

# APEX-S™ Valve Controller

Installation, Operating, & Maintenance Instructions



98607000 REV-A

+1 574-295-8330  
[www.elkhartbrass.com](http://www.elkhartbrass.com)

**ELKHART BRASS**  
FIRE FIGHTING EQUIPMENT A SAFE FLEET BRAND

# CONTENTS

---

- INTRODUCTION** ..... 4
  - Overview ..... 4
  - Specifications ..... 5
  - Control Module ..... 5
- GENERAL DESCRIPTION** ..... 6
  - Components ..... 6
  - Controls and Indicators ..... 7
- INSTALLATION** ..... 8
  - Install Valve Controller ..... 8
- ELECTRICAL CONNECTIONS** ..... 10
  - Wiring the Valve Controller ..... 12
- MAINTENANCE/CALIBRATION** ..... 17
  - Automatic Valve Position Calibration for APEX-S ..... 17
- OPERATION** ..... 19
  - Button Functions ..... 19
- PROGRAMMING MODE** ..... 20
  - Customizing Default Settings ..... 20

# List of Tables

**Error/Warning Codes Troubleshooting Table ..... 22**

# List of Figures

**Figure 1. Controls and Indicators ..... 7**  
**Figure 2. Valve Controller Mounting Dimensions ..... 9**  
**Figure 3. Valve Controller Wiring ..... 10**  
**Figure 4. Valve Actuator Wiring ..... 11**  
**Figure 5. Wiring (Cables and Connectors) ..... 13**  
**Figure 6. Wiring (Cables and Connectors) ..... 14**  
**Figure 7. APEX-S 1:1 Wiring Connections ..... 15**  
**Figure 8. APEX-S 2:1 Wiring Connections ..... 16**

# INTRODUCTION

---

## Overview

The APEX-S electric valve controller is designed with precision and ease of use in mind. Rugged design withstands the demands of outdoor apparatus use. Monitor the valve position with ultra-bright LEDs. Tactile buttons provide enhanced user experience with intuitive and familiar operation. Use keypad buttons to open, close and adjust valve position. All controls and indicators are located on the front of the controller. Controls are simple push button style controls. The controller is compatible with E14X and E16X (EB6D) electric valve actuators.

## Features

- . 10 Green LEDs Indicate Open Valve Position
- . Red LED Indicates Valve is Closed
- . Keypad—rubberized, large, embossed and color-coded Tactile Buttons (glove friendly)
- . Button actions—Full Open, Full Close
- . Automatic valve position calibration
- . Auto-travel open and close
- . Programmable LED intensity
- . Automatic adjusting day/night LED intensity
- . Enclosure— Molded Glass-filled Polymer for Rigidity, Surface Hardness and Strength
- . Sealed to IP67 Ingress Protection on All Sides
- . Visor—Color-coded in 12 Colors to Match Discharges to Valve Controller
- . Datalink interface simplifies wiring between controller & valve
- . Connector— Sealed Connectors (Power & CAN data/bus)
- . CAN communication to Unibody valve using E14X/E16X
- . Power Requirements—9 to 30 VDC; Less than 1 Watt Power Consumption

# Specifications

## APEX-S Valve Controller

Supply Voltage:	9—30VDC
Current:	0.5 A - Display Module only.
Fuse Rating:	1 A (12V) & 0.5 AMPS (24V)
<b>Dimensions:</b>	
Height	3 31/32"
Width	3 5/8"
Depth	2 5/16"
Datalink Interface:	CAN Bus

## GENERAL DESCRIPTION

---

### Components

The Electric Valve System consists of the following components:

- . Valve Controller
- . Valve with Actuator
- . Cables

### Valve Controller

The valve control and LED is sealed to an IP67 rating, and has dimensions of 3 31/32 inches high by 3 5/8 inches wide by 2 5/16 inches deep. All controls and indicators are located on the front of the module. (Refer to Controls and Indicators.)

### Valve with Actuator

An Elkhart Unibody valve with an E14X (E16X for EB6D) actuator must be installed in the apparatus plumbing and connected to the valve controller.

### Cables

Interconnecting cables are provided. Refer to Electrical Connections (Wiring) section.

## Controls and Indicators

The display and pushbuttons controls are accessible on the front of the unit. (Refer to Figure 1.)

### Valve Position Indicator LEDs

Closed Indicator will be red when the valve is fully closed. As the valve moves from the closed to fully open position the red closed LED will go out and the green LEDs will turn on one at a time from left to right until all 10 of the green LEDs light up indicating the valve is fully open.

### Valve Control Buttons

Two buttons open and close the valve. The third button (Preset) will move the valve to a programmed position.

### Color-Coded Visor

The Visor helps prevent water and dirt from running down the display. It can also be used to color code the valve controller to match the corresponding discharge.

