JOHN GLASSFORD	6/13/05
APPD DAVE HURLEY	6/13/05
PROD LEO LESTER	6/13/05
WO#/CO#	
FILE	

**ASAHI/AMERICA**  
 ISO 9001 CERTIFIED  
 35 GREEN STREET, P.O. BOX 653, MALDEN, MA.



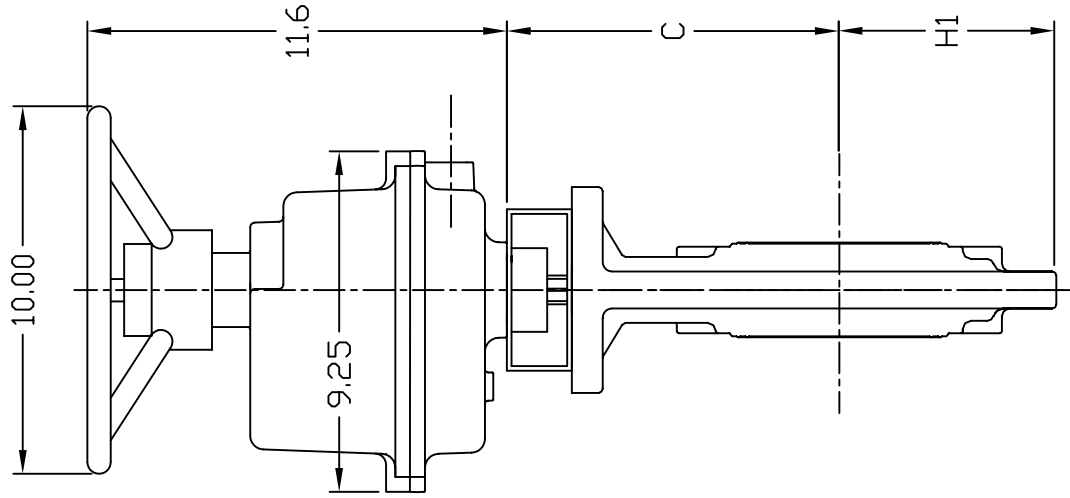
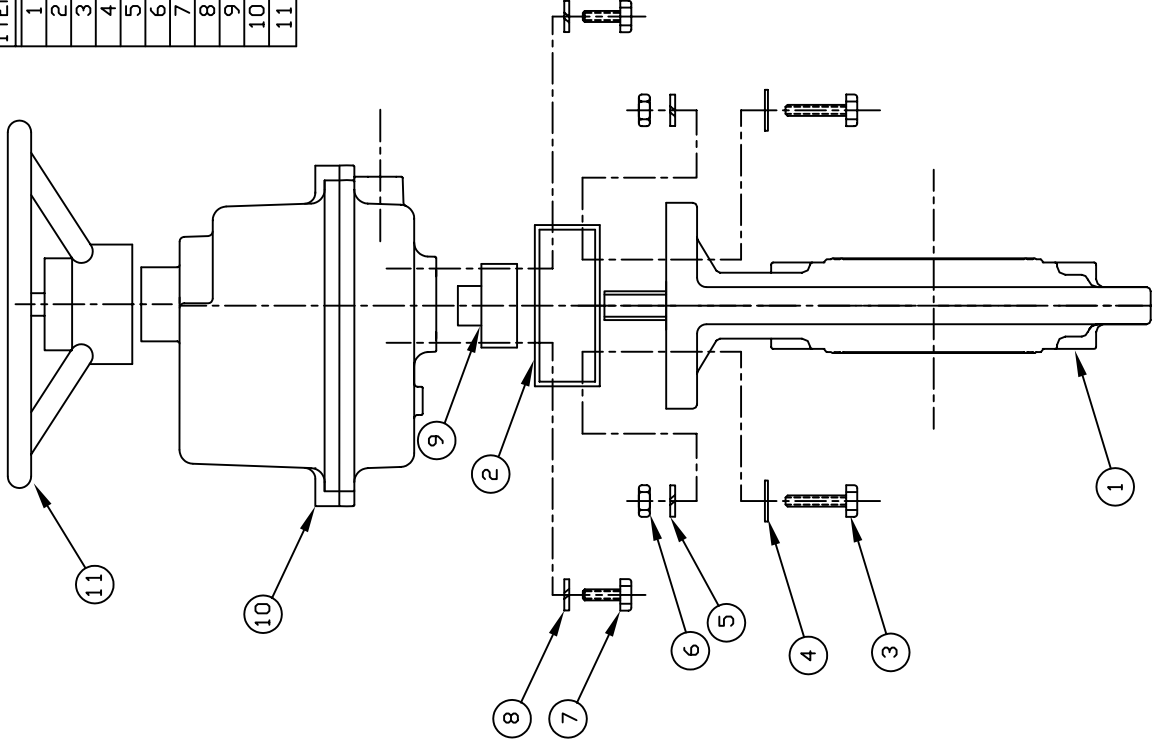
BUTTERFLY VALVE TYPE57  
 SERIES92 ELECTRIC ACTUATOR  
 1-1/2" THRU 6"

