

Battery Backup Unit (BBU) for Series 70

IOM Manual



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Safety Instructions - Definition of Terms

Read, Follow and Save these instructions



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE

Used without the safety alert symbol indicates a potential situation which, if not avoided, may result in an undesirable result or state, including property damage.

Hazard Free Use

This device left the factory in proper condition to be safely installed and operated in a hazard-free manner. The notes and warnings in this document must be observed by the user if this safe condition is to be maintained and hazard-free operation of the device assured.

Take all necessary precautions to prevent damage to the BBU due to rough handling, impact, or improper storage. Do not use abrasive compounds to clean the BBU, or scrape its surfaces with any objects.

Configuration and setup procedures are described in this document. Proper configuration and setup is required for the safe operation of the BBU.

The control system in which the BBU is installed must have proper safeguards to prevent injury to personnel, or damage to equipment, should failure of system components occur.

This document does not cover every detail about every version of the product described. It cannot take into account every potential occurrence in installation, operation, maintenance and use.

If situations transpire that are not documented in sufficient detail, please request the required information from the Bray Distributor or Representative responsible for your area.

Qualified Personnel

A qualified person in terms of this document is one who is familiar with the installation, commissioning and operation of the device and who has appropriate qualifications, such as:

- Is trained in the operation and maintenance of electric equipment and systems in accordance with established safety practices.
- Is trained or authorized to energize, de-energize, ground, tag and lock electrical circuits and equipment in accordance with established safety practices.
- Is trained in the proper use and care of personal protective equipment (PPE) in accordance with established safety practices.
- Is trained in first aid.
- In cases where the device is installed in a potentially explosive (hazardous) location – is trained in the operation, commissioning, operation and maintenance of equipment in hazardous locations.



Battery Backup Unit (BBU) - Installation, Operation & Maintenance Manual Continued

Construction and Performance	
Power Requirements	24-27 VAC or 30-38 VDC (the minimum voltage is required to provide proper battery charging). Use dedicated Class 2 non-bonded transformer rated 100 VA per BBU
Power Output	BBU output with 24 VAC supply is 30-38 VDC On failure of AC/DC supply, Battery output is 24-25.5 VDC BBU will provide fail open or fail close operation
Battery Monitoring	Local LED indicator and voltage free 2-wire normally open contact for remote monitoring
Battery Conservation	Automatically shuts-off batteries after one minute or when actuator stops
Battery Monitoring	SLA (Sealed Lead Acid) Power Sonic PS1212 or Equal
Current Draw of Actuator & BBU with Full Torque Load	800 inlb = 2.0A 2,000 inlb = 3.1A 3,000 inlb = 3.1A 5,000 inlb = 4.1A
Power Protection	Two 5 amp, 250 V fast blow, 5x20mm fuses, one for the external power output circuit and the other for the battery output circuit
Operating Temperature	-4°F (-20°C) to 122°F (50°C) LED light may not function below -20°F (-29°C)
Housing	Die Cast Aluminium, Polyester finish, Nema 4X (IP 65)
Exposed Fasteners	Stainless Steel

Battery Specifications	
Battery (2)	12 volt 1.4 ampere-hour (AH) rechargeable sealed lead acid battery wired in series
Features	Valve regulated, spill proof construction allows safe operation in any position Rugged impact resistant ABS case and cover (UL94-HB) U.L. Recognized under file number MH 20845
Specifications	Battery Case: ABS plastic Maximum discharge current (7 minutes): 4.2 amperes 4 years, depended on ambient Temperature Shelf Life (% of nominal capacity at 68°F (20°C)) 1 month = 97% 3 months = 91% 6 months = 83%
Temperature	Charge: -4°F to 122°F (-20°C to 50°C) Discharge: -20°F to 140°F (-29°C to 60°C) Storage: -20° to 140°F (-29° to 60°C) ¹ The BBU should be powered up for a minimum of 12 hours

¹ Leaving the battery in an unpowered state for long periods at ambient temperatures greater than 40°F will result in excessive battery drain.

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Operation

The BBU is operated by a micro controller which performs all of the functions pertaining to power management, battery monitoring and charging, and control of the Series 70 Servo NXT or On/Off Controller. The BBU constantly monitors the incoming power. In the normal mode of operation with power supplied to the actuator, the batteries maintain a charge and are in an offline mode. The power applied to the motor is from the power supply, not the batteries.

When a power loss occurs, the BBU pauses for 5 seconds and then reads the "Open/Close" fail position switch setting. The BBU circuitry applies the stored power in the batteries to move the valve or damper to the full open or full closed position as initially designated by the user. The BBU will allow up to one minute for the actuator to attain the fail position. If the fail position is reached before one minute, the BBU will detect the loss of motor current and turn the power off to the actuator to conserve battery power. The actuator remains in this position until external power is restored to the unit. When power is restored to the BBU, the battery charge cycle commences.

Battery Status Indicator

The BBU has a bi-color red/green indicator on the side of the battery enclosure to provide information regarding the operation and battery status of the BBU. Table 1 is a summary of the different indications.

Indication	Description
Solid Green	The BBU is powered and the batteries are fully charged.
Flashing Green	The BBU is powered and the batteries are charging.
Fast Flashing Red	The BBU is not powered and the actuator is seeking the fail position.
Slow Flashing Red	The BBU is not powered and the BBU is in low power stand-by.

Table 1 - Indicator Lamp Guide

Battery Charging

A battery charge cycle will commence upon the return of power to the BBU. Charge cycles will require from a few minutes to several hours depending upon the discharged state of the battery, condition of the battery, and ambient temperature. When the charge cycle is complete, the batteries are held in a fully charged state by applying a voltage which maintains the "Stand-by Mode" of the battery.

Every 8 hours, a full charge cycle commences which tests the condition of the batteries. This cycle will normally last a few seconds with batteries that are in good condition. Batteries that require replacement will require a longer period to complete the charge cycle. After 12 hours, if the batteries cannot attain full charge, the alarm relay is engaged to indicate that the batteries require replacement.



Quick Start Guide

The large majority of BBUs will be received pre-assembled and pre-wired. Under these conditions, the Quick Start Guide is applicable. For situations in which the BBU and/or batteries need to be installed, then skip to the Installation Guide page 7.