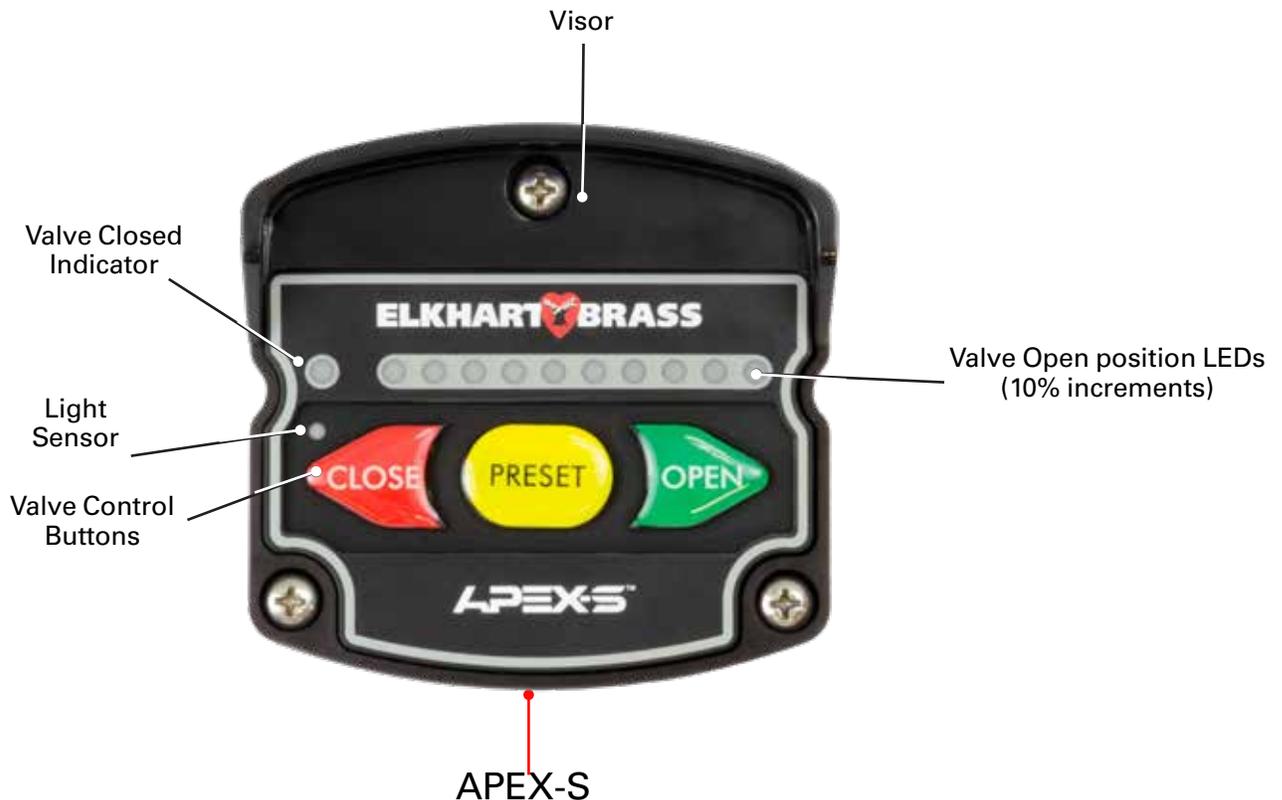


Figure 1. Controls and Indicators

## INSTALLATION

---

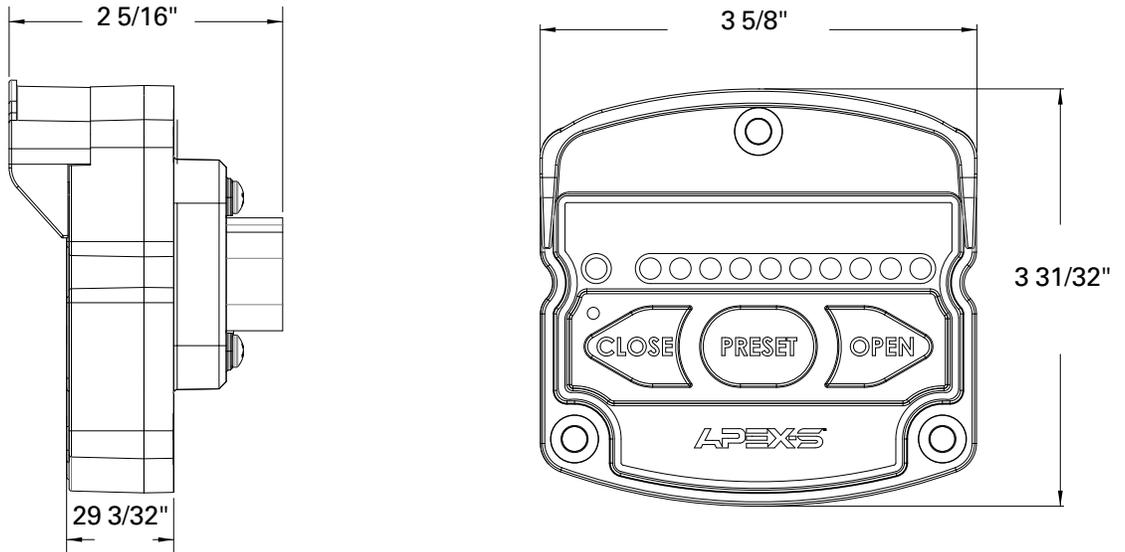
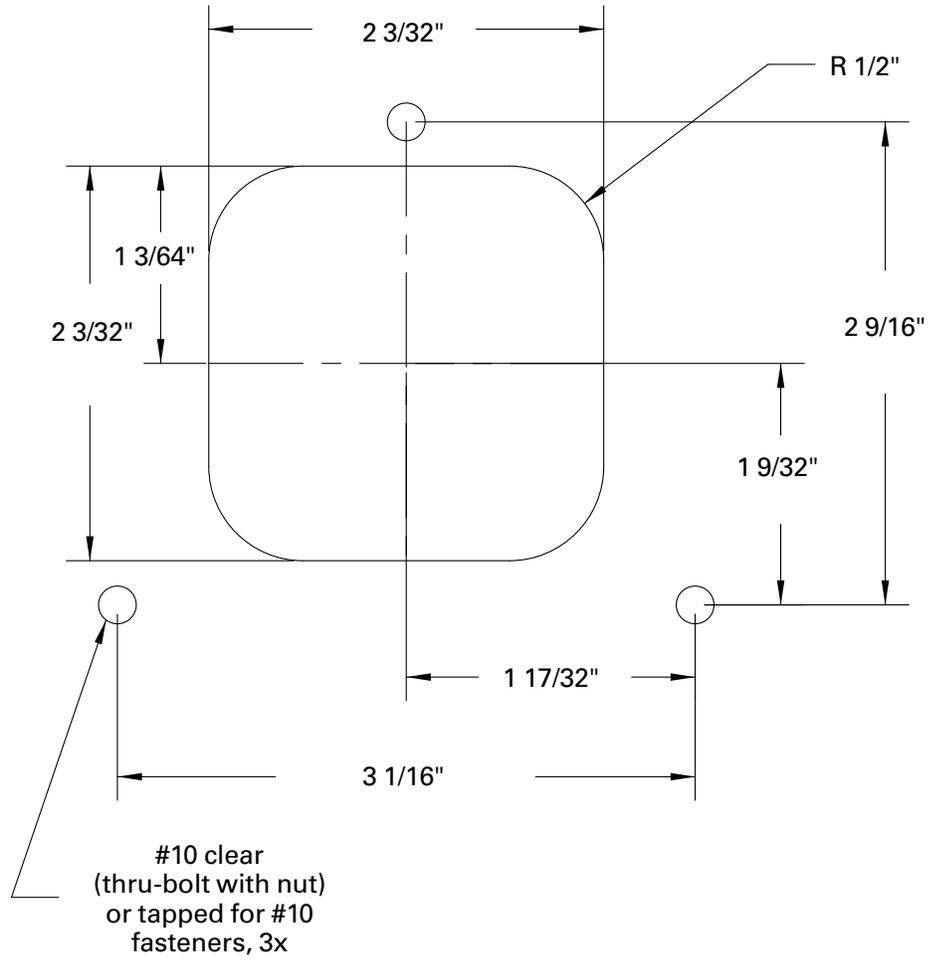
The APEX valve controller is compatible with unibody valves used in 1.5 to 8 inch piping.

### Install Valve Controller

1. Measure and mark mounting location for controller 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 2 for layout and dimensions.
2. Cut out a mounting hole according to the cutout diagram in Figure 2, and drill three holes (clearance or tapped) for #10 mounting screws.
3. Connect the cables and wires. (Refer to Wiring section.)
4. \*Place control module into position and secure with three screws.  
Use #10 size, Phillips pan head type screws with a minimum length of 1.25 inch.

**\*NOTE:** The Visor must be placed onto the valve controller housing prior to inserting mounting screws and attaching to your apparatus.