SIZE	A	DWG. NO.	0200BF57	REV	A
SCALE	NTS	SHEET 1	OF 1		

**FOR REFERENCE ONLY  
 ASAHI/AMERICA**

VALVE SIZE	H1	C
1 1/2"	3.74	5.00
2"	3.86	5.00
2 1/2"	3.66	5.58
3"	3.94	5.78
4"	4.53	6.56
5"	5.00	8.05
6"	5.63	8.76
8"	6.70	11.25

ITEM	DESCRIPTION	MATERIAL	QTY
1	BUTTERFLY VALVE		1
2	BRACKET MOUNTING	300 SS	1
3	SCREW	300 SS	4
4	WASHER FLAT	300 SS	4
5	WASHER LOCK	300 SS	4
6	NUT HEX	300 SS	4
7	SCREW	300 SS	4
8	WASHER LOCK	300 SS	4
9	SHAFT ADAPTER	300 SS	1
10	ACTUATOR	ALUM. EPOXY COATED	1
11	HANDWHEEL	ALUM. EPOXY COATED	1



**FOR REFERENCE ONLY**  
**ASAHI/AMERICA**

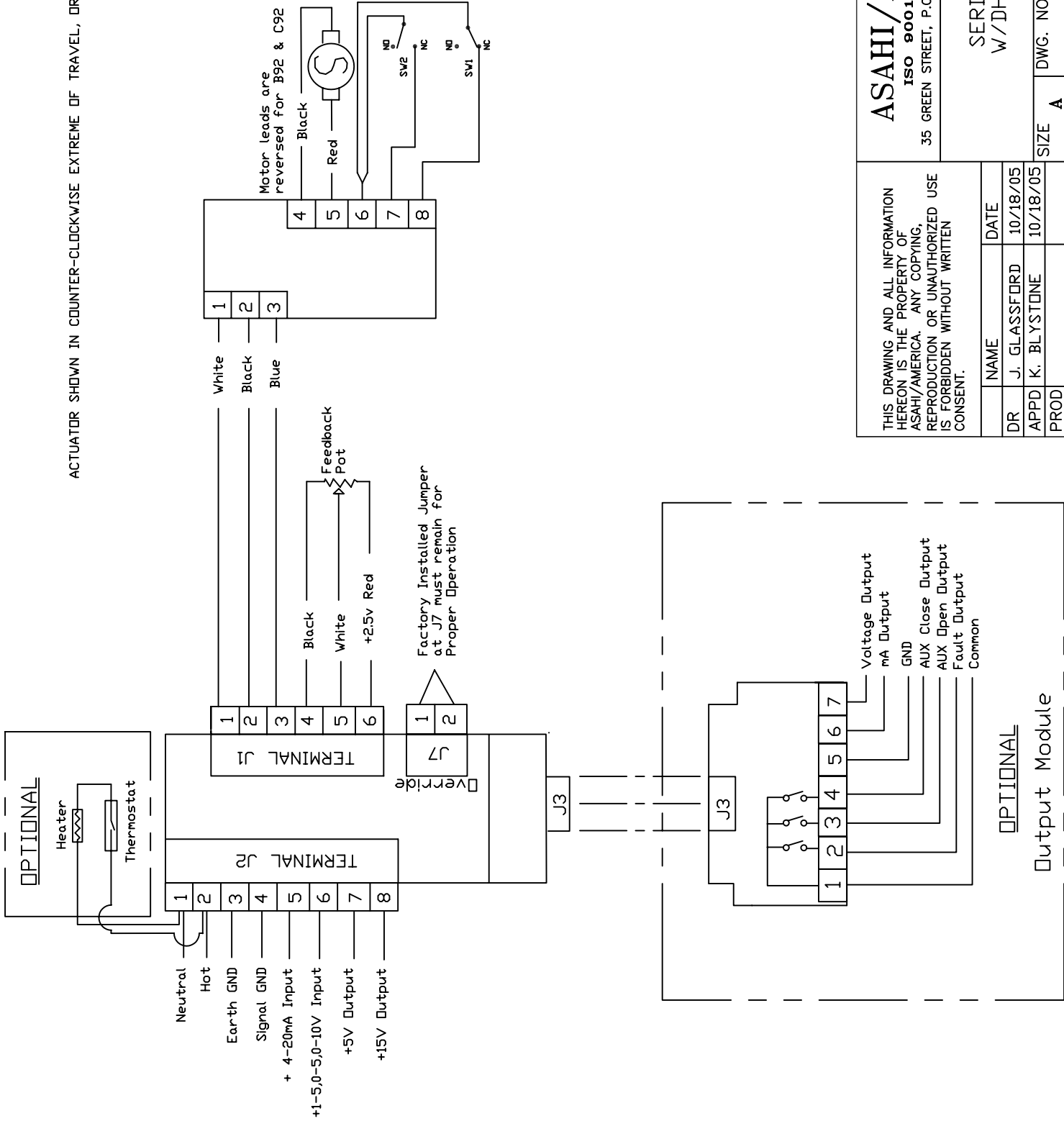
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NAME	DATE
DR JOHN GLASSFORD	6/10/05
APPD DAVE HURLEY	6/10/05
PROD LEO LESTER	6/10/05
PATH	
WO#/CO#	