1

**Remove
Battery Cover**



2

Activate Batteries

See page 14 - Section 7.3



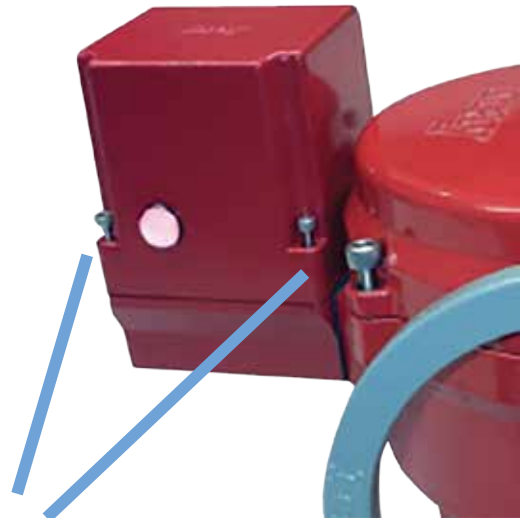
3

Power & Command Signal

Connect Power and Command Signal per the respective wiring diagrams found on pages 17 to 19 of this document or on the lid of the actuator.

4

**Replace Battery Cover &
tighten down screws**





Installation

1.0 Purpose

For assembly of a Bray Battery Backup Unit (BBU) to a Bray S70 electronic actuator.

2.0 Tools and Equipment Required

- Wire Strippers
- Wrench
- Allen Wrench
- Signal Generator
- Power Supply (100 VA Minimum Isolated Transformer)
- Screw Driver



CAUTION: Risk of Electric Shock.
Disconnect the power supply before making electrical connections to avoid electric shock.



CAUTION: Risk of Property Damage.
Do not apply power to the system before checking all wiring connections. Short circuited or improperly connected wires may result in permanent damage to the equipment.

3.0 Bill of Materials

- Series 70 Actuator
- BBU
- Batteries (2)
- Wiring Diagram with applicable Wire Colors
- Mounting Hardware
- O-Rings



IMPORTANT: Do not exceed the electrical ratings of the S70 Actuator or BBU.

4.0 Actuator/BBU Preparation

- 4.1** Wear safety glasses and all other appropriate safety equipment as directed by your governing body before performing any of the listed tasks.
- 4.2** Retrieve all parts required to construct the S70/BBU assembly as specified on your sales order's BOM. Some hardware depicted below [\[Figure 1\]](#).

