UNIBODY VALVE™

Valve and Controller Manual

ELKHART BRASS
Fire Fighting Equipment

Doc #98311000/Rev. C

TABLE OF CONTENTS

A. Quick Start Instructions. 4

I. Introduction: Unibody Valve 6

II. Component Identification 7

1. Bodies 7

2. Adapters 8

3. Actuators. 8

4. Remote Valve Controls 10

III. General Warning and Cautions 11

IV. Quick Installation Guide 12

1. Adapters to Body. 12

2. Installation of Actuators to Valve Body 13

A) Remote, Direct Handle, or Twist Lock Actuator. 13

B) Rack and Sector Actuator. 14

C) Gear and Electric Actuator 16

3. Handle Position 18

A) Non-Slow Close Handle Positioning 19

B) Slow Close Handle Positioning 20

4. Slow Close Adjustment 22

V. Maintenance 23

1. Seal Kits 23

2. Gear Box Lubrication 23

VI. Exploded Parts View. 24

VII. Introduction: Electric Valves 39
1. Overview 39
2. Features 39
3. Specifications 39

VIII. General Description 40
1. Components 40
2. Controls and Indicators 41

IX. Installation 42
1. Install Control and Display Module 42
2. Install Pressure Sensor (UBEC2, UBEC3, UICS2, E4F, and E6F) 43
3. Install Flow Sensor (UBEC3, E4F, and E6F) 44

X. Operation 51
1. Datalink Interface 51
2. Primary Control and Display Module 51
3. Remote Control and Display Module 51
4. External Switches 51
5. Preset Setting 52
6. Flow CAF 52
7. Set Preprogrammed Valve Positions 52

XI. Programming (UBEC1) 53

XII. Programming (UBEC2 and UBEC3) 56

XIII. Programming (UICS2) 59

XIV. Programming (E3F, E4F, E5F, and E6F) 62

XV. Calibration 63
1. Valve Position Calibration 63
2. Automatic Valve Position Calibration 63
3. Pressure Calibration 64
4. Flow Calibration, Single Point 64
5. Flow Calibration, Multiple Point 65

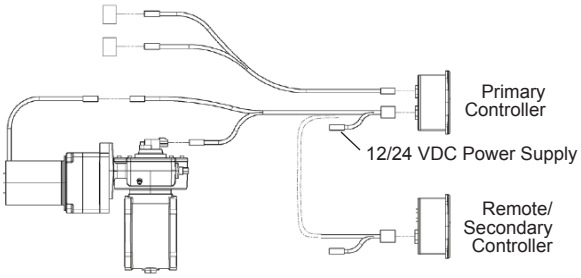
XVI. Diagnostics 66

XVII. Wiring (UBEC1, UBEC2, UBEC3 and UICS2) 68

XVIII. Wiring (E3F, E4F, E5F, and E6F) 70

UBEC AND UICS2 QUICK START INSTRUCTIONS (E1F AND E2F)

1. Wire Harness Diagram



2. Valve Position Calibration

NOTE: The valve should be partially open before starting valve position calibration.

SET FULLY CLOSED POSITION

1. Press and hold CLOSE and PRESET buttons. Release both buttons when the red CLOSED LED starts to flash.
2. Use the CLOSE button to close the valve.
3. When the valve is fully closed (detected by a high current surge when the valve hits the positive stop), the CLOSE LED will flash at a faster speed.
4. Press and hold the PRESET (CAF SELECT for UICS2) button for 5 seconds to accept and exit calibration. Red LED will stop flashing.

SET FULLY OPEN POSITION

1. Press and hold OPEN and PRESET buttons. Release both buttons when the green OPEN LED starts to flash.
2. Use the OPEN button to open the valve.
3. When the valve is fully opened (detected by a high current surge when the valve hits the positive stop), the last fully opened LED will flash at a faster speed.
4. Press and hold the PRESET (CAF SELECT for UICS2) button for 5 seconds to accept and exit calibration. The green fully OPEN LED will stop flashing.

Pressure – Not required unless pressure display is found to be inaccurate. **(See page 64)**

Flow – Always required with UBEC3 controller. **(See page 64-65)**

3. Common Error Codes
   - F1 – Valve calibration problem
     See Valve Position Calibration above.
   - F5 – No pressure sensor detected
     Check sensor harness connections. **(See page 68)**
   - E202 – Invalid program code entered
     See Pages 53-61 for programming codes.
   - E204 – No signal from sensor
     Check harness connections. **(See page 68)**

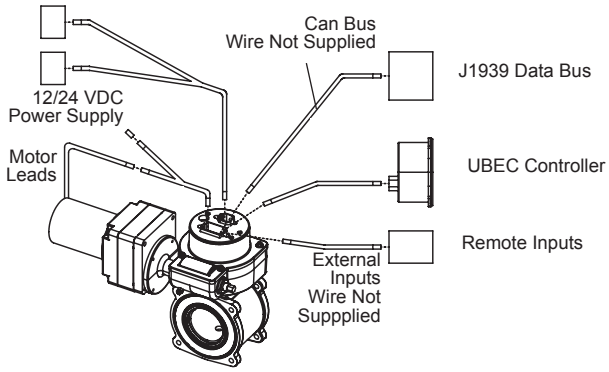
   NOTE: See page 66 of manual for more diagnostic information.

4. Special Notes
   - EB6D Butterfly Valves
     These valves utilize a high frictional coefficient seat material. This high friction value could result in a high torque scenario when closing new, dry valves. In the event of a high torque scenario, there is a possibility of the controller reaching its preset amperage limit, causing the controller LEDs to flash and reset the controller. Once reset, the controller will function properly. For this reason it is recommended that repeatedly opening and closing of the valve while dry is avoided.

     Note: The above scenario is only possible in the absence of water on the valve seat.
   - EBXJ Butterfly Valves
     1. Press and hold the OPEN and CLOSE buttons for 5 seconds.
     2. Enter code 2160
        Press OPEN button 2 times to enter 2
        Press CLOSE button to move the cursor to the next digit
        Press OPEN button 1 time to enter 1
        Press CLOSE button to move the cursor to the next digit
        Press OPEN button 6 times to enter 6
        Result: The PRESSURE display shows 2160.
     3. After 3 seconds TYPE1 (standard) or TYPE2 (reverse) shows in the display.
     4. Use the OPEN button to toggle between the two.
     5. Press the PRESET/CAF SELECT button and hold for 5 seconds to exit and save the programmed parameters.

E3F AND E4F QUICK START INSTRUCTIONS

5. Wire Harness Diagram



Input Device Options

6. Valve Position Calibration (**SEE PAGE 63 OF MANUAL.**)

   NOTE: The valve should be partially open before starting valve position calibration.

   AUTOMATIC POSITION CALIBRATION

   1. Press and hold the CLOSE and PRESET buttons for 5 seconds.
   2. The valve will cycle through the CLOSED and OPEN positions and finish in the CLOSED position.

   AUTOMATIC POSITION CALIBRATION (NO EXTERNAL INPUTS)

   1. Supply a 12/24-VDC signal to Pin 5 on the 12-Pin connector.
   2. The valve will cycle through the CLOSED and OPEN positions and finish in the CLOSED position.

      Pressure – Not required unless pressure display is found to be inaccurate. (**See page 64**)

      Flow – Always required with UBEC3 controller. (**See page 64-65**)

7. Common Error Codes

   - F1 – Valve calibration problem.
     See Valve Position Calibration above.
   - F5 – No pressure sensor detected.
     Check sensor harness connections. (**See page 70**)
   - E202 – Invalid program code entered.
     See Pages 62 for programming codes.
   - E204 – No signal from sensor.
     Check harness connections. (**See page 70**)
   - OPEN and CLOSE LED Flashing – Position Calibration needed.
     See Valve Position Calibration above.

   NOTE: See page 66 of manual for more diagnostic information.

8. Special Notes

   - EB6D Butterfly Valves
     These valves utilize a high frictional coefficient seat material. This high friction value could result in a high torque scenario when closing new, dry valves. In the event of a high torque scenario, there is a possibility of the controller reaching its preset amperage limit, causing the controller LEDs to flash and reset the controller. Once reset, the controller will function properly. For this reason it is recommended that repeatedly opening and closing of the valve while dry is avoided.

     Note: The above scenario is only possible in the absence of water on the valve seat.
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     2. Enter code 2160

        Press OPEN button 2 times to enter 2

        Press CLOSE button to move the cursor to the next digit

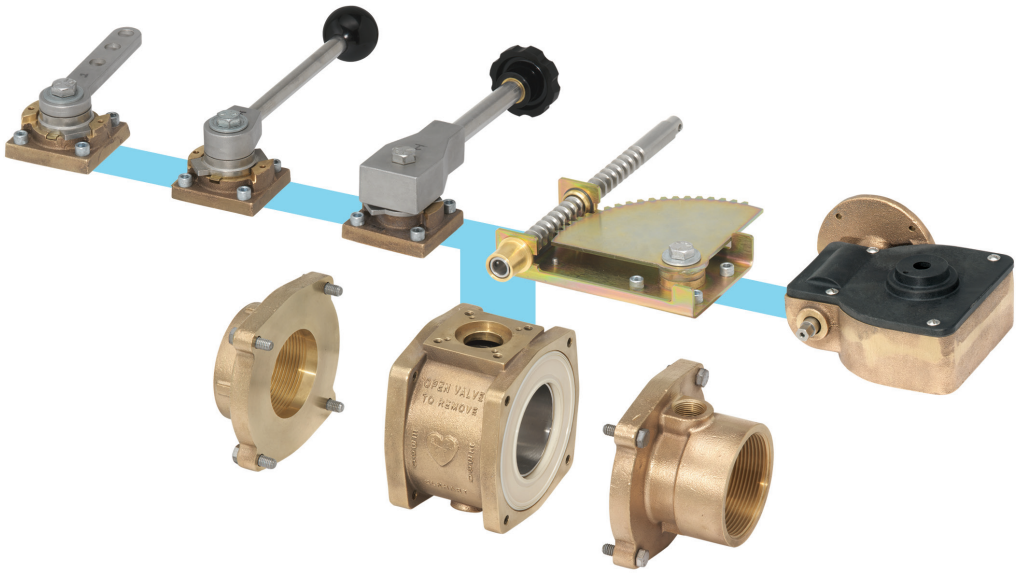
        Press OPEN button 1 time to enter 1

        Press CLOSE button to move the cursor to the next digit

        Press OPEN button 6 times to enter 6

        Result: The PRESSURE display shows 2160.
     3. After 3 seconds TYPE1 (standard) or TYPE2 (reverse) shows in the display.
     4. Use the OPEN button to toggle between the two.
     5. Press the PRESET/CAF SELECT button and hold for 5 seconds to exit and save the programmed parameters.

I. INTRODUCTION



Elkhart Brass Unibody apparatus valves are specially designed for reliability, ease of installation and ease of use.

BALL VALVE

- Unibody Ball Valves are available in 1.5", 2", 2.5", 3", 3.5", and 4" sizes.
- The bodies are constructed of corrosion resistant brass, and the ball is constructed from durable stainless steel (EB15–EB35) or high strength brass alloy (EB40).
- Dual self-adjusting seats provide bidirectional sealing (EB15-EB35) or single self-adjusting abrasion resistant unidirectional seat (EB40).
- Adapters (end caps) and pump flanges are constructed of either brass or stainless steel requiring no O-rings that could cut or tear during servicing.
- Swing out construction allows for easy access to internal waterway.
- The patent pending Unibody design allows any actuator assembly to be bolted onto the valve body without need to break the internal plumbing of the truck.
- Actuators are interchangeable so that a Unibody Valve may be easily converted to a different actuation type without the need to break the waterway.
- Durable handles and handle stops ensure dependability, while the handle may be easily changed to eight different positions by removing a single bolt.

BUTTERFLY VALVE

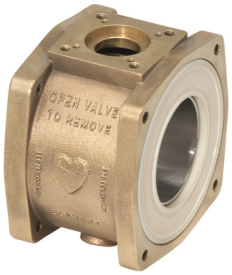
- Unibody Butterfly Valves are available in 3", 4", 5", 6", and 8" sizes.
- Bidirectional with EPDM seat.
- The butterfly valve utilizes either our extreme duty electric actuator or our gear actuator.

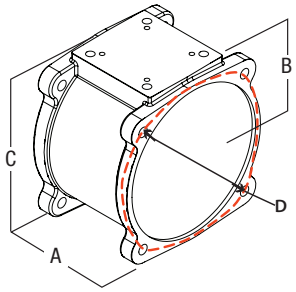
Unibody Valves meet or exceed NFPA 1901 Standards.

The electric valve utilizes a three-inch extreme duty motor and gearbox for ultimate reliability.

II. COMPONENT IDENTIFICATION

1a. Ball Valve Body

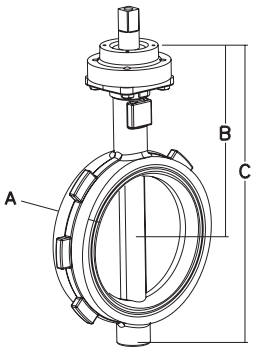




Size	DIMENSIONS A	B	C	D*	MATERIALS Body	Ball	Seat	BALL TYPE	PRESSURE RATED (psi)	C_v VALUE	ELKHART MODEL	Akron Model
1½"	3"	2 3/16"	4 5/16"	4½"	Brass Alloy 844	316 Stainless Steel	Hytrel	Round	600	139	EB15	7615/7815
2"	3"	2 3/16"	4 5/16"	4½"	Brass Alloy 844	316 Stainless Steel	Hytrel	Round	600	139	EB20	8620/8820
2½"	3½"	2 5/8"	5 1/16"	5 3/8"	Brass Alloy 844	316 Stainless Steel	Hytrel	Round	600	277	EB25	8625/8825
3"	4"	3"	5 7/8"	6 1/8"	Brass Alloy 844	316 Stainless Steel	Hytrel	Round	600	510	EB30	8630/8830
3½"	4"	3"	5 7/8"	6 1/8"	Brass Alloy 844	316 Stainless Steel	Hytrel	Round	600	510	EB35	8635/8835
4"	4"	4 11/16"	8 5/8"	7 1/8"	Brass Alloy 844	316 Stainless Steel	Hytrel	lat	500	694	EB40	8840

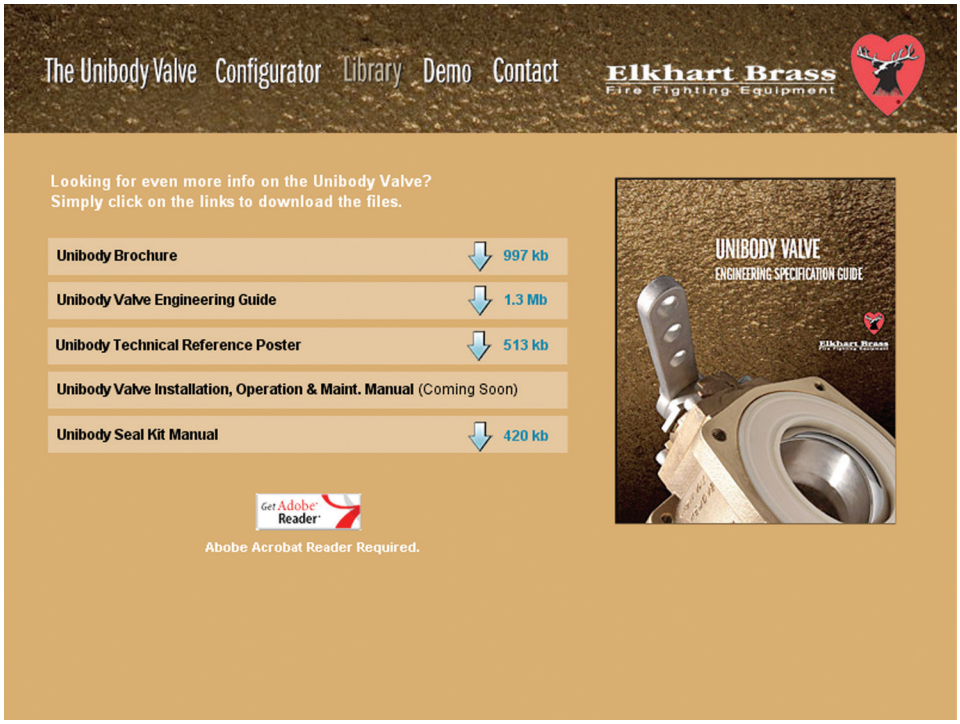
* Bolt center diameter

1b. Butterfly Body



Size	DIMENSIONS A	B	C	MATERIALS Body	Wafer	Shaft	Seat	PRESSURE RATED (psi)	C_v VALUE	ELKHART MODEL	Akron Model
3"	1 13/16"	7 23/32"	11 1/8"	Cast Iron	Aluminum/Bronze	416 Stainless Steel	EPDM	250	340	EB3B	7940
4"	2 1/16"	8 13/32"	12 15/32"	Cast Iron	Aluminum/Bronze	416 Stainless Steel	EPDM	250	660	EB4B	7940/7945
	2 1/8"	8 7/16"	13 3/4"	Carbon Steel	316 Stainless Steel	17-4 PH Stainless Steel	PTFE	285	400	EB4J	
5"	2 3/16"	8 31/32"	13 23/32"	Cast Iron	Aluminum/Bronze	416 Stainless Steel	EPDM	250	1080	EB5B	7950
	2 1/2"	6 17/32"	13 7/32"	Carbon Steel	316 Stainless Steel	17-4 PH Stainless Steel	PTFE	285	650	EB5J	
6"	2 3/16"	9 19/32"	14 19/32"	Cast Iron	Aluminum/Bronze	416 Stainless Steel	EPDM	250	1613	EB6B	7960
	2 1/4"	9 13/32"	11 13/32"	Ductile Iron	Aluminum/Bronze	416 Stainless Steel	EPDM	250	1950	EB6D	
	2 1/4"	9 3/16"	15 1/16"	Carbon Steel	316 Stainless Steel	17-4 PH Stainless Steel	PTFE	285	1050	EB6J	
	2 1/4"	9 3/16"	15 1/16"	316 Stainless Steel	316 Stainless Steel	17-4 PH Stainless Steel	PTFE	275	1050	EB6JS	
8"	2 3/8"	10 27/32"	17 11/32"	Cast Iron	Aluminum/Bronze	416 Stainless Steel	EPDM	250	3759	EB8B	
	2 1/2"	10 9/16"	18 3/16"	Carbon Steel	316 Stainless Steel	17-4 PH Stainless Steel	PTFE	285	2200	EB8J	
	2 1/2"	10 9/16"	18 3/16"	316 Stainless Steel	316 Stainless Steel	17-4 PH Stainless Steel	PTFE	275	2200	EB8JS	

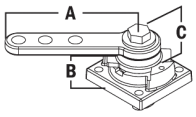
2. Adapters



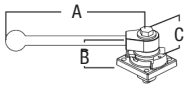
For complete adapter availability, view the “Unibody Valve Engineering Guide” at www.unibodyvalve.com.

3. Actuators

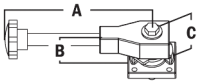
REMOTE HANDLE

Dimensions	Inches		Description	Elkhart Model	
				Self-Locking	Non-Locking
Handle Length A (short)	4½"		Short	R1F	R3F
Handle Length A (long)	7"		Long	R2F	R4F
Handle Height B	1⅝"		Short with slow close	R1S	R3S
Overall Height C	2¼"				
Overall Height C (with slow close)	3⁵⁄₁₆"		Long with slow close	R2S	R4S

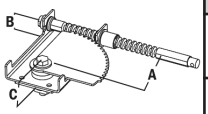
DIRECT HANDLE

Dimensions	Inches		Description	Elkhart Mode
Handle Length A (short)	5"		Short	D3F
Handle Length A (long)	9⁵⁄₁₆"		Long	D1F
Handle Height B	1⅞"		Short with slow close	D3S
Overall Height C	2¼"		Long with slow close	D1S
Overall Height C (with slow close)	3⅝"		Short with chrome cover	D4F
			Long with chrome cover	D2F

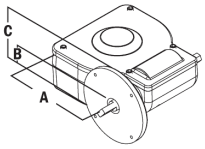
TWIST LOCK

Dimensions	Inches		Description	Elkhart Model
Handle Length A	8 15/16"		Standard	T1F
Handle Height B	1 7/8"			
Overall Height C	3"			

RACK and SECTOR

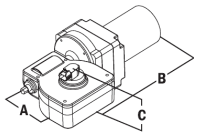
Dimensions	Inches		Description	Elkhart Model
Handle Offset A	4 7/8"		Standard	S1F
Handle Height B	1 1/8"			
Overall Height C	1 7/8"		Standard with slow close	S1S
Overall Height C (with slow close)	3 5/16"			

GEAR

Dimensions	Inches		Description	Elkhart Model
Handle Offset A	2 9/16"		*Handwheels are ordered separately.*	G1F *G2F
Handle Height B	1 9/16"			
Overall Height C	3 7/16"			

* For use on the EB6D only.

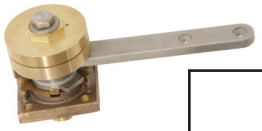
ELECTRIC

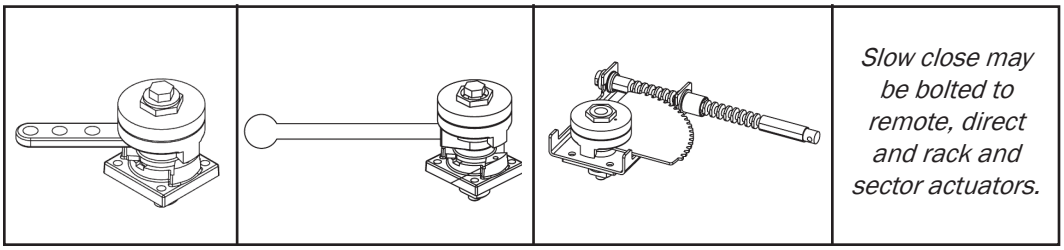
Dimensions	Inches		Description	Elkhart Model
Manual Offset A	2 9/16"		***Controllers are ordered separately.***	E1F
Motor Length B	10 1/4"			*E2F
Overall Height C (E1F, E2F, E3F, E4F, E5F, and E6F)	4 3/8"			E3F & E4F
				*E5F & *E6F

Controllers are ordered separately.

* For use on the EB6D only.

SLOW CLOSE





Slow close may be bolted to remote, direct and rack and sector actuators.

4. Remote Valve Controls

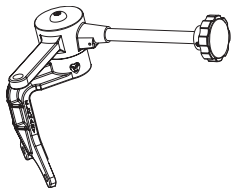
POSITION INDICATING HANDWHEEL

PRODUCT INFORMATION	MODELS	
	GWP-4	GWP-6.3
Handwheel diameter	4"	6.3"
Material	Aluminum	
Finish *(specify)*	Black or Chrome	
Installation diameter	1.125"	
Furnished with	Panel bushing and two universal swivel joints with protective rubber boots	
Weight	4.0 lbs.	4.5 lbs.

STANDARD HANDWHEEL

PRODUCT INFORMATION	MODELS			
	GWR-5	GWR-6.5	GWD-5	GWD-6.5
Handwheel diameter	5"	6.5"	5"	6.5"
Material	Chrome plated brass			
Type	Panel mount		Direct mount	
Installation diameter	1.125"		–	
Furnished with	Panel bushing and two universal swivel joints with protective rubber boots		–	
Weight	4.0 lbs.	6.75 lbs.	2.50 lbs.	5.25 lbs.

PIGGY-BACK REMOTE CONTROL UNIT



PRODUCT INFORMATION	MODELS	
	RC-2U	RC-3U
Valve compatability	For use with the Elkhart Brass Unibody line	
Handle	Twist-Lock	Non-locking
Orientation *(specify)*	Dual handle right (A) or left (B)	Dual handle right (A) or left (B)
Material	Cast brass with stainless steel handle rod	
Length	8"	8"
Weight	6.0 lbs.	6.0 lbs.

III. GENERAL WARNINGS AND CAUTIONS

Important:
Before installing and operating this equipment, read and study this manual thoroughly. Proper installation is essential to safe operation. In addition, the following points should be adhered to in order to assure the safety of equipment and personnel.

- All personnel who may be expected to operate this equipment must be thoroughly trained in its safe and proper use.
- Become thoroughly familiar with the hydraulic characteristics of this equipment.

NFPA 1901 Standards specify a minimum of 3 seconds is required to open or close a 3" or larger valve.

- Always open and close valves slowly to avoid water hammer.
- After each use, and on a scheduled basis, inspect equipment per instructions in the maintenance Section V.
- Keep fingers and hands clear of moving parts.
- Do not use lubrication on the valve ball or seats.
- Do not wrench on the valve body or the opposite adapters.
- Disconnect power before servicing an electric valve.
- Clear debris from waterway before the valve is installed.
- Foreign materials such as metal chips could jeopardize the sealing capability of the valve. Any drilled holes required in the plumbing should be added, and the chips removed from the waterway, prior to installation of the valve.
- Do not exceed rated operating pressure for any valve as listed in Table 1.

	Model Number	Rated Operating Pressure (psi)	C_v Value
Ball Valves	EB15	600	139
	EB20	600	139
	EB25	250	277
	EB30	250	510
	EB35	250	510
	EB40	250	694
Butterfly Valves	EB3B	250	340
	EB4B	250	660
	EB4J	285	400
	EB5B	250	1080
	EB5J	285	650
	EB6B	250	1613
	EB6D	250	1950
	EB6J	285	1050
	EB6S	275	1050
	EB8B	250	3759
	EB8J	285	2200
	EB8S	275	2200

Table 1 – Pressure

IV. QUICK INSTALLATION GUIDE

1. Adapters to Valve Body

A) Move valve to close position. See Figure 1.