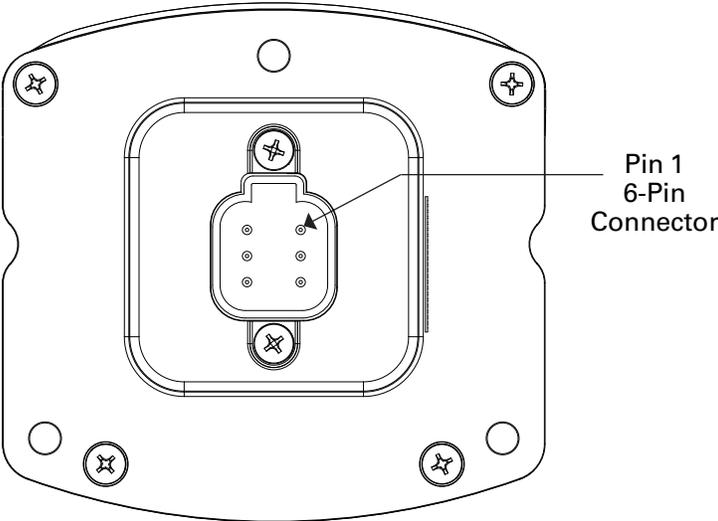
## Recommended Panel Cutout



**Figure 2. Valve Controller Mounting Dimensions**

# ELECTRICAL CONNECTIONS

---



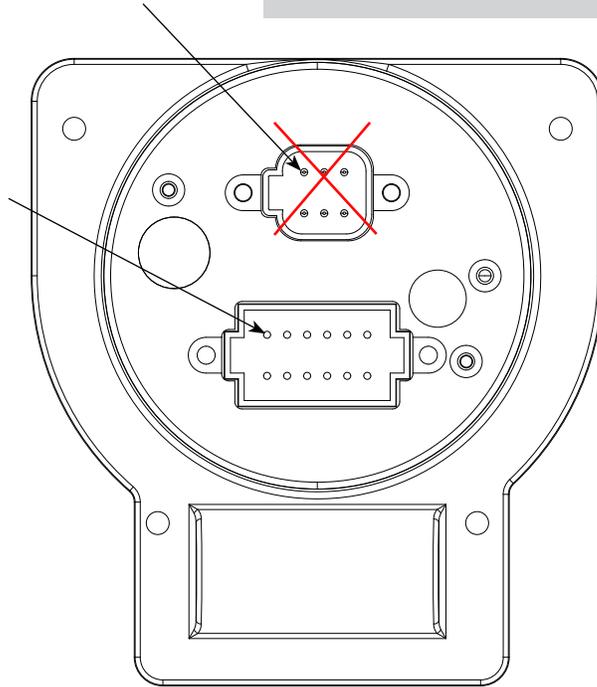
Valve Controller 6-Pin Connector	
Pin	Signal Description
1	Power 12/24VDC
2	Ground Supply
3	NC
4	Datalink Shield
5	Datalink CAN Low
6	Datalink CAN High

**Figure 3. Valve Controller Wiring**

6-Pin  
Connector  
Pin 1

**NOTE: 6-Pin Connector is not used with the  
APEX-S. Leave sealed plug in place.**

12-Pin  
Connector  
Pin 1



**Actuator 12-Pin Connector**

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

**Figure 4. Valve Actuator Wiring**

## Wiring the Valve Controller

For a single APEX-S controlling one valve, see diagram on page 15:

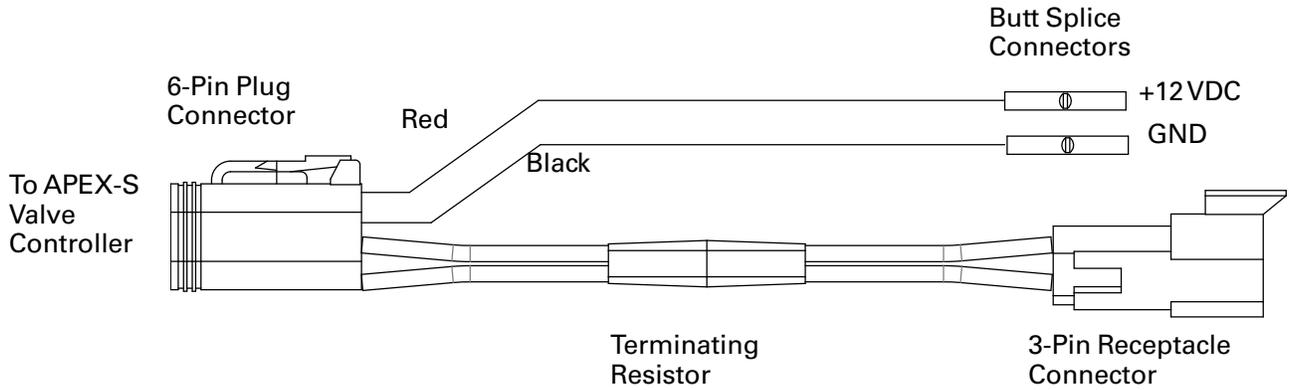
1. Connect power and ground to the controller. Use 1 amp fuse for 12v (0.5 amp for 24v) on positive controller leads.
2. Connect CAN wiring from the APEX-S to the valve. See Wiring Diagrams on the following page for pin positions and wire colors for wiring a APEX-S.
3. When done there should be continuity between the CAN LOW contacts (Yellow wires in connector position A), CAN HIGH contacts (Green wires in connector position B), and CAN SHIELD contacts (Black wires in connector position C) throughout the entire CAN communication wiring harness.\*\*

For two APEX-S controllers to be controlling one valve, see diagram on page 16:

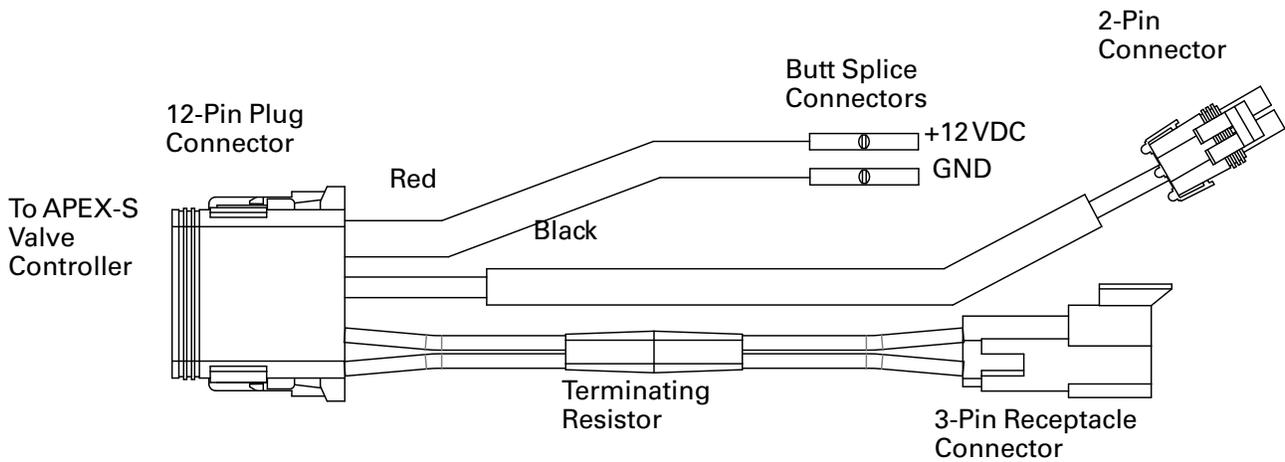
1. Connect power and ground to the controllers. Use 1 amp fuse for 12v (0.5 amp for 24v) positive controller leads.
2. Connect CAN wiring from the first APEX-S to a CAN splitter at the valve and then onto the second APEX-S.
3. Replace the terminated CAN leads going to positions 11 &12 in valves 12 pin connector with the non-terminated version - Cable D. Plug the triangular connector into the CAN splitter as shown. The wire length from one APEX-S to the other should not exceed 131 ft. (40 m) when added together.
4. When done there should be continuity between all CAN LOW contacts (Yellow wires in connector position A), CAN HIGH contacts (Green wires in connector position B), and CAN SHIELD contacts (Black wires in connector position C) throughout the entire CAN communication wiring harness.\*\*

NOTE: \*\* CAN Shield (black wire connector position C) stops at valve connector

### Cable A–Display Cables with Terminating Resistor (P/N 37542000)

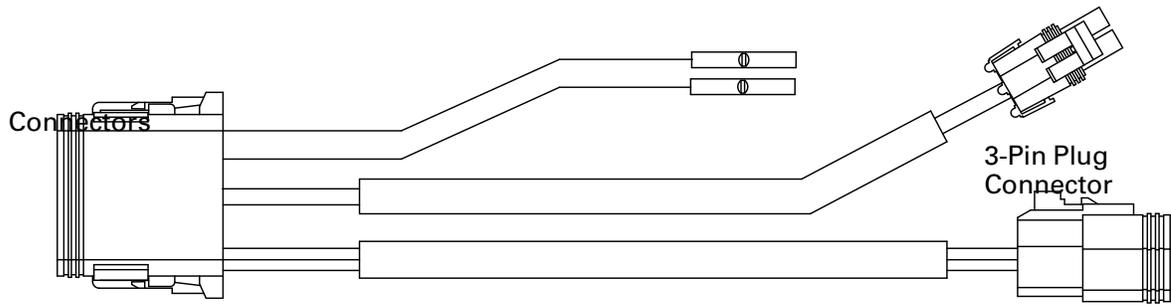


### Cable C–Valve Controller Cables (P/N 37544000)

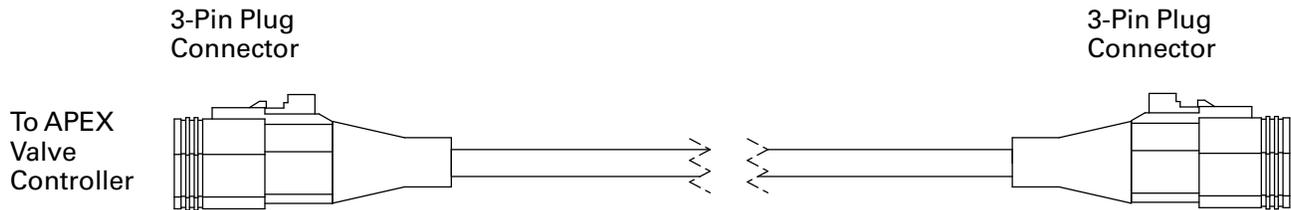


**Figure 5. Wiring (Cables and Connectors)**

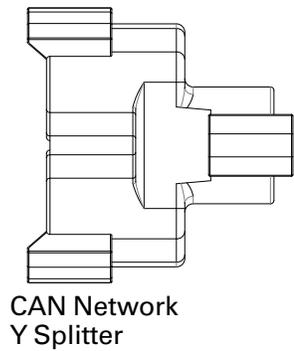
## Cable D–Valve Controller Cable without Terminating Resistor P/N 375440NT



