

PROMATION ENGINEERING

Precision Actuation for Industry

Installation & Operation Manual

**This IOM is for the following
ProMation Engineering Products:**

120VAC On/Off/Jog

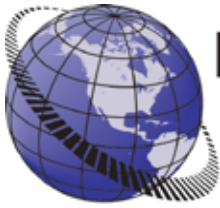
PBU100-120-4, PBU100-120-4 with Status
PBU102-120-4, PBU102-120-4 with Status
PBU104-120-4, PBU104-120-4 with Status
PBU505-120-4, PBU505-120-4 with Status
PBU506-120-4, PBU506-120-4 with Status

24VAC On/Off/Jog

PBU100-24A-4, PBU100-24A-4 with Status
PBU102-24A-4, PBU102-24A-4 with Status
PBU104-24A-4, PBU104-24A-4 with Status
PBU505-24A-4, PBU505-24A-4 with Status
PBU506-24A-4, PBU506-24A-4 with Status

230VAC On/Off/Jog

PBU102-230-4, PBU102-230-4 with Status
PBU104-230-4, PBU104-230-4 with Status
PBU505-230-4, PBU505-230-4 with Status
PBU506-230-4, PBU506-230-4 with Status



PBU100

The battery backup system (PBU) is housed in a NEMA 4X enclosure with a clear front access door to allow instantaneous visual confirmation of the operation of the system. This product requires connection to a 120V or a 230V supply to power the backup unit depending on the model.



PBU100 with Status Option

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Product shipping information

1. The PBU system is shipped in two separate enclosures. This is done to prevent shipping damage to both the fiberglass enclosure as well as to sensitive components associated with the heavier control panel and battery back up system.
2. BOX 1 contains the fiberglass enclosure. Do NOT use sharp objects when opening the carton as you may damage the clear lexan door attached to the enclosure cabinet.
3. BOX 2 contains the main face plate panel, battery system and control electronics.

4. This unit is shipped with the battery system disconnected. Follow the instructions below to correctly reconnect the battery to the power unit. Failure to follow the connection sequence will prevent the battery unit from starting.

Product Installation

1. Mount the cabinet either indoors or outdoors protected from direct sunlight or other high heat sources.
 - The cabinet mounts with the latches to the RIGHT, and hinge to the LEFT.
 - The suggested EMT entry location is shown on page 18 in the dimensional drawing.
 - Make all conduit penetrations per local code and perform all wire pulls prior to installing the main control panel.
2. After the enclosure is properly mounted, install the four corner standoffs using a 3/8" socket or a nut driver. There are two (2) 2" long hex standoffs connected together for EACH corner of the enclosure.
 - These are located inside the enclosure when shipped. **DO NOT OVERTIGHTEN!**
3. Turn the main panel over to reveal the back side of the plate. Remove the sliding battery compartment cover from the APC unit.
4. Tilt the entire assembly to slide the battery out of the enclosure. This will give you access to the battery terminals.
5. **Connect the battery.**
 - Connect the positive (red) wire to the red battery terminal.
 - Connect the negative (black) wire to the black battery terminal.
6. Slide the battery back into the enclosure, and replace the slide cover.
 - Take care not to pinch the battery wires in the process.
7. Install the panel onto the four standoff posts from step 2 (above) using 10-32 x 1/2" PH screws from parts bag.
8. **Make wiring connections** (see pages 6-16).
 - Note that it is possible to connect multiple actuators to one PBU (see page 17).
 - After power is applied to the PBU, press the "Enable" button on the front panel to start the system.
 - Note that the Optional Indicators and Connections are not functional unless the unit is ordered "with Status".



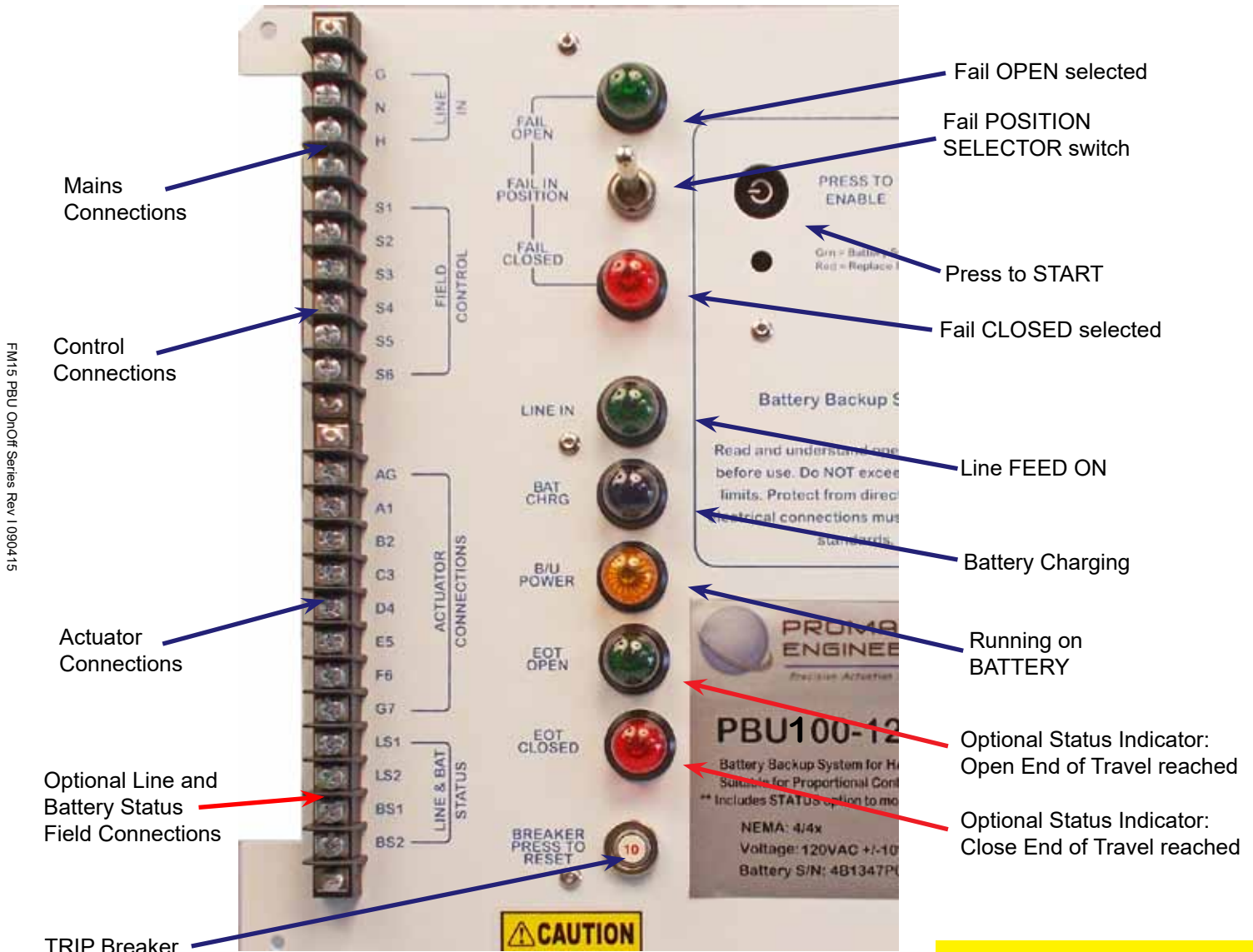
Installation and Application Notes

- After installation and wiring are complete, apply power and PRESS the START button to enable the battery system.
- Place the FAIL POSITION SELECTOR switch in the desired mode (Fail OPEN or Fail CLOSED) based on the requirements of the site.
- Indicator lamps show when Power is applied, which Fail position has been selected, when the Battery is Charging, and when the system is running on Battery Power. Units with the factory installed “with Status” option also include two extra lamps: Open End of Travel and Closed End of Travel. [Indicator lenses unscrew to access the lamps. Lamps are T-2 style and PRESS straight in, do NOT twist. Lamps are 120v for 24v & 120v models, and 230v for 230v models.]



After the battery has been connected to the power unit, there is LIVE voltage present on the back of the main panel even after the main power has been disconnected. Handle appropriately!

- Overloading the backup system will TRIP the breaker. This is a PRESS to RESET type and is NOT self resetting.
- The Line Status and Battery Status are dry form C contacts rated at 8A, 250 vac/30vdc.
- ***It is possible to connect multiple actuators to a single PBU PROVIDED THE TOTAL ACTUATOR DEMAND DOES NOT EXCEED THE RATING OF THE PBU. Reference page 17 for details and contact ProMation for assistance.***



PBU100 with Status

The Optional Indicators and Connections are not functional unless the unit is ordered “with Status”.

PBU Series Sequence of Operation - On/Off/Jog Actuators

The battery backup system (PBU) is wired in series between the mains power and the actuator. Under normal operation, power supplied to the PBU H (HOT) and N (NEU) terminals will illuminate the green **"LINE IN"** indicator light, and provide charging voltage to the battery system.

While Mains power is present

On/Off/Jog control modes are enabled to allow the positioning of the actuator through remote control devices. The end user can install a center-off switch for 3 point floating control, or dry contacts from a remote controller or line voltage outputs may also be utilized to provide control for On/Off/Jog type actuators.

While under mains power the blue **"BAT CHARGING"** indicator light will illuminate and the yellow **"B/U POWER"** indicator light will be off. While under mains power, the position of the **"FAIL POSITION SELECT"** switch is irrelevant. Power is supplied through the interface cabinet and the actuator heater is enabled. No current is being drawn from the battery system during this mode of operation. Optional indicator lights can be wired to show actuator end of travel status. These lamps are active as long as the battery system is running or Mains power is present AND the actuator is receiving a signal to drive to the full OPEN or CLOSED position. Optional STATUS contacts can be used for remote health indicators of LINE voltage coming into the PBU and if the Battery System is operating.

When the mains power is lost

Charging power is no longer supplied to the battery system. The green **"LINE IN"** indicator light is turned off, and the battery system automatically generates modified-sine wave line voltage to provide power for the actuator. The blue **"BAT CHARGING"** indicator light is turned off, and the yellow **"B/U POWER"** indicator light is turned on. The **"FAIL POSITION SELECT"** switch becomes active, and depending on its position, drives the actuator either fully open or fully closed. During this mode of operation, the position of any field interface switching is irrelevant.