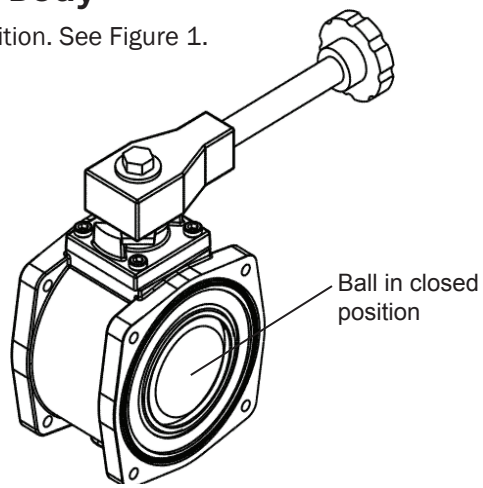


Figure 1

B) Tighten the four 3/8" adapter bolts in an X pattern (see Figure 2). See Table 2 for torque requirements.

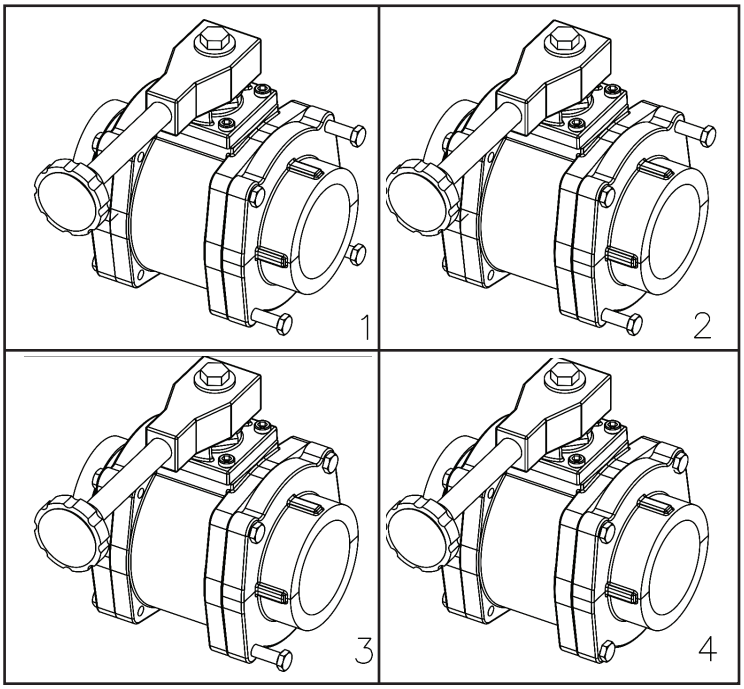


Figure 2

Valve	Torque
EB15	25-30 ft-lbs
EB20	25-30 ft-lbs
EB25	25-30 ft-lbs
EB30	38-40 ft-lbs
EB35	38-40 ft-lbs
EB40	60-70 ft-lbs

Table 2 – Torque

2. Installation of Actuators to Valve Body

A) Remote, Direct Handle, or Twist Lock Actuator

1. Hold the actuator assembly above valve body assembly and align the actuator shaft with the slot in the ball as shown. See page 18 Handle Position if the handle requires new orientation.

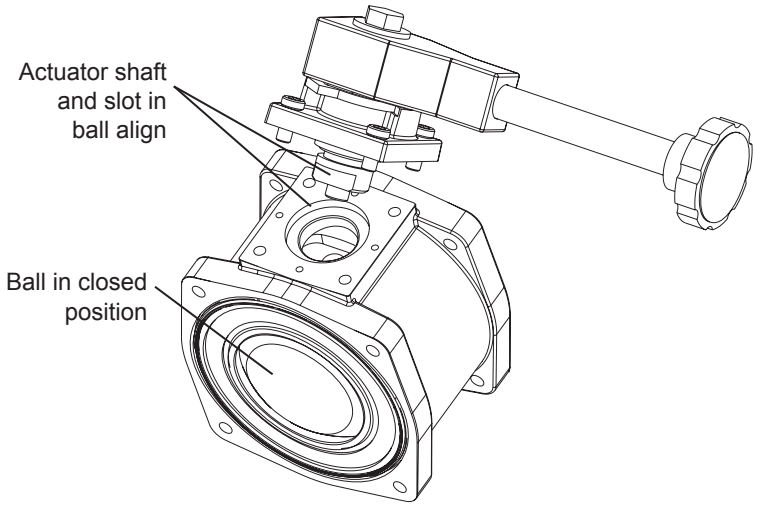


Figure 3

2. Push the actuator assembly down against valve body assembly and rotate the handle assembly in both directions slightly while pushing assembly against valve body until actuator drops into slot in valve ball as shown in Figure 4. There should be no gap between the actuator assembly and the valve body.

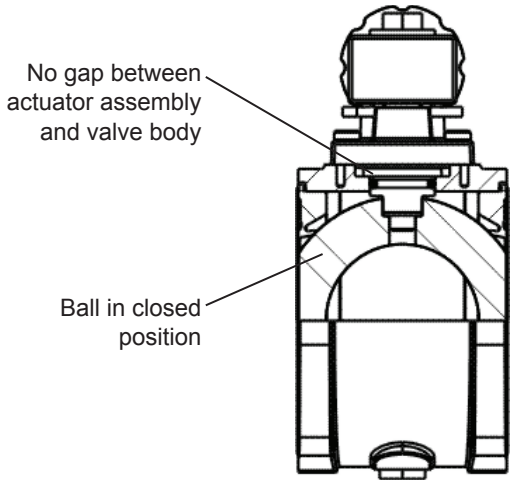


Figure 4

3. Rotate the actuator assembly on valve body until handle stops align with waterway as shown in Figure 5.

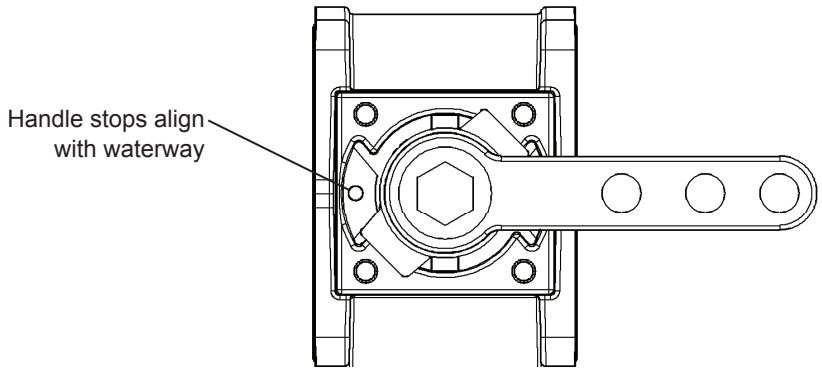


Figure 5

4. Fasten the actuator assembly to valve body by tightening 5/16 socket head cap screws in an X pattern to a torque of 15 ft-lb.

B) Rack and Sector Actuator

1. Hold the actuator assembly above valve body assembly and align the actuator shaft with the slot in the ball as shown in Figure 6. Ensure that the first tooth of the rack and the first tooth of the section are aligned properly (see Figure 7) or the valve will not shut completely. Note that the rack and sector actuator assembly can rotate in 90° increments for different orientations of the actuator assembly.

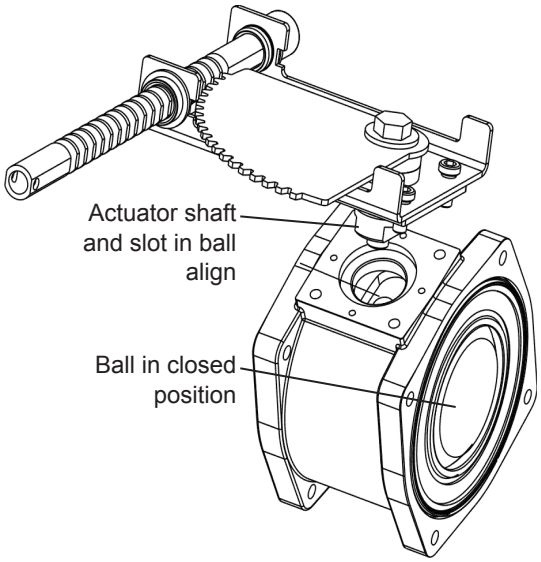


Figure 6

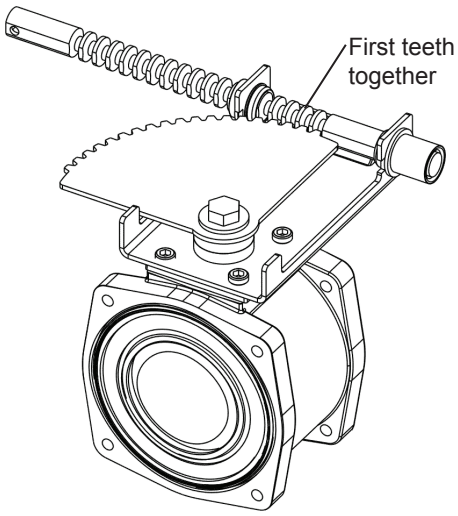


Figure 7

2. Push the actuator assembly down against valve body assembly and rotate the assembly in both directions slightly while pushing assembly against valve body until actuator drops into slot in valve ball as shown in Figure 8. There should be no gap between the actuator assembly and the valve body.

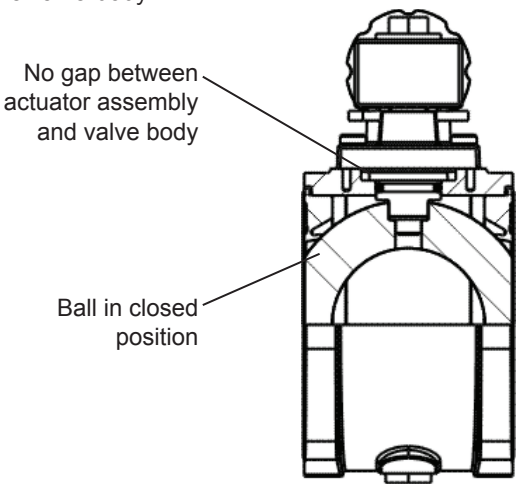


Figure 8

3. Rotate the actuator assembly on valve body until the rectangular actuator adapter aligns with the square-mounting surface on the valve body. Ensure the rack is in the proper position when the ball is open, as shown in Figure 9.

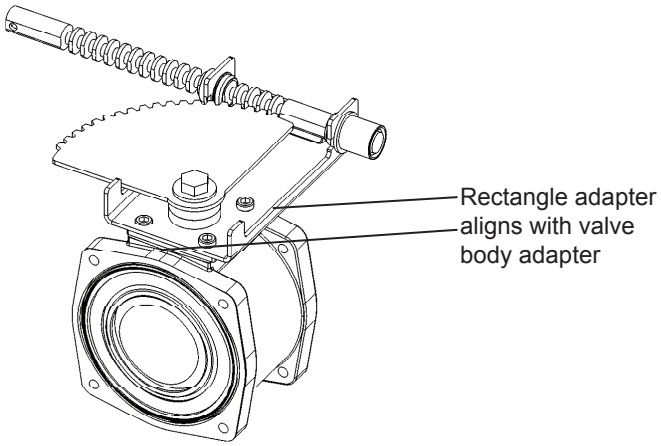


Figure 9

4. Fasten the actuator assembly to valve body assembly by tightening 5/16 socket head cap screws in an X pattern to a torque of 15 ft-lb.

C) Gear and Electric Actuator

1. Disassemble gear case cover from gear case by removing four screws as shown below.

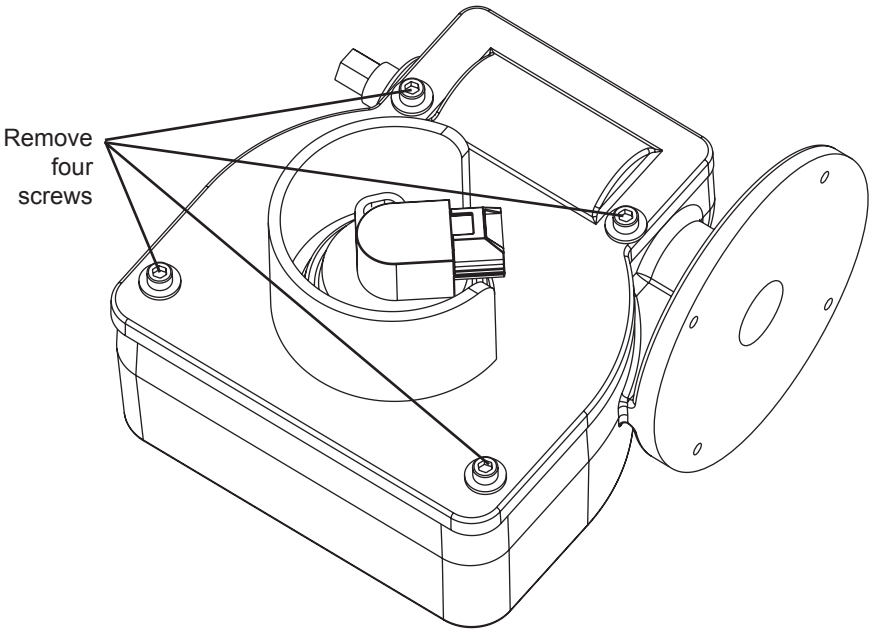


Figure 10

2. Remove the 1/2" bolt and washer that locks the actuator assembly in position. Remove actuator shaft. Remove gear sector and place in the full clockwise position as shown in Figure 11. This equates to the valve open position for electric actuators on all valves except EB_J & EB_S butterfly valves (The gear sector positions are opposite for the EB_J and EB_S butterflys with electric actuators). This full clockwise position also equates to the closed position for gear actuators on all valves.

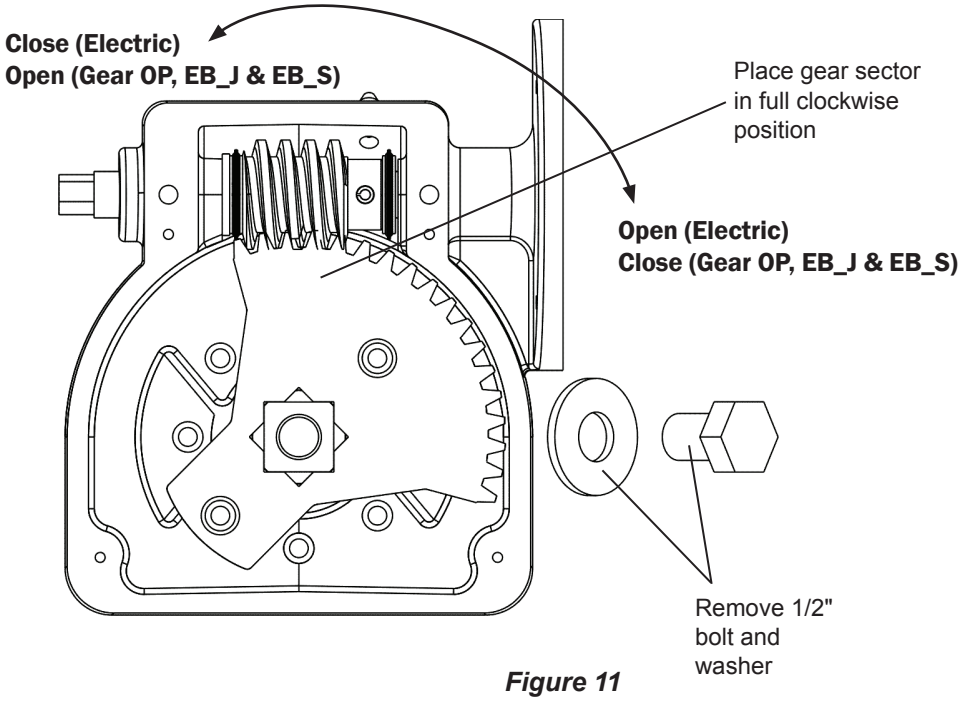


Figure 11

3. Hold the actuator assembly above valve body assembly and align the actuator shaft with the slot in the ball as shown in Figure 12 for desired gear position on valve body as shown in Figure 13.

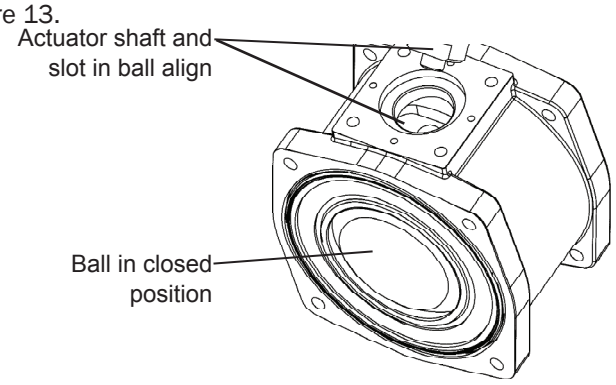


Figure 12

4. Push the actuator assembly down against valve body assembly and rotate the actuator assembly in both directions slightly while pushing assembly against valve body until actuator drops into slot in valve ball as shown in Figure 12. There should be no gap between the actuator assembly and the valve body as shown below.

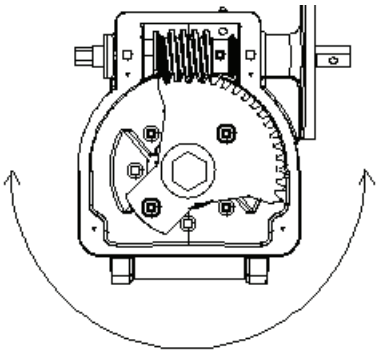


Figure 13

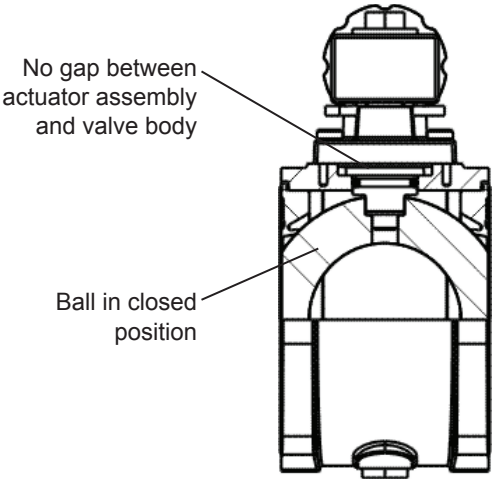


Figure 14

5. The actuator assembly should be rotated on the valve body until the #10-24 socket head cap screws line up with the tapped holes on the valve body. The actuator assembly may be positioned in rotational increments of 45° on the valve body. Replace the 1/2" bolt and washer that were removed in Step 2. Secure with a thread locker (Blue Loctite #242) and tighten to 5-7 Ft-Lb.
6. It is recommended to apply a thread locker (Blue Loctite #242) to the screws fastening the actuator to the valve. Fasten the actuator assembly to valve body assembly by tightening the #10-24 socket head cap screws in an X pattern to a torque of 5 ft-lb.

7. On G1F, E3F and E4F assemblies, reattach the gear case cover to the gear case by replacing the four screws that were removed in Step 1.
8. On E1F (electric) assemblies only, the gear case cover should be re-attached to the gear case with the sensor shaft engaged into the gear sector. Accomplish this by aligning the sensor shaft with the gear sector hole nearest the worm gear as shown below.

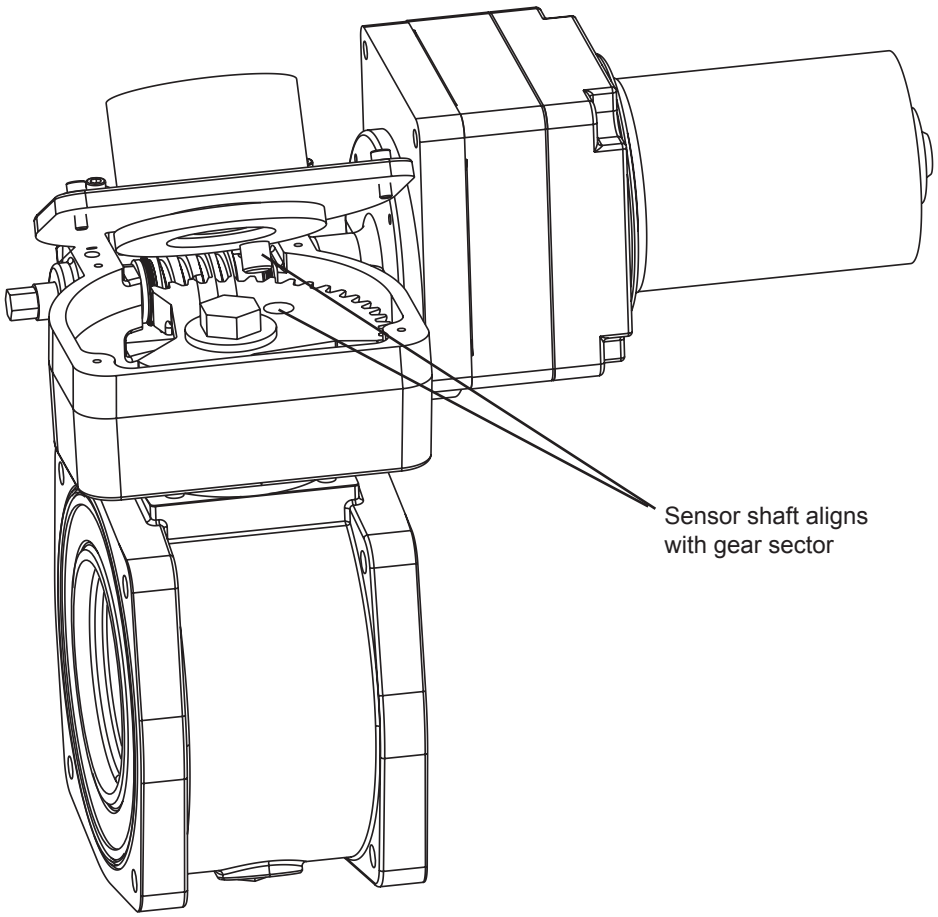


Figure 15

9. Push the gear case cover on to the gear case so that the sensor actuator engages in the hole on the gear sector, then rotate the gear case cover on the gear case so that the holes in the gear case cover line up with the tapped holes in the gear case. Next, re-attach the screws that were removed in Step 1.

3. Handle Position

The twist lock, remote, and direct handle actuators may easily have the handles repositioned in 45° increments. The following details the handle reposition procedure.

A) Non-Slow Close Handle Positioning

1. Remove the 1/2" bolt and washer that locks the handle in position.

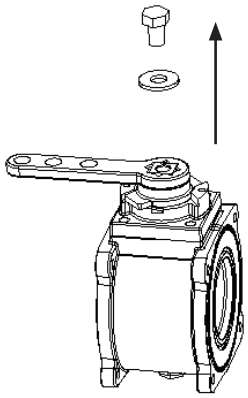


Figure 16

2. The spring-loaded assembly will urge the handle off the actuator shaft. Remove the handle completely from the shaft and rotate to the desired location in 45° increments.

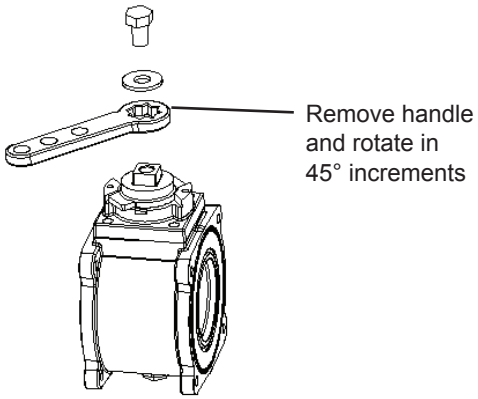


Figure 17

3. Place handle back on actuator shaft in new location and reattach washer and 1/2" bolt. While tightening bolt, ensure that the stop plate tabs line up with slots in adapter plate as shown.

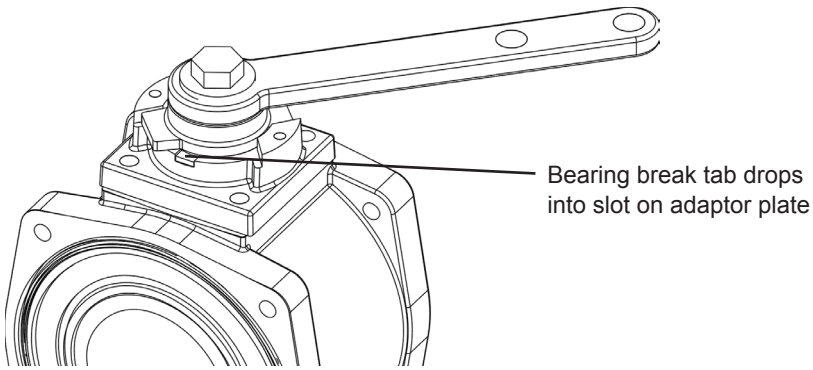


Figure 18

B) Slow Close Handle Positioning

A slow close is available for the R1S, R2S, D1S, D3S and S1S actuators.

1. Properly position the handle. See page 19 - Non-Slow Close Handle Positioning
2. Determine the position of the roll pin alignment. Ensure that the handle will not be obstructed from moving to full open and full close positions when installed.