**ASAHI/AMERICA**  
ISO 9001 CERTIFIED  
35 GREEN STREET, P.O. BOX 653, MALDEN, MA.

TYPE57 BF VALVE SERIES	
92 2000 IN/LB ELECTRIC ACT	
SIZE A	DWG. NO. 0168BF57
REV A	
SCALE NINE	SHEET 1 OF 1

ACTUATOR SHOWN IN COUNTER-CLOCKWISE EXTREME OF TRAVEL, OR 'OPEN' POSITION



**ASAHI/AMERICA**

ISO 9001 CERTIFIED

35 GREEN STREET, P.O. BOX 653, MALDEN, MA.



SERIES 92/94 24VAC  
W/DHC-100 POSITIONER

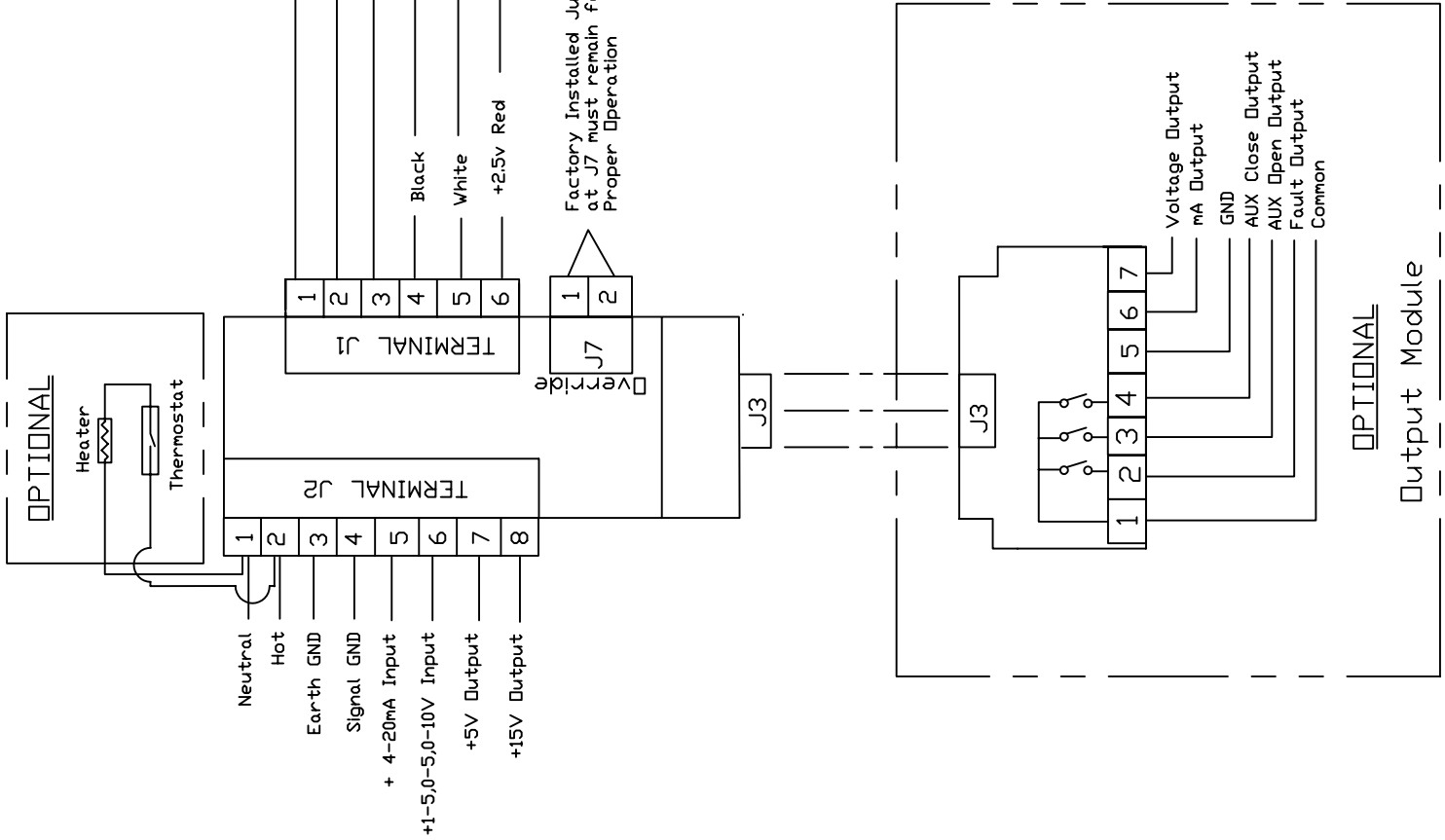
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NAME	DATE
DR J. GLASSFORD	10/18/05
APPD K. BLYSTONE	10/18/05
PROD	
WO#/SO#	
FILE	