Figure 1

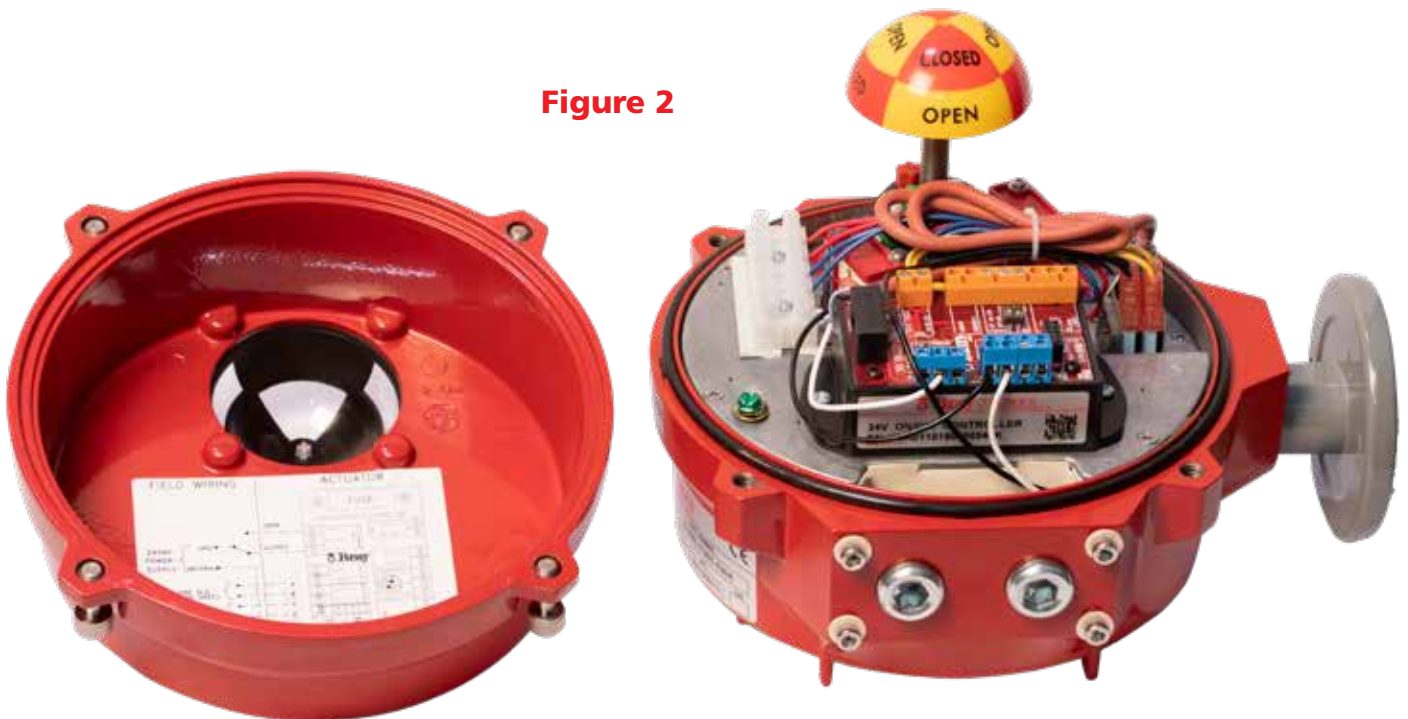




5.0 Initial Assembly and Battery Installation

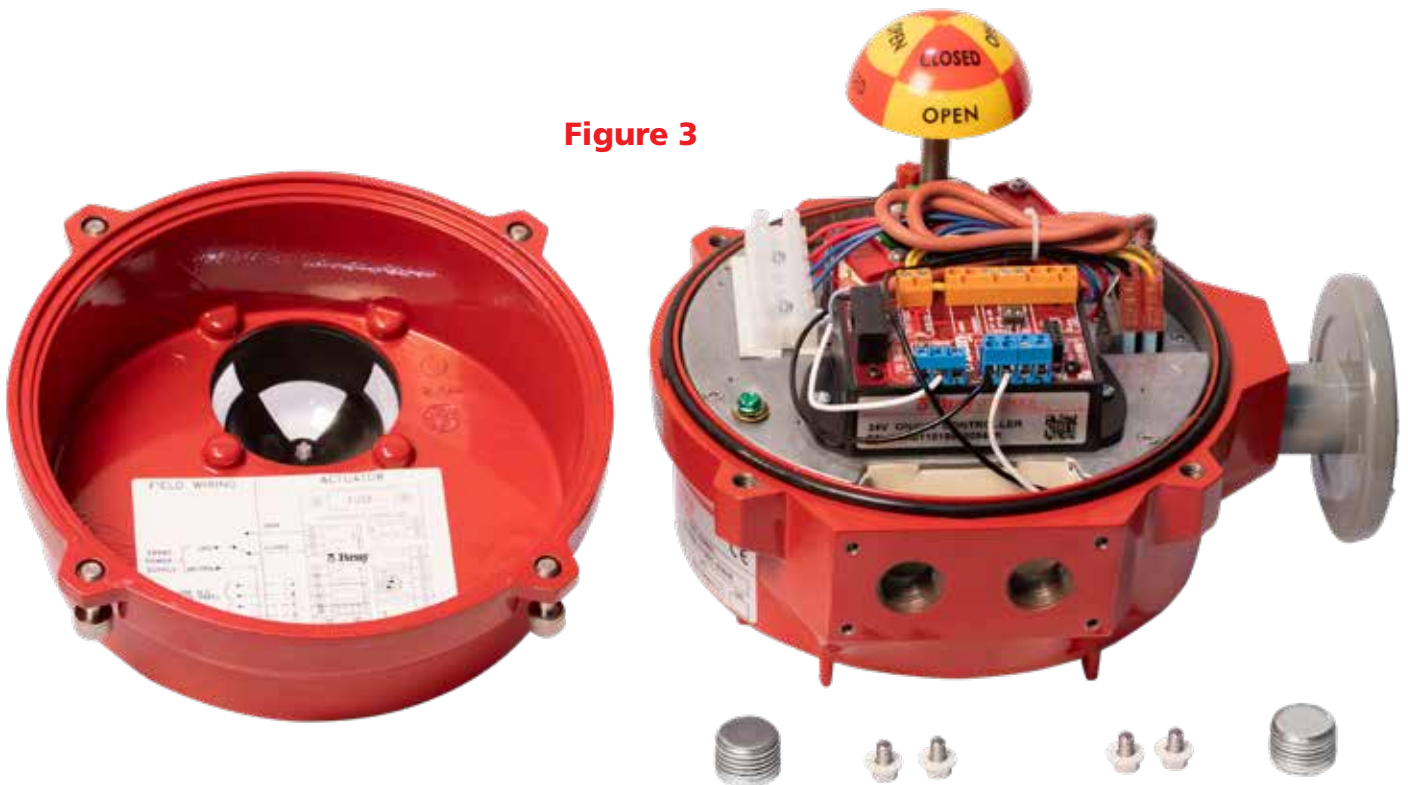
5.1 Remove lid of the actuator [Figure 2].

Figure 2



5.2 Remove four (4) BBU actuator mounting bolts and two (2) conduit plugs from side of S70 actuator [Figure 3].

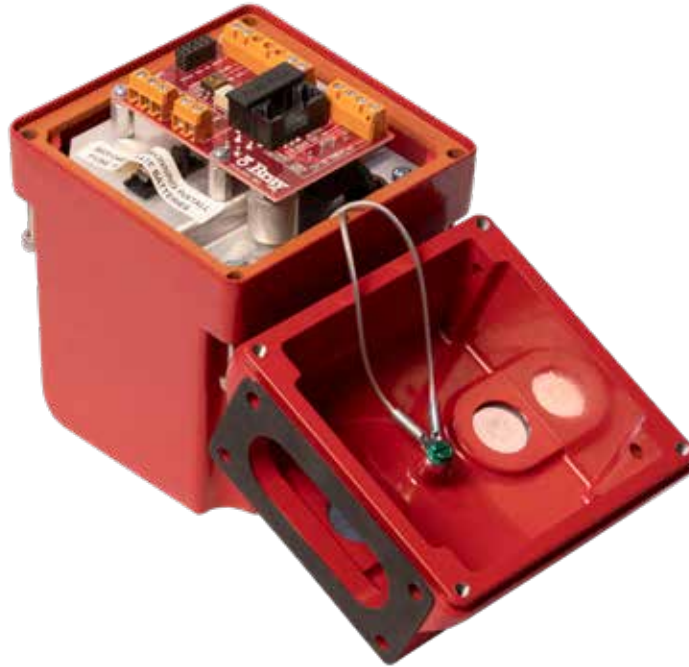
Figure 3





- 5.3** Disengage the four (4) BBU lid bolts from BBU [Figure 4].

Figure 4



- 5.4** Remove two (2) battery cover panel screws from BBU [Figure 5].