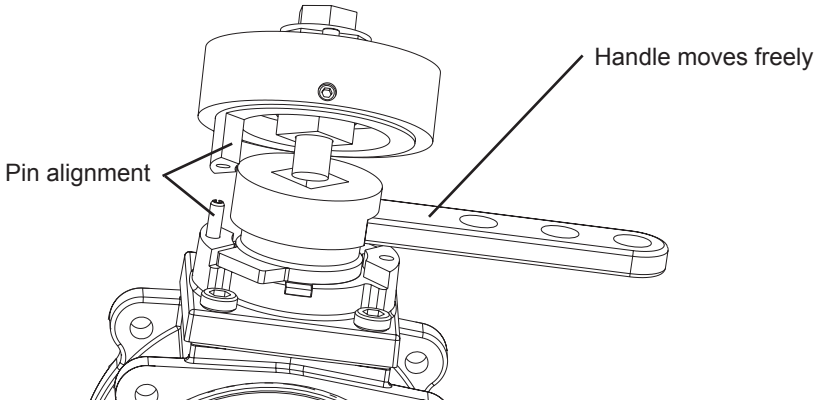


Figure 19

3. Remove the 1/2" bolt and washer that locks the handle in position.

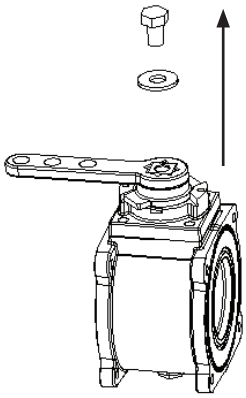


Figure 20

4. Drive the roll pin into an appropriate stop.

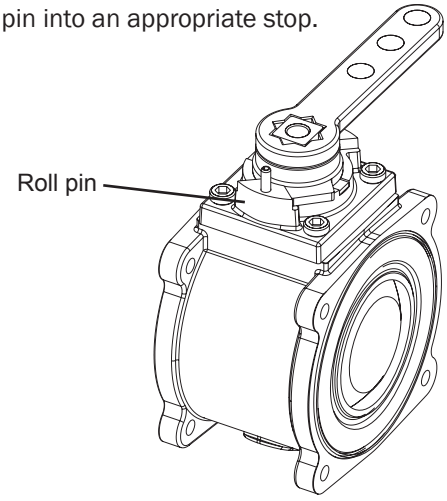


Figure 21

5. Place the handle coupler over the handle with the handle filling the slot.

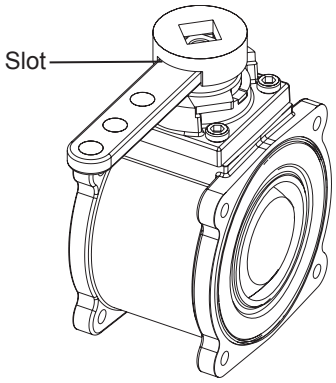


Figure 22

6. Place the slow close onto the handle coupler. Ensure that the slow close shaft is properly engaged with the handle coupler. Place entire assembly onto actuator shaft considering proper handle and drive pin alignment.

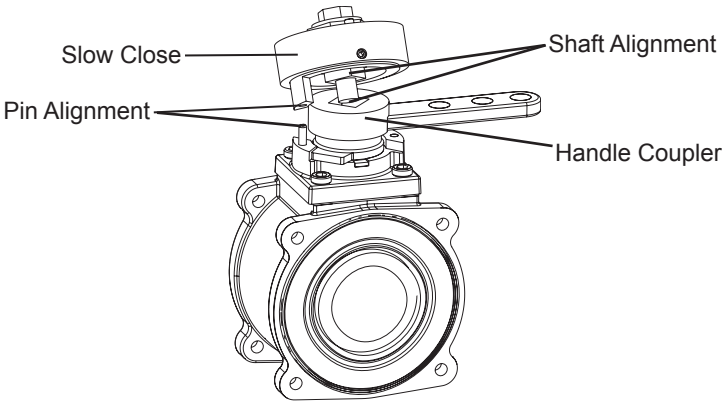


Figure 23

7. Attached washer and new 2" long 1/2" bolt. While tightening bolt, ensure that the bearing break tabs line up with slots in adapter plate as shown.

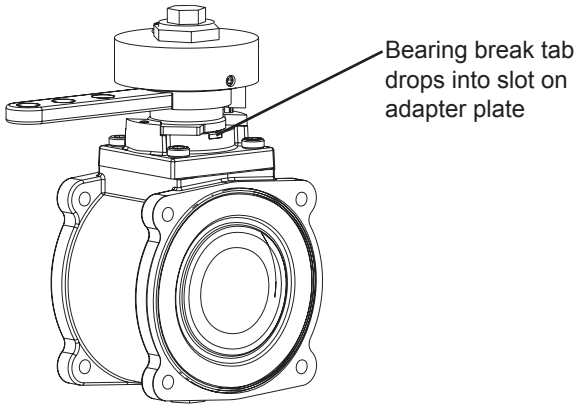


Figure 24

4. Slow Close Adjustment

1. Loosen the socket head cap screw and two set screws.

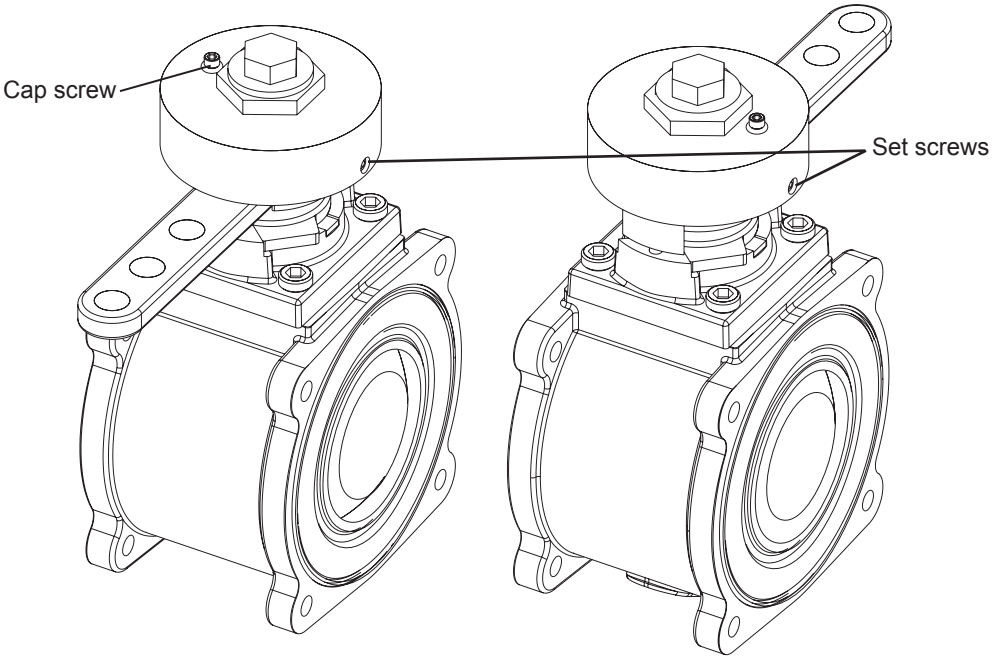


Figure 25

2. Use a 1-3/8" wrench to adjust the slow close. (Note that a 3" or larger valve cannot be actuated to close or open in less than three seconds per NFPA 1901.) Turning the cover clockwise will reduce the speed at which the valve can be actuated. Turning the cover counterclockwise will increase the speed at which the valve can be actuated.

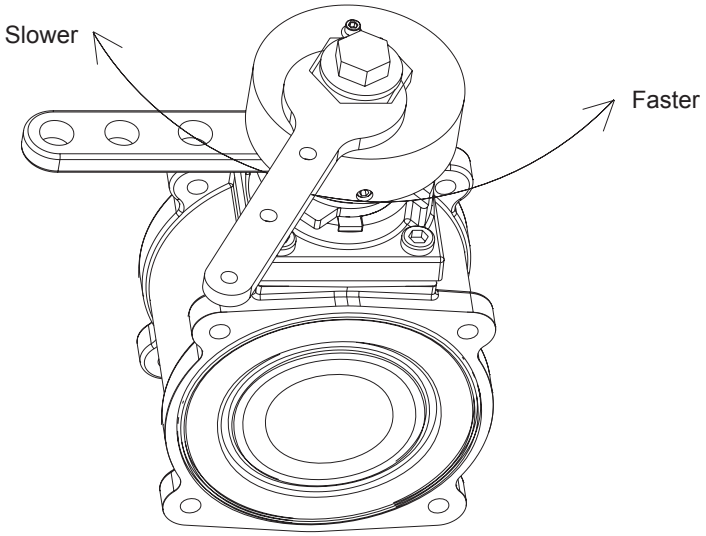


Figure 26

3. Once proper adjustment has been achieved, tighten the socket head cap screw and both set screws firmly.

V. MAINTENANCE

1. Ball Valve Seal Kits

   The Unibody Valve body assemblies require very little maintenance. If it does become necessary to service a ball valve body, seal kits are available to provide all O-rings and seats required in the valve assembly.
   Additional kits are available that also include the valve ball in the case of severe waterway debris damage.

Part Number	Description	Valve Size
65476000	Seal Kit	EB15 or EB20
65477000	Seal Kit with Stainless Steel Ball	EB15 or EB20
65478000	Seal Kit	EB25
65479000	Seal Kit with Stainless Steel Ball	EB25
65480000	Seal Kit	EB30 or EB35
65481000	Seal Kit with Stainless Steel Ball	EB30 or EB35
65482000	Seal Kit	EB40

Table 3

Swing out instructions for accessing internal waterway.

1. Remove three of the end-cap bolts on each side of the valve away from the desired swing-out direction.
2. Loosen the remaining two bolts (one on each side of the valve).
3. Rotate the valve out from the end caps pivoting on the remaining two end cap bolts.
4. After servicing the valve, ensure the two seats are secured in the valve body. Rotate the valve back in line with the end caps.
5. Replace all the end cap bolts and tighten in an X pattern to the torque specified in Table 2 (page 12).

Do not lubricate the valve ball or seats.

2. Gear Box Lubrication

   Gearbox should be greased with petroleum base grease (Mobilux EP2) every six months.

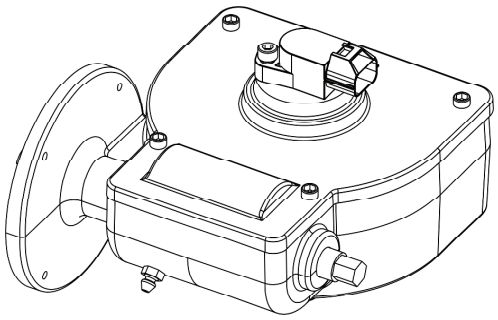


Figure 27

VI. EXPLODED PARTS VIEW

EB15 (Ball Valve)
EB20 (Ball Valve)
EB25 (Ball Valve)
EB30 (Ball Valve)
EB35 (Ball Valve)

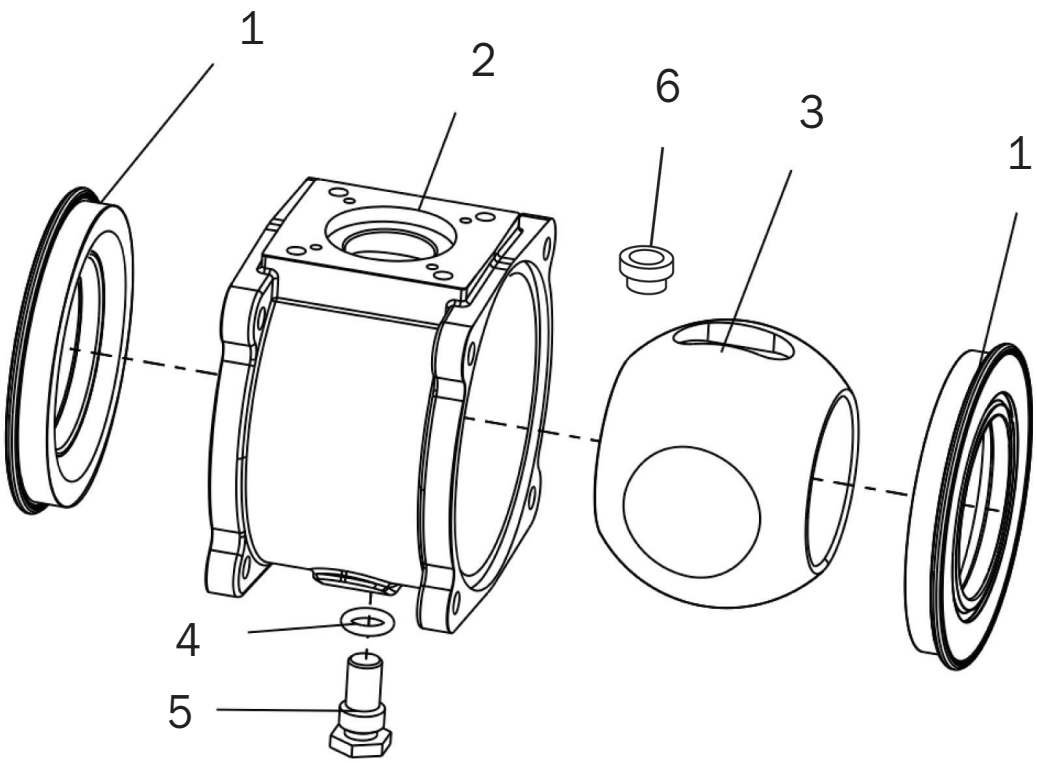


Figure 28

INDEX	DESCRIPTION	QTY	EB15/EB20	EB25	EB30/EB35
1	SEAT	2	65013000	65014000	65015000
2	BODY	1	17764001	17765001	17766001
3	BALL	1	17329000	17330000	17331000
4	O RING	1	57343000	57343000	57530000
5	BOLT PIVOT	1	17862000	17862000	18473001
6	BUSHING	1			17895000

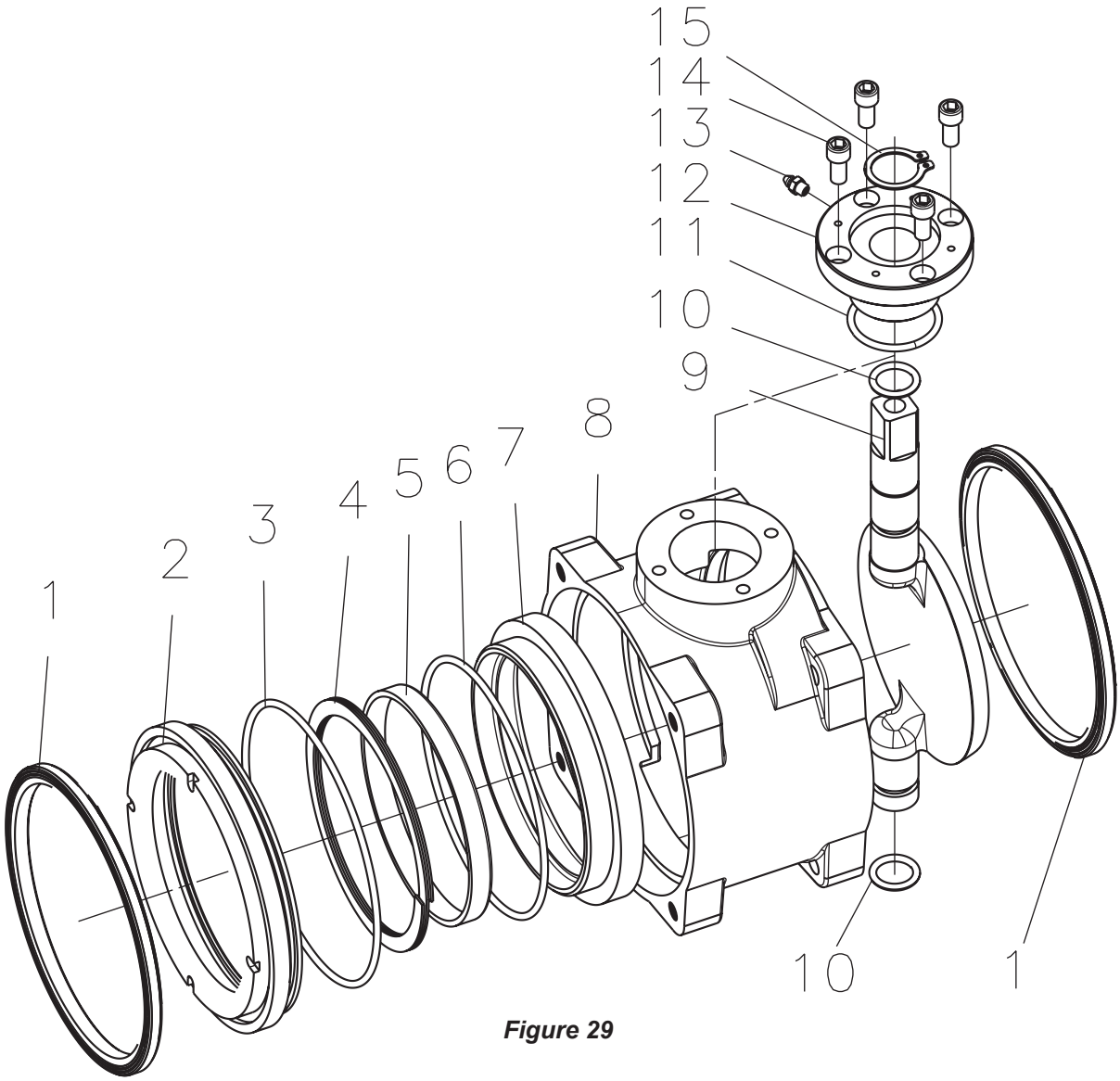


Figure 29

INDEX	PART #	DESCRIPTION	QTY
1	65016000	FACE SEAL	2
2	58910000	SEAT RETAINER	1
3	57453000	O RING	1
4	61802000	WAVE SPRING	1
5	59172000	RING SEAT	1
6	57423000	O RING	1
7	65017000	SEAT	1
8	17768001	BODY	1
9	20508001	FLAT BALL	1
10	57459000	O RING	2
11	57317000	O RING	1
12	11733000	ADAPTER GEAR CASE	1
13	32134000	GREASE FITTING	1
14	61041000	1/2-20 X 5/8 SHCS SS	4
15	58953000	RETAINING RING	1

EB3B

INDEX	PART #	DESCRIPTION	QTY
1	70123001	BUTTERFLY VALVE	1
2	16388000	BOLT – HEX HEAD	4
3	11945001	ADAPTER	1
4	63789000	SCREW – SOC. CAP	4
5	65332001	SHAFT	1
6	51072000	PIN	1

EB4B

INDEX	PART #	DESCRIPTION	QTY
1	70120001	BUTTERFLY VALVE	1
2	16388000	BOLT – HEX HEAD	4
3	11945001	ADAPTER	1
4	63789000	SCREW – SOC. CAP	4
5	65332101	SHAFT	1
6	51072000	PIN	1

EB5B

INDEX	PART #	DESCRIPTION	QTY
1	70121001	BUTTERFLY VALVE	1
2	16388000	BOLT – HEX HEAD	4
3	11945001	ADAPTER	1
4	63789000	SCREW – SOC. CAP	4
5	65332201	SHAFT	1
6	51076000	PIN	1

EB6B

INDEX	PART #	DESCRIPTION	QTY
1	70122001	BUTTERFLY VALVE	1
2	16388000	BOLT – HEX HEAD	4
3	11945001	ADAPTER	1
4	63789000	SCREW – SOC. CAP	4
5	65332201	SHAFT	1
6	51076000	PIN	1

EB8B

INDEX	PART #	DESCRIPTION	QTY
1	70124001	BUTTERFLY VALVE	1
2	16388000	BOLT – HEX HEAD	4
3	11945001	ADAPTER	1
4	63789000	SCREW – SOC. CAP	4
5	65332301	SHAFT	1
6	51076000	PIN	1

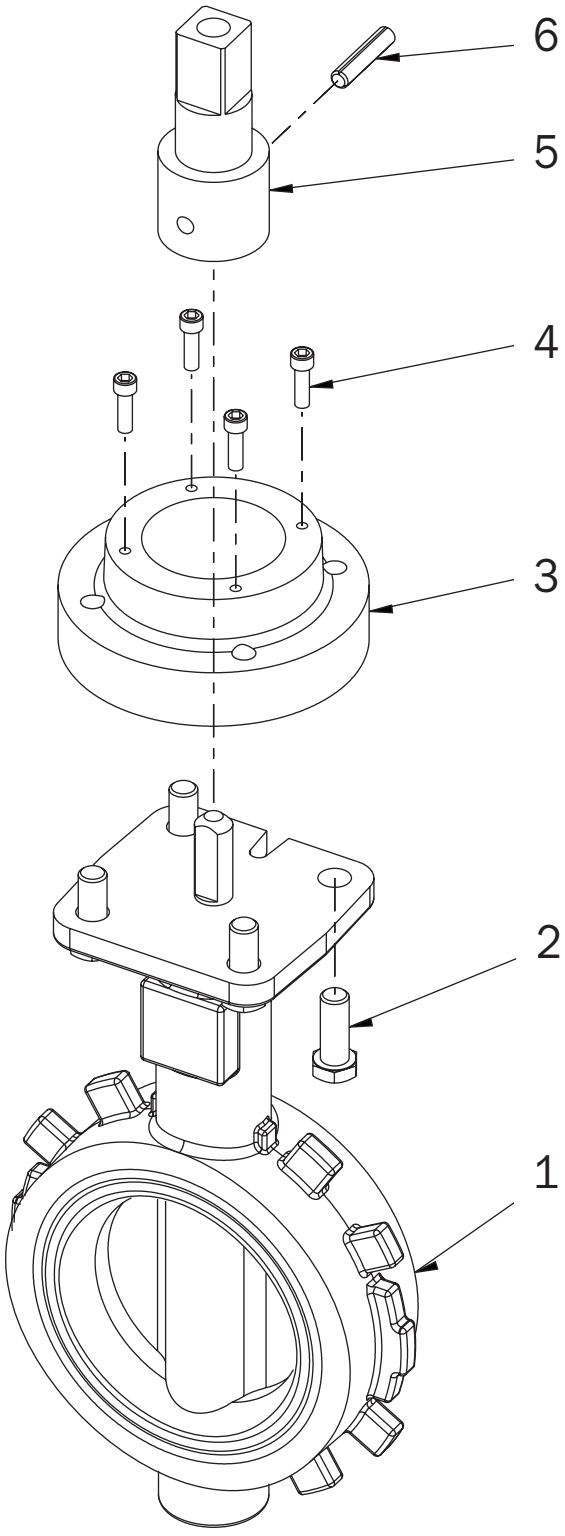
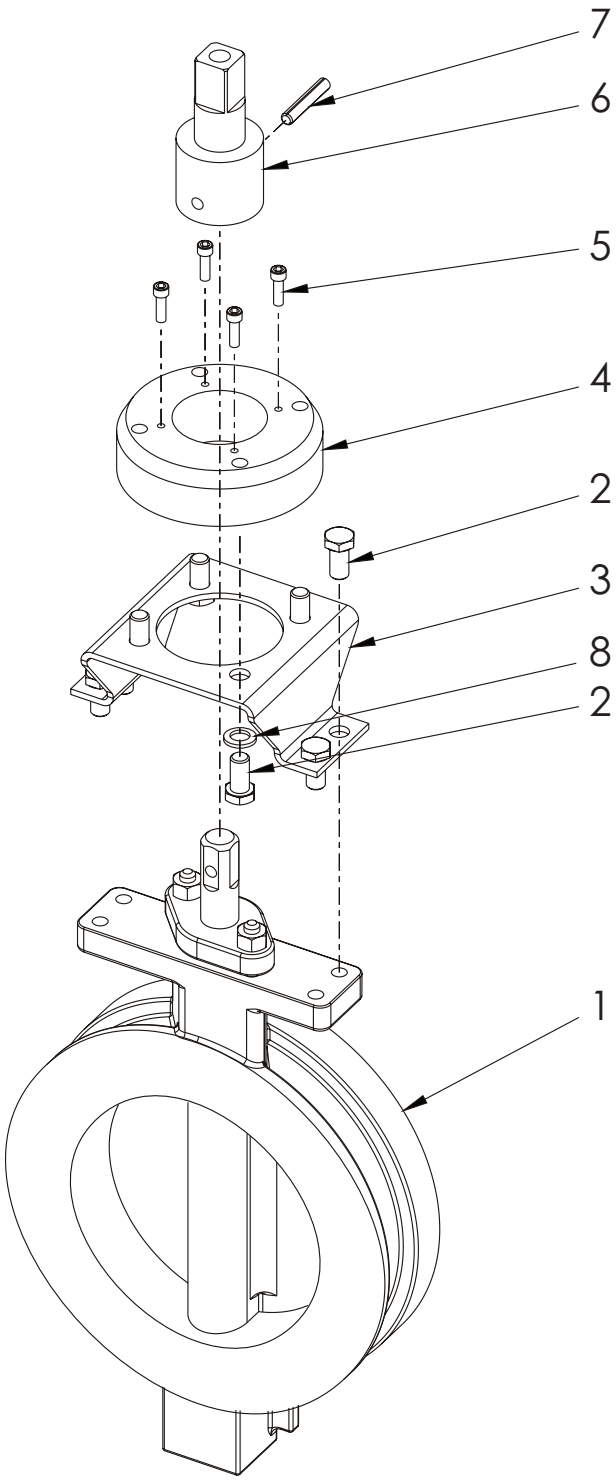