SIZE	A	DWG. NO.	M00EL382	REV	A
SCALE	NTS	SHEET 1	OF	1	



ACTUATOR SHOWN IN COUNTER-CLOCKWISE EXTREME OF TRAVEL, OR 'OPEN' POSITION



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 35 GREEN STREET, P.O. BOX 653, MALDEN, MA.

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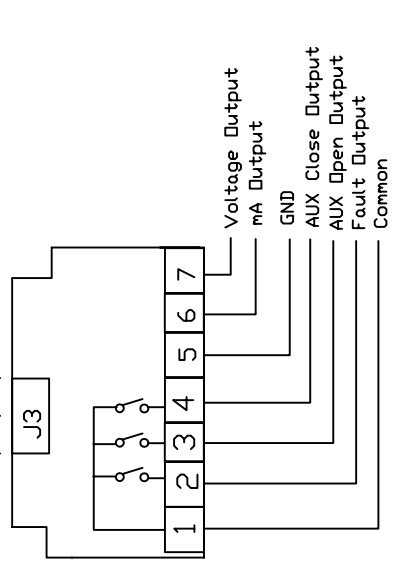
NAME	DATE
DR J. GLASSFORD	10/17/05
APPD K. BLYSTONE	10/17/05
PROD	
WO#/SO#	
FILE	