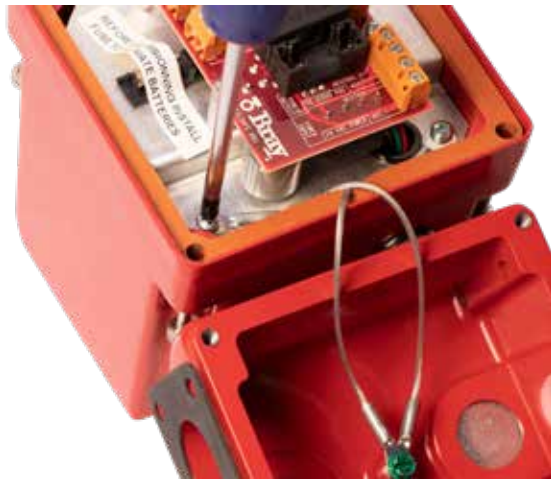


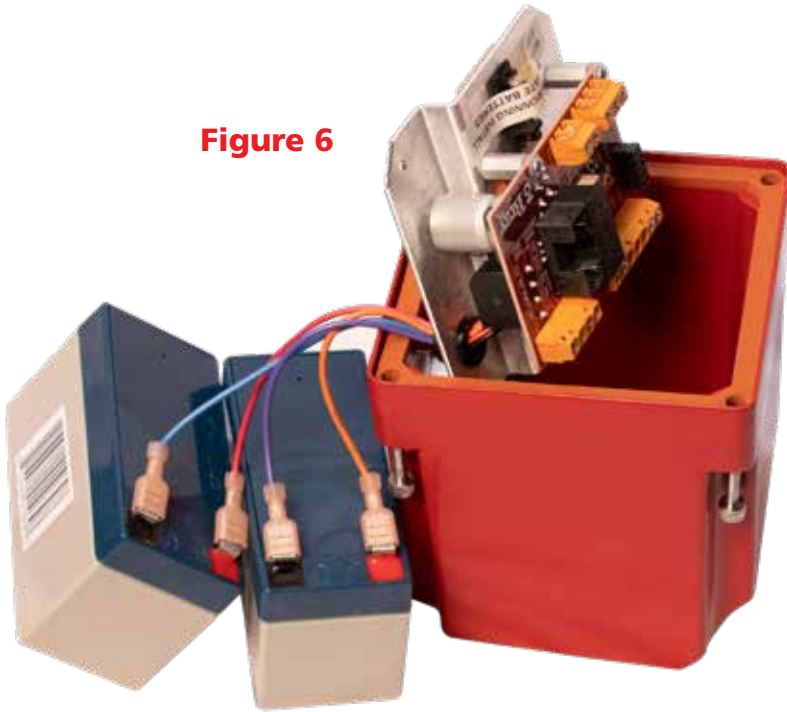
Figure 5





- 5.5** Connect four (4) battery terminals to two (2) 12VDC batteries as shown in the wire color table below. See [Figure 6] for example.

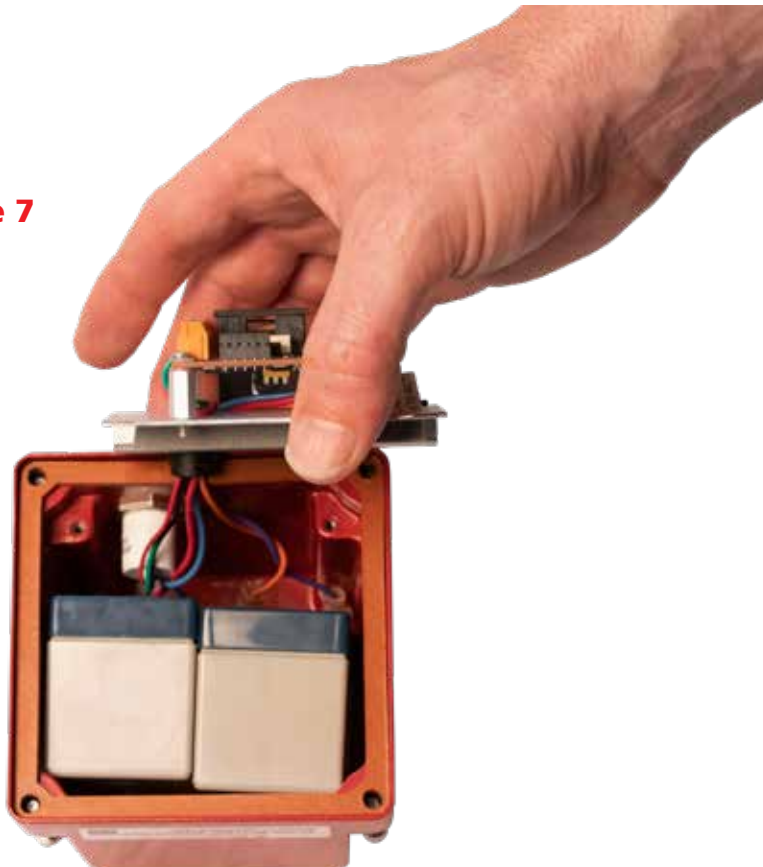
Figure 6



Wire Color	Description
Red	Battery 1 - Positive
Blue	Battery 1 - Negative
Orange	Battery 2 - Positive
Purple	Battery 2 - Negative

- 5.6** Gently insert the batteries into the BBU case with the battery terminals positioned nearest to the circuit board [Figure 7].

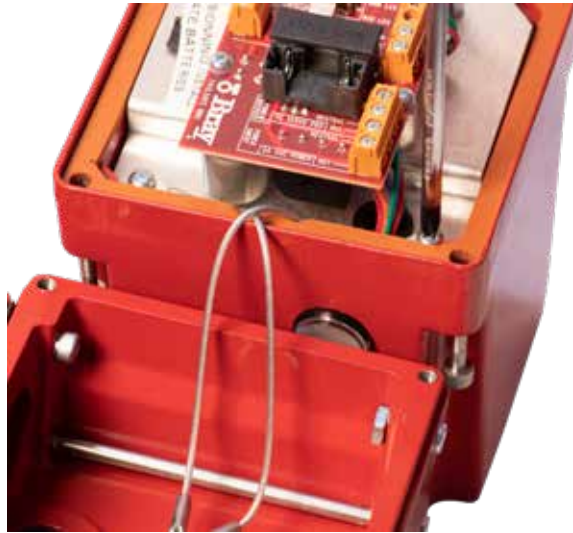
Figure 7





- 5.7** Re-attach BBU card plate using two (2) screws previously removed with silver holding cables crisscrossed like before [Figure 8].

Figure 8



- 5.8** Add four (4) O-rings to two (2) Long Cap Screws and two (2) Small Cap-Screws [Figure 9].

Figure 9



- 5.9** Insert these two (2) Long Cap Screws with O-rings into the bottom two (2) holes of BBU base and assemble to S70 actuator.
- 5.10** Install the Medium Cap Screws on the top two (2) holes of BBU base that attach to S70 actuator.
- 5.11** Install two (2) Small Cap Screws with O-rings on top two (2) holes of BBU base [opposite side of Medium Cap Screws] and secure using Hex Screw Nuts. See [Figure 10] for final BBU attachment to S70 actuator.