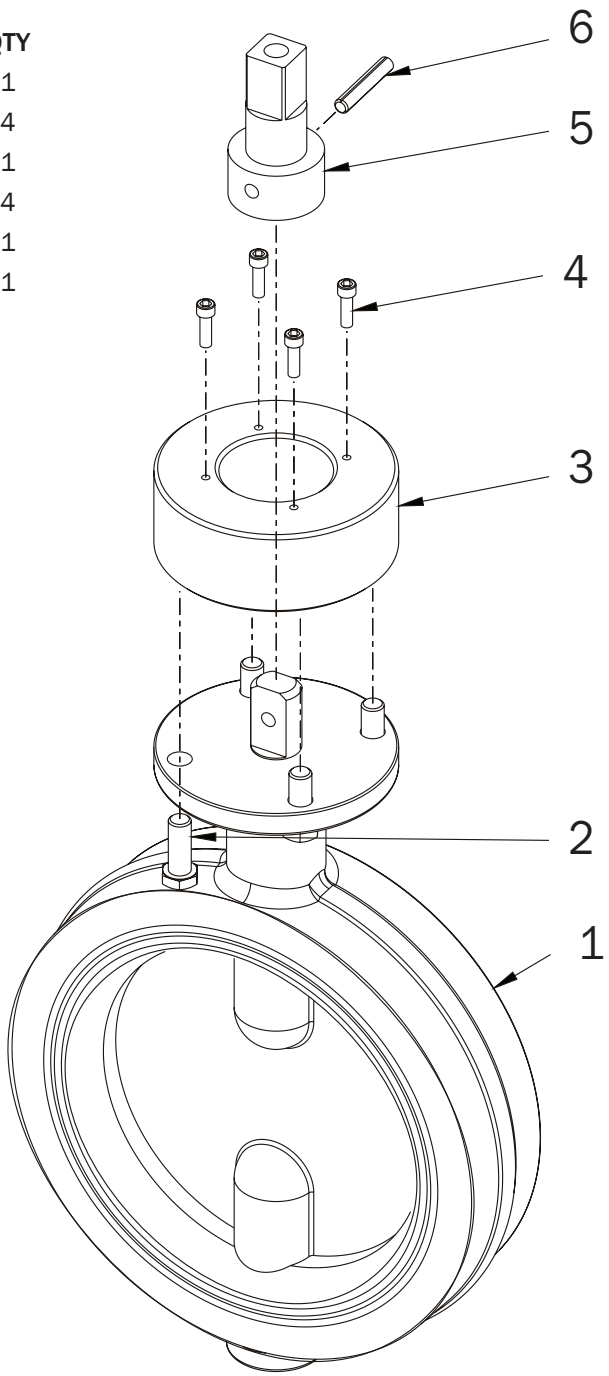
Figure 30

INDEX	PART #	DESCRIPTION	QTY
		EB4J	
1	70105001	BUTTERFLY VALVE	1
2	61034000	BOLT - HEX HEAD	8
3	17724001	BRACKET	1
4	11946001	ADAPTER	1
5	63789000	SCREW - SOC. CAP	4
6	65333101	SHAFT	1
7	51072000	PIN	1
8	71102000	WASHER	4
		EB5J	
1	70100101	BUTTERFLY VALVE	1
2	61034000	BOLT - HEX HEAD	8
3	17724001	BRACKET	1
4	11946001	ADAPTER	1
5	63789000	SCREW - SOC. CAP	4
6	65333101	SHAFT	1
7	51076000	PIN	1
8	71102000	WASHER	4
		EB5S	
1	70134001	BUTTERFLY VALVE	1
2	61034000	BOLT - HEX HEAD	8
3	17724001	BRACKET	1
4	11946001	ADAPTER	1
5	63789000	SCREW - SOC. CAP	4
6	65333101	SHAFT	1
7	51076000	PIN	1
8	71102000	WASHER	4
		EB6J	
1	70106001	BUTTERFLY VALVE	1
2	61034000	BOLT - HEX HEAD	8
3	17724001	BRACKET	1
4	11946001	ADAPTER	1
5	63789000	SCREW - SOC. CAP	4
6	65333001	SHAFT	1
7	51076000	PIN	1
8	71102000	WASHER	4
		EB6S	
1	70128001	BUTTERFLY VALVE	1
2	61034000	BOLT - HEX HEAD	8
3	17724001	BRACKET	1
4	11946001	ADAPTER	1
5	63789000	SCREW - SOC. CAP	4
6	65333001	SHAFT	1
7	51076000	PIN	1
8	71102000	WASHER	4
		EB8J	
1	70107001	BUTTERFLY VALVE	1
2	61034000	BOLT - HEX HEAD	8
3	17724001	BRACKET	1
4	11946001	ADAPTER	1
5	63789000	SCREW - SOC. CAP	4
6	65333301	SHAFT	1
7	51076000	PIN	1
8	71102000	WASHER	4



		EB8S	
1	70129001	BUTTERFLY VALVE	1
2	61034000	BOLT - HEX HEAD	8
3	17724001	BRACKET	1
4	11946001	ADAPTER	1
5	63789000	SCREW - SOC. CAP	4
6	65333301	SHAFT	1
7	51076000	PIN	1
8	71102000	WASHER	4

INDEX	PART #	DESCRIPTION	QTY
1	70126001	BUTTERFLY VALVE	1
2	16388000	BOLT - HEX HEAD	4
3	11949001	ADAPTER	1
4	63789000	SCREW - SOC. CAP	4
5	65336001	SHAFT	1
6	51076000	PIN	1



R1F (Self-Locking Remote Short)
R2F (Self-Locking Remote Long)

INDEX	PART #	DESCRIPTION	QTY
1	17864000	1/2" X 3/4" BOLT SS	1
2	71060000	WASHER FLAT	1
3	36752000	HANDLE 4.5" (R1)	1
3	36753000	HANDLE 7" (R2)	1
4	51819000	STOP PLATE	1
5	17708000	BEARING BREAK	1
6	61801000	WAVE SPRING	1
7	17878000	BUSHING	1
8	64110000	5/16" X 3/4" SHCS	4
9	11735001	ADAPTER – MANUAL	1
10	17608000	WASHER ACTUATOR	1
11	64052001	SHAFT ACTUATOR	1
12	57344000	O RING	1

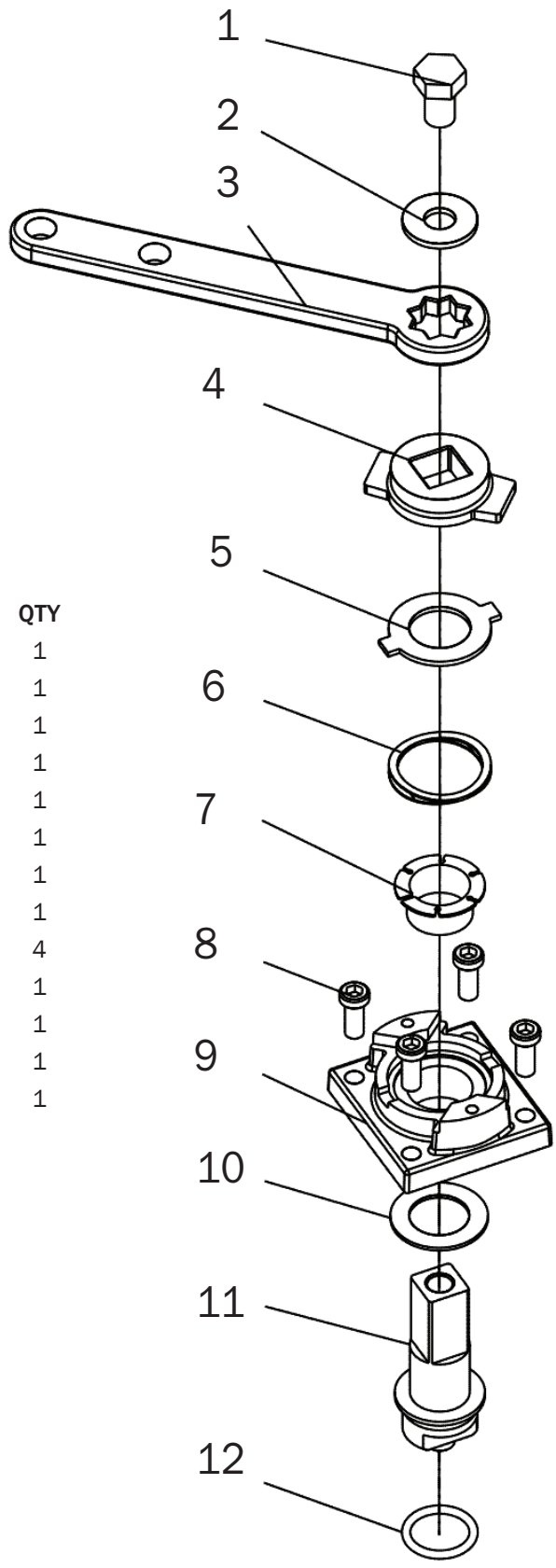
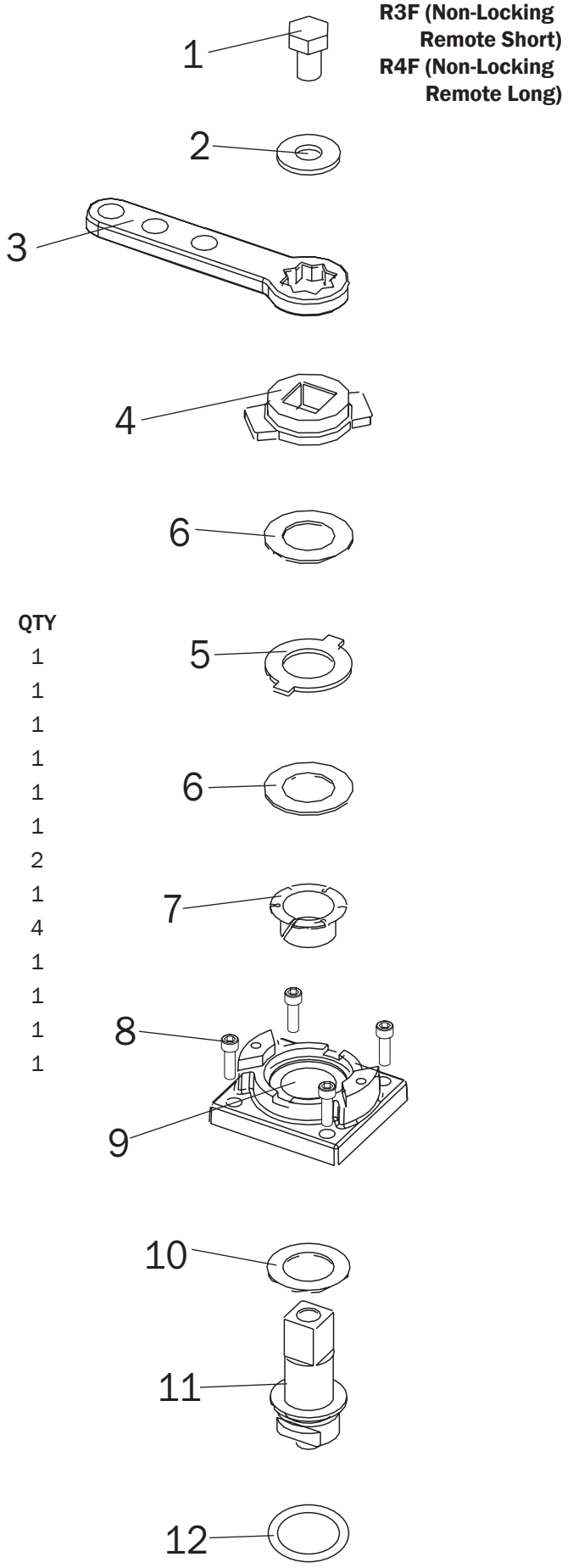


Figure 31

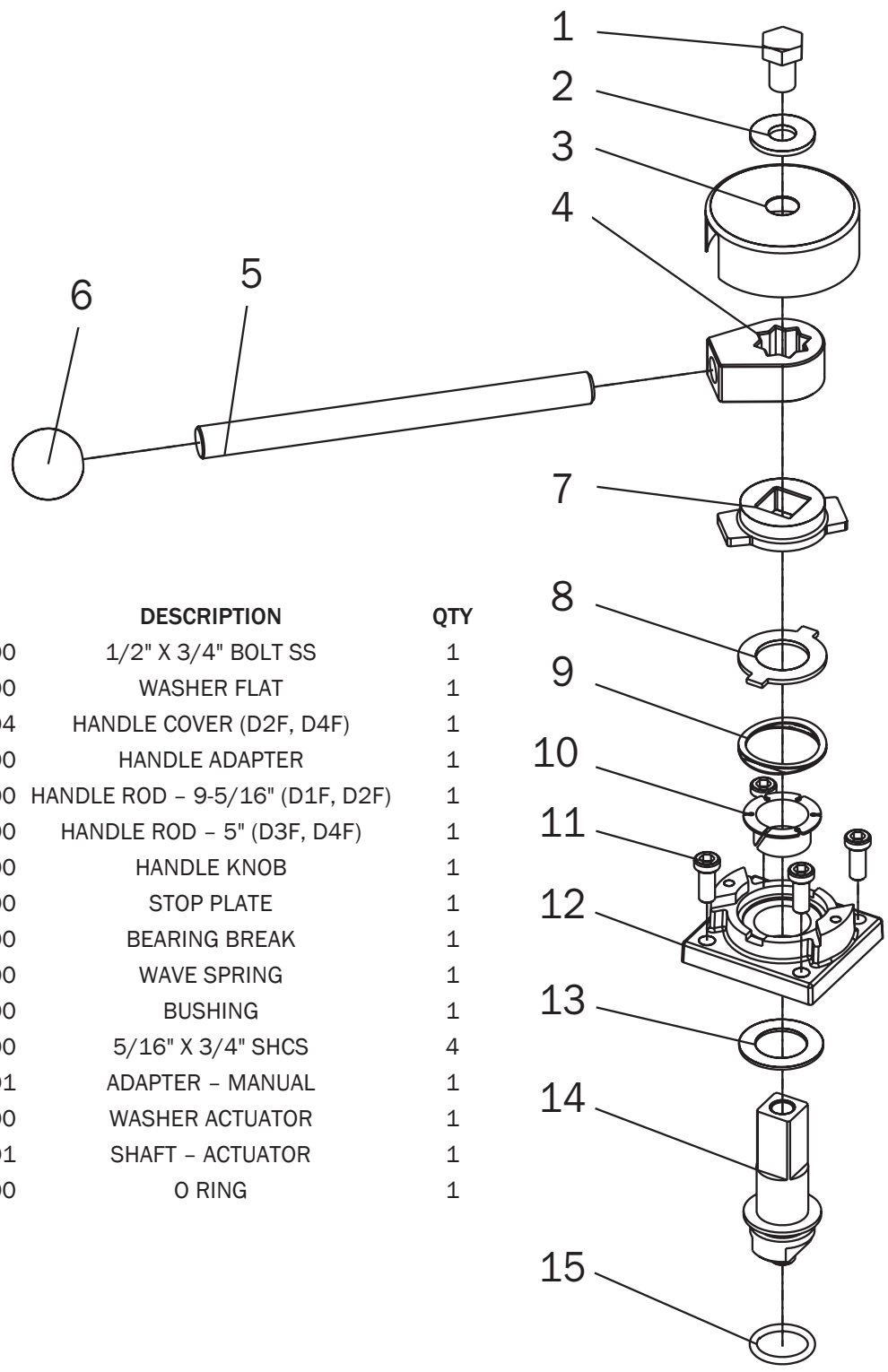
R3F (Non-Locking Remote Short)
R4F (Non-Locking Remote Long)



INDEX	PART #	DESCRIPTION	QTY
1	17864000	1/2" X 3/4" BOLT SS	1
2	71060000	WASHER FLAT	1
3	36752000	HANDLE 4.5" (R3)	1
3	36753000	HANDLE 7" (R4)	1
4	51819000	STOP PLATE	1
5	17708000	BEARING BREAK	1
6	71527000	THRUST WASHERS	2
7	17878000	BUSHING	1
8	64110000	5/16" X 3/4" SHCS	4
9	11735001	ADAPTER – MANUAL	1
10	17608000	WASHER ACTUATOR	1
11	64052001	SHAFT ACTUATOR	1
12	57344000	O RING	1

Figure 32

D1F (Direct [Long])
D2F (Direct [Long] – Chrome)
D3F (Direct [Short])
D4F (Direct [Short] – Chrome)



INDEX	PART #	DESCRIPTION	QTY
1	17864000	1/2" X 3/4" BOLT SS	1
2	71060000	WASHER FLAT	1
3	23515004	HANDLE COVER (D2F, D4F)	1
4	11923000	HANDLE ADAPTER	1
5	36754000	HANDLE ROD – 9-5/16" (D1F, D2F)	1
5	36756000	HANDLE ROD – 5" (D3F, D4F)	1
6	42023000	HANDLE KNOB	1
7	51819000	STOP PLATE	1
8	17708000	BEARING BREAK	1
9	61801000	WAVE SPRING	1
10	17878000	BUSHING	1
11	64110000	5/16" X 3/4" SHCS	4
12	11735001	ADAPTER – MANUAL	1
13	17608000	WASHER ACTUATOR	1
14	65330001	SHAFT – ACTUATOR	1
15	57344000	O RING	1

Figure 33

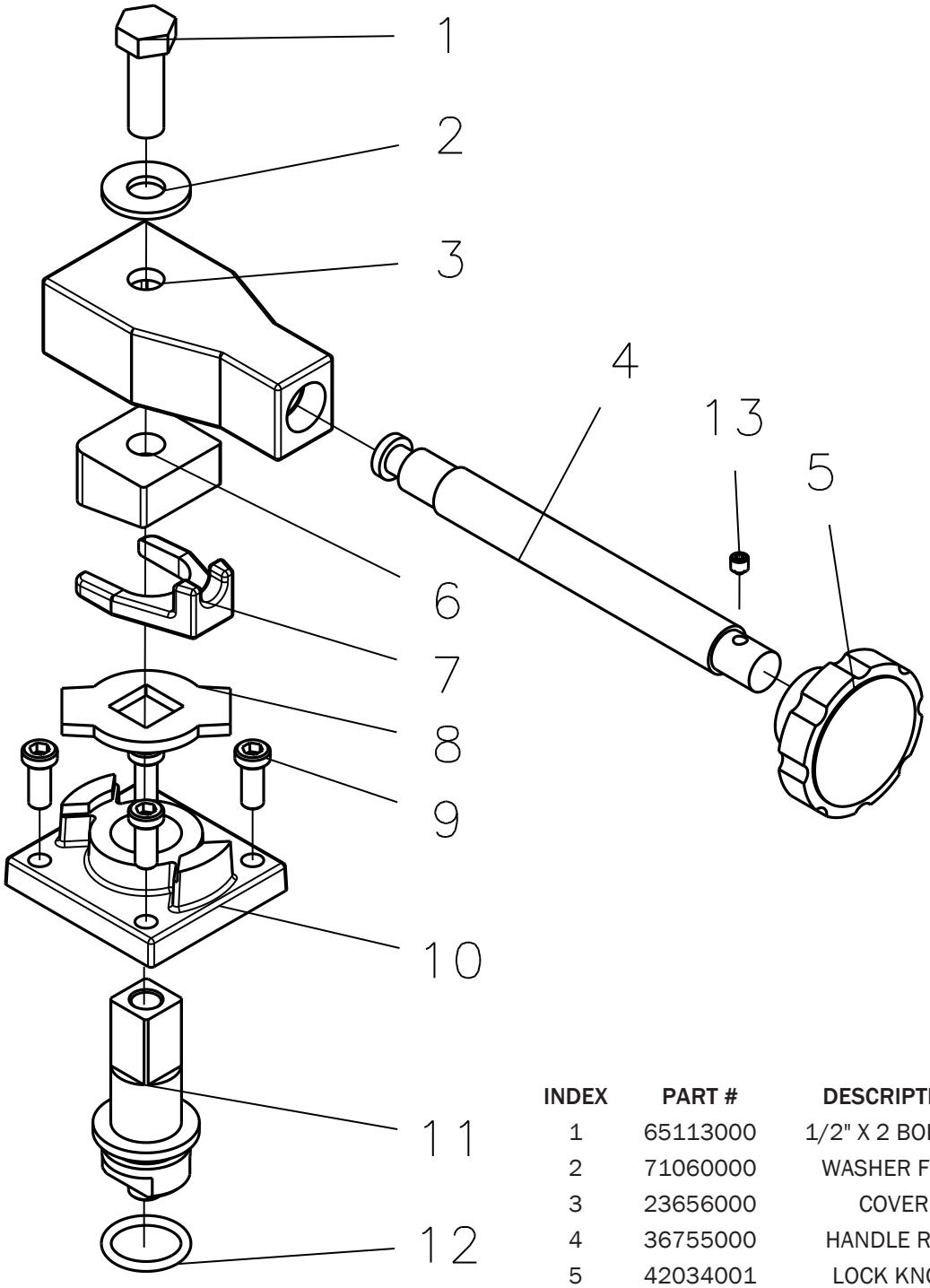


Figure 34

INDEX	PART #	DESCRIPTION	QTY
1	65113000	1/2" X 2 BOLT SS	1
2	71060000	WASHER FLAT	1
3	23656000	COVER	1
4	36755000	HANDLE ROD	1
5	42034001	LOCK KNOB	1
6	44410000	LOCK WEDGE	1
7	44121000	LOCK ELEVATOR	2
8	52831000	PLATE STOP	1
9	64110000	5/16" X 3/4 SHCS	4
10	11741001	ADAPTER	1
11	64060000	SHAFT ACTUATOR	1
12	57344000	O RING	1
13	61275000	1/4” X 1/4” SET SCREW	1

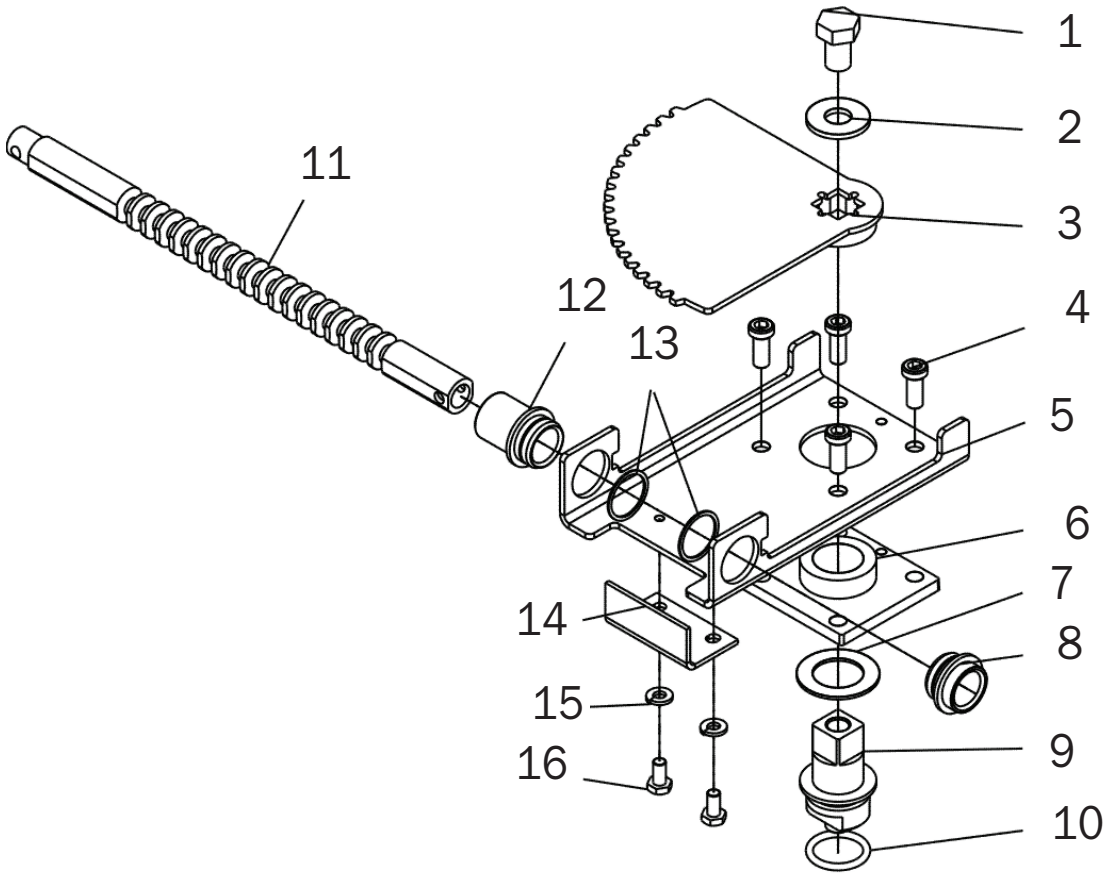


Figure 35

INDEX	PART #	DESCRIPTION	QTY
1	17864000	1/2" X 3/4" BOLT SS	1
2	71060000	WASHER FLAT	1
3	33862000	GEAR SECTOR	1
4	64110000	5/16" X 3/4" SHCS	4
5	18353000	BRACKET R and S	1
6	11742001	ADAPTER R and S	1
7	17608000	WASHER ACTUATOR	1
8	17882000	BUSHING SHORT R and S	1
9	65327001	SHAFT ACTUATOR R and S	1
10	57344000	O RING	1
11	33861000	GEAR RACK	1
12	17881000	BUSHING LONG R and S	1
13	59127000	RETAINING RING	2
14	18354000	BRACKET – L R and S	1
15	71100000	WASHER – LOCK	2
16	61040000	1/4" X 1/2" SHCS	2

G1F (Gear)
G2F (Gear)

INDEX	PART #	DESCRIPTION	QTY
1	64103000	#8 X 1/2" SHCS	4
2	71609000	WASHER	4
3	23653000	GEAR CASE COVER	1
4	17864000	1/2"-13 X 3/4" BOLT SS	1
5	71060000	WASHER FLAT 1/2" SAE	1
6	33610001	GEAR SECTOR	1
7	51224000	ROLL PIN	1
8	71249001	WORM GEAR	1
9	71522000	WASHER THRUST	4
10	15698000	THRUST BEARING 1/2"	2
11	71521000	WASHER THRUST BRASS	1
12	63789000	#10-24 X 5/8" SHCS	4
13	24476001	GEAR CASE (G1F)	1
13	24477001	GEAR CASE (G2F)	1
14	17608000	WASHER ACTUATOR (G1F)	1
15	65326001	ACTUATOR SHAFT GEAR (G1F)	1
16	57344000	O RING (G1F)	1
17	65367000	SHAFT HANDLE	1
18	32134000	GREASE FITTING	1