Cable E–APEX Extension Cable  
 P/N 37543002 - 2'  
 P/N 37543010 - 10'  
 P/N 37543015 - 15'  
 P/N 37543020 - 20'  
 P/N 37543030 - 30'  
 P/N 37543040 - 40'



F–Splitter  
 P/N 24196000



**Figure 6. Wiring (Cables and Connectors)**

# APEX-S Wiring 1:1 Connections

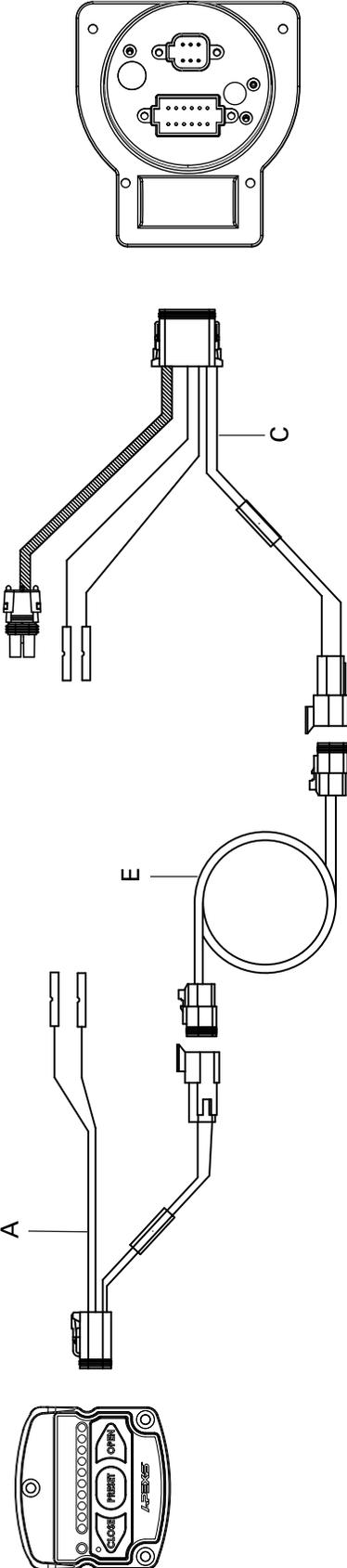


Figure 7. APEX-S 1:1 Wiring Connections

# APEX-S Wiring 2:1 Connections

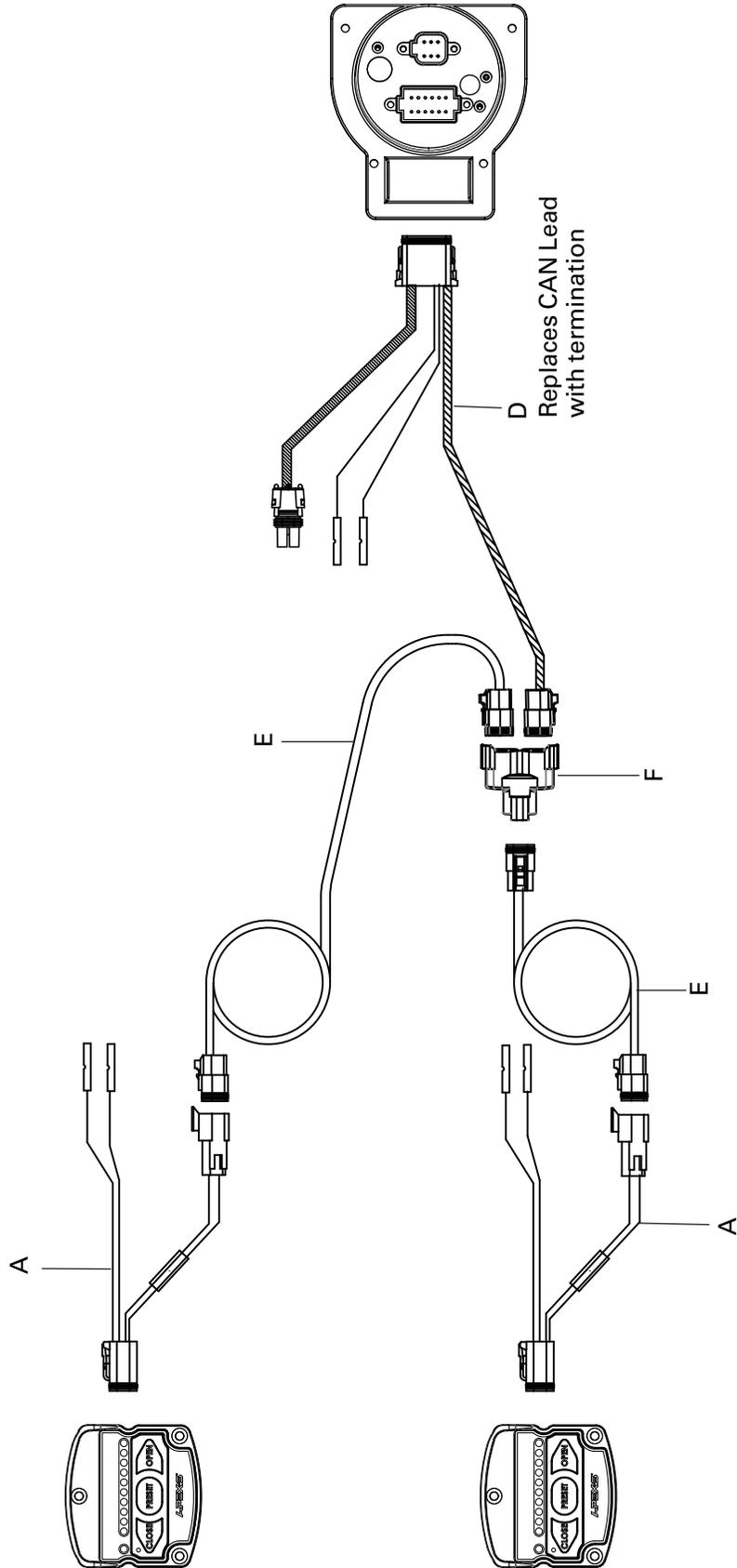


Figure 8. APEX-S 2:1 Wiring Connections



**Important:** All valves must have the position calibrated after installation.

**NOTE:** If using an EB\_J or EB\_S butterfly valve refer to “Valve Polarity” in the Programming Mode section on page 21. This programming must be done before performing the automatic valve position calibration.

### Automatic Valve Position Calibration for APEX-S

The valve position calibration determines the point where the valve is fully open or fully closed. This process will automatically determine these points by running the valve to the fully closed position then the fully open position, and then back to the fully closed position. This calibration must be done after installation, when the actuator has been replaced, or in any case when valve does not fully close or fully open.

**NOTE:** These routines must be utilized so the position of the valve will be displayed accurately.

#### Valve Calibration (CODE 1113)

1. Turn on power to the valve and controller(s).

Enter Code 1113

2. Press and hold the CLOSE button; then press and hold the OPEN button. After 5 seconds, the red CLOSE LED will flash. Code 1113 can now be entered.

3. Use the OPEN button to set the first digit of the code 1113. Press the OPEN button once, one green LED on.



4. Press the CLOSE button to move the cursor to the next digit for the second digit to be entered.

Press the OPEN button once, one green LED on.



5. Press the CLOSE button to move the cursor to the next digit for the third digit to be entered.



6. Press the CLOSE button to move the cursor to the next digit for the fourth digit to be entered. Press the OPEN button three times. Valve calibration begins approximately 4 to 5 seconds after the last digit is entered for Code 1113.



7. The valve will move to the closed position, calibrate to the closed position, then move to the open position, calibrate that position and then return back to the closed position and stop. While the valve is calibrating the LEDs on the controller will turn on and off on at a time from left to right. When calibration is complete all 11 LEDs will flash several times and then the red closed LED will stay on solid. The valve is now position calibrated.