Figure 10



6.0 Control Board Wiring

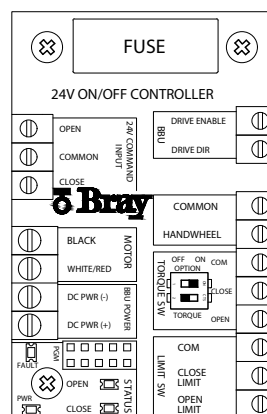
6.1 All wiring from BBU to Actuator shall pass through the conduit ports. Do not allow sharp conduit threads to damage the wire insulation. Use the appropriate Bray S70 wiring diagram for terminal locations and wire color selection. See [Figure 11] for applicable electronic modules.

Note: The wire diagram will be supplied with the BBU. Contact your Bray Sales Rep or Bray Tech Support if you need an extra wiring diagram copy.

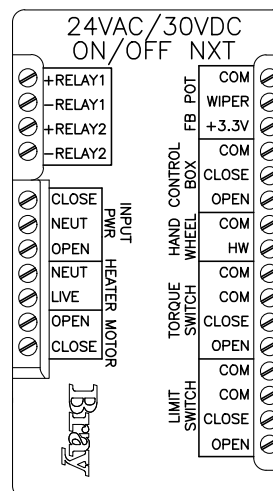
Figure 11



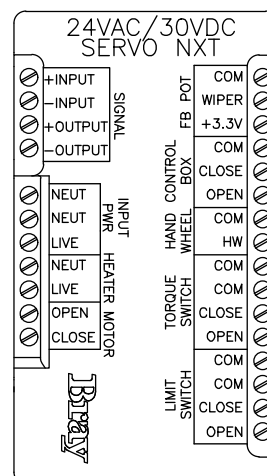
On/Off



On/Off NXT



Servo NXT

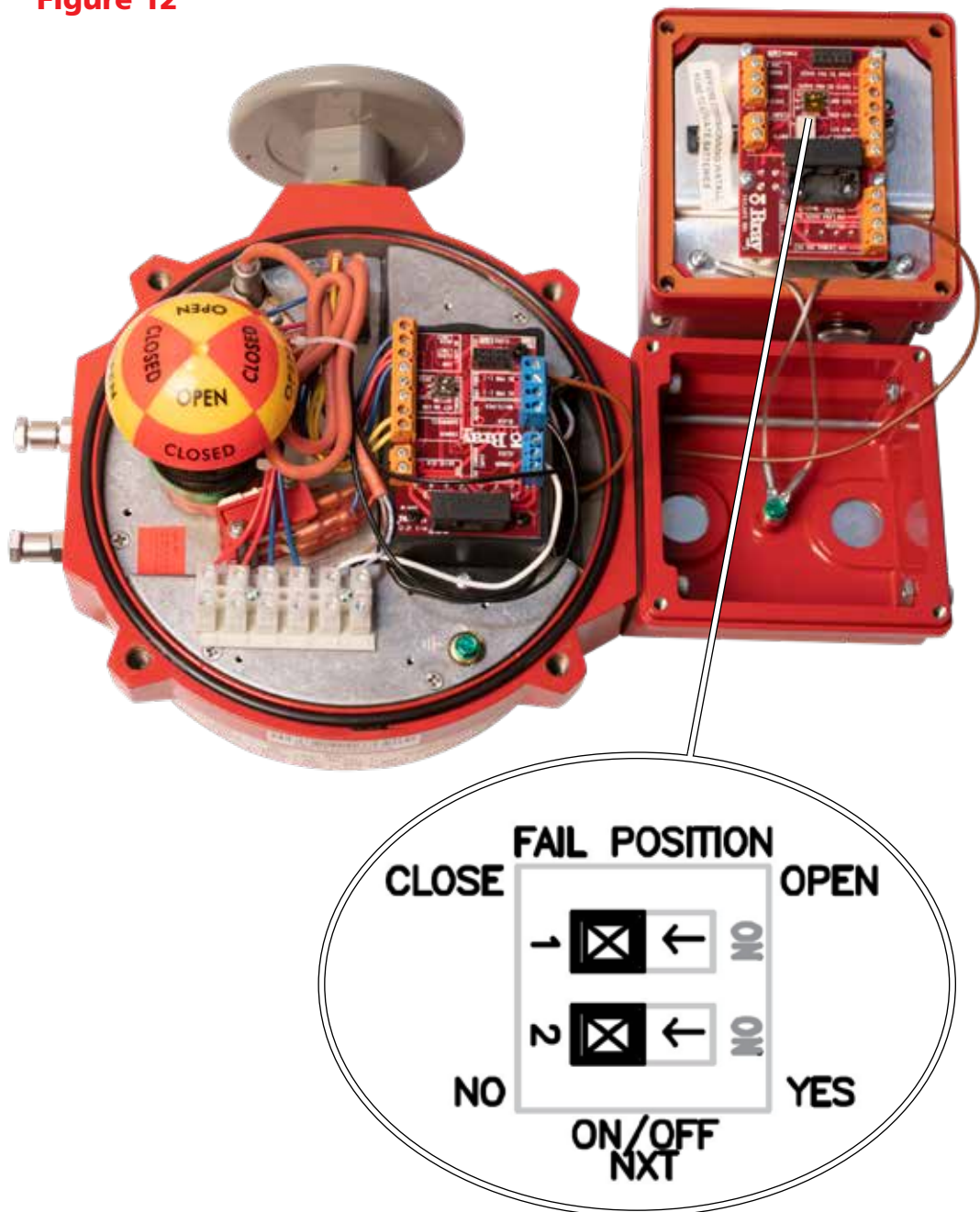




7.0 Testing

- 7.1 Fail Position (DIP Switch #1)** - The actuator position during a power loss is determined by the Close/Open DIP switch #1 setting [Figure 12] on the BBU. The switch setting is only recognized at the time of a power failure.
- 7.2 Control Type Selection (DIP Switch #2)** - The BBU needs to be told the type of S70 actuator controller connected. Use the BBU's DIP switch #2 to select whether the S70 actuator controller is an On/Off NXT or not. The wiring diagram at the end of this BBU IOM and a paper copy shipped with the BBU, will provide additional details. [Figure 12]