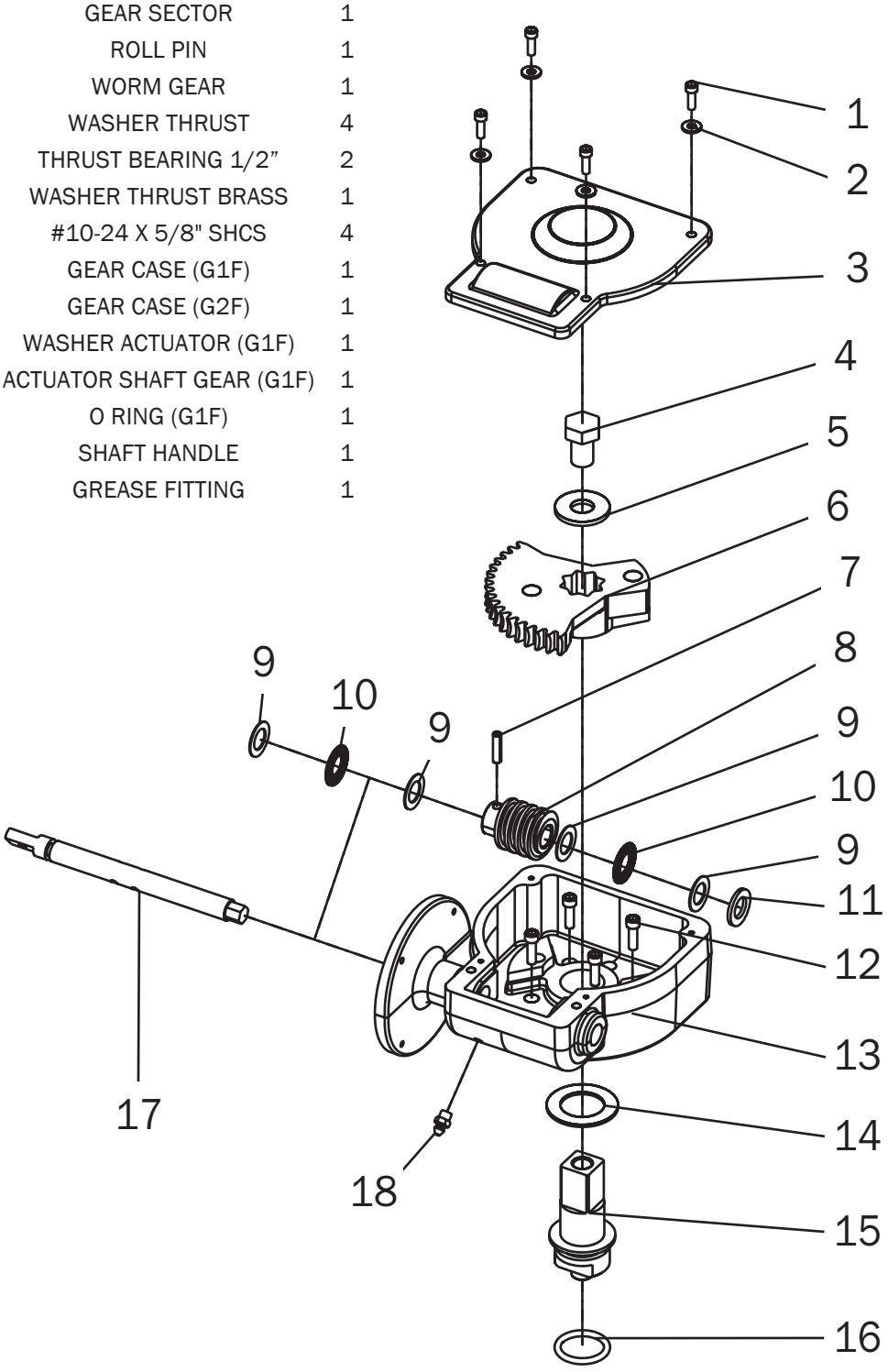


Figure 36

E1F (Electric)
E2F (Electric)

INDEX	PART #	DESCRIPTION	QTY
1	65105000	SENSOR	1
2	64103000	#8-32 X 1/2" SHCS	4
3	71609000	#8 WASHER	4
4	23657000	GEAR CASE COVER	1
5	65328001	ACTUATOR SHAFT SENSOR	1
6	17864000	1/2"-13 X 3/4" BOLT SS	1
7	71060000	WASHER FLAT	1
8	33610001	GEAR SECTOR	1
9	51224000	ROLL PIN	1
10	71249001	WORM GEAR	1
11	71522000	WASHER THRUST	4
12	15698000	THRUST BEARING	2
13	71521000	THRUST WASHER BRASS	1
14	63789000	#10-24 X 5/8" SHCS	9
15	23593001	GEAR CASE (E1F)	1
15	23597001	GEAR CASE (E2F)	1
16	46094000	MOTOR	1
17	11943001	MOTOR ADAPTER	1
18	65370000	SHAFT MOTOR	1
19	32134000	GREASE FITTING	1
20	17608000	WASHER ACTUATOR (E1F)	1
21	57344000	O RING (E1F)	1
22	65326001	ACTUATOR SHAFT GEAR (E1F)	1
23	44565000	LABEL	1

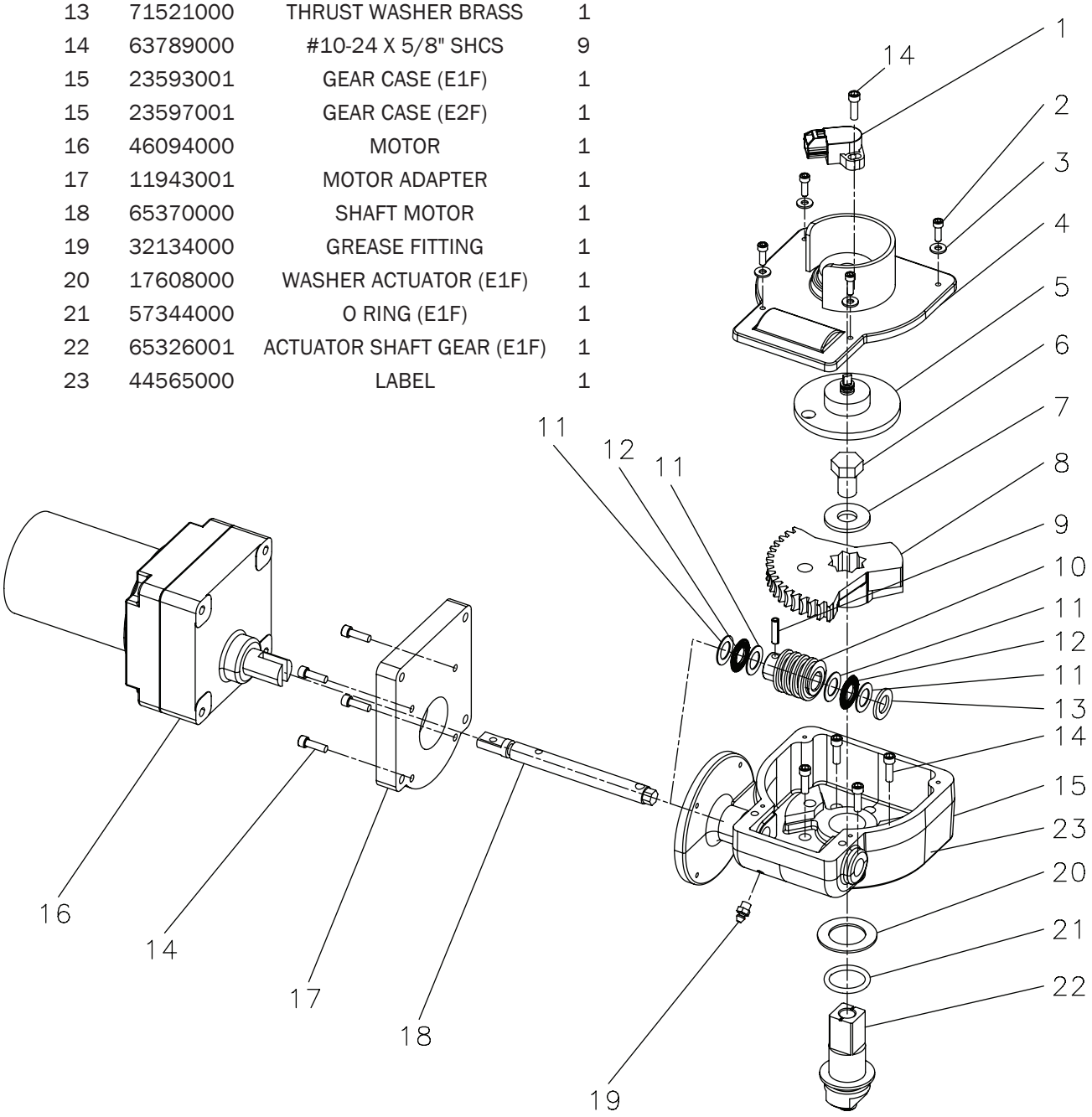


Figure 37

E3F (Electric)
E5F (Electric)

INDEX	PART #	DESCRIPTION	QTY
1	64103000	#8-32 X 1/2" SHCS	4
2	71609000	#8 WASHER	4
3	81595001	CNTL COVER ASSY.	1
4	81699001	BOLT MAGNET ASSY.	1
5	71060000	WASHER FLAT	1
6	33610001	GEAR SECTOR	1
7	51224000	ROLL PIN	1
8	71249001	WORM GEAR	1
9	71522000	WASHER THRUST	4
10	15698000	THRUST BEARING	2
11	71521000	THRUST WASHER BRASS	1
12	23593001	GEAR CASE (E3F)	1
12	23597001	GEAR CASE (E5F)	1
13	17608000	WASHER ACTUATOR	1
14	65326001	ACTUATOR SHAFT GEAR	1
15	57344000	O-RING	1
16	46094000	MOTOR	1
17	11943001	MOTOR ADAPTER	1
18	65370000	SHAFT MOTOR	1
19	32134000	GREASE FITTING	1
20	63789000	#10-24 X 5/8" SHCS	8
21	44565000	LABEL	1

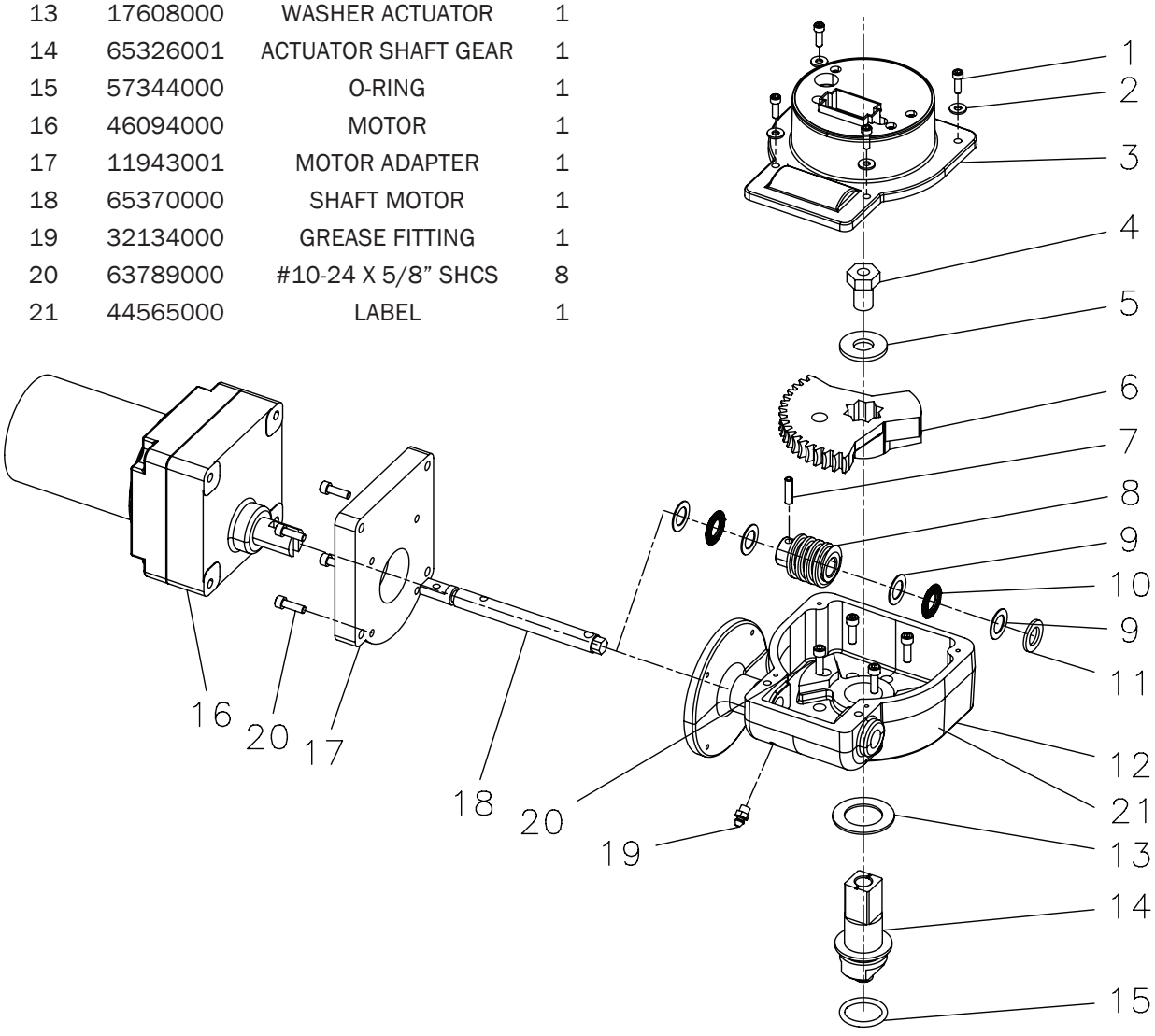


Figure 38

E4F (Electric)
E6F (Electric)

INDEX	PART #	DESCRIPTION	QTY
1	64103000	#8-32 X 1/2" SHCS	4
2	71609000	#8 WASHER	4
3	81596001	CNTL COVER ASSY.	1
4	81699001	BOLT MAGNET ASSY.	1
5	71060000	WASHER FLAT	1
6	33610001	GEAR SECTOR	1
7	51224000	ROLL PIN	1
8	71249001	WORM GEAR	1
9	71522000	WASHER THRUST	4
10	15698000	THRUST BEARING	2
11	71521000	THRUST WASHER BRASS	1
12	23593001	GEAR CASE (E4F)	1
12	23597001	GEAR CASE (E6F)	1
13	17608000	WASHER ACTUATOR	1
14	65326001	ACTUATOR SHAFT GEAR	1
15	57344000	O-RING	1
16	46094000	MOTOR	1
17	11943001	MOTOR ADAPTER	1
18	65370000	SHAFT MOTOR	1
19	32134000	GREASE FITTING	1
20	63789000	#10-24 X 5/8" SCHS	8
21	44565000	LABEL	1

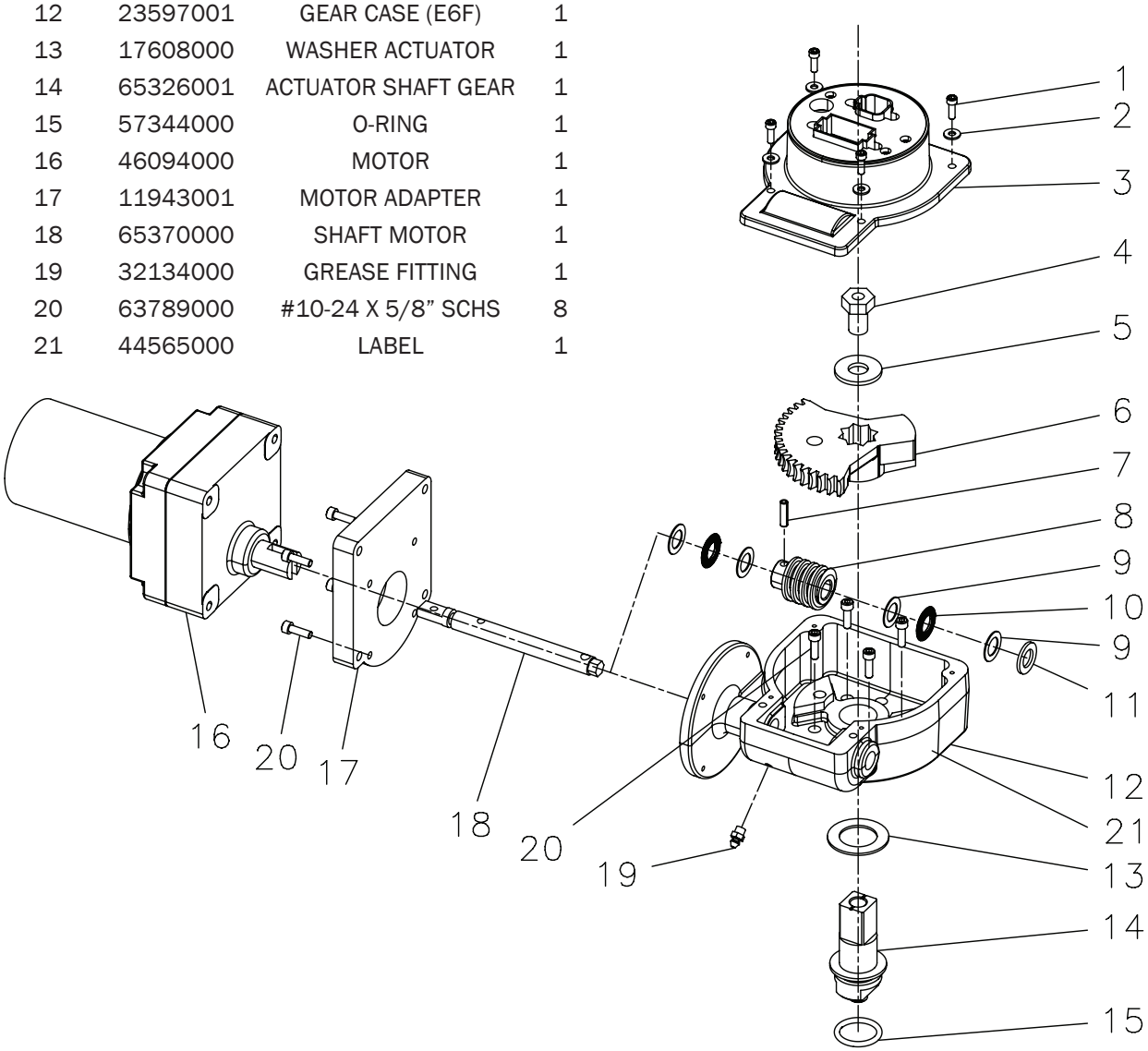


Figure 39

SLOW CLOSE (Remote, Direct, and Rack and Sector)

INDEX	PART #	DESCRIPTION	QTY
1	17867000	1/2-13 X 2" BOLT	1
2	71060000	WASHER FLAT	1
3	64114000	#6-32 X 1/8" SOC CAP SCR SS	1
4	57535000	O-RING AS 568-003	1
5	23654000	COVER	1
6	65219000	1/4-28 X 3/16" SET SCR SS	2
7	57292000	O-RING AS 568-117	1
8	71614000	FRICTION DISC	3
9	71559000	WASHER CUSHIONING	1
10	65325000	SHAFT ACTUATOR	1
11	57474000	O-RING AS 568-038	1
12	18204001	BODY	1
13	51078000	PIN (D1F, D1S)	1
13	51232000	PIN (R1S, R2S, S1F, S1S)	1
14	24306000	COUPLING (S1S, S1F)	1
14	24304000	COUPLING (R1S, R2S, R1F, R2F)	1
14	24305001	COUPLING (D1S, D1F)	1

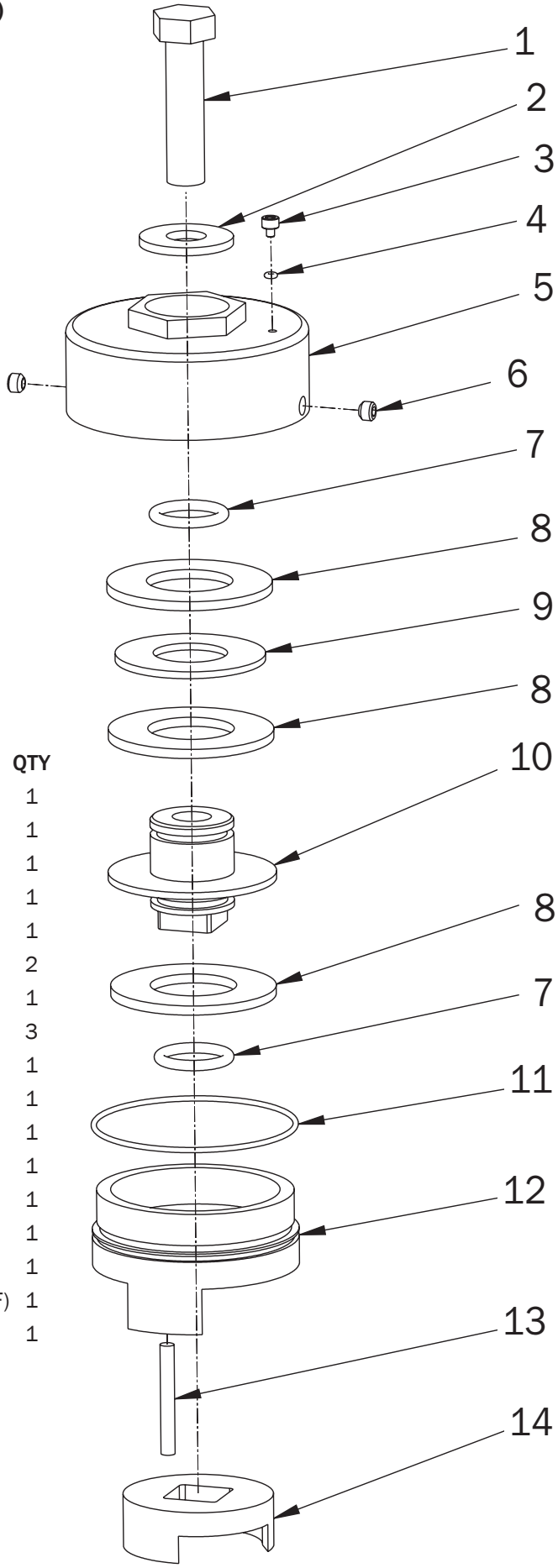


Figure 40

VII. INTRODUCTION: ELECTRIC VALVES

1. Electric Controller Overview (UBEC1, UBEC2, UBEC3, UICS2)

Designed with precision in mind, the electric valve controller and integrated electronic display is easy to operate. Monitor the valve position on a 10 LED valve position indicator. All controls and indicators are located on the front of the control and display module. Controls are simple push buttons.

UBEC1 – Valve control with valve position indicator.
UBEC2 – Valve control with valve position indicator and digital pressure display.
UBEC3 – Valve control with valve position indicator, digital pressure display, and digital flowmeter.
UICS2 – Valve control with valve position indicator, digital pressure display, and CAF control with on/off input as well as selectable preset positions for wet, medium, and dry CAF.

Electric Actuator Overview (E3F, E4F)

The E3F and E4F Unibody electric actuators have been designed to further simplify the use of electric valves on a fire fighting apparatus. The control logic has been relocated to the top of the valve. This increases the simplicity of wiring the valve as well as broadening the options for controlling the valve. The E3F and E4F electric actuator utilize the J1939 data bus for control communication. All electronic components have been potted with a two part epoxy to ensure a water tight seal.

2. Features

Programmable Preset
Automatic Adjusting of LED Displays for Day/Night Viewing
Datalink Interface for Primary/Remote Operation
Multiple Flow Rate Calibration Points (UBEC3)

Additional Information

For the latest design and application information on the Unibody Valve, Valve Controllers and Harnesses, go to www.unibodyvalve.com

3. Specifications

Control and Display Module
Supply Voltage 12 or 24 VDC

Current:
Valve control circuit will handle a current load of 10 amps for valve sizes of 1.5, 2, 2.5, 3, 3.5, 4, 5, 6 and 8 inches.

Controller Dimensions:
Height 4¼"
Width 4¼"
Depth 2½"
Datalink Interface: CAN – bus

Flow Sensor
Type Paddlewheel with Brass Housing for Saddle Clamp
Sensor Material Acetal (Delrin) with Stainless Steel (316) Shaft
Excitation Voltage 5 VDC
Model Number See Engineering Guide for available mounting styles

Pressure Sensor
Pressure Range 0 – 600 PSI
Proof Pressure 200 PSI
Excitation Voltage 5 VDC
Output Voltage 0.5 – - 4.75 VDC (Refer to Table 4)
Model Number 65106000

PRESSURE (PSI)	VOLTAGE (VDC)
0	0.5
100	1.21
150	1.56
200	1.92
250	2.27
300	2.625
600	4.75

Table 4. Pressure Sensor Output Voltage

VIII. GENERAL DESCRIPTION

1. Components

The Valve Control indicator requires the following components:

- Control or Display Module
- Pressure Sensor (UBEC2, UBEC3 and UICS2)
- Paddlewheel Flow Sensor and Mounting Assembly (UBEC3)
- Cables

Control and Display Module (UBEC1, UBEC2, UBEC3 and UICS2)

The valve control and display module is waterproof and has dimensions of 4¼ inches high by 4¼ inches wide by 2½ inches deep. All controls and indicators are located on the front of the display module. **Refer to Controls and Indicators on Page 41.**

Actuator Control Module (E3F and E4F)

The valve control module is permanently fixed to the top of the actuator gear case cover. The entire control module is sealed by utilizing a two part epoxy to ensure that moisture will not affect the electronics. Control of the valve can be accomplished though the use of the CAN communication, UBEC series controllers, or external switches.