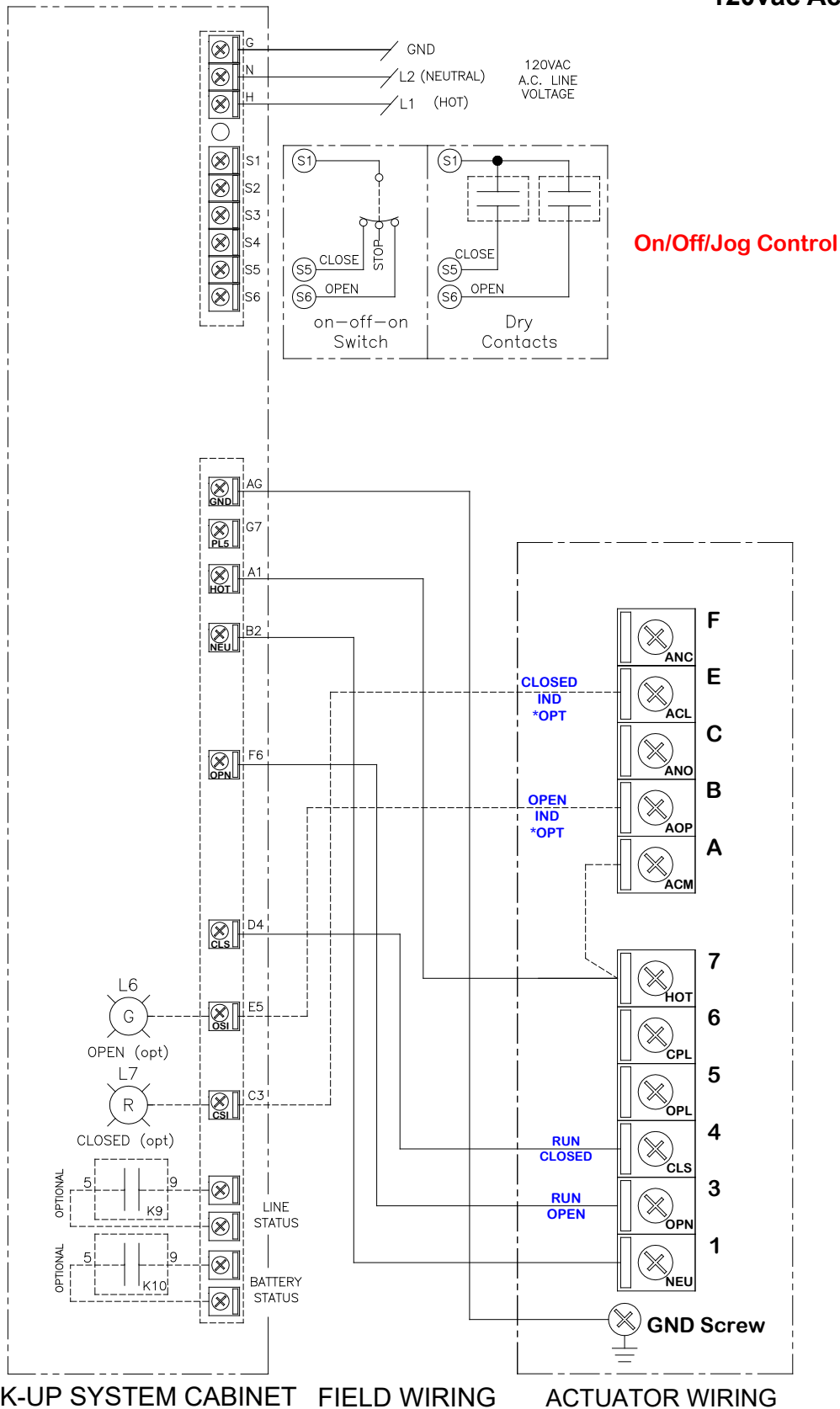
The battery system will provide ample power to drive the actuator more than 5 full torque cycles. However, once the actuator reaches its end-of-travel limit switch, power drain from the back-up system is reduced to the requirements of the yellow **"B/U POWER"** indicator light.

After 15 minutes, the battery system turns itself off and waits for the mains power to return. The design of the ProMation P Series actuators provides automatic locking of the actuator position after the battery system shuts down. Normal operation is resumed when mains power returns.

It is possible to connect multiple actuators to a single PBU PROVIDED THE TOTAL ACTUATOR DEMAND DOES NOT EXCEED THE POWER CAPACITY OF THE PBU. Reference page 17 for details.

Wiring Diagrams for PBUs - On/Off Actuators

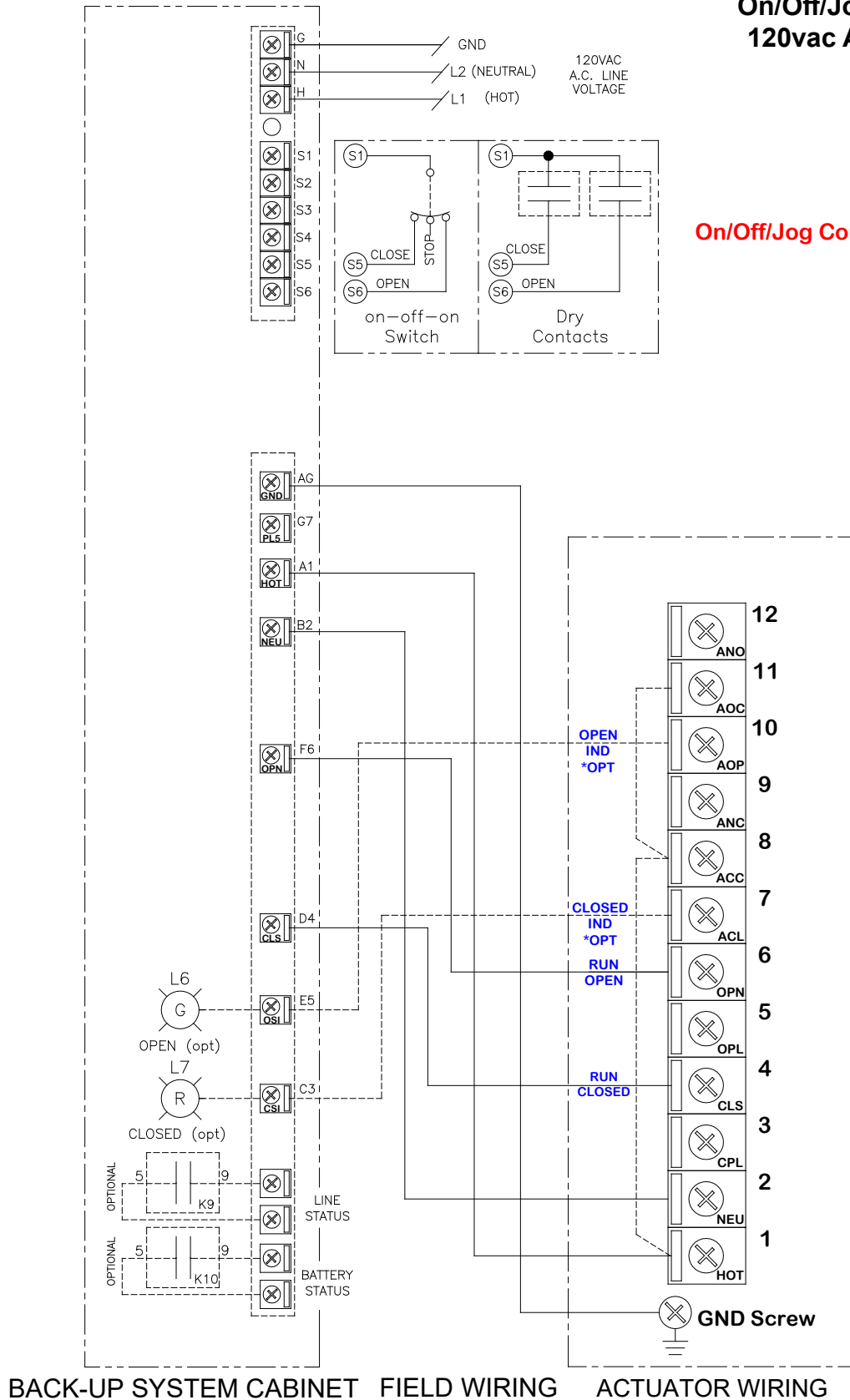
**PBU100-120N4 for
P1/P1.A Series
On/Off/Jog Control
120vac Actuators**



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Wiring Diagrams for PBU

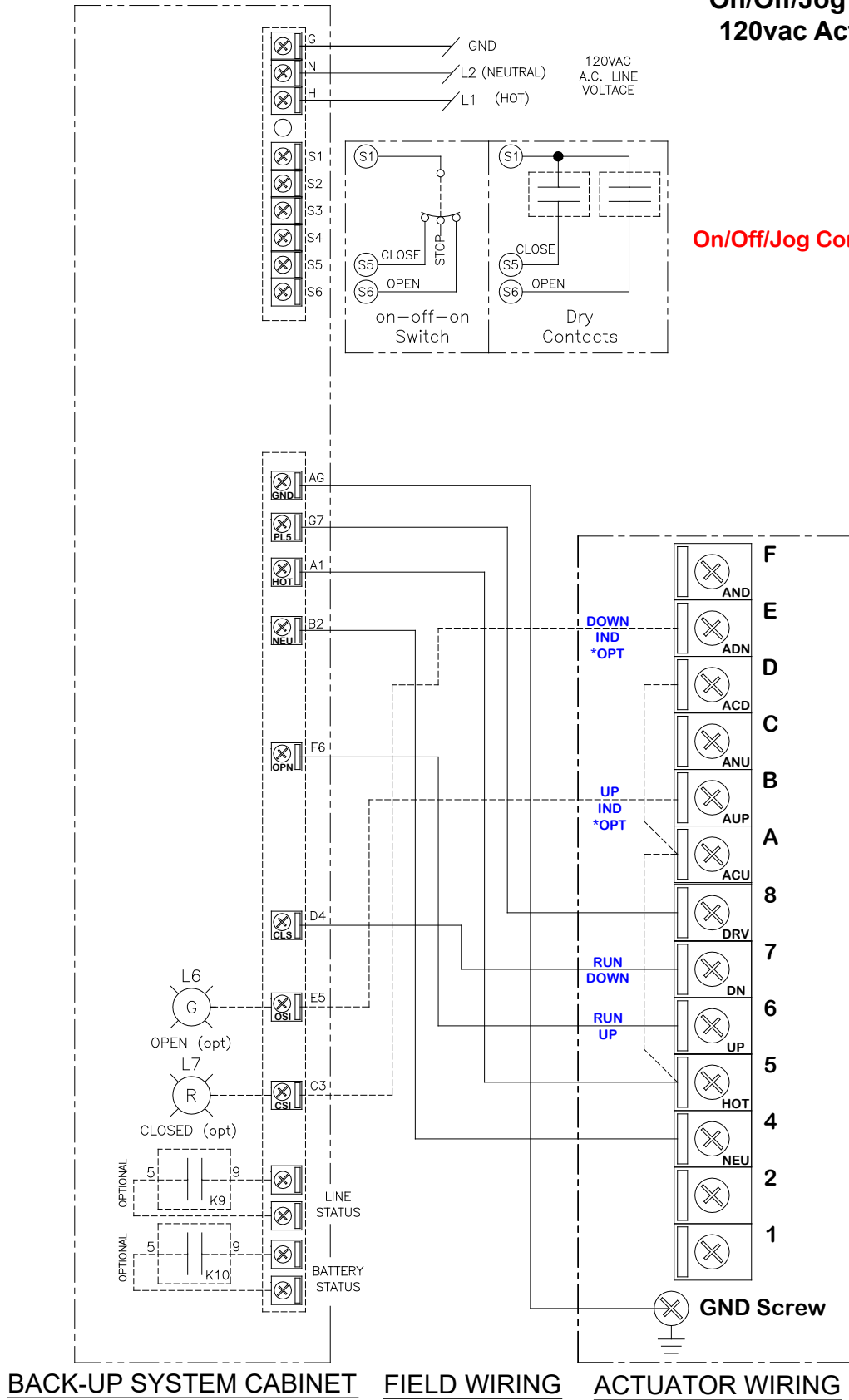
PBU100, 102, 104 - 120N4 for P2~P13 Series On/Off/Jog Control 120vac Actuators