## Maintenance Instructions

### Preventive Maintenance

The control system should be inspected during each apparatus check. Inspect the valve controller, wiring, and valve for damage.

- Operate all possible functions to ensure that each works normally
- Fully open and fully close valve to check for full range operation
- During valve check, inspect rotation for smoothness and seats/seals for leaks
- Inspect all exposed wiring for signs of damage

## OPERATION

---

On power-up the valve controller will be in the normal operating mode. The green OPEN, red CLOSE, and yellow PRESET buttons will control valve position. The yellow PRESET button will set the valve to a programmed position. Once a preset position has been programmed, pressing the PRESET button will move the valve to that position.

The red LED will be on when the valve is in the fully closed position. The 10 green LED indicators will show the valve position. Each LED indicator signifies 10 percent of the valve position. When the valve is in the fully open position, all 10 of the green LEDs will be lit.

All information is supplied to the controller from the E14X or E16X electric actuator on the CAN bus.

### Button Functions

#### Button Operations



Green OPEN button: Press and hold to drive a valve toward the Open position. Valve will stop when the button is released, or when it is fully open.



Red CLOSE button: Press and hold to drive a valve toward the Closed position. Valve will stop when the button is released, or when it is fully closed.



Yellow PRESET button: Press and release once; upon release the LED for programmed preset position will flash and the valve will travel to that position and stop there.

To program a preset position move the valve to the desired position (full closed or full open or anywhere in between) then press and hold the preset button until the valve position LED starts flashing. Let up on the preset button and wait for the position LED to stop flashing. The new preset position is now set.

### Auto Travel OPEN and Auto Travel CLOSE

The auto travel OPEN method will fully open the valve when initiated.

1. Press and hold the OPEN button
2. While holding the OPEN button, press and release the CLOSE button
3. Release the OPEN button and the valve will automatically travel to the fully open position

The auto travel CLOSE routine will fully close the valve when initiated.

1. Press and hold the CLOSE button
2. While holding the CLOSE button, press and release the OPEN button
3. Release the CLOSE button and the valve will automatically travel to the fully closed position.