Pressure Sensor (UBEC2, UBEC3 and UICS2)

The pressure sensor provides an input signal to the display module that is proportional to the discharge pressure. It is mounted on the downstream side of the discharge valve. The electrical connector is waterproof and molded into the pressure sensor housing.

Paddlewheel Flow Sensor (UBEC3)

The flow sensor provides an input signal to the display module that is proportional to the discharge flow rate. It is mounted in the discharge piping. Placement of the sensor in the piping is critical to obtaining accurate flow rate information, refer to the installation procedures for detailed information on mounting locations on **Page 44**. The electrical connector is waterproof and molded into the flow sensor housing.

Cables

Interconnecting cables are provided. **Refer to Wiring section on Page 68.**

2. Controls and Indicators (UBEC1, UBEC2, UBEC3, UICS2)

All controls and indicators are located on the front of the control and display module. Refer to Figure 41.

Valve Position Indicator
When the valve is fully closed the red closed LED will be on. The ten green LEDs indicate the valve position as it moves from closed to fully open.

Valve Control Buttons
Three buttons control the valve motor to open and close the valve. The preset button will set the valve to a programmed position.

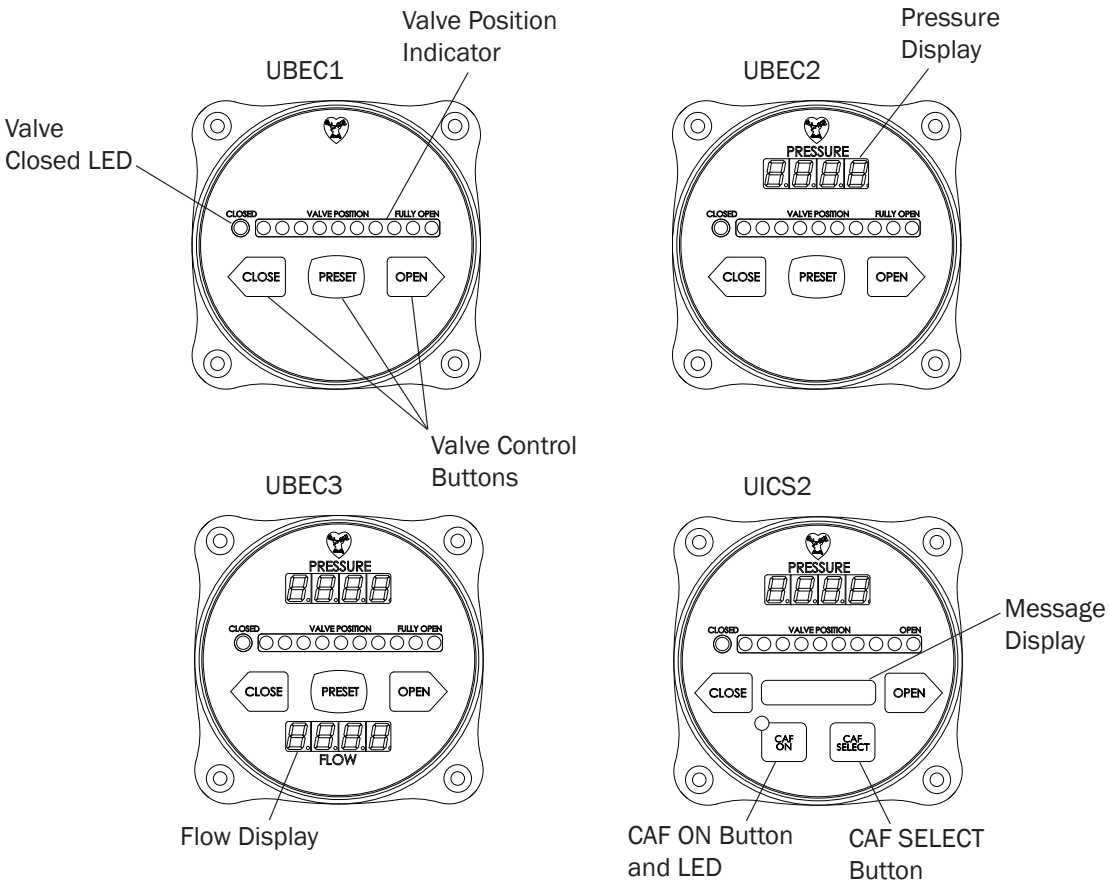
Pressure Display (UBEC2, UBEC3, and UICS2)
This 4-digit LED display will indicate pressure in PSI, kPa, or Bar. The display is also used when accessing program features. See the Programming section for more information. **Pages 53-62.**

Flow Display (UBEC3)
This 4-digit LED display will indicate flow rate in GPM or LPM. The display is also used when accessing program features. See the Programming section for more information. **Pages 53-62.**

CAF SELECT Button (UICS2)
This button selects the operating mode and moves the valve to a pre programmed position.

CAF ON Button and LED (UICS2)
This button activates/deactivates the compressed air and allows the operating mode with pre programmed valve positions to be selected.

Figure 41. Controls and Indicators



IX. INSTALLATION

The valve control and display module, flow sensor and pressure sensor are compatible for use with 1 to 5 inch piping.

Note: Plumbing systems are always unique and may cause small deviations in the factory calibration. It is recommended that the calibration procedure be performed after installation.

1. Install Control and Display Module (UBEC1, UBEC2, UBEC3, UICS2)

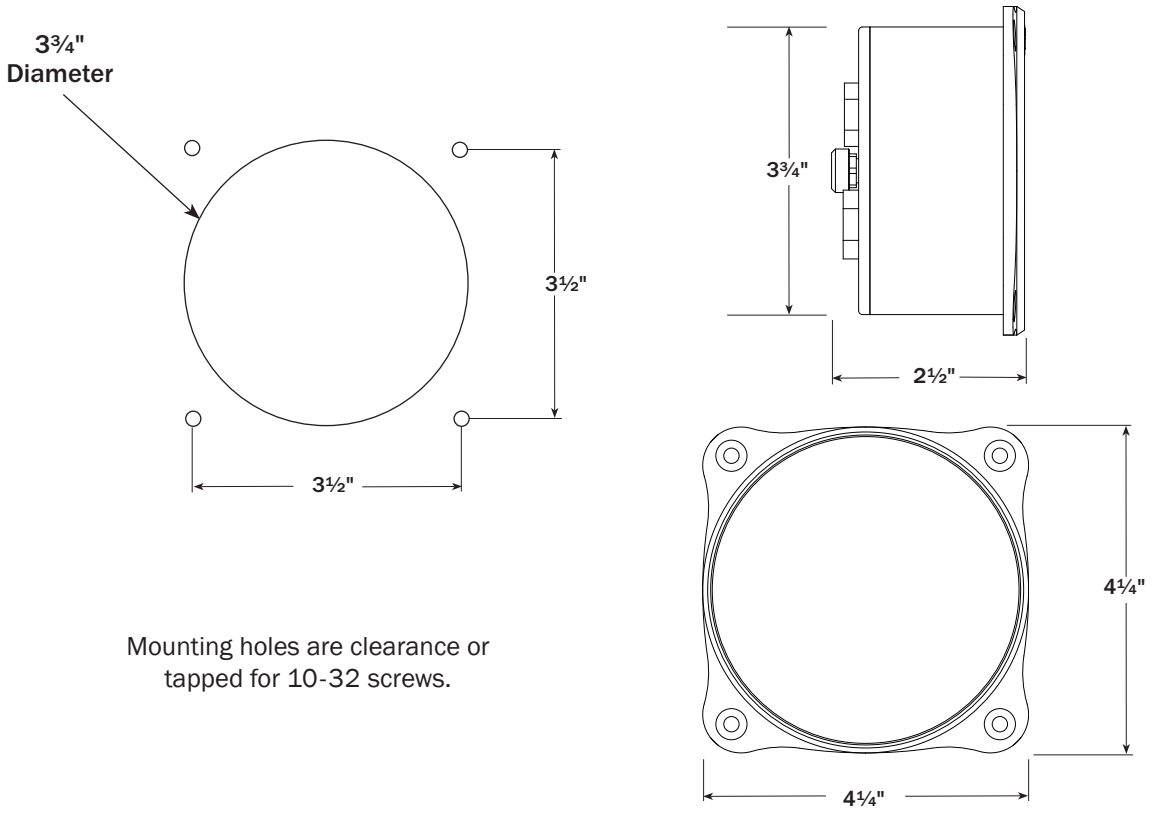
The control and display modules are interchangeable. It is recommended that the calibration be checked if modules are swapped.

Note: it is recommended to have the control and display module mounted close to the associated discharge valve.

1. Measure and mark mounting location for control module panel cutout and mounting screw holes. Make sure there is clearance behind the panel for the display and cables before cutting holes. Refer to **Figure 42 for layout and dimensions**.
2. Cut out a $^{3}/_{4}$ inch diameter hole and drill four holes (clearance or tapped) for 10-32 mounting screws.
3. Place control module in position and secure with four screws.
4. Connect the cables and wires. **Refer to Wiring section on Page 68.**

Panel Cutout

Figure 42. Control Module Mounting Dimensions



Mounting holes are clearance or tapped for 10-32 screws.

2. Install Pressure Sensor (UBEC2, UBEC3, UICS2, E4F, & E6F)

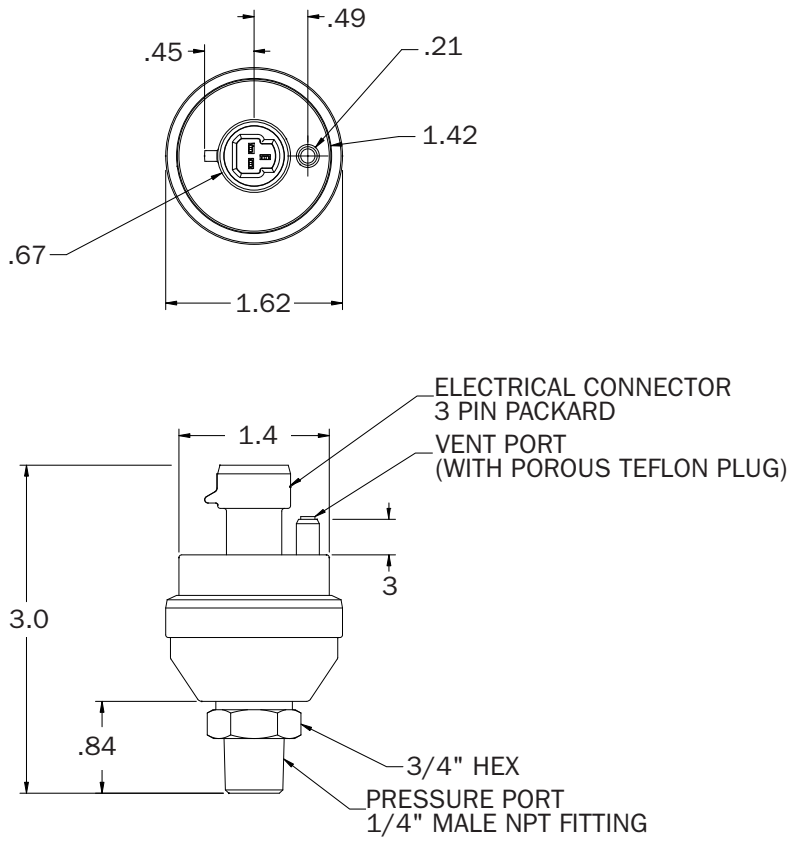
The pressure sensor is mounted on the downstream side of the discharge valve. Pressure sensors are interchangeable. It is recommended that the calibration be checked if pressure sensors are swapped.

Note: Install the pressure sensor upright so water in the end of the sensor is able to drain back into the pipe.

1. Screw the sensor into a ¼ inch 18 NPT hole.
   Caution: Do not use the main body that houses the electronics to tighten the pressure sensor. Damage to the sensor may occur.
2. Tighten the sensor with a ¾ inch wrench on the lower hex fitting.
3. Connect the pressure sensor cable from the control module to the sensor.

Refer to Wiring section on Page 68.

Figure 43. Pressure Sensor



All Dimensions in Inches.

3. Install Flow Sensor (UBEC3, E4F, & E6F)

There are several ways to install the paddlewheel type flow sensors. Mounting options include saddle clamps, weldments, pipe tees and special adapters. Each mount will meet particular plumbing requirements.

Flow sensors are interchangeable. It is recommended that the calibration be checked if flow sensors are swapped.

The maximum pressure for a flow sensor installation is 600 PSI.

Flow Sensor Location

The location of the flow sensor in the plumbing system is critical. The flow of water at and around the sensor must be laminar, or smooth, to ensure accurate flow rate measurement. There must be enough straight pipe run before the flow sensor location to allow the water stream to stabilize into a uniform flow. Guidelines for selecting flow sensor locations are outlined in **Figure 44**.

When the sensor is mounted after an area in the plumbing that tends to increase water stream turbulence (a valve, increase in pipe diameter, etc.), it is critical that steps are taken to stabilize the flow.

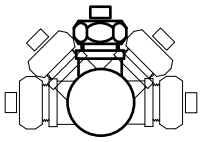
- When a pipe is reduced in diameter the water stream tends to be squeezed into a more uniform flow. This can be used to help stabilize flow when there is not a sufficient pipe run upstream.
- Elkhart Brass offers an optional flow conditioner that replaces the standard sensor housing. It protrudes into the water stream at the sensor location and is specially shaped to reduce local turbulence.

Linearizer Feature

The UBEC3 features a Linearizer function in the calibration programming. This function should be used when the flow sensor is installed in a plumbing location where flow is not linear. It corrects for nonlinear flow by allowing the display to be calibrated at multiple flow rates (up to 10) to provide a more accurate flow rate display. **Refer to Calibration section on Pages 63-65.**

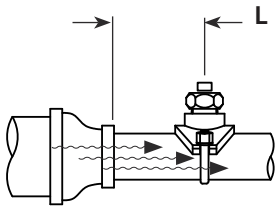
Figure 44. Flow Sensor Location Guide

The preferred location for the mounting of a flow sensor is on the top half of the pipe. The best orientation is vertical. If the sensor is mounted on the bottom of the pipe, it may be susceptible to the accumulation of dirt.



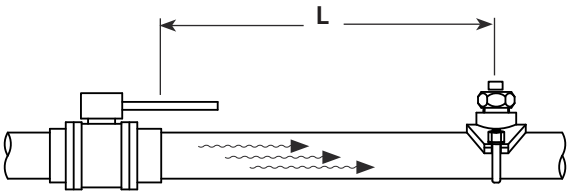
Best Orientation is Vertical

When mounting the sensor after the pipe diameter is reduced the length L must be at least 2 times the pipe diameter.



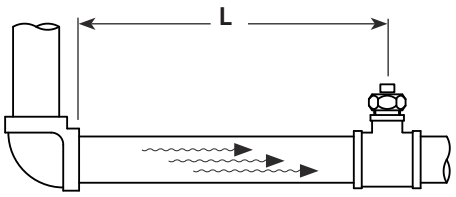
After Reduction
L > 2 X PIPE DIA.

When mounting the sensor after a valve the length L must be at least 14 times the pipe diameter.



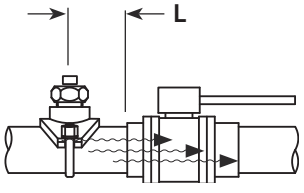
After Valve
L > 14 X PIPE DIA.

When mounting the sensor after an elbow the length L must be at least 6 times the pipe diameter.



After Elbow
L > 6 X PIPE DIA.

When mounting the sensor before a valve or an elbow the length L must be at least equal to the pipe diameter.



Before Valve or Elbow
L > 1 X PIPE DIA.

Saddle Clamp Installation

Note: Ensure that the mounting location meets the requirements for uniform water flow.
Refer to Flow Sensor Location on Page 44-45.

Note: Ensure that there is enough room for the saddle clamp, sensor and connector to fit.
Refer to Figure 45.

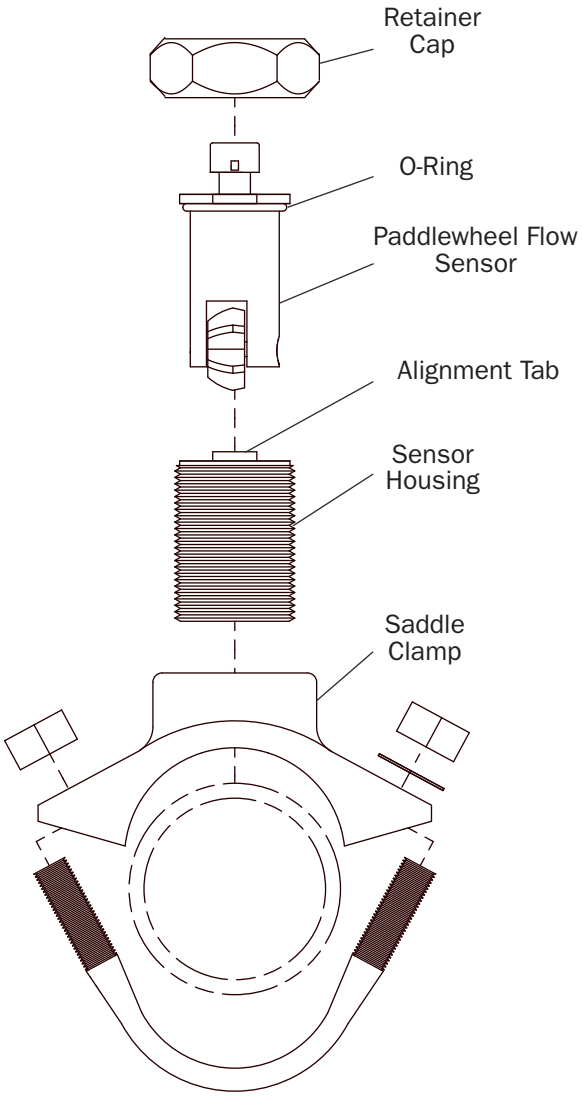
1. Drill and deburr a $1\frac{11}{16}$" to $1\frac{3}{4}$" diameter hole at mounting location.
2. Clean pipe surface in area where saddle clamp gasket will seal.

   Note: The sensor housing is epoxied in the saddle clamp with the alignment tab in the correct position and is not meant to be removed.
3. Place saddle clamp over hole with sensor housing centered.
4. Tighten saddle clamp nuts until the gasket makes a good tight seal.
5. Insert flow sensor into sensor housing. Align flat spot on sensor rim with alignment tab and make sure o-ring is in groove.

   Note: The retainer cap only needs to be hand tightened. There is an inside lip that will stop the cap from turning when it makes contact with the alignment tab. This provides the correct pressure to make the seal at the o-ring. Make sure the flow sensor does not disengage from the alignment tab and rotate.
6. Install retainer cap and hand tighten.
7. Connect cable from display module to flow sensor (the cable is color coded blue).

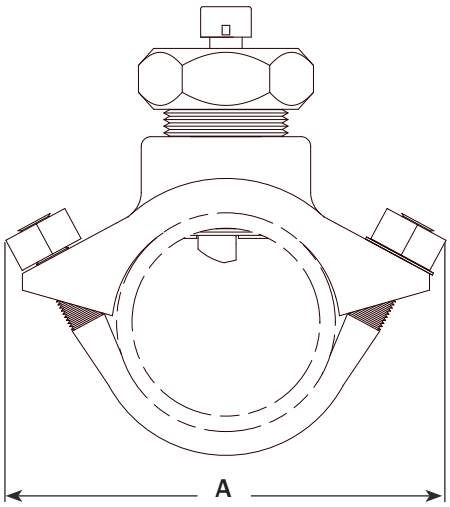
Refer to Wiring section on Page 68.

Figure 45. Saddle Clamp Installation



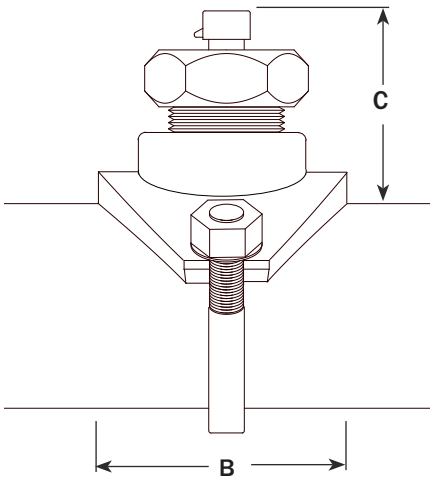
Note: When the retainer cap is tightened make sure the sensor rim flat spot does not disengage from the alignment tab and allow the flow sensor to rotate.

Note: Allow a minimum of 2 inches clearance at the sensor top for removal/ installation of the connector.



Pipe Size	Dimensions		
(Sch 40)	A	B	C
2	5.5	3.9	2.9
2.5	5.5	3.9	2.8
3	5.9	3.9	2.8
3.5	6.8	4.3	2.8
4	6.8	4.3	2.8
5	8	4.3	2.8

Note: These dimensions are typical and are given to be used as an aid in determining mounting locations for flow sensors.



Weldment Installation

Note: Ensure that the mounting location meets the requirements for uniform water flow. **Refer to Flow Sensor Location on Page 44-45.**

Note: Ensure that there is enough room for the weldment, sensor and connector to fit. **Refer to Figure 46.**

1. Drill and deburr a $1^{11}/_{16}$" to $1^{3}/_{4}$" diameter hole at mounting location.
2. Center weldment mount over hole and weld it to pipe. The weld must be continuous around the fitting with no gaps or voids.
3. Screw sensor housing into weldment. Run it down far enough to make sure it will go through the pipe freely then back it out.

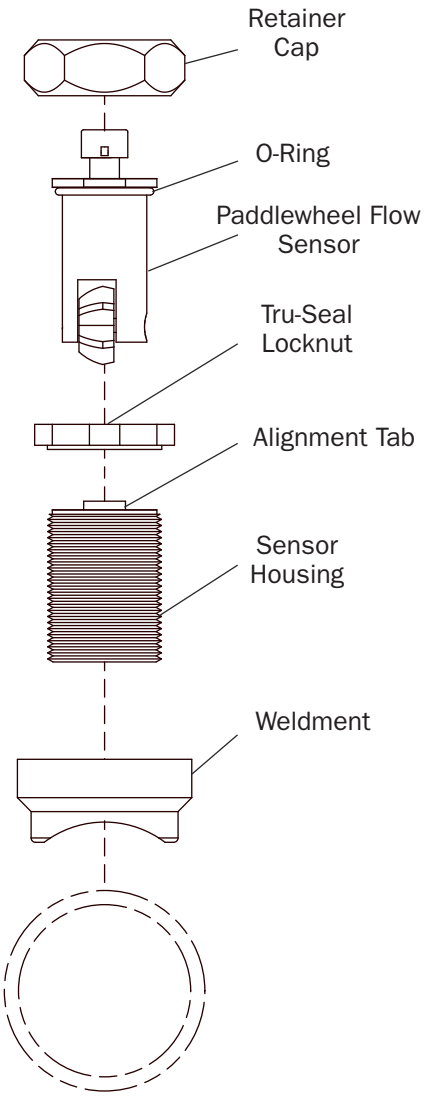
Note: The paddlewheel sensor must be correctly aligned in the water stream. The alignment tab is used to set the position of the sensor. Make sure that the alignment tab is centered on the pipe centerline. **Refer to Figure 46.**

4. Set sensor housing to dimension A in **Figure 46**. Make sure the alignment tab is centered on the pipe as shown (it can be on upstream or downstream side).
5. Screw on tru-seal locknut and tighten with a 2" wrench using light to medium torque. Make sure that the sensor housing alignment tab remains centered and the sensor housing does not rotate causing dimension A to change.
6. Insert flow sensor into sensor housing. Align flat spot on sensor rim with alignment tab and make sure o-ring is in groove.

Note: The retainer cap only needs to be hand tightened. There is an inside lip that will stop the cap from turning when it makes contact with the alignment tab. This provides the correct pressure to make the seal at the o-ring. Make sure the flow sensor does not disengage from the alignment tab and rotate.

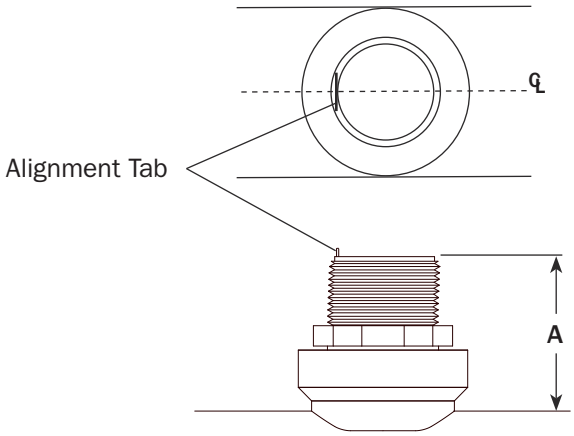
7. Install retainer cap and hand tighten.
8. Connect cable from display module to flow sensor (the cable is color coded blue). **Refer to Wiring section on Page 68.**

Figure 46. Weldment Installation



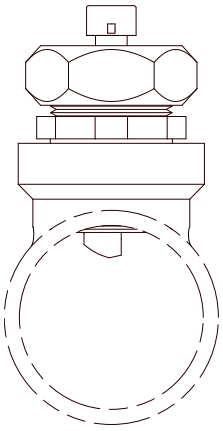
Pipe Size	Dimension
(Sch 40)	A
1.5	1.95 to 1.80
2	1.95 to 1.80
2.5	1.90 to 1.75
3	1.88 to 1.73
3.5	1.88 to 1.73

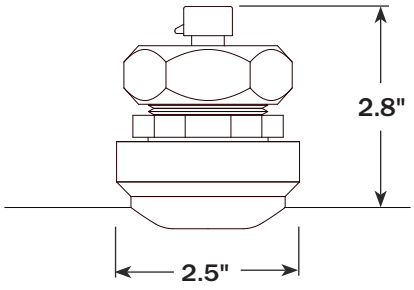
Make sure that the alignment tab is centered on the pipe centerline.