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Wiring Diagrams for PBU

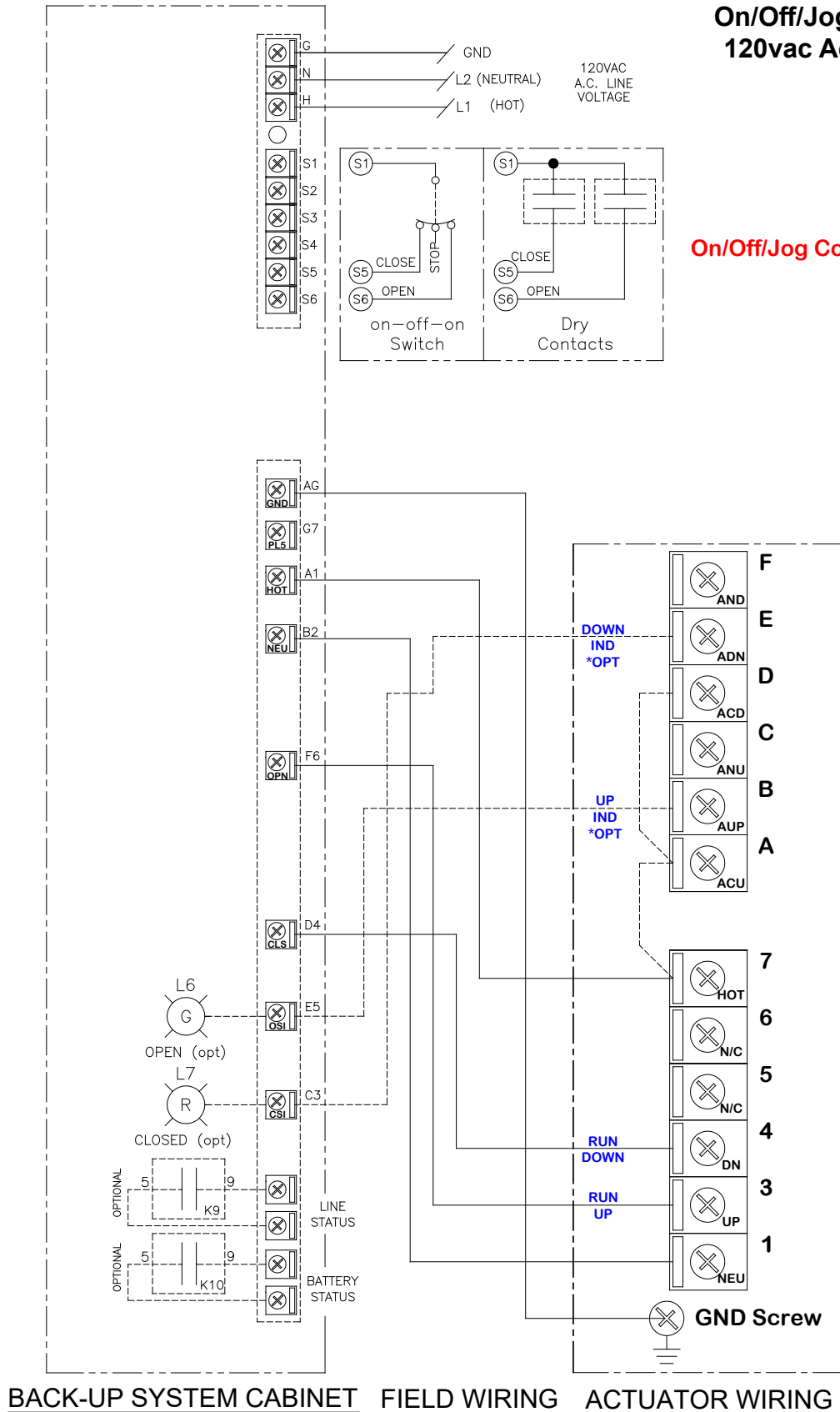
PBU505 - 120N4 for PL550/1100 Series On/Off/Jog Control 120vac Actuators



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Wiring Diagrams for PBU

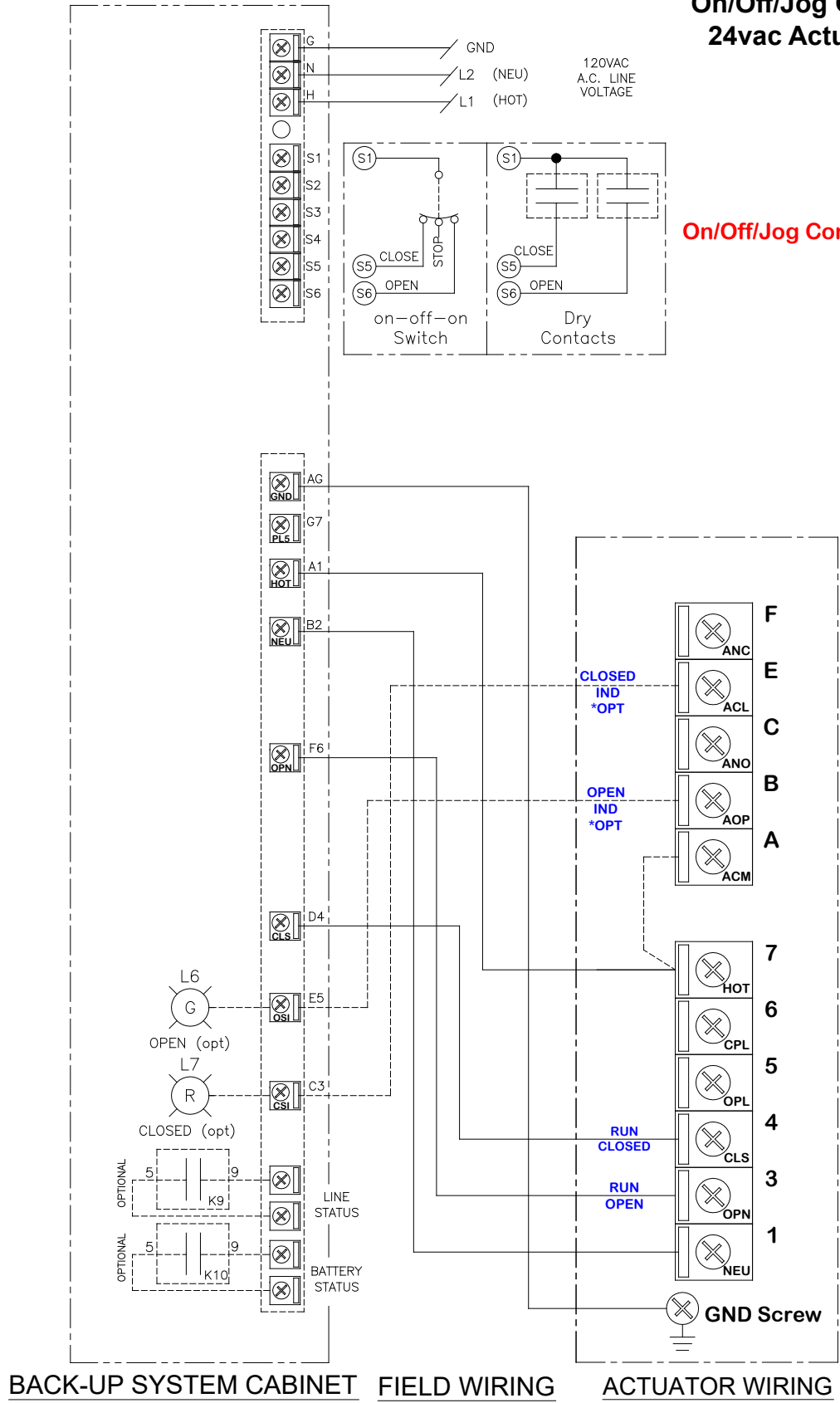
PBU506 - 120N4 for PL2200/4400 Series On/Off/Jog Control 120vac Actuators