SERIES 92/94 115/230 VAC  
 W/DHC-100 POSITIONNER

SIZE	A	DWG. NO.	M00EL381	REV	A
SCALE	NTS	SHEET 1	OF	1	



OPTIONAL  
 Output Module



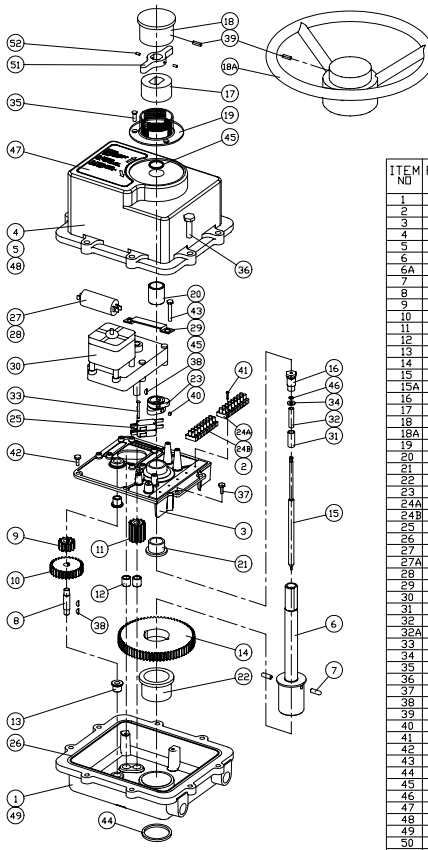
# SERIES 92

## PARTS LIST & MATERIALS OF CONSTRUCTION

**FOR REFERENCE ONLY**  
**ASAHI/AMERICA**

S92= 400 IN\*LBS  
A92= 700 IN\*LBS  
B92= 1100 IN\*LBS  
C92=2000 IN\*LBS

ITEM NO	PART NO	QUANTITY				DESCRIPTION
		S92	A92	B92	C92	
1	7401920	1	1	1	1	BASE
2	7401440	1	1	1	1	WIRING HARNESS - 4 PCS
3	7401060	1	1	1	1	BASE PLATE
4	7401940	1	1	1	1	COVER
5	7401925	1	1	1	1	WIRING DIAGRAM LABEL
6	7401900	1	1	1	1	SHAFT MAIN
6A	7401905	-	-	-	-	SHAFT MAIN
7	7401360	2	2	2	2	PIN
8	7401280	-	-	-	-	SHAFT STUB
9	7402003	-	-	-	-	SPUR GEAR 1A
10	7402002	-	-	-	-	SPUR GEAR 1A
11	7401400	1	1	1	1	GEAR PINION
12	7401540	1	1	1	1	BEARING PINION
13	7402006	-	-	2	2	BEARING FL - SPUR GEAR
14	7401380	1	1	1	1	GEAR MAIN
15	7401200	1	1	1	1	SHAFT INNER
15A	7401210	-	-	-	-	SHAFT INNER
16	7401180	1	1	1	1	SHAFT RETAINER
17	7401300	1	1	1	1	KNOB LOWER
18	7401320	1	1	1	1	KNOB UPPER
18A	7401995	-	-	-	-	HANDWHEEL
19	7401260	1	1	1	1	COLLAR
20	7401120	1	1	1	1	BEARING UPPER COVER
21	7401080	1	1	1	1	BASE PLATE BEARING
22	7401020	1	1	1	1	BASE BEARING
23	7401480	2	2	2	2	CAM
24A	7401420	2	2	2	2	TERMINAL BLOCK 1-B
24B	7401425	2	2	2	2	TERMINAL BLOCK 9-16
25	7401460	2	2	2	2	SWITCH ACTUATOR
26	7401560	1	1	1	1	O-RING BASE/COVER
27	7401948	1	1	1	1	CAPACITOR 4.2 MFD
27A	7402004	-	-	-	-	CAPACITOR 6.7 MFD
28	7403008	-	-	-	-	CAPACITOR 7.6 MFD
29	7401520	1	1	1	1	CLAMP CAPACITOR
30	7401340	1	1	1	1	MOTOR
31	7401250	1	1	1	1	SHELL
32	7401220	1	1	1	1	SPRING
32A	7401230	-	-	-	-	SPRING
33	7401620	2	2	2	2	SCREW ROUND HD. 4-40 x 100 LG
34	7401240	1	1	1	1	WASHER, FLAT #10 6.450 x .06 THK
35	7401680	3	3	3	3	SCREW FLAT HD. 8-32 x .25 LG. SS.
36	7401640	8	8	8	8	SCREW HEX HD. 5/16-18 x 1.00 LG. SS.
37	7401521	1	1	1	1	SCREW SELF TAP (GREEN) #10 x .50 LG.
38	7401880	1	1	3	5	KEY WOODRUF 3/32
39	7401700	1	1	1	1	SCREW SLOT SET 8-32 x .50 LG. SS.
40	7401740	4	4	4	4	SCREW SET 8-32 x .12 LG.
41	7401600	4	4	4	4	BASE NAMEPLATE
42	7401660	5	5	5	5	SCREW SELF TAP SLOT/HEX #10 x .50 LG.
43	7401720	4	4	4	4	SCREW SLOT/HEX 10-32 x 1.62 LG.
44	7401040	1	1	1	1	SEAL BASE
45	7401140	1	1	1	1	SEAL COVER
46	7401580	1	1	1	1	O-RING SHAFT
47	7401950	1	1	1	1	DIVERIDE LABEL
48	7401960	1	1	1	1	COVER NAMEPLATE
49	7401970	1	1	1	1	BASE NAMEPLATE
50	7401430	1	1	1	1	CAPACITOR HARNESS- 2 PCS
51	7401485	-	-	-	-	HANDWHEEL CAM
52	8100179	-	-	-	2	CAM SCREW SET 1/4-20 x .750 LG.



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# ASAHI/AMERICA

ISO 9001 CERTIFIED

35 GREEN STREET, P.O. BOX 653, MALDEN, MA.



## SERIES 92 EXPLODED VIEW

NAME	DATE
DR A.SELEZNEV	2/17/98
CHK DAVE HURLEY	2/17/98
APPD LEO LESTER	2/17/98
PATH \ACAD11\S92	
DO NOT SCALE DRAWING	

SIZE	DWG. NO.	REV
A	289S92	3
SCALE	NTS	SHEET 1 OF 1