Note: Allow a minimum of 2 inches clearance at the sensor top for removal/installation of the connector.

Note: When the retainer cap is tightened make sure the sensor rim flat spot does not disengage from the alignment tab and allow the flow sensor to rotate.





Note: These dimensions are typical and are given to be used as an aid in determining mounting locations for flow sensors.

Adapter (End Cap) Installation

Note: Mounting a flow sensor in a valve end cap adapter will normally not meet the previously listed sensor location guidelines. Refer to **"Flow Sensor Location"**. When it is necessary to mount the sensor in an end cap adapter, the multipoint calibration feature available on the UBEC3 valve controller/display should be used to minimize reading error.

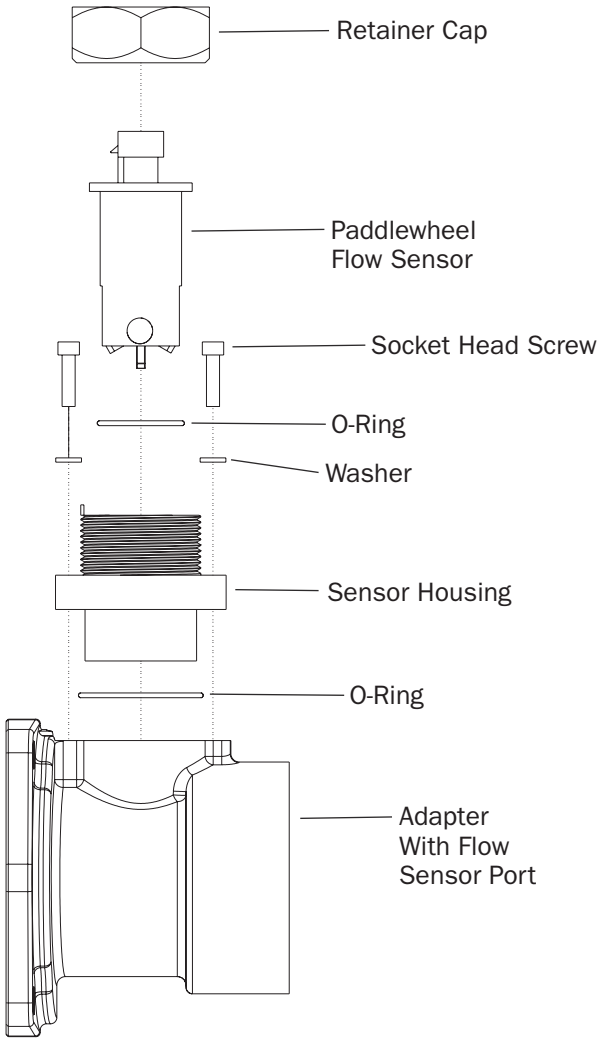
Note: Ensure that there is enough room for the sensor and connector.

1. Install sensor housing into valve end cap adapter using supplied socked head screws.
2. Insert flow sensor into sensor housing. Align flat spot on sensor rim with alignment tab and make sure o-ring is in groove.
3. Hand tighten retainer cap.

Note: The retainer cap only needs to be hand tightened. There is an inside lip that will stop the cap from turning when it makes contact with the alignment tab. This provides the correct pressure to make the seal at the o-ring. Make sure the flow sensor does not disengage from the alignment tab and rotate.

4. Connect cable from display module to flow sensor. The cable is color coded blue. **Refer to Wiring section on Page 68.**

Figure 47. Adapter Installation



X. OPERATION

For UBEC2, UBEC3 and UICS2, pressure and flow information from sensors or from the datalink interface is processed and displayed.

On power-up the valve control will be in the normal operating mode. The OPEN, CLOSE and PRESET buttons will control valve position. The PRESET button will set the valve to a programmed position.

The red CLOSED LED will be on when the valve is in the fully closed position. The VALVE POSITION indicator will show the valve position with ten green LEDs (1 LED on, valve 10% open; 10 LEDs on, valve fully open).

For the UICS2, the CAF ON LED is lit when the compressed air foam control is activated and the CAF SELECT button sets the valve at a pre programmed position.

1. Datalink Interface

The Elkhart Brass datalink interface is standard on all valve controllers and provides a way of connecting multiple display modules on a shared CAN data bus.

Each valve control is programmed as a primary or remote display. When a control is programmed as a remote, the ID Number must be the same as the primary it is matched to.
Refer to Programming section on Pages 53-62.

The primary control will send data to the remote(s) via the datalink.

- Both primary and remote will operate the valve.
- The primary will override a remote if buttons are pushed at the same time.
- All calibration data will be updated from the primary to remote at power up.
- Either primary or remote can be used to reprogram the preset position.

2. Primary Control and Display Module (Secondary)

Primary displays are programmed with the module function Pri. A primary display receives input from the valve, pressure sensor and flow sensor. When it is programmed with ID 0 it will not output information on to the datalink. When it is programmed with ID 1 to ID 99 (ID 10 is maximum for UBEC1), it will provide information (via the datalink) to remote displays.

3. Remote Control and Display Module

Remote displays are programmed with the module function SLA (slaved to a primary). A remote display must be programmed with the same ID number as a primary display. It will receive information for the display of valve position, pressure and flow rate from the primary display over the datalink. All program code features are programmed independently of the primary display. No calibration is necessary on a remote display.

4. External Switches

Switches

Control of the E3F, E4F, E5F, and E6F electric actuator can be achieved though the use of external switches by supplying a ground signal to the designated pins on the control module. The pin designation can be found in the Wiring section on **Page 68.**

Note: If switches are used in conjunction with any other control method, the switches will always function as the primary control for the valve.

Valve Position Indication Light (E3F, E4F, E5F, & E6F)

Two pins on the E3F, E4F, E5F, and E6F electric actuator control module have been designated as optional valve position indication lights. The pin designation can be found in the Wiring section on **Page 70.**

1. The CLOSE light output pin supplies 12 VDC. This pin can be utilized by connecting a light between this pin and ground. The CLOSE light will be turned on when the valve is fully closed.
2. The OPEN light output pin supplies ground. This pin can be utilized by connecting a light between this pin and a 12 VDC supply. The OPEN light will flash when the valve is in between the fully open and fully closed position.

Auto Open/Auto Close (All Controllers)

Auto Open will fully open the valve when initiated.

Press and hold OPEN button then press CLOSE button and release both buttons, the valve will go to the full open position. To cancel press the CLOSE button.

Auto Close will fully close the valve when initiated.

Press and hold CLOSE button then press OPEN button and release both buttons, the valve will go to the full open position. To cancel press the OPEN button.

5. Preset Setting (UBEC1, UBEC2 and UBEC3)

Pressing the PRESET button will set the valve at a programmed position. When the button is pressed the LEDs will show what the valve position will be with the end LED blinking. When the valve is in the correct preset position, the last LED will stop blinking and stay on.

To change the programmed setting:

1. Press the OPEN or CLOSE buttons and set the valve to the desired position.
2. Press and hold the PRESET button for 10 seconds. When the setting is stored the LEDs will flash.
3. Release the PRESET button.

Preset

Note: The PRESET input for the E3F and E4F actuators functions the same as described above.

6. Flowing CAF (Compressed Air Foam/UICS2 only)

The control and display module operates in manual mode and does not add compressed air into the solution when the CAF ON LED is off.

When the CAF ON LED is lit, compressed air foam control is active. Pressing the CAF SELECT button sets the valve at a pre programmed position. When the button is pressed, the VALVE POSITION LEDs show what the valve position is with the end LED blinking. When the valve is in the correct position, the last LED stops blinking and stays on. The message display shows the type of foam that is dispensed – WET, MED, or DRY.

1. Press the ON button for 2 seconds.

   Result: The CAF ON LED goes on. WET CAF shows in the message display and the valve starts to open to the pre programmed WET CAF position. The air solenoid opens (after a programmed delay).
2. Press the CAF SELECT button again for MED CAF or press it twice for DRY CAF.

   Result: MED CAF or DRY CAF shows in the message display and the valve moves to the pre programmed position.
3. Press the CAF ON button for 2 seconds.

   Result: The CAF ON LED goes off. The air solenoid closes. The valve stays in its current position.
4. Press the OPEN or CLOSE buttons at any time to adjust the valve position.

7. Set Pre programmed Valve Positions (UICS2 only)

1. Activate CAF and select the type of foam – WET, MED, or DRY. (Refer to steps 1 and 2 above.)
2. Press and hold the CAF ON button and then the CAF SELECT button for 5 seconds.

   Result: The CAF ON LED starts flashing. Release both buttons to activate the programming mode.
3. Press the OPEN or CLOSE buttons to adjust the valve position.
4. Press and hold the CAF ON button and then the CAF SELECT button for 5 seconds.

   Result: The CAF ON LED starts flashing faster. Release both buttons. The new pre programmed valve position is set for the selected type of foam.
5. Repeat steps 1 through 4 for each type of foam.

XI. PROGRAMMING (UBEC1)

When in the program access mode the LEDs are used to set the control and display module to be a primary or remote and to set the ID number. To gain access to the program features a three digit program code must be entered.

Programming Mode

Note: The valve must be closed and the red CLOSED LED must be on to program the valve control.

Press and hold the CLOSE button then press and hold the OPEN button. After 5 seconds the red CLOSED LED will flash. The program code can now be entered.

Program Valve Polarity (CODE 216)

The valve controller can be programmed for a standard valve (factory default) or reverse valve.

Note: The red CLOSED LED must be flashing to change the program.

1. Use the OPEN button to set the first digit of code 216, two green LEDs on. Each time the OPEN button is pressed the next green LED will go on.

Note: If an error is made when entering the code, continue to press the OPEN button until all 9 LEDs are on, press again and the LEDs will all be off, press to return to the first LED on.

2. Press the CLOSE button to move the cursor to the next digit. Now all LEDs will be off and ready for the second digit to be entered. Press the OPEN button once, one green LED on.

3. Press the CLOSE button to move the cursor to the next digit. All LEDs will be off. Press the OPEN button 6 times, six green LEDs on.

4. After 3 seconds, the LEDs will indicate the valve type. One (1) LED is for a standard valve, two (2) LEDs is for a reverse valve.

5. Press the OPEN button to change this setting.

6. Press the PRESET button for 3 seconds to exit. ALL LEDs will go off to indicate the data is accepted and the control module returns to normal operation after 2 seconds.
7. All LEDs will flash if there is a problem with exiting the programming mode. Press any button to cancel the warning or let time out after 10 seconds.

Primary Control and Display Module

Primary displays are programmed with the module function PRIMARY. A primary display receives input from the valve and pressure sensor. When it is programmed with ID 0 it will not output information on to the datalink. When it is programmed with ID 1 to ID 99 it will provide information (via the datalink) to remote displays.

Program Primary or Remote (Code 212)

Note: The red CLOSED LED must be flashing to change the program.

1. Use the OPEN button to set the first digit of code 212, two green LEDs on. Each time the OPEN button is pressed the next green LED will go on.

Note: If an error is made when entering the code, continue to press the OPEN button until all 9 LEDs are on, press again and the LEDs will all be off, press to return to the first LED on.

2. Press the CLOSE button to move the cursor to the next digit. Now all LEDs will be off and ready for the second digit to be entered. Press the OPEN button once, one green LED on.

3. Press the CLOSE button to move the cursor to the next digit. All LEDs will be off. Press the OPEN button twice, two green LEDs on.

4. After 3 seconds, for Primary (Pri) all LEDs will be on.

For Remote (Slave) (SLA) alternate LEDs will be on.

Use the OPEN button to toggle between the Pri and SLA.

5. Press the PRESET button for 3 seconds to exit. All LEDs will go off to indicate the data is accepted and the control module return to normal operation after 2 seconds.
6. All LEDs will flash if there is a problem when exiting the programming mode. Press any button to cancel the warning or let time out after 10 seconds.
7. Power must be cycled for programming change to become effective.

Remote Control and Display Module

Remote displays are programmed with the module function REMOTE. A remote display must be programmed with the same ID number as a primary display. It receives information for the display of valve position and pressure from the primary display over the datalink. All program code features are programmed independently of the primary display. No calibration is necessary on a remote display.

Program ID Number (Code 213)

Note: The red CLOSED LED must be flashing to change the program.

1. Use the OPEN button to set the first digit of code 213, two green LEDs on. Each time the OPEN button is pressed the next green LED will go on.

Note: If an error is made when entering the code, continue to press the OPEN button until all 9 LEDs are on, press again and the LEDs will all be off, press to return to the first LED on.

2. Press the CLOSE button to move the cursor to the next digit. Now all LEDs will be off and ready for the second digit to be entered. Press the OPEN button once, one green LED on.

3. Press the CLOSE button to move the cursor to the next digit. All LEDs will be off. Press the OPEN button 3 times, three green LEDs on.

4. After three seconds the ID is shown (factory default is 0). A maximum of 10 IDs can be set. Press the OPEN button once and ID = 1 is selected.

5. Press the OPEN button 3 times and ID = 3 is selected.

6. Press the PRESET button for 3 seconds to exit. All LEDs will go off to indicate the data is accepted and the control module return to normal operation after 2 seconds.
7. All LEDs will flash if there is a problem when exiting the programming mode. Press any button to cancel the warning or let time out after 10 seconds.

XII. PROGRAMMING (UBEC2 AND UBEC3)

When in the program access mode the digital display will show operator inputs and program options. To gain access to the program features a 4-digit program code must be entered.

Error Code E202

If error code E202 is shown it means that an invalid program code has been entered. Re-enter program code when the digital display resets.

Programming Mode

Note: The valve must be closed and the red CLOSED LED must be on to program the valve control. Press and hold the CLOSE button then press and hold the OPEN button. After 5 seconds the pressure display will show 4 dashes. The program code can now be entered.

Programming

When in the program access mode the digital display will show operator inputs and program options. To gain access to the program features a four digit program code must be entered.

Error Code E202

If error code E202 is shown it means that an invalid program code has been entered. Re-enter program code when the digital display resets.

Programming Mode

Note: The valve must be closed and the red CLOSED LED must be on to program the valve control.

Press and hold the CLOSE button then press and hold the OPEN button. After 5 seconds the pressure display will show 4 dashes. The program code can now be entered.

Select Model Type (Code 2110)

The valve control and display module UBEC2 and can be programmed to act like a UBEC1; a UBEC3 can be programmed to act like a UBEC2 or UBEC1.

Note: The pressure display must show four dashes to enter a program code.

1. Enter code 2120
   - Press OPEN button 2 times to enter 2
   - Press CLOSE button to move the cursor to the next digit
   - Press OPEN button 1 time to enter 1
   - Press CLOSE button to move the cursor to the next digit
   - Press OPEN button 1 time to enter 1.
2. The pressure display will show 2110.
3. After 3 seconds, the current programmed model type will show in the display.
4. Use the OPEN button to toggle the model type selection.
5. Press the PRESET button and hold for 5 seconds to exit and save the programmed parameters.

Program Primary or Remote (Code 2120)

1. Enter code 2120
   - Press OPEN button 2 times to enter 2
   - Press CLOSE button to move the cursor to the next digit
   - Press OPEN button 1 time to enter 1
   - Press CLOSE button to move the cursor to the next digit
   - Press OPEN button 2 times to enter 2.
2. The pressure display will show 2120.
3. After 3 seconds the current selection will show in the display Pri or SLA.
4. Use the OPEN button to toggle the selection.
5. Press the PRESET button and hold for 5 seconds to exit and save the programmed parameters.

Program ID Number (Code 2130)

1. Enter code 2130
   - Press OPEN button 2 times to enter 2
   - Press CLOSE button to move the cursor to the next digit
   - Press OPEN button 1 time to enter 1
   - Press CLOSE button to move the cursor to the next digit
   - Press OPEN button 3 times to enter 3.
2. The pressure display will show 2130.
3. After 3 seconds the current ID number will show in the display.
4. Change the ID numbers as desired.
   - Use the CLOSE button to select the digit to change. The digit will flash.
   - Use the OPEN button to change the value of the flashing digit.
5. Press the PRESET button and hold for 5 seconds to exit and save the programmed parameters.

Program Pressure Display Unit of Measure (Code 2140)

There are three units of measure available for the pressure display:
PSI=PSI; PCAL=kPa; bAr=BAR.

1. Enter code 2140
   - Press OPEN button 2 times to enter 2
   - Press CLOSE button to move the cursor to the next digit
   - Press OPEN button 1 time to enter 1
   - Press CLOSE button to move the cursor to the next digit
   - Press OPEN button 4 times to enter 4.
2. The pressure display will show 2140.
3. After 3 seconds the current unit of measure will show in the display.
4. Use the OPEN button to toggle the unit of measure.
5. Press the PRESET button and hold for 5 seconds to exit and save the programmed parameters.

Program Flow Display Unit of Measure (Code 2150)

There are two units of measure available for the flow display: gP=GPM; LP=LPM.

1. Enter code 2150
   - Press OPEN button 2 times to enter 2
   - Press CLOSE button to move the cursor to the next digit
   - Press OPEN button 1 time to enter 1
   - Press CLOSE button to move the cursor to the next digit
   - Press OPEN button 5 times to enter 5.
2. The pressure display will show 2150.
3. After 3 seconds the current unit of measure will show in the display.
4. Use the OPEN button to toggle the unit of measure.
5. Press the PRESET button and hold for 5 seconds to exit and save the programmed parameters.

Program Valve Polarity (Code 2160)

The control can be set for TYPE1 standard or TYPE2. TYPE1 valves have standard counter-clockwise to open valve rotation. TYPE2 valves have clockwise to open valve rotation as required with EB_J butterfly valves.

1. Press and hold the OPEN and CLOSE buttons for 5 seconds.

   Result: The PRESSURE display shows ENTER/CODE.
2. Enter code 2160
   - Press OPEN button 2 times to enter 2
   - Press CLOSE button to move the cursor to the next digit
   - Press OPEN button 1 time to enter 1
   - Press CLOSE button to move the cursor to the next digit
   - Press OPEN button 6 times to enter 6.

   Result: The PRESSURE display shows 2160.
3. After 3 seconds TYPE1 (standard) or TYPE2 (reverse) shows in the display.
4. Use the OPEN button to toggle between the two.
5. Press the PRESET button and hold for 5 seconds to exit and save the programmed parameters.

Flow Cutoff (Code 3190) (UBEC3 Only)

Factory programmed value: 0

Options: 0 to 999

This code allows a cutoff flow rate for the flow sensor to be set. There is always some turbulence in the pipe that could cause the flow sensor to turn with the discharge closed. This would cause the display to show a flow rate when there is no true flow. The flow cutoff function is set so that the flow display will show 0 when the signal from the flow sensor is below the programmed value.

1. Enter code 3190
   - Press OPEN button 3 times to enter 3
   - Press CLOSE button to move the cursor to the next digit
   - Press OPEN button 1 time to enter 1
   - Press CLOSE button to move the cursor to the next digit
   - Press OPEN button 9 times to enter 9.
2. The pressure display will show 3190.
3. After 3 seconds the flow display window will show the programmed flow cutoff value.
4. Adjust the flow cutoff as desired.
   - Use the CLOSE button to select the digit to change. The digit will flash.
   - Use the OPEN button to change the value of the flashing digit.
5. Press the PRESET button and hold for 5 seconds to exit and save the programmed parameters.

XIII. PROGRAMMING (UICS2)

When in the program access mode the digital display will show operator inputs and program options. To gain access to the program features a 4-digit program code must be entered.

Error Code E202

If error code E202 is shown it means that an invalid program code has been entered. Re-enter program code when the digital display resets.

Programming Mode

Note: The valve must be closed and the red CLOSED LED must be on to program the valve control.

Press and hold the CLOSE button then press and hold the OPEN button. After 5 seconds the pressure display shows ENTER/CODE. The program code can now be entered.

Primary Control and Display Module

Primary displays are programmed with the module function PRIMARY. A primary display receives input from the valve and pressure sensor. When it is programmed with ID 0 it will not output information on to the datalink. When it is programmed with ID 1 to ID 99 it will provide information (via the datalink) to remote displays.

Remote Control and Display Module

Remote displays are programmed with the module function REMOTE. A remote display must be programmed with the same ID number as a primary display. It receives information for the display of valve position and pressure from the primary display over the datalink. All program code features are programmed independently of the primary display. No calibration is necessary on a remote display.

Program Primary or Remote (Code 2120)

This code sets the control and display module as a primary or remote. When a control is programmed as a remote, the ID Number must be the same as the primary it is matched to.

1. Press and hold the OPEN and CLOSE buttons for five seconds.

   Result: The PRESSURE display shows ENTER/CODE.
2. Enter code 2120
   - Press OPEN button 2 times to enter 2
   - Press CLOSE button to move the cursor to the next digit
   - Press OPEN button 1 time to enter 1
   - Press CLOSE button to move the cursor to the next digit
   - Press OPEN button 2 times to enter 2.

   Result: The PRESSURE display shows 2120.
3. After 3 seconds the current selection shows in the display PRIMARY or REMOTE.
4. Use the OPEN button to toggle between PRIMARY or REMOTE.
5. Press the CAF SELECT button and hold for 5 seconds to exit and save the programmed parameters.

Program ID Number (Code 2130)

This code sets the ID of the control and display module. A remote has to have the same ID as the primary.

1. Press and hold the OPEN and CLOSE buttons for 5 seconds.
   Result: The PRESSURE display shows ENTER/CODE.
2. Enter code 2130
   – Press OPEN button 2 times to enter 2
   – Press CLOSE button to move the cursor to the next digit
   – Press OPEN button 1 time to enter 1
   – Press CLOSE button to move the cursor to the next digit
   – Press OPEN button 3 times to enter 3.
   Result: The PRESSURE display will show 2130.
3. After 3 seconds the current ID number shows in the display.
4. Change the ID numbers as desired.
   – Use the CLOSE button to select the digit to change. The digit flashes.
   – Use the OPEN button to change the value of the flashing digit.
5. Press the CAF SELECT button and hold for 5 seconds to exit and save the programmed parameters.

Program Pressure Display Unit of Measure (Code 2140)

There are three units of measure available for the pressure display: PSI=PSI; PCAL=kPa; bAr=BAR.

1. Press and hold the OPEN and CLOSE buttons for five seconds.
   Result: The PRESSURE display shows ENTER/CODE.
2. Enter code 2140
   – Press OPEN button 2 times to enter 2
   – Press CLOSE button to move the cursor to the next digit
   – Press OPEN button 1 time to enter 1
   – Press CLOSE button to move the cursor to the next digit
   – Press OPEN button 4 times to enter 4.
   Result: The PRESSURE display shows 2140.
3. After 3 seconds the current unit of measure shows in the display.
4. Use the OPEN button to toggle between each unit of measure.
5. Press the CAF SELECT button and hold for 5 seconds to exit and save the programmed parameters.

Program Valve Polarity (Code 2160)

The control can be set for TYPE1 standard or TYPE2. TYPE1 valves have standard counter-clockwise to open valve rotation. TYPE2 valves have clockwise to open valve rotation as required with EBXJ butterfly valves.

1. Press and hold the OPEN and CLOSE buttons for 5 seconds.
   Result: The PRESSURE display shows ENTER/CODE.
2. Enter code 2160
   – Press OPEN button 2 times to enter 2
   – Press CLOSE button to move the cursor to the next digit
   – Press OPEN button 1 time to enter 1
   – Press CLOSE button to move the cursor to the next digit
   – Press OPEN button 6 times to enter 6.
   Result: The PRESSURE display shows 2160.
3. After 3 seconds TYPE1 (standard) or TYPE2 (reverse) shows in the display.
4. Use the OPEN button to toggle between the two.
5. Press the CAF SELECT button and hold for 5 seconds to exit and save the programmed parameters.

Air Valve Delay (Code 2170)

Factory programmed value: 1 Seconds

Options: 0 to 999

This code sets the time delay between pressing the CAF ON button to set the valve position and when the air solenoid valve is activated.

1. Press and hold the OPEN and CLOSE buttons for 5 seconds.

   Result: The PRESSURE display shows ENTER/CODE.

2. Enter code 2170.
   - Press OPEN button 2 times to enter 2
   - Press CLOSE button to move the cursor to the next digit
   - Press OPEN button 1 time to enter 1
   - Press CLOSE button to move the cursor to the next digit
   - Press OPEN button 7 times to enter 7.

   Result: The PRESSURE display will show 2170.

3. After 3 seconds the PRESSURE display shows AVDELAY.
4. Press OPEN button.

   Result: The PRESSURE display shows the programmed air valve time delay.

5. Adjust the time delay as desired.
   - Use the CLOSE button to select the digit to change. The digit flashes.
   - Use the OPEN button to change the value of the flashing digit.

6. Press the CAF SELECT button and hold for 5 seconds to exit and save the programmed parameters.

XIV. PROGRAMMING (E3F, E4F, E5F, & E6F)

Programming of the E3F, E4F, E5F, and E6F actuators can be accomplished though the use of the J1939 Data Bus, a UBEC controller, or any hard wired, external switches. Programming with the UBEC can be accomplished through the use of the standard programming code found on **Pages 53-61**.

NOTE: The UICS2 controller can not be used with E3F, E4F, E5F, or E6F actuated valves.