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Wiring Diagrams for PBU

PBU100 - 24AN4 P1/P1.A Series On/Off/Jog Control 24vac Actuators

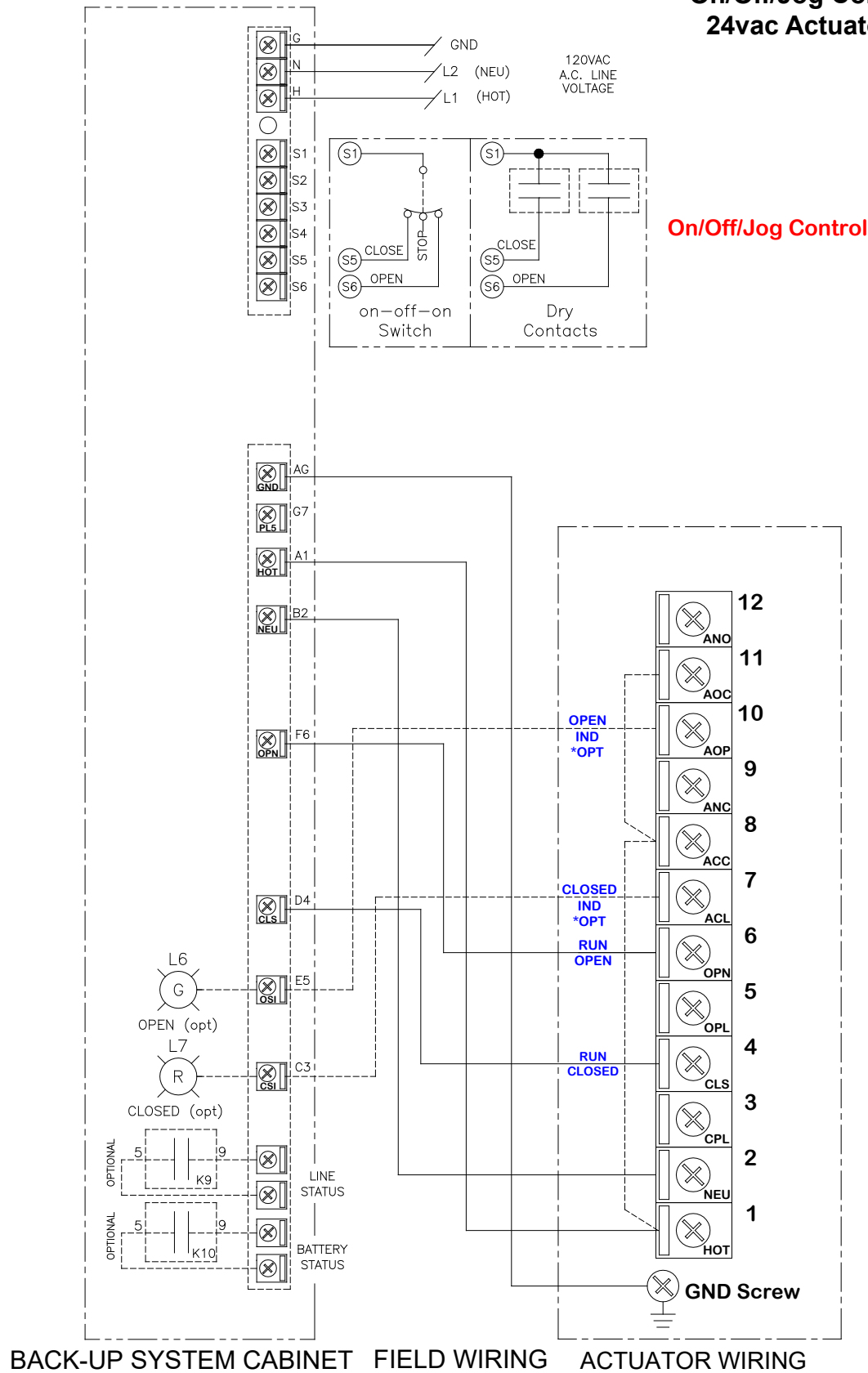


On/Off/Jog Control

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Wiring Diagrams for PBU

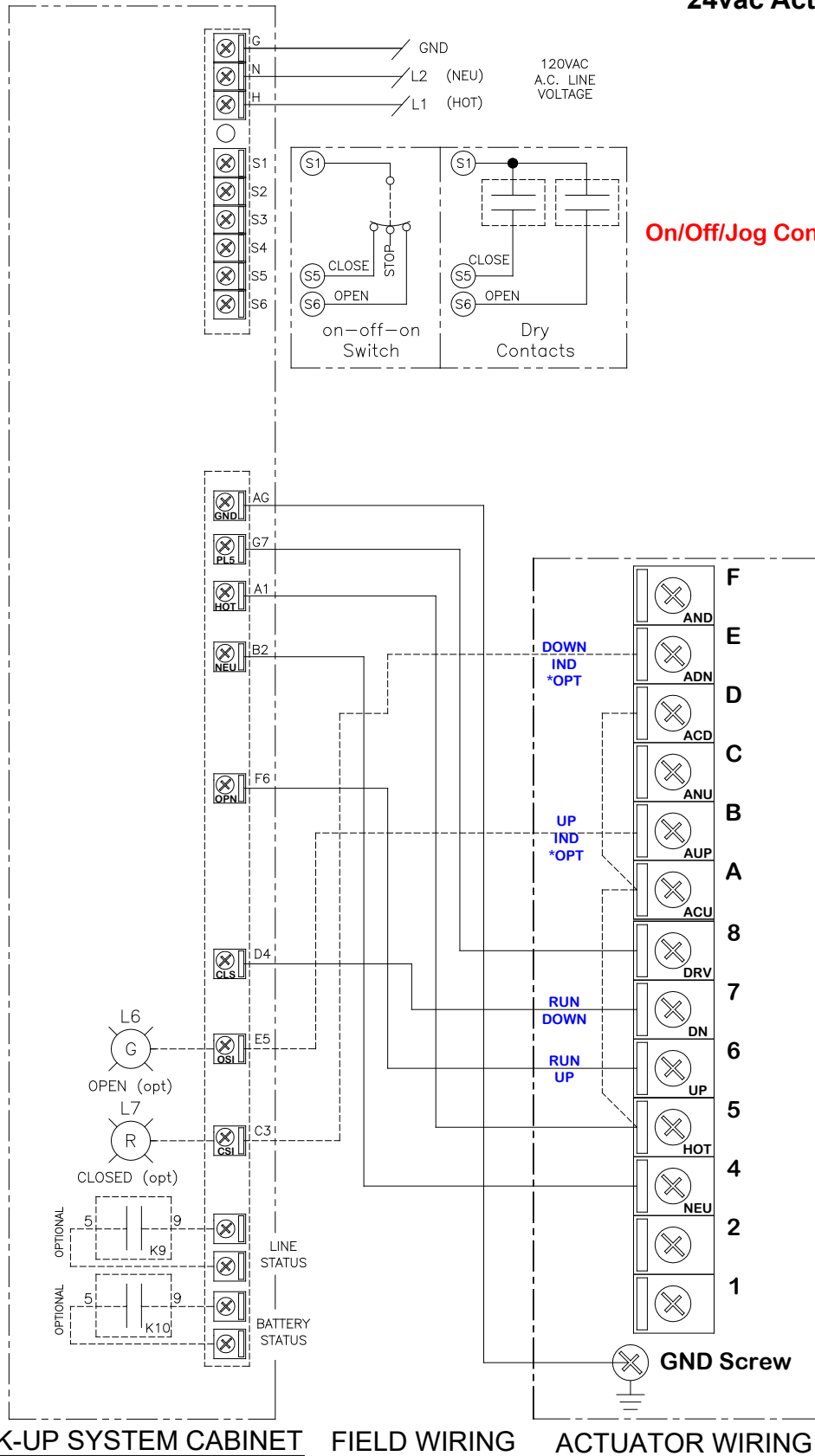
PBU100, 102, 104 - 24AN4 for P2~P8 Series On/Off/Jog Control 24vac Actuators



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Wiring Diagrams for PBU

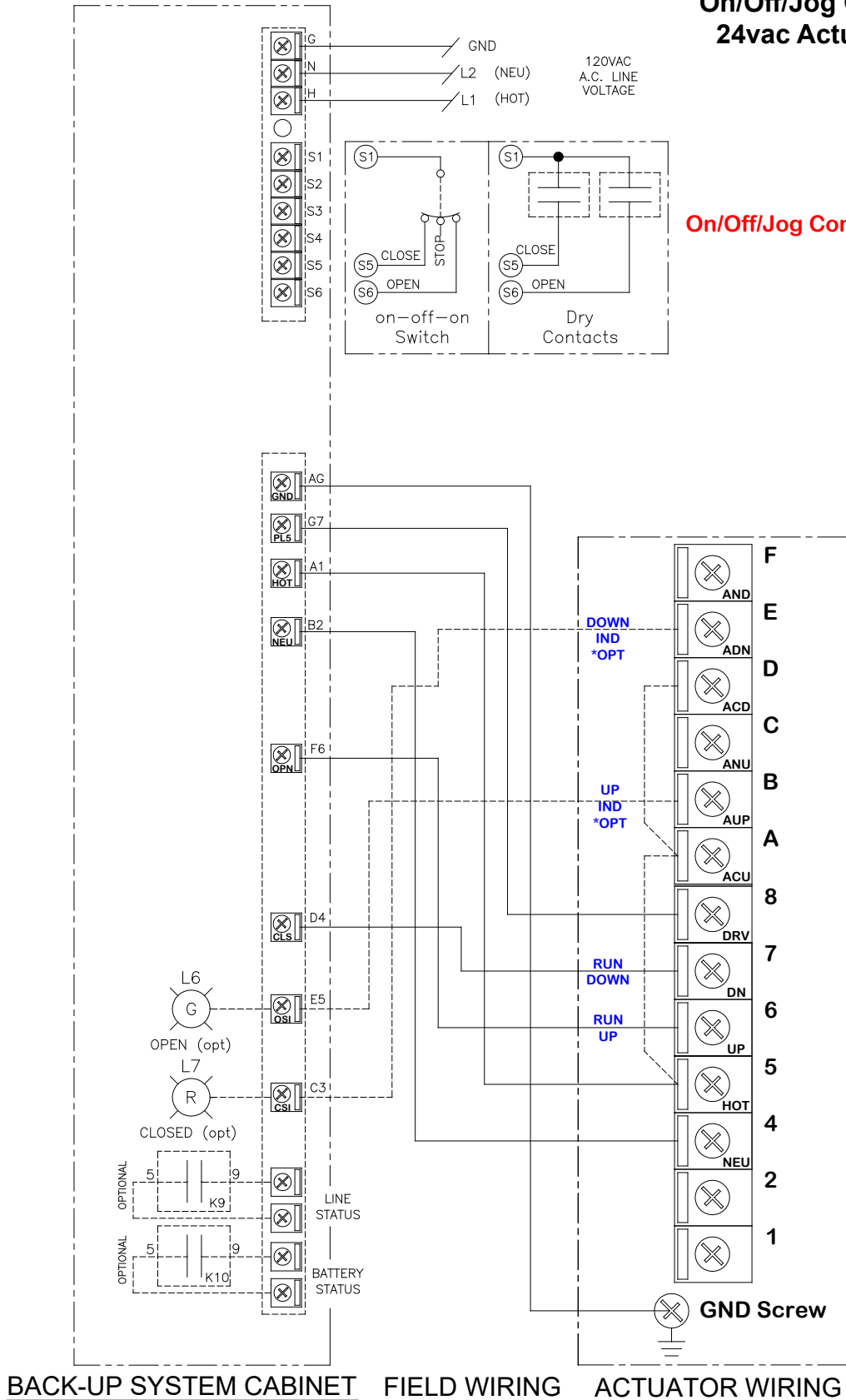
PBU505 - 24AN4 for PL550/1100 Series On/Off/Jog Control 24vac Actuators