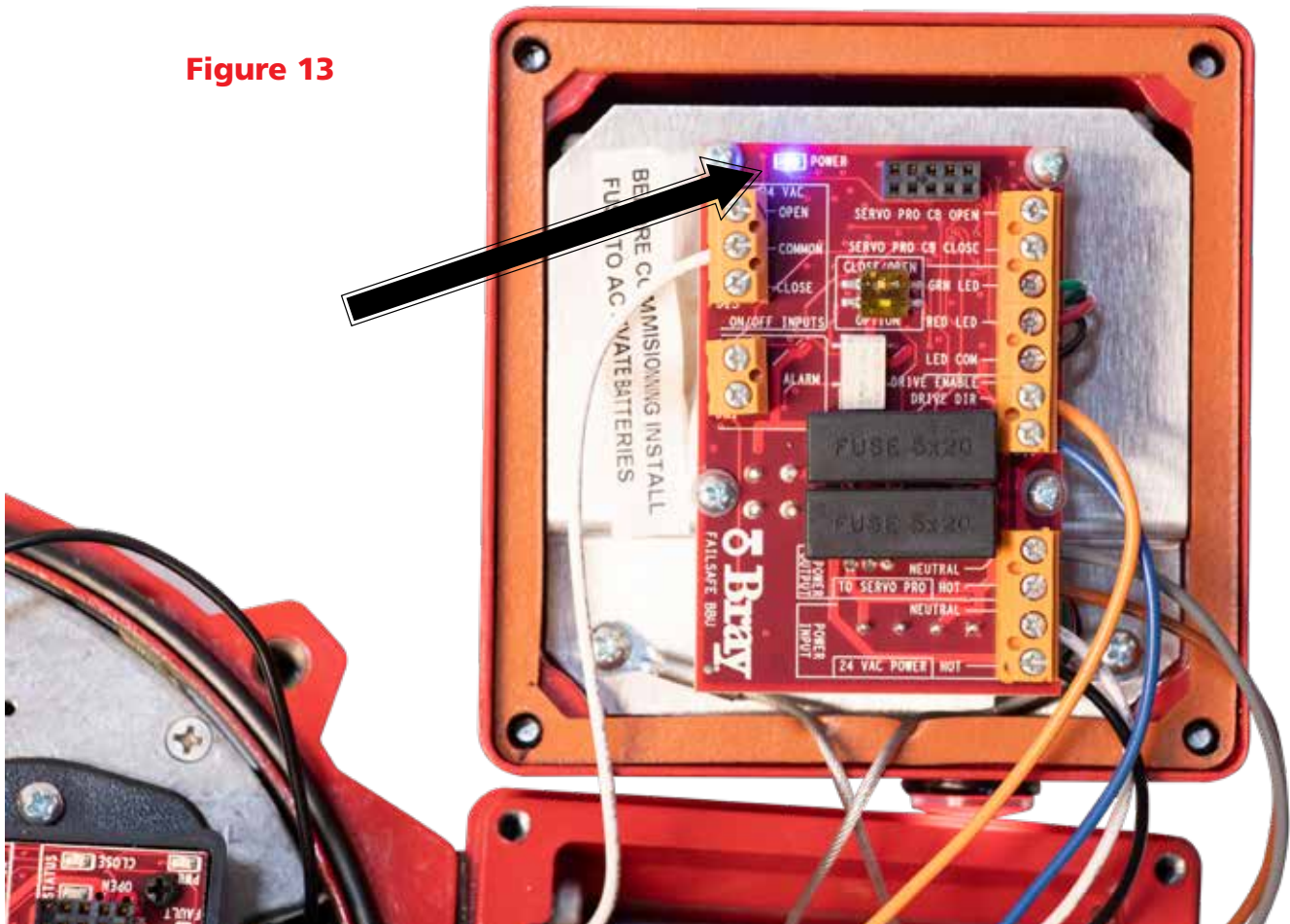
Figure 12





- 7.3** Wire the Power Supply and Command Signal Generator according the wiring diagram specific to your model. Power Supply and Command Signal Generator shall not be powered on yet.
- 7.4** Insert the fuse supplied under the white label. See [Figure 13] below. Verify LED indicator on the side of the BBU is flashing **RED** and the Power LED on the BBU Circuit Board is on.

Figure 13



WARNING – ONCE BATTERY POWER IS APPLIED TO THE BBU, THE UNIT IS OPERATIONAL AND MAY CAUSE THE ACTUATOR TO SEEK THE FAIL POSITION IF THE MAIN POWER IS NOT CONNECTED TO THE BBU.



- 7.5** Turn on the Power Supply to the BBU. Verify LED indicator on the side of the BBU is flashing or steady **GREEN**, see [Figure 14] below. Electrically command the actuator full open and close to verify proper actuator operation.

Figure 14



- 7.6** Command the actuator to the position opposite of the Fail Position. Turn off the Power Supply and verify that the BBU drives the actuator to the full Fail Position and the LED indicator on the side of the BBU is Rapidly flashing **RED**. After the actuator has reached full Fail Position, the LED indicator will Slowly flash **RED**. See [Figure 15] for details.