Programming

Note: In order to control the E3F, E4F, E5F, and E6F actuators with a UBEC controller, the controller must be programmed as a Remote unit. The ID number and model type for the UBEC controller must match the ID number and model type of the E3F, E4F, E5F, or E6F actuator. **Refer to the Programming section on Pages 53-61.**

Program Valve Polarity (E3F, E4F, E5F, or E6F SWITCHES ONLY)

1. Reverse the power and ground valve control pins on the 12-Pin connector on the actuator. This will result in Pin 6 becoming the positive valve control and Pin 7 becoming the negative valve control. **Refer to Wiring section on Page 68.**
2. Initiate the Automatic Valve Position Calibration routine. Upon completion of this routine, the valve should be in the CLOSED position. **Refer to Calibration section on Page 63.**

Valve Configuration Transfers

The valve configuration transfer codes enable the user to transfer information from a remote unit (UBEC) to an E3F, E4F, E5F, or E6F actuator or visa versa. The controller ID, valve type, and units of measure can all be transferred using this function.

Note: The valve configuration transfer must be completed in order to change the above listed options on the E3F, E4F, E5F, or E6F actuator.

Transfer Information From Remote Unit To E3F, E4F, E5F, or E6F (4110)

1. Enter code 4110
   - Press OPEN button 4 times to enter 4
   - Press CLOSE button to move the cursor to the next digit
   - Press OPEN button 1 time to enter 1
   - Press CLOSE button to move the cursor to the next digit
   - Press OPEN button 1 time to enter 1
2. The pressure display will show 4110
3. After 3 seconds the pressure display will show CF_P
4. Press the OPEN button once to change the display to yes
5. Press the PRESET button and hold for 5 seconds to transfer the information

Transfer Information From E3F, E4F, E5F, or E6F To Remote Unit (4120)

1. Enter code 4120
   - Press OPEN button 4 times to enter 4
   - Press CLOSE button to move the cursor to the next digit
   - Press OPEN button 1 time to enter 1
   - Press CLOSE button to move the cursor to the next digit
   - Press OPEN button 2 times to enter 2
2. The pressure display will show 4120
3. After 3 seconds the pressure display will show CF_r
4. Press the OPEN button once to change the display to yes
5. Press the PRESET button and hold for 5 seconds to transfer the information

XV. CALIBRATION

1. Valve Position Calibration (UBEC1, UBEC2, UBEC3, UICS2)

All valves must have the position calibrated after installation.

The program has to be calibrated for the voltage level at both full closed and full open position of the valve. After the 2 valve positions are calibrated, the program will check to make sure that the voltage levels are within normal limits.

If they are not, an alarm will be generated to indicate a system failure:
UBEC1 will flash the red CLOSED and green FULLY OPEN LEDs.
UBEC2, UBEC3, and UICS2 will show an F1 in the pressure display.

NOTE: The valve should be partially open before starting valve position calibrationl.

Set Fully Closed Position

1. Press and hold the CLOSE and PRESET buttons. Release both buttons when the red CLOSED LED starts to flash.
2. Use the CLOSE button to close the valve.
3. When the valve is fully closed (detected by a high current surge when the valve hits the positive stop), the CLOSED LED will flash at a faster speed.
4. Press and hold the PRESET (CAF SELECT for UICS2) button for 5 seconds to accept and exit the calibration. Red LED will stop flashing.

Set Fully Open Position

1. Press and hold the OPEN and PRESET buttons. Release both buttons when the last green LED in the fully opened window starts to flash.
2. Use the OPEN button to open the valve.
3. When the valve is fully opened (detected by a high current surge when the valve hits the positive stop), the last fully opened LED will flash at a faster speed.
4. Press and hold the PRESET (CAF SELECT for UICS2) button for 5 seconds to accept and exit the calibration.

2. Automatic Valve Position Calibration (E3F, E4F, E5F, & E6F)

All valves must have the position calibrated after installation.

NOTE: The valve should be partially open before starting valve position calibrationl.

The automatic calibration routine has been added to further simplify the calibration of the open and closed positions of the valve. After initiating the calibration routine, the valve will automatically travel completely closed. After setting the closed position, the valve will automatically travel completely open. The valve is then returned to the completely closed position at the end of the routine. The routine can be enabled with the use of any type of valve controller.

UBEC

The automatic calibration can be activated with the use of any UBEC controller. This routine can be initiated by pressing and holding the CLOSE and PRESET buttons for 5 seconds. This routine can also be initiated by pressing and holding the OPEN and PRESET buttons for 5 seconds.

External Switches

The automatic calibration routine can be activated through the use of external switches by pressing and holding the CLOSE and PRESET switches for 5 seconds. This routine can also be initiated by pressing and holding the OPEN and PRESET switches for 5 seconds.

No Controller

The automatic calibration routine can be activated without the use of any controller. This can be accomplished by supplying a 12 or 24 VDC signal to PIN 5 on the 12-pin connector for 10 seconds. Please refer to the Wiring section on **Page 68** for further details.

3. Pressure Calibration (Code 3230)

To calibrate the pressure display use a calibrated pressure reference. Two pressure levels are needed to calibrate. (Use 0 for the first.)

Note: The valve must be closed and the red CLOSED LED must be on to start calibration.

1. Enter code 3230. (**Refer to Programming section on how to enter a code.**)

   Result: The digital display will show Pt1 (the pressure program is ready to set the first calibration point).
2. The OPEN and CLOSE buttons are active. Press the CLOSE button and confirm the pressure on the down stream side of the valve is 0.
3. Press and release the PRESET (CAF SELECT for UICS2) button.

   Result: The display will show 0. Pt1 is now set at 0 PSI.
4. Press and release the PRESET (CAF SELECT for UICS2) button again.

   Result: The display will show Pt2 (for the next calibration point).
5. Press the OPEN button to open the valve. Bring the pressure up to the desired calibration point. Ensure a constant pressure is maintained.
6. Press the PRESET (CAF SELECT for UICS2) button again.

   Result: The display will show 0 flashing. Calibration point Pt1 is ready to be set.
7. Adjust the digital display to match the reference pressure.

   Use the CLOSE button to select the digit to change. The digit will flash.

   Use the OPEN button to change the value of the flashing digit.
8. To exit the calibration program, press and hold the PRESET (CAF SELECT for UICS2) button.

   Result: The display will show 4 dashes.
9. Release the PRESET (CAF SELECT for UICS2) button to exit the calibration program:

   Result: The display will show pressure reading.

Error Code E204

If error code E204 is shown it means that there is no signal from the flow sensor. This code will only be displayed when in a calibration mode. Troubleshoot the sensor and the associated wiring.

4. Flow Calibration, Single Point (Code 3210)

Select a flow rate to calibrate that is within the most commonly used flow range for the discharge. Set up a reference flowmeter on the discharge.

Note: The valve must be closed and the red CLOSED LED must be on to start calibration of the valve control.

1. Enter code 3210. Refer to Programming section on how to enter a code.

   Result: The flow display will show Pt.
2. Press the OPEN and CLOSE buttons to adjust the flow rate. Ensure a constant pressure is maintained to obtain a steady flow rate on the reference flowmeter.
3. Press the PRESET button.

   Result: The display will show a flow rate with the last digit flashing.
4. Adjust the displayed flow rate to match the reference flow rate.
   - Use the CLOSE button to select the digit to change. The digit will flash.
   - Use the OPEN button to change the value of the flashing digit.
5. To exit the calibration program, press and hold the PRESET button.

   Result: The display will show 4 dashes.
6. Release the PRESET button to exit the calibration program.

   Result: The display will show flow reading.
7. Vary the water flow through the discharge and ensure the displayed flow rate matches the reference. If there are differences at other flow rates, the multiple point flow calibration may be necessary.

5. Flow Calibration, Multiple Point (Code 3220)

This function allows for the display to be calibrated at multiple flow rates. It corrects for nonlinear flow in difficult to plumb locations to provide an accurate flow rate display.

Note: There must be at least a 5% difference between each calibration point. If a selected calibration point is too close to the previous point, an error code will show on the display.

Select flow rates to calibrate (up to 10 calibration points) that are within the most commonly used flow range for the discharge. Start at the lowest flow rate and calibrate in order up to the highest.

Set up a reference flowmeter on the discharge.

Note: The valve must be closed and the red CLOSED LED must be on to start calibration of the valve control.

1. Enter code 3220. (**Refer to Programming section on how to enter a code.**)

   Result: The flow display will show Pt1 (the flowmeter program is ready to set the first calibration point).
2. Press the OPEN and CLOSE buttons to adjust the flow rate through the discharge at the flow rate selected for the calibration point. Ensure a constant pressure is maintained to obtain a steady flow rate on the reference flowmeter.
3. Press the PRESET button.

   Result: The display will show a flow rate with the last digit flashing.
4. Adjust the displayed flow rate to match the reference flow rate.

   Use the CLOSE button to select the digit to change. The digit will flash.

   Use the OPEN button to change the value of the flashing digit.
5. Press and release the PRESET button.

   Result: The display will show Pt2 (or the next calibration point).
6. Repeat steps 2 through 5 for each flow rate calibration point.
7. To exit the calibration program, press and hold the PRESET button.

   Result: The display will show 4 dashes.
8. Release the PRESET button to exit the calibration program.

   Result: The display will show flow reading.
9. Vary the water flow through the discharge and ensure the displayed flow rate matches the reference.

XVI. DIAGNOSTICS

When a warning condition exists, 2 center LEDs blinking or all position LEDs blinking.

With the 2 Center LEDs Blinking:

- There is no sensor feedback of the valve movement.
- The valve is operated in override with no software safety limits except stalled current.
- Stalled current level (greater than 18 AMPS) the valve will operate for three seconds then stop, pressing the button again will operate the valve for another three seconds. The valve can be pulsed in this manner to change position.

With All Position LEDs Blinking:

There is a higher than normal current being detected.

Closed LED and Fully Open LED Blinking

The open and closed positions for the valve have not been calibrated. Refer to Calibrations section on **Page 63**.

WARNINGS DURING OPERATION:

2 Center LEDs Blink

All Position Indicating LEDs Blink
(Shows valve at 60% open.)

Set the program in the diagnostic mode to access the problem code.

Diagnostic Mode (Code 1110)

Refer to Table 5, Diagnostics Codes.

1. Enter code 1110. Refer to Programming section on how to enter a code on **Pages 53-62**.
2. Press the OPEN and CLOSE buttons to change the valve position.
   Results: When the warning condition is recreated the LEDs blink
3. Press PRESET (CAF SELECT for UICS2) button to show code.
   Results: Diagnostic Code will show on blinking LEDs.

Blinking between one green LED and three green LEDs indicated code 13.

Table 5. Diagnostics Codes

CODE	DESCRIPTION	VALVE CURRENT	WARNING
12	No Sensor Signal Voltage Out of Range	Normal Less than 10 AMPS	2 LEDs Blink
13	No Sensor Signal Voltage Out of Range	High 10 to 18 AMPS	2 LEDs Blink
14	No Sensor Signal Voltage Out of Range	Stalled Greater than 18 AMPS	2 LEDs Blink
15	Sensor Signal Does Not Change	Normal Less than 10 AMPS	2 LEDs Blink
16	Sensor Signal Does Not Change	High 10 to 18 AMPS	2 LEDs Blink
17	Sensor Signal Does Not Change	Stalled Greater than 18 AMPS	2 LEDs Blink
18	Sensor Signal Good High Current Sensed	High 10 to 18 AMPS	All LEDs Blink

Error Code
Error codes will be shown in the digital displays.

F1
There is a valve calibration problem. After the valve is calibrated, the system checks that the voltage range is within normal limits (0.2 to 4 volts).

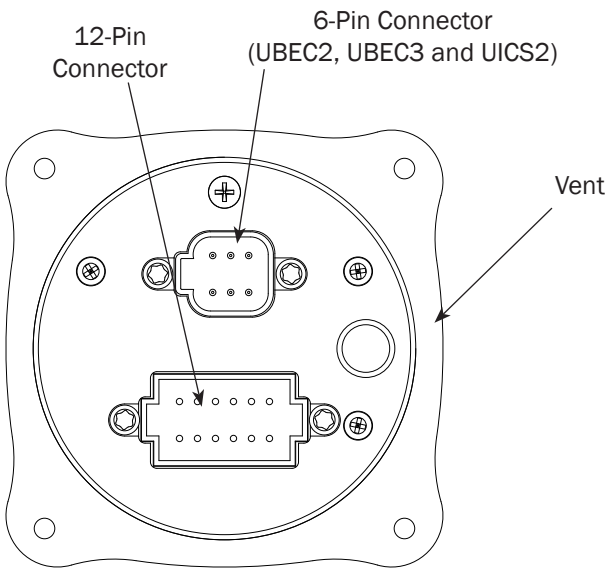
F5
No pressure sensor is detected.

E202
An invalid program code has been entered. Re-enter program code when the digital display resets.

E204
There is no signal from the sensor. This code is only displayed when in a calibration mode. Troubleshoot the sensor and the associated wiring.

XVII. WIRING (UBEC1, UBEC2, UBEC3 AND UICS2)

Figure 48. Control Module Wiring



UBEC 6-Pin Connector
(UBEC2 and UBEC3)

Pin	Signal Description
1	Pressure Sensor 5 VDC
2	Pressure Sensor Ground
3	Pressure Sensor Signal
4	Flow Sensor 5 VDC
5	Flow Sensor Ground
6	Flow Sensor Signal

UICS2 6-Pin Connector

Pin	Signal Description
1	Pressure Sensor 5 VDC
2	Pressure Sensor Ground
3	Pressure Sensor Signal
4	CAF ON
5	Air Valve Positive
6	Air Valve Negative

UBEC 12-Pin Connector

Pin	Signal Description
1	Power 12/24 VDC
2	Ground
3	Valve Position 5 VDC
4	Valve Position Ground
5	Valve Position Signal
6	Valve Control (–)
7	Valve Control (+)
8	CLOSE
9	PRESET
10	OPEN
11	Datalink CAN High
12	Datalink CAN Low

UICS2 12-Pin Connector

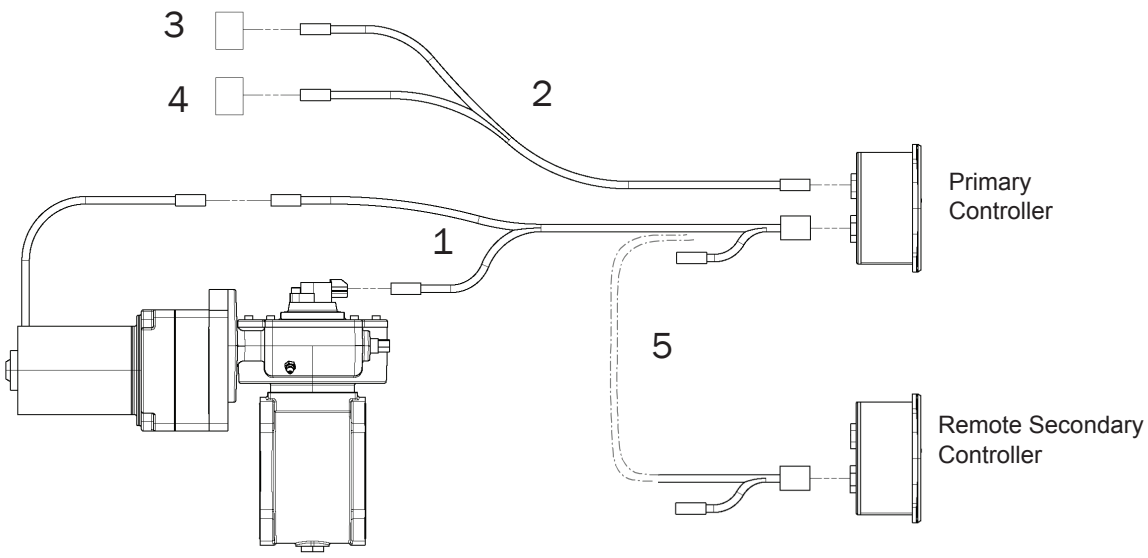
Pin	Signal Description
1	Power 12/24 VDC
2	Ground
3	Valve Position 5 VDC
4	Valve Position Ground
5	Valve Position Signal
6	Valve Control (–)
7	Valve Control (+)
8	CLOSE
9	CAF SELECT
10	OPEN
11	Datalink CAN High
12	Datalink CAN Low

Power Requirements
If used as a Primary - 12v (30 amp) or 24v (15 amp)
If used as a Secondary - 12v (1 amp) or 24v (0.5 amp)

GENERAL WIRING DIAGRAM (UBEC1, UBEC2, UBEC3 and UICS2)

1. Controller harness
2. Sensor/solenoid harness
   a. Pressure only (UBEC2 only)
   b. Pressure and flow (UBEC3 only)
   c. Pressure and air solenoid (UICS2 only)
3. Pressure sensor
4. Flow sensor or air solenoid
5. Secondary controller harness (Datalink)

Figure 49. General Wiring Diagram (UBEC1, UBEC2, UBEC3 and UICS2)



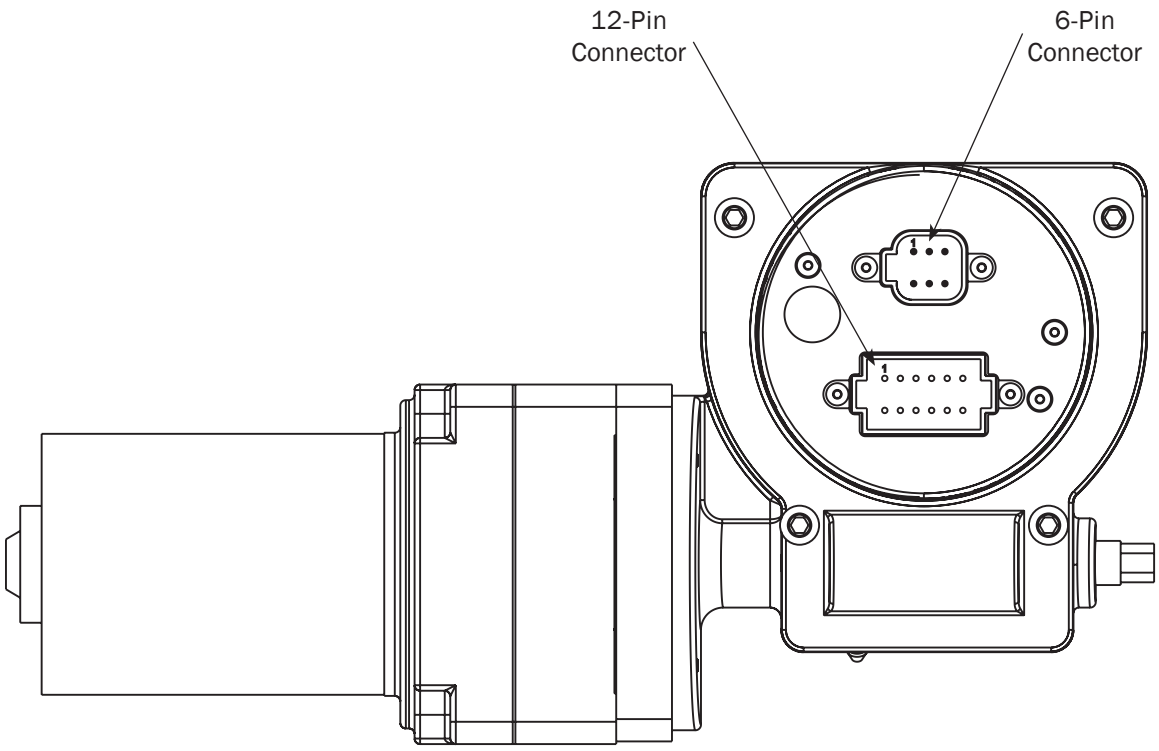
Wiring the Remote/Secondary Controller

The Datalink terminals of the secondary controller harness must be field installed into the appropriate pin positions of the 12-pin connector of the primary controller harness.

1. Remove the rubber debris plugs from positions 11 and 12 of the primary controller harness 12-pin connector.
2. Note the wire colors corresponding to pin positions 11 and 12 on the secondary controller harness 12-pin connector.
3. Insert the Datalink terminals into their respective positions in the primary controller harness 12-pin connector.

   Note: Push gently on the terminal until it “clicks” into housing.

XVIII. WIRING (E3F, E4F, E5F, & E6F)



E4F & E6F 6-Pin Connector

Pin	Signal Description
1	Pressure Sensor 5 VDC
2	Pressure Sensor Ground
3	Pressure Sensor Signal
4	Flow Sensor 5 VDC
5	Flow Sensor Ground
6	Flow Sensor Signal

Power Requirements
12v (30 amp) or 24v (15 amp)

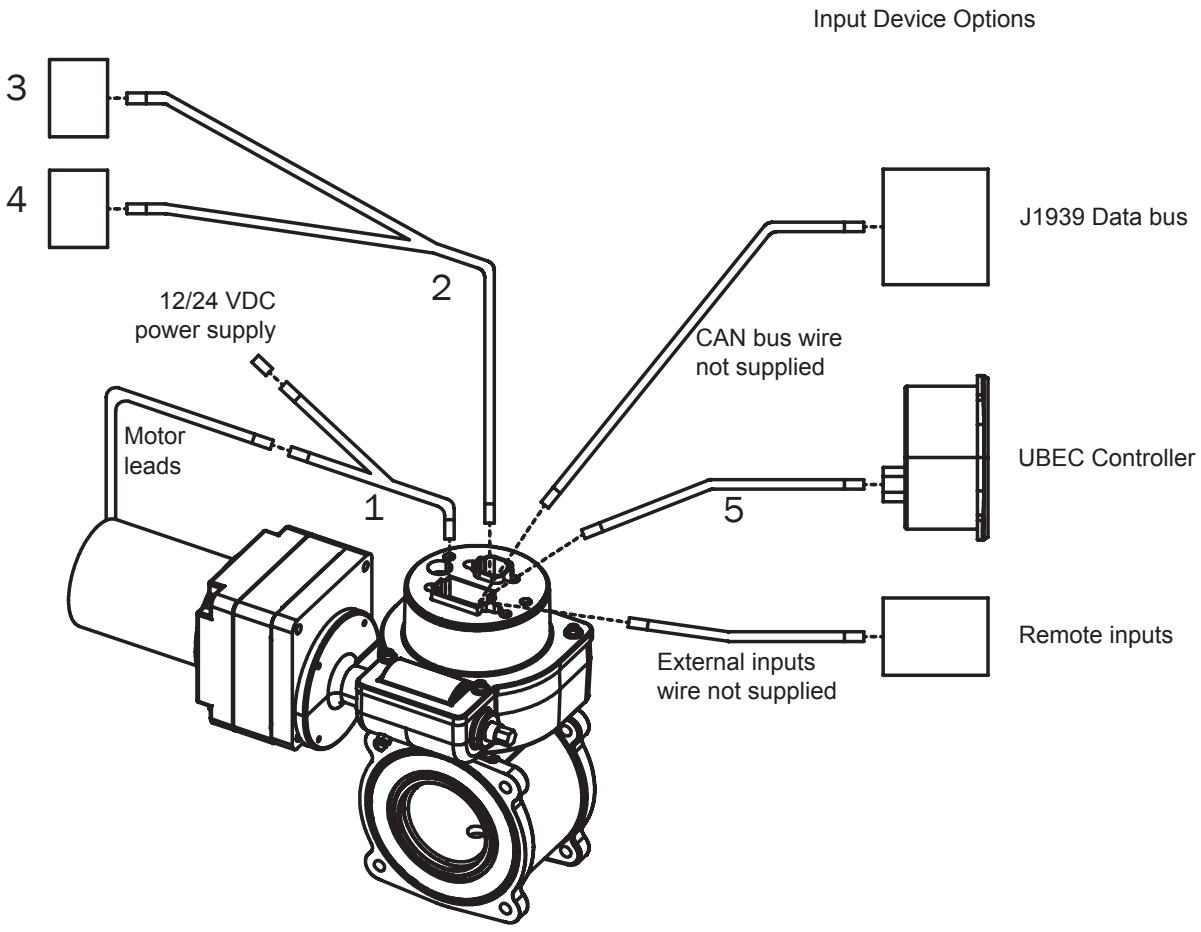
E3F, E4F, E5F, & E6F 12-Pin Connector

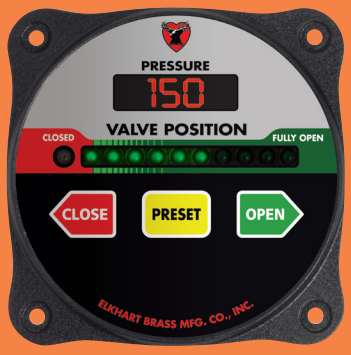
Pin	Signal Description
1	Power 12/24 VDC
2	Ground
3	Indicator Light Closed (12 VDC)
4	Indicator Light Open (Ground)
5	Auto Calibrate
6	Valve Control (–)
7	Valve Control (+)
8	CLOSE
9	PRESET
10	OPEN
11	Datalink CAN High
12	Datalink CAN Low

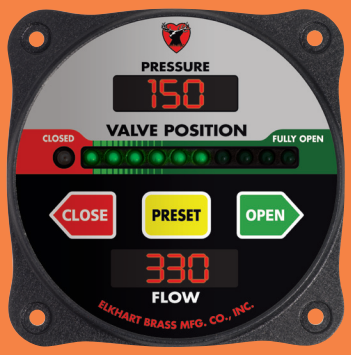
General Wiring Diagram (E3F and E4F)

1. Controller harness
2. Sensor/solenoid harness
   a. Pressure only (UBEC2 only)
   b. Pressure and flow (UBEC3 only)
3. Pressure sensor
4. Flow sensor or air solenoid
5. Secondary controller harness (Datalink)

Figure 50. General Wiring Diagram (E3F and E4F)







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