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Wiring Diagrams for PBU

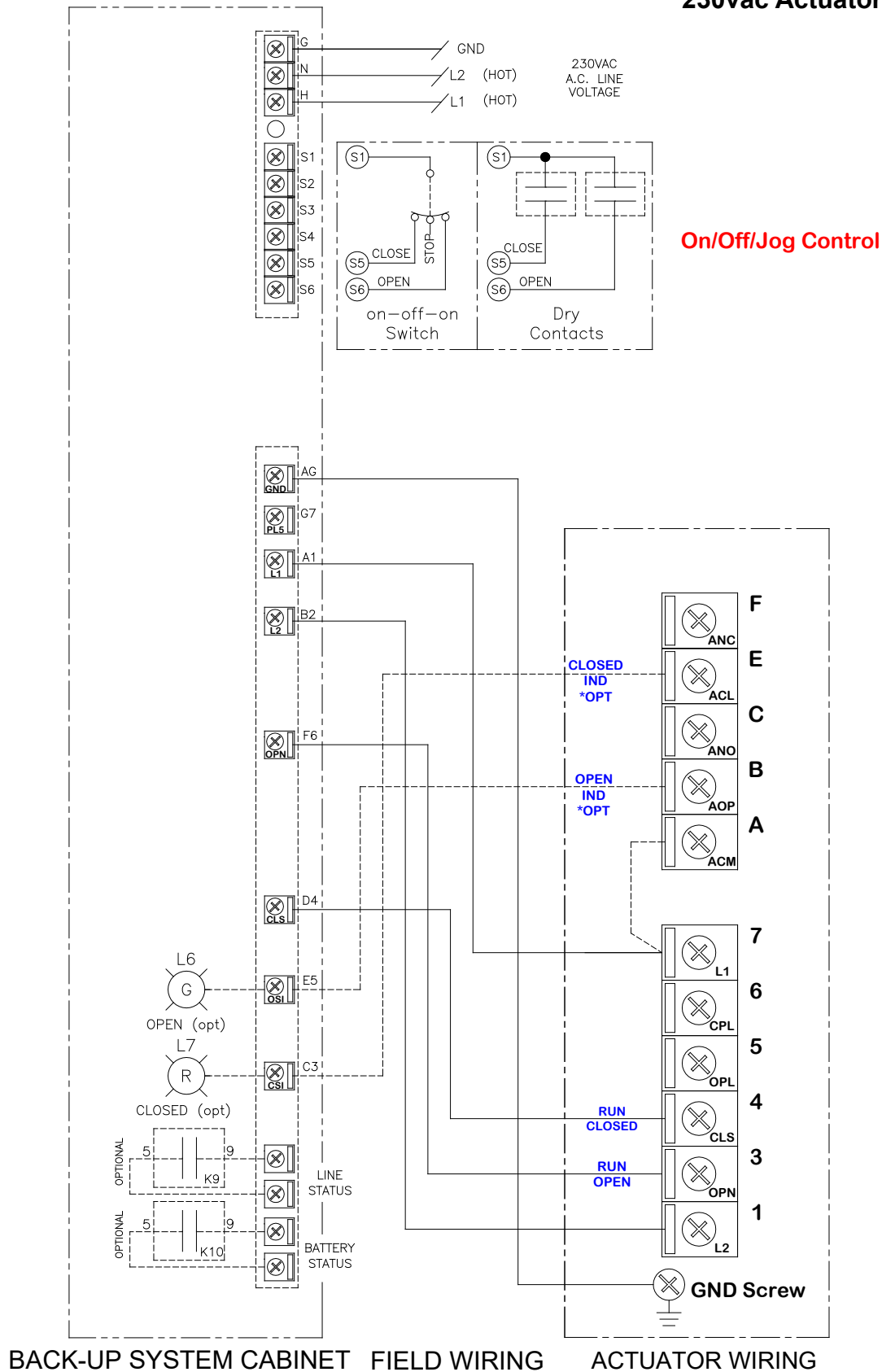
PBU506 - 24AN4 for PL2200/4400 Series On/Off/Jog Control 24vac Actuators



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Wiring Diagrams for PBU

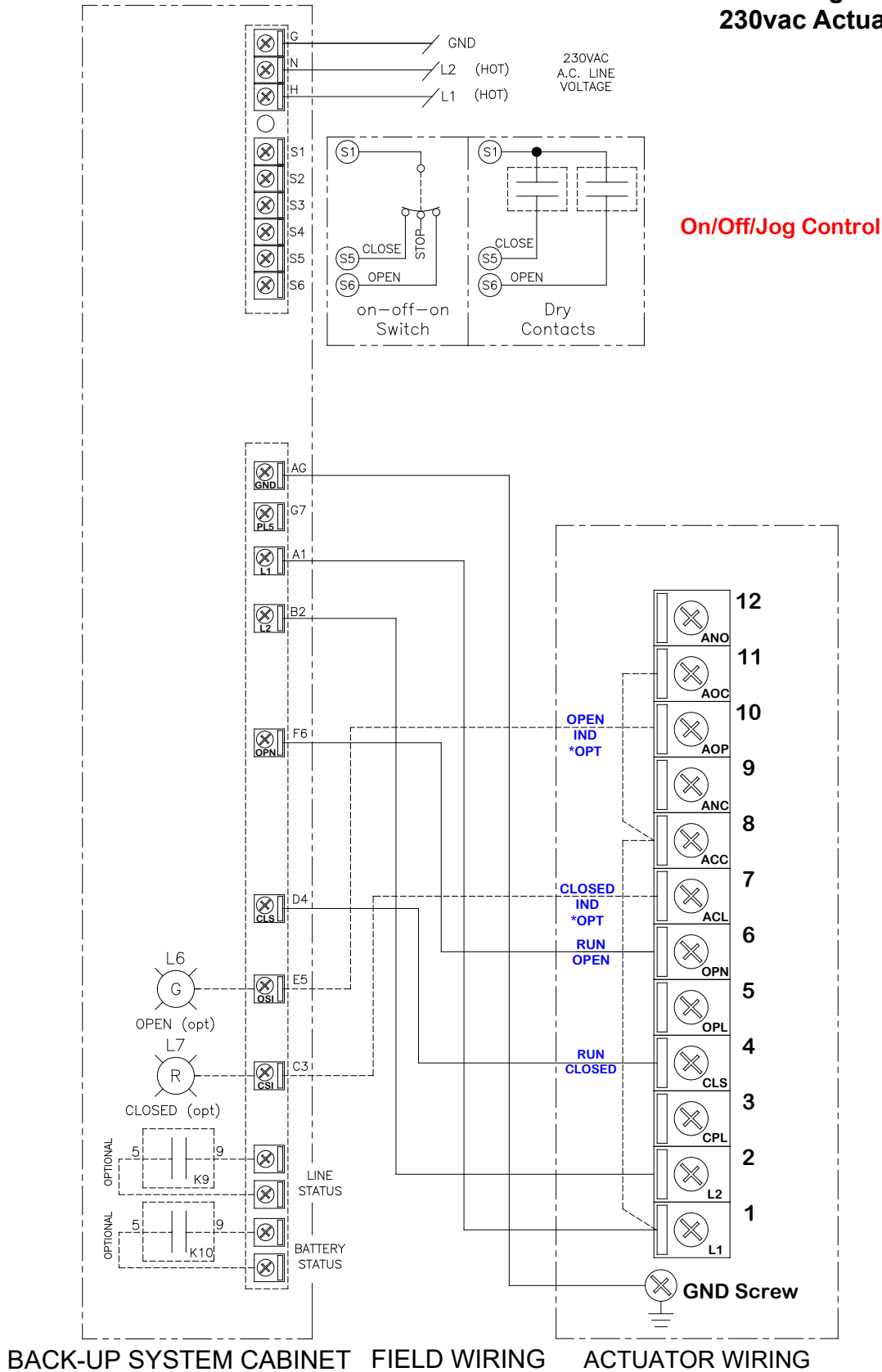
PBU102-230N4 for P1/P1.A Series On/Off/Jog Control 230vac Actuators



FM15 PBU On/Off Series Rev 1.090415

Wiring Diagrams for PBU

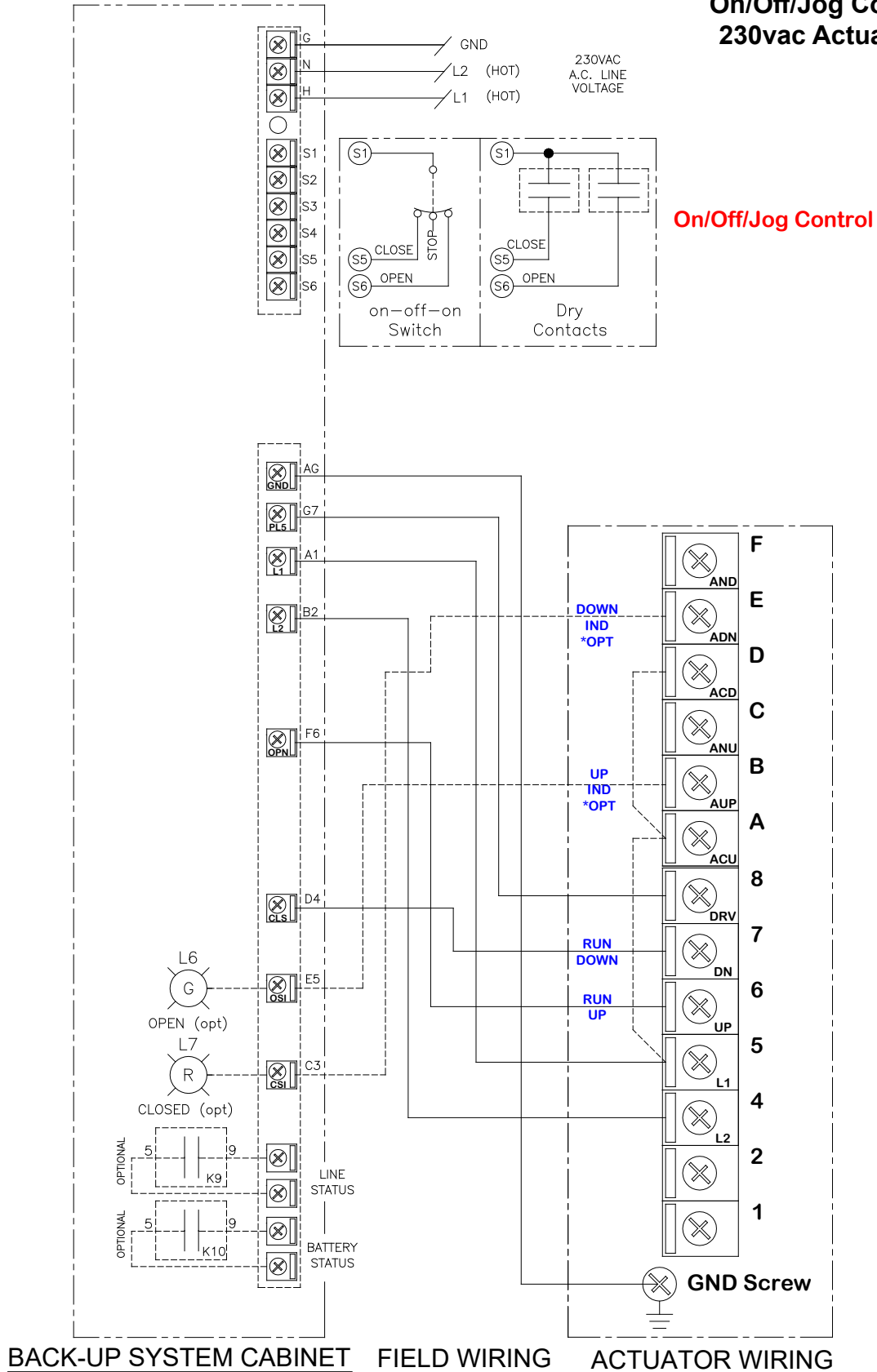
PBU102, 104 - 230N4 for P2~P13 Series On/Off/Jog Control 230vac Actuators