Figure 15

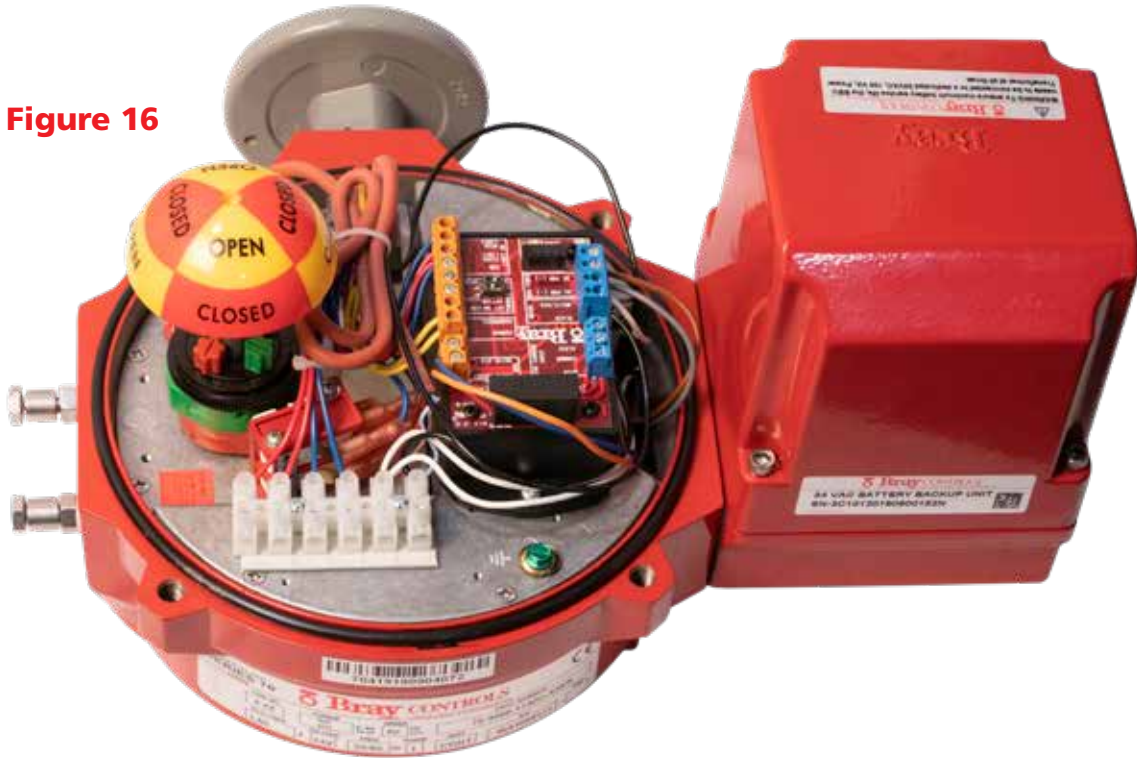
Indication	Description
Solid Green	The BBU is powered and the batteries are fully charged.
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Slow Flashing Red	The BBU is not powered and the BBU is in low power stand-by.



8.0 Final Assembly

- 8.1** Reconnect the top and bottom BBU case assemblies. Be careful not to pinch or damage wiring and ensure the BBU enclosure gasket is in place. [Figure 16]

Figure 16



- 8.2** If the actuator has already been calibrated then reinstall the actuator lid and the assembly is ready for use. If the actuator is not calibrated or needs recalibration then procedure with a separate procedure 570 Quick Start Guide, found on our Bray Commercial Division website and available upon request. [Figure 17]