### Setting the PRESET Position

To set or change the preset position:

1. Use the OPEN or CLOSE buttons to move the valve to the desired position.  
(This can be fully closed, fully open, or somewhere in between.)
2. Press and hold the PRESET button for until the LED(s) flash.
3. Release the PRESET button and do not operate the valve until the LED(s) stop flashing.  
Once the LED(s) stop flashing the new preset position will be saved.

# PROGRAMMING MODE

---

## Customizing Default Settings

Programming mode allows the user to customize some default settings on the controller. When in programming mode, the position of the LEDs is used to program the valve controller to the desired settings.

**NOTE:** The valve must be closed and the red CLOSED LED must be on to enter program mode.

### Entering Program Mode

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

### Daytime LED Intensity (CODE 318)

**NOTE:** Operator must be in programming mode with the red CLOSED LED flashing to make changes.

1. Use the OPEN button to set the first digit of the code 318, three green LEDs on. Each time the OPEN button is pressed the next LED will illuminate.



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 eight times, eight green LEDs on.



4. After 3 seconds all the LEDs will turn on at the current brightness level. Use the OPEN and CLOSE buttons to scroll through the intensity levels.

5. Once the desired brightness level has been reached, press and hold the PRESET button for 3 seconds to accept the setting. The valve controller will resume normal operation.

### Nighttime LED Intensity (CODE 317)

Follow the instructions from the Daytime LED Intensity setup to set a Nighttime LED Intensity level. Only press the button seven times in step three to enter the code 317, instead of 318.

## Valve Polarity (CODE 216)

**NOTE:** After the polarity setting is changed, valve calibration is required. The valve will not work correctly until the calibration is done.

Use the following program CODE 216 for valve opening direction. One (1) LED is for standard, or two (2) LEDs are for reversal polarity operation.

1. Press and hold the CLOSE button, then press and hold the OPEN button. After 5 seconds the red CLOSED LED will flash. Program code 216 can now be entered.

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



3. 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.



4. 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.



5. After 3 seconds, the LEDs will indicate the valve type set in the actuator. One (1) LED is for a standard valve, two (2) LEDs are for a reverse valve.

Press the CLOSE button once to select Standard Valve Polarity.



6. Press the OPEN button once to change this setting so that there are 2 green LEDs on to select Reverse Valve Polarity.



(Press the closed button to change from the Type2 to Type 1.)

7. Press and hold the PRESET button for 3 seconds to accept the setting and return to normal operation. The flashing red closed LED will go out. One or more green LEDs may stay on.

8. Cycle power to the APEX-S controller and the valve.

9. Calibrate the valve by using Code 1113. See page 17 to follow the instructions for Valve Calibration.

## Error/Warning Codes Troubleshooting Table

The table is provided to assist in tracking down system problems, it is not meant to take the place of good troubleshooting practices.

Table 1. Error/Warnings Codes and Troubleshooting

<b>Code</b>	<b>Description of Warning/Error</b>	<b>Probable Cause (Symptom)</b>	<b>Corrective Actions</b>
<b>A</b>	One LED blinking alternatively on the left and right sides	No Valve Detected	—Verify the ID # is Set Correctly —Verify the Wiring
<b>B</b>	Left and right LEDs blink simultaneously	—Valve Needs to be Calibrated —CAN Bus Not Connected	—Perform Valve Calibration —Connect CAN Bus or Check Wiring
<b>C</b>	Middle two green LEDs blink	—Valve is Not Moving —Motor Drawing Excessive Current	—Valve May Need to be Serviced —Replace Valve Assembly



### **PERSONAL RESPONSIBILITY CODE**

The member companies of FEMSA that provide emergency response equipment and services want responders to know and understand the following:

1. Firefighting and Emergency Response are inherently dangerous activities requiring proper training in their hazards and the use of extreme caution at all times.
2. It is your responsibility to read and understand any user's instructions, including purpose and limitations, provided with any piece of equipment you may be called upon to use.
3. It is your responsibility to know that you have been properly trained in Firefighting and/or Emergency Response and in the use, precautions, and care of any equipment you may be called upon to use.
4. It is your responsibility to be in proper physical condition and to maintain the personal skill level required to operate any equipment you may be called upon to use.
5. It is your responsibility to know that your equipment is in operable condition and has been maintained in accordance with the manufacturer's instructions.
6. Failure to follow these guidelines may result in death, burns or other severe injury.



Fire and Emergency Manufacturers and Services Association, Inc.  
P.O. Box 147, Lynnfield , MA 01940 [www.FEMSA.org](http://www.FEMSA.org)

Copyright 2006 FEMSA. All Rights Reserved



Elkhart Brass Manufacturing Co., Inc.

1302 W. Beardsley Avenue Elkhart, IN 46514

Tel. +574-295-8330

Toll Free (800) 346-0250

Fax (574) 293-9914

[www.elkhartbrass.com](http://www.elkhartbrass.com)

Email: [eb.info@safefleet.net](mailto:eb.info@safefleet.net)