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Wiring Diagrams for PBU

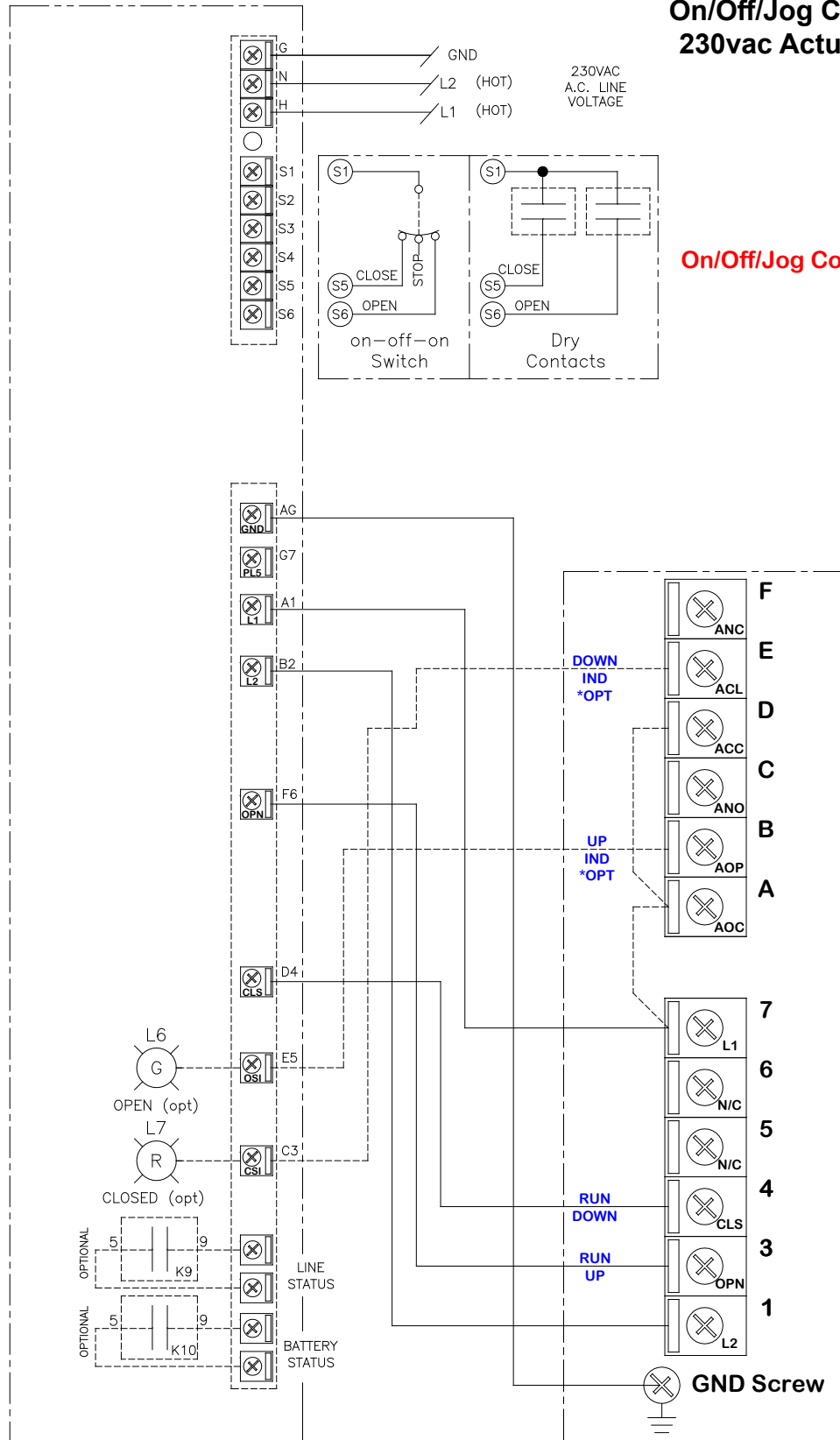
PBU505 - 230N4 for PL550/1100 Series On/Off/Jog Control 230vac Actuators



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Wiring Diagrams for PBU

PBU506 - 230N4 for PL2200/4400 Series On/Off/Jog Control 230vac Actuators



On/Off/Jog Control

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Connecting Multiple Actuators To A Single PBU Unit

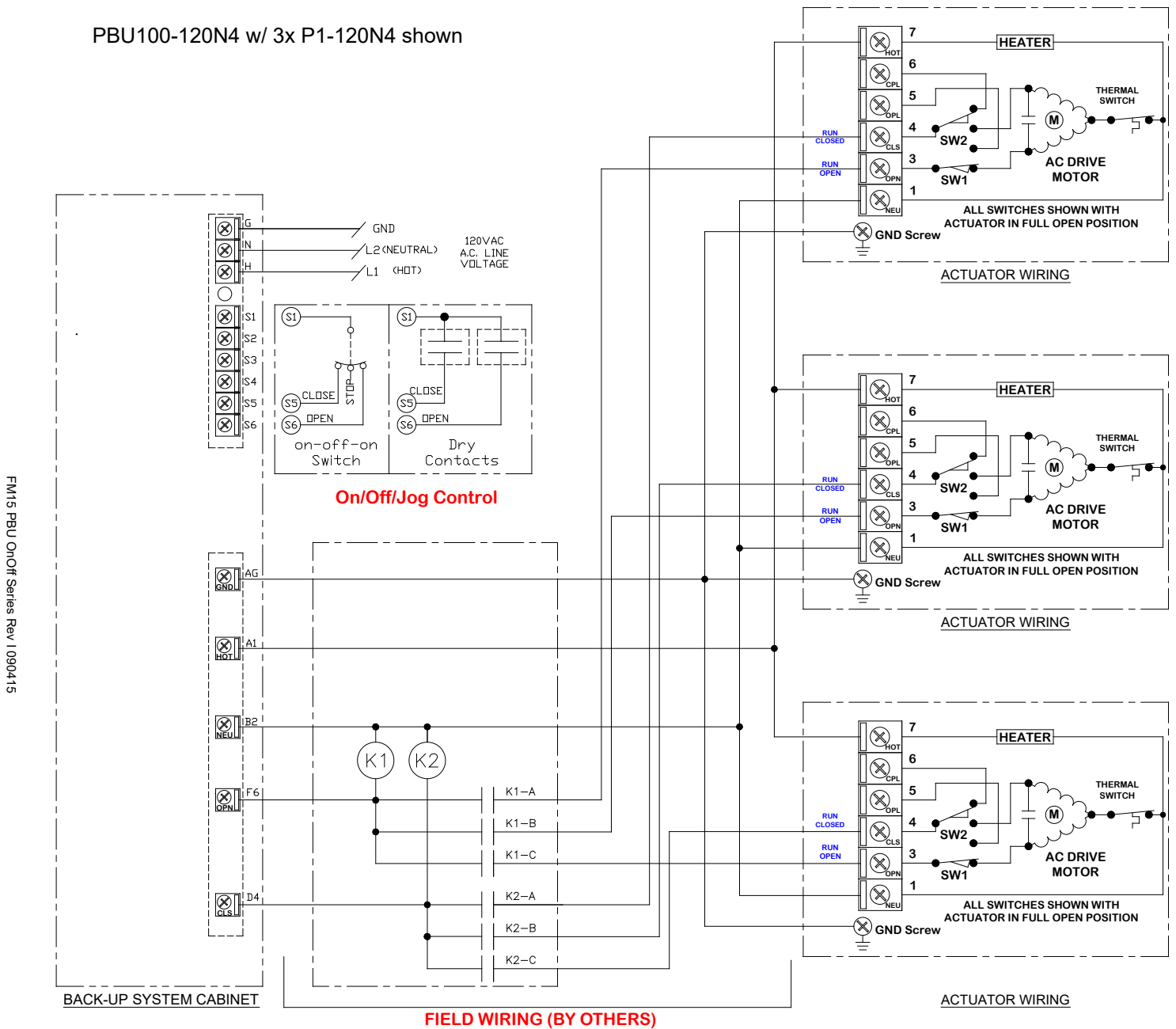
CAUTION! The PBU must have enough Power Capacity to start all intended actuators at the same time. Do NOT exceed the power capacity of the PBU, it will cause premature battery failure, breaker tripping, low actuator torque, and unreliable actuator operation.

Check actuator START current demand for each actuator being connected to a single PBU unit. ADD the STARTING currents together, then check which PBU model will support the requirement.

IMPORTANT! NOTE that there is only ONE FIELD CONTROL point provided on the PBU. This means any actuator(s) connected to the PBU will be required to OPERATE at the SAME time. However you may have the connected actuators running in opposite directions (some OPEN while others CLOSE).

Follow the wiring diagram below (example is 120vac) to connect multiple on/off actuators to a single PBU unit. NOTE the isolation relays K1 and K2 in the field wiring. These must be included. Other voltages use a similar strategy.