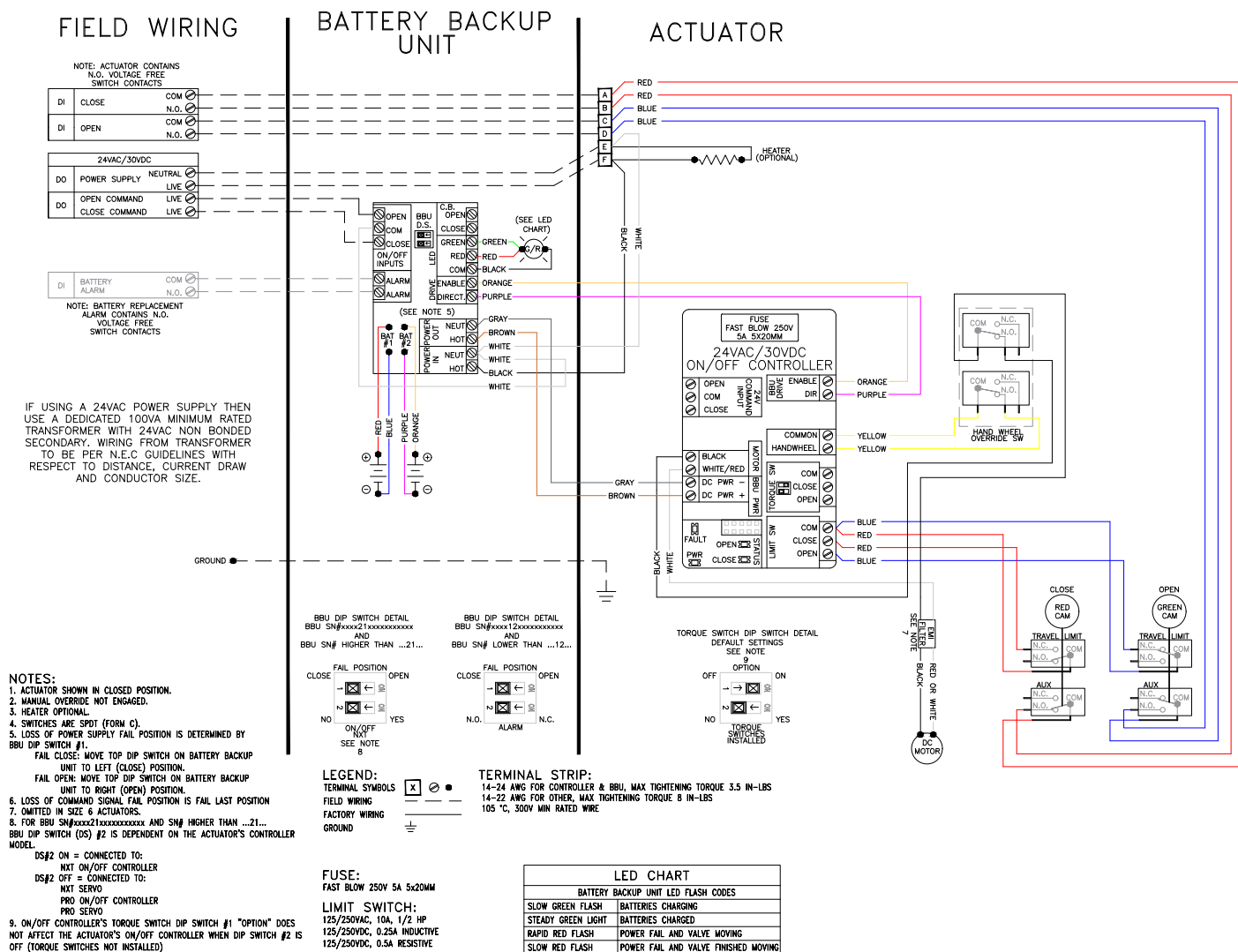
Figure 17





Battery Backup (BBU) - Wiring

24 VAC On/Off Controller BBU - Size 800-2,000 lb-in - (BCD-WD-A014-3)

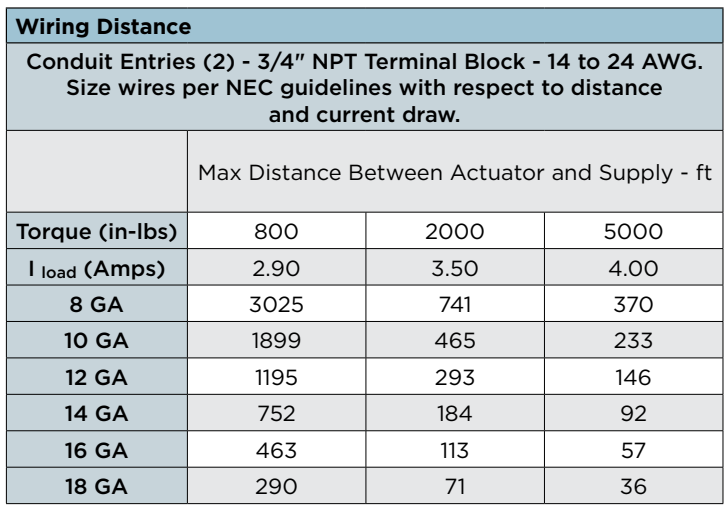


Wiring Distance

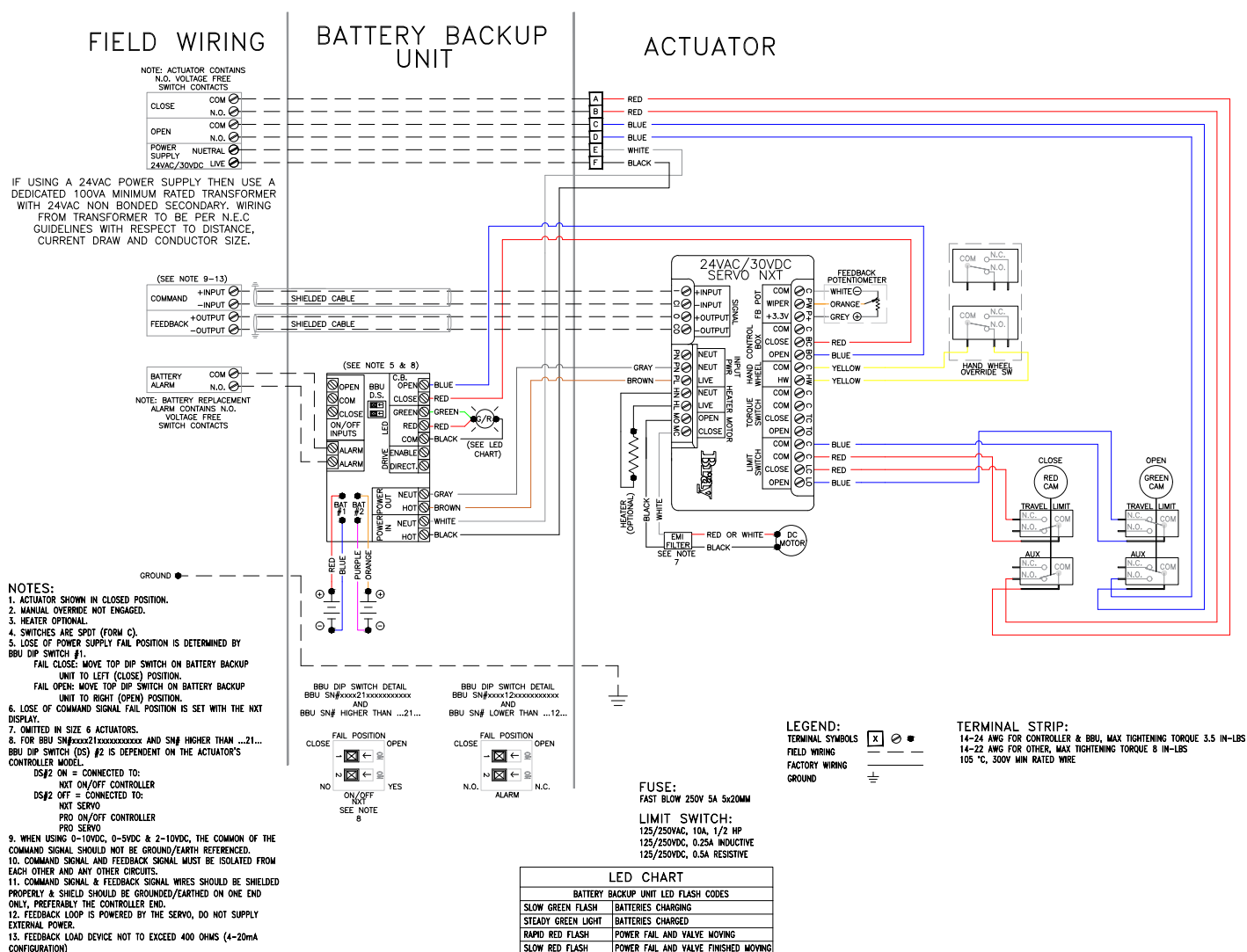
Conduit Entries (2) - 3/4" NPT Terminal Block - 14 to 24 AWG.
Size wires per NEC guidelines with respect to distance and current draw.

	Max Distance Between Actuator and Supply - ft		
Torque (in-lbs)	800	2000	5000
I load (Amps)	2.90	3.50	4.00
8 GA	3025	741	370
10 GA	1899	465	233
12 GA	1195	293	146
14 GA	752	184	92
16 GA	463	113	57
18 GA	290	71	36

FIELD WIRING	BATTERY BACKUP UNIT	ACTUATOR
1	2	3
4	5	6
7	8	9
10	11	12
13	14	15
16	17	18
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361	362	363
364	365	366



24 VAC Modulating NXT BBU - Size 800-5,000 lb-in - (BCD-WD-A035-2)



Wiring Distance			
Conduit Entries (2) - 3/4" NPT Terminal Block - 14 to 24 AWG. Size wires per NEC guidelines with respect to distance and current draw.			
	Max Distance Between Actuator and Supply - ft		
Torque (in-lbs)	800	2000	5000
I _{load} (Amps)	2.90	3.50	4.00
8 GA	3025	741	370
10 GA	1899	465	233
12 GA	1195	293	146
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