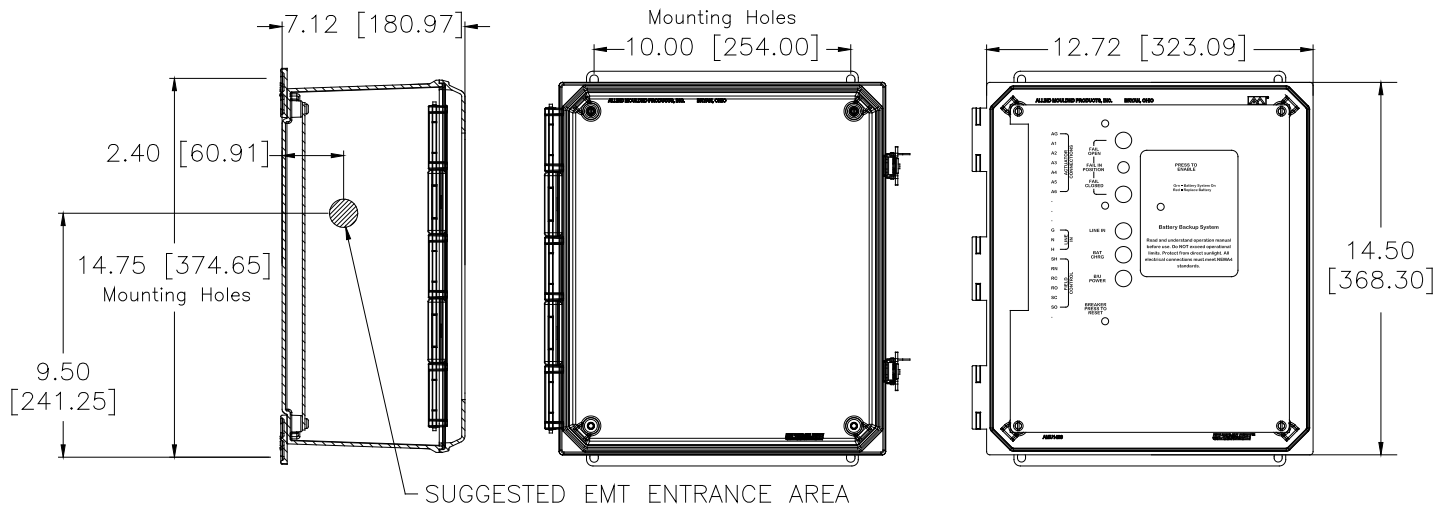
PBU100-120N4 w/ 3x P1-120N4 shown



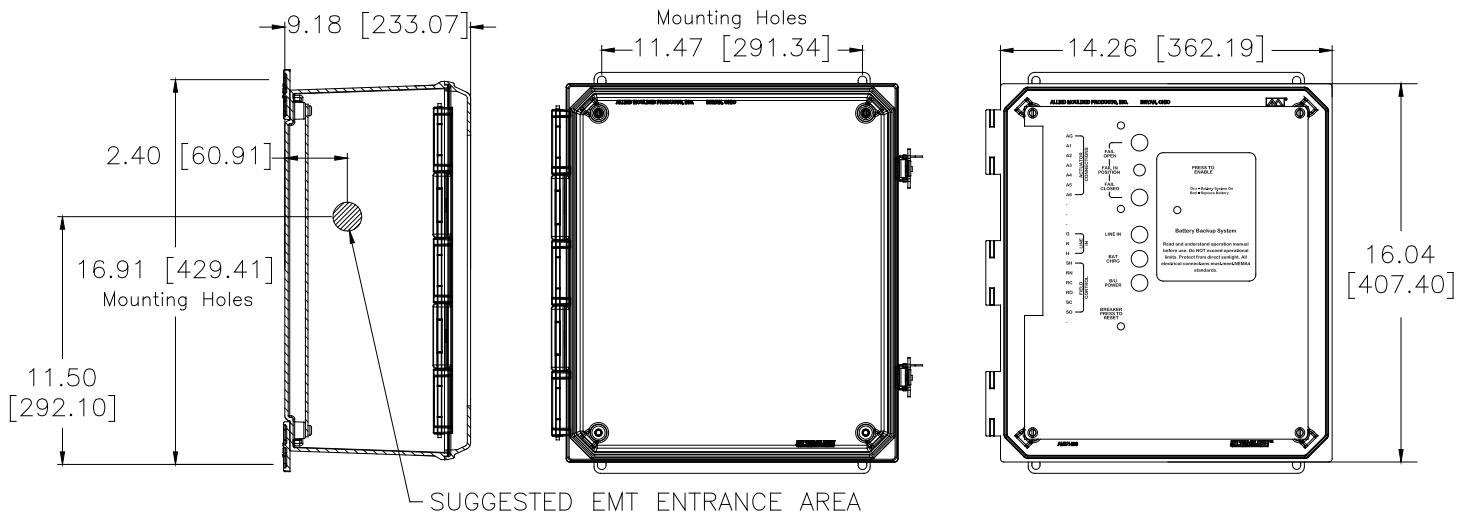
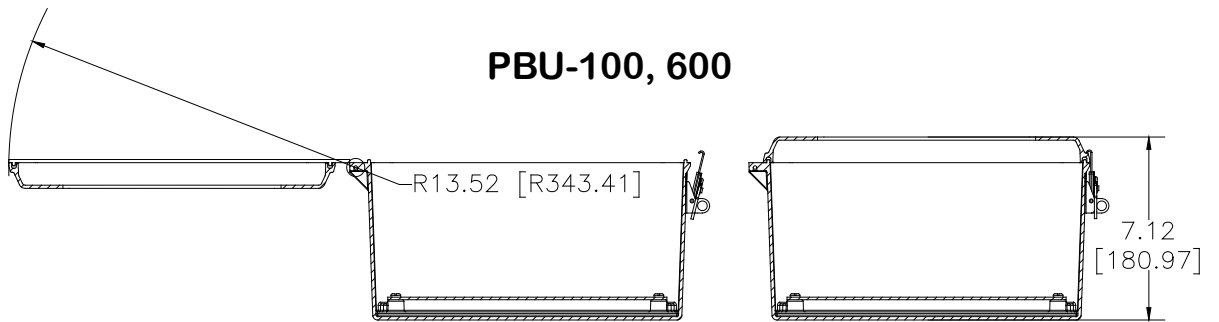
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This illustration is a general example of a multiple actuator / single PBU solution. It is not intended to describe any specific set of actuators.

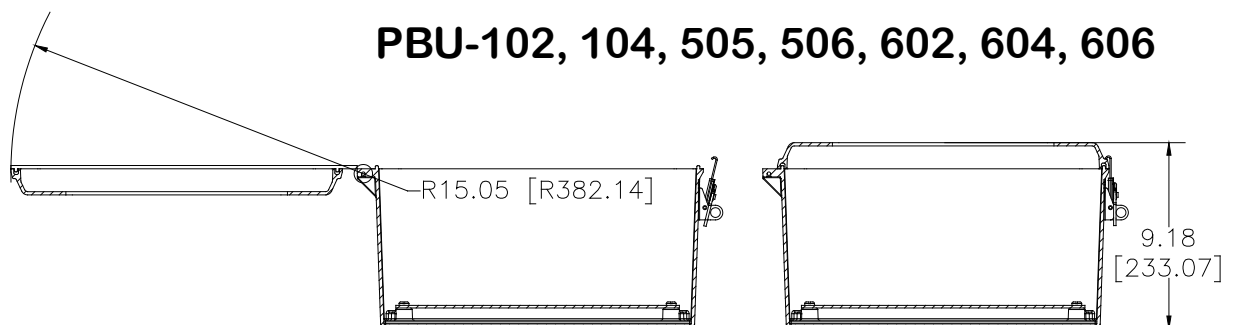
Mounting Dimensional Data



PBU-100, 600



PBU-102, 104, 505, 506, 602, 604, 606



Technical Specifications

		PBU100-120	PBU100-24	PBU100-230
<u>Input:</u>	Nominal input voltage: Mains Input Voltage Range:	120vac 88-139vac	120vac 88-139vac	230vac 186-268vac
	Input Frequency:	50/60Hz +/- 1Hz (auto sensing)		
<u>Output:</u>	Nominal Output voltage:	120vac	24vac	120vac
	Power Capacity: Waveform Type:	350VA/ 210 Watts Stepped approximation to a sinewave		
<u>Batteries:</u>	Typical backup time at half-load: Type:	5.6 minutes Maintenance-Free sealed lead-acid Suspended electrolyte: Leakproof		
	Typical recharge time:	16 hours **		
<u>Filtering</u>	Full time multi-pole noise filtering:	5% IEEE surge let-through. Response time meets UL 1449		

		PBU102-120	PBU102-24	PBU102-230
<u>Input:</u>	Nominal input voltage: Mains Input Voltage Range:	120vac 88-139vac	120vac 88-139vac	230vac 186-268vac
	Input Frequency:	50/60Hz +/- 1Hz (auto sensing)		
<u>Output:</u>	Nominal Output voltage:	120vac	24vac	120vac
	Power Capacity: Waveform Type:	550VA/ 300 Watts Stepped approximation to a sinewave		
<u>Batteries:</u>	Typical backup time at half-load: Type:	13.4 minutes Maintenance-Free sealed lead-acid Suspended electrolyte: Leakproof		
	Typical recharge time:	24 hours **		
<u>Filtering</u>	Full time multi-pole noise filtering:	5% IEEE surge let-through. Response time meets UL 1449		

		PBU104-120	PBU104-24	PBU104-230
<u>Input:</u>	Nominal input voltage: Mains Input Voltage Range:	120vac 88-139vac	120vac 88-139vac	230vac 186-268vac
	Input Frequency:	50/60Hz +/- 1Hz (auto sensing)		
<u>Output:</u>	Nominal Output voltage:	120vac	24vac	120vac
	Power Capacity: Waveform Type:	750VA/ 540 Watts Stepped approximation to a sinewave		
<u>Batteries:</u>	Typical backup time at half-load: Type:	11.8 minutes Maintenance-Free sealed lead-acid Suspended electrolyte: Leakproof		
	Typical recharge time:	16 hours **		
<u>Filtering</u>	Full time multi-pole noise filtering:	5% IEEE surge let-through. Response time meets UL 1449		

** The time to recharge to 90% of full battery capacity following a discharge to shutdown using a load rated for 1/2 the full load rating of the UPS.

Technical Specifications

PBU505-120	PBU505-24A	PBU505-230
PBU506-120	PBU506-24	PBU506-230
PBU606-120	PBU606-24	PBU606-230

<u>Input:</u>	Nominal input voltage: Mains Input Voltage Range:	120vac 88-139vac	120vac 88-139vac	230vac 186-268vac
	Input Frequency:	50/60Hz +/- 1Hz (auto sensing)		
<u>Output:</u>	Nominal Output voltage:	120vac	24vac	120vac
	Power Capacity: Waveform Type:	750VA/ 540 Watts Stepped approximation to a sinewave		
<u>Batteries:</u>	Typical backup time at half-load: Type:	11.8 minutes Maintenance-Free sealed lead-acid Suspended electrolyte: Leakproof		
	Typical recharge time:	16 hours **		
<u>Filtering</u>	Full time multi-pole noise filtering:	5% IEEE surge let-through. Response time meets UL 1449		

Environmental:

** The time to recharge to 90% of full battery capacity following a discharge to shutdown using a load rated for 1/2 the full load rating of the UPS.

Operating Relative Humidity 0 - 95%

Operating Elevation 0-10000 feet (0-3000 m)

Storage Temperature -15 - 45 °C (5 - 113°F)

Storage Relative Humidity 0 - 95%

Storage Elevation 0-50000 feet (0-15000 m)

Audible noise at 1 meter from surface of unit 45 dBA

Online thermal dissipation 14 (100), 16 (102) & 47 (104) BTU/hr

Conformance - APC Back UP Module:

Approvals: cUL Listed
FCC Part 15 Class B
FCC part 68, NOM
UL1778
UL497A
UL498

Physical Dimensions PBU Series Back Up Systems

	PUB 100/600		PBU 102/602			PBU 104/505/506/604/606		
VAC	120	24	120	24	230	120	24	230
Max HT	15.25	15.25	17.50	17.50	17.50	17.50	17.50	17.50
Max WD	13.52	13.52	15.05	15.05	15.05	15.05	15.05	15.05
Net Depth	7.50	7.50	9.50	9.50	9.50	9.50	9.50	9.50
Net WT	35	45	45	58	50	54	72	58
Ship WT	45	55	58	71	63	67	85	71

*NOTE: PBU Series ships in two separate cartons.

Commissioning

After completing all mounting and wiring procedures, main power is available and battery has been connected per instructions found on page 2, it is now possible to commission the PBU.

1. Apply power to the unit, the green LINE IN indicator is illuminated.
2. Measure (for your unit) xxx vac on terminals H & N on the PBU panel face.
 - 2.01 PBU 120V & 24V units, measure 100-125vac on terminals H & N on the PBU panel face.
 - 2.02 PBU 230V units, measure 210-240vac on terminals H & N on the PBU panel face.
3. Press the START button on the battery unit (see item 8 page 2).
4. Wait for 30 seconds, then the LED on the battery unit itself will turn green and stay on solid.
5. Measure (for your unit) xxx vac on terminals A1 & B2 on the PBU panel face.
 - 5.01 PBU 120V units, measure 100-125vac on terminals A1 & B2 on the PBU panel face.
 - 5.02 PBU 24V units, measure 22.5-26.0vac on terminals A1 & B2 on the PBU panel face.
 - 5.03 PBU 230V units, measure 210-240vac on terminals A1 & B2 on the PBU panel face.
6. The blue CHARGE indicator is illuminated.
7. The yellow BAT POWER indicator is NOT illuminated.
8. Select CLOSE actuator at the FIELD CONTROL DEVICE. The actuator will drive CLOSED.
9. Measure (for your unit) xxx vac on terminals B2 & D4 on the PBU panel face.
 - 9.01 PBU 120V units, measure 100-125vac on terminals B2 & D4.
 - 9.02 PBU 24V units, measure 22.5-26.0vac on terminals B2 & D4.
 - 9.03 PBU 230V units, measure 210-240vac on terminals B2 & D4.
10. Select OPEN actuator at the FIELD CONTROL DEVICE. The actuator will drive OPEN.
11. Measure (for your unit) xxx vac on terminals B2 & F6.
 - 11.01 PBU 120V units, measure 100-125vac on terminals B2 & F6.
 - 11.02 PBU 24V units, measure 22.5-26.0vac on terminals B2 & F6.
 - 11.03 PBU 230V units, measure 210-240vac on terminals B2 & F6.
12. Move the Fail Position Selector switch to the OPEN position, and the green FAIL OPEN indicator is illuminated. This will have no effect on the position of the ACTUATOR.
13. Move the Fail Position Selector switch to the CLOSE position, and the red FAIL CLOSED indicator is illuminated. This will have no effect on the position of the ACTUATOR.
14. Disconnect MAIN power from the PBU.
15. The ALARM will start beeping on the battery unit, once every 30 seconds until power is restored.
16. The green LINE IN indicator will turn off.
17. The blue BAT CHARGE indicator will turn off.
18. The yellow BAT POWER indicator will be illuminated.
19. The commands received from the FIELD CONTROL DEVICE will have no effect on the positioning of the actuator.
20. Measure 0 vac on terminals H & N (all models).
21. Measure 0 vac on terminals A1 & B2 (all models).
22. Move the Fail Position Selector switch to the CLOSE position, the red FAIL CLOSE indicator is illuminated and the actuator will drive CLOSED. The FIELD CONTROL DEVICE will have no effect on the position of the actuator in this mode.
23. Measure (for your unit) xxx vac on terminals B2 & D4.
 - 23.01 PBU 120V units, measure 100-125vac on terminals B2 & D4.
 - 23.02 PBU 24V units, measure 22.5-26.0vac on terminals B2 & D4.
 - 23.03 PBU 230V units, measure 210-240vac on terminals B2 & D4.
24. Move the Fail Position Selector switch to the OPEN position, the green FAIL OPEN indicator is illuminated and the actuator will drive OPEN. The FIELD CONTROL DEVICE will have no effect on the position of the actuator in this mode.
25. Measure (for your unit) xxx vac on terminals B2 & F6.
 - 25.01 PBU 120V units, measure 100-125vac on terminals B2 & F6.
 - 25.02 PBU 24V units, measure 22.5-26.0vac on terminals B2 & F6.
 - 25.03 PBU 230V units, measure 210-240vac on terminals B2 & F6.
26. Re-establish Main power, whereupon the unit will automatically return to normal operating mode.
27. Unit is now ready for automatic operation.

Troubleshooting - On/Off Units

Common questions when using ProMation Engineering PBU systems:

Issue:	Check:
The green LINE IN indicator does not illuminate.	<ul style="list-style-type: none"> • Measure for proper line voltage on terminals H & N on the panel face. • Check the indicator bulb.
The green start indicator on the internal battery system does not turn on when the start button is pressed.	<ul style="list-style-type: none"> • Measure for proper line voltage on terminals H & N on the panel face. • Is the battery connected as instructed on page 2? • Has the panel breaker tripped? • Check the indicator bulb on the panel face. • Check the status indicator adjacent to the START button. Other than solid green color indicates a system problem.
The blue charge indicator does not illuminate.	<ul style="list-style-type: none"> • Has the START button been pressed? • Has the battery been connected as instructed on page 2? • Check the indicator bulb.
The yellow BATTERY B/U indicator does not illuminate.	<ul style="list-style-type: none"> • Has the START button been pressed? • Has the battery been connected as instructed on page 2? • Has line voltage been removed from terminals H & N? • Has the panel breaker tripped? • Check the indicator bulb.
The breaker keeps tripping.	<ul style="list-style-type: none"> • Check for proper actuator and PBU supply wiring and correct input voltage. • Check thermal temperature of panel face.
The connected actuator does not respond properly to FIELD CONTROL Signals.	<ul style="list-style-type: none"> • Check FIELD CONTROL DEVICE (FCD) wiring to PBU terminals S1, S5 & S6 compared to wiring diagrams in this manual. Connecting S1 to S5 should drive the actuator CLOSED, and connecting S1 to S6 should drive it OPEN. If actuator responds in reverse, either FCD to PBU interface wiring is reversed, or PBU to Actuator wiring is reversed.
The connected actuator does not respond properly in battery backup mode.	<ul style="list-style-type: none"> • Has the START button been pressed? • Has the battery been connected as instructed on page 2? • Has line voltage been removed from terminals H & N? • Has the panel breaker tripped? • Has the FAIL Position switch been set properly? • Does the actuator respond correctly in POWER mode?
The connected actuator does not drive completely to the selected fail position before stopping.	<ul style="list-style-type: none"> • Check the status indicator adjacent to the START button. Other than solid green color indicates a system problem. • Check product selection tables for proper actuator / PBU sizing. • Measure the running current between PBU terminal D4 and actuator terminal 4 while CLOSING, as well as from PBU terminal F6 and actuator terminal 6 while OPENING, to check for abnormally high current readings.

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Troubleshooting - On/Off Units (continued)

Common questions when using ProMation Engineering PBU systems:

Issue:	Check:
Multiple actuators connected to the same unit do not drive to the intended fail position.	<ul style="list-style-type: none">• Do the total starting amps of all the actuators together exceed the rating of the PBU?• Has the wiring diagram on page 18 been followed?
There is no change in the status contacts when the PBU changes operating modes from POWER to BATTERY.	<ul style="list-style-type: none">• Unless ordered WITH the STATUS option, those PBU terminals are not activated on standard PBU models.

For further assistance, please contact:

ProMation Engineering, Inc.
352-544-8436 Technical Support
www.promationei.com

Before contacting technical assistance, please have available your model number, serial number, and SO number, all found on the product label inside the PBU unit, as well as an as-built wiring diagram of your installation.

FM15 PBU On/Off Series Rev 1.090415

ProMation Engineering follows a policy of continual product updates and enhancements. Please use the scan code on the back of this document to easily go online to our website to obtain the latest product documentation.

Industrial Applications

ProMation Engineering actuators have been installed to operate process controls such as butterfly valves, ball valves, high performance valves, plug valves, gate valves and dampers, in a broad range of demanding industrial applications.

Power Generation



Water Processes



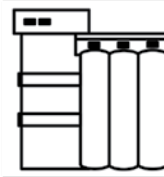
Mining



Oil and Gas



Agriculture



Chemicals



Complete Support

ProMation Engineering is committed to providing superior customer support compared to our larger competitors. Contact us today.

Full Documentation

We offer complete wiring diagrams, field installation manuals and set up documentation for all our products, both in printed and digital form. We regularly host customized educational webinars for our customers.

RapidQuote

Most quotes and estimates are generated within hours of the request.

ProMation Engineering Services

ProMation Engineering can provide design and technical services for OEM's, projects with customized requirements and specialized operations.



**PROMATION
ENGINEERING**

Precision Actuation for Industry

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