Electrical Options Booklet

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1 Confirm Equipment Compatibility
The QEL is compatible with the following equipment (refer to individual instructions as needed):

- PS900-Series power supplies - PS902, PS904, PS906, PS914
- PS873 power supply plus 871-2, 871-2Q, 873-4TD/AO option boards

2 Drill Wire Access Hole
Drill \( \frac{5}{8} \)” dia. access hole through device side of door.

3 Route Two Wires from QEL Exit Device to Power Supply

<table>
<thead>
<tr>
<th>Distance (one way)</th>
<th>Wire Gauge</th>
</tr>
</thead>
<tbody>
<tr>
<td>200’</td>
<td>18AWG</td>
</tr>
<tr>
<td>320’</td>
<td>16AWG</td>
</tr>
<tr>
<td>500’</td>
<td>14AWG</td>
</tr>
<tr>
<td>800’</td>
<td>12AWG</td>
</tr>
</tbody>
</table>

QEL electrical load:
Voltage: 24 VDC
Current: 1.0 A inrush (0.5 sec)
0.14 A holding

Note: Power wires to QEL are not polarized.
4 Install 900-2RS, 4RL, or 4R option board(s) into power supply

**a** Review Available 900 series Option Board Mounting Locations (Gray)

- PS902
- PS904, 914
- PS906

**b** Plug Option Board Cable into any Available Option Connector

- PS902 1 Board
- PS904, 914 2 Boards
- PS906 3 Boards

**c** Secure Board(s) with Screws

**Notes:**
1. 24VDC output setting required when QEL device connected.
2. If installing board in location 2 or 3, rotate board 180°.
3. The QEL is compatible with an existing 900-2Q board if currently installed.
4. Latchbolt retraction of (2) sequenced QEL’s requires more than 1 second to complete.
5. When powering multiple components, verify that the amperage requirements of all components combined does not exceed the power supply output rating.
5 Connect Input and Output Wires to Option Board (2RS Shown)

Sequential Mode - Typical Wiring

![Sequential Mode Wiring Diagram]

Individual Mode - Typical Wiring

![Individual Mode Wiring Diagram]

Note:
Fail secure output only allowed if approved by Authority Having Jurisdiction

6 Check Operation

A. Activate each input and verify all QEL devices operate properly.
B. If any device does not operate properly, see step 7 for troubleshooting.
If Necessary, Troubleshoot Operation (LED is only visible with the mechanism cover removed)

<table>
<thead>
<tr>
<th>Power at the QEL</th>
<th>QEL Response</th>
<th>Condition/Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>24VDC</td>
<td>LED - Solid green Latchbolt - retracted</td>
<td>Operation normal, latch retracted immediately</td>
</tr>
<tr>
<td></td>
<td>LED - Solid red after latchbolt attempts to retract multiple times</td>
<td>Latchbolt cannot fully retract mechanically Verify mechanical adjustment (on vertical rod or mortise lock devices if used). Remove and reapply input voltage to reset this condition.* See Check Mechanical Operation on page 6 as needed.**</td>
</tr>
<tr>
<td></td>
<td>LED - Flashing green/red Latchbolt - not retracted</td>
<td>Excessive tamper (while power applied, the push-pad was pulled out at least 3 time) Wait 15 seconds and latchbolt will retract again OR remove and reapply power to clear condition</td>
</tr>
<tr>
<td>24VDC low</td>
<td>LED - Flashing green Latchbolt - retracted</td>
<td>Voltage low during latchbolt retraction (latchbolt retract at reduced force) Wire length is too long, wire gauge is too small or power supply has poor regulation</td>
</tr>
<tr>
<td>29VDC or greater</td>
<td>LED- Flashing red Latchbolt - will not retract</td>
<td>Input voltage is too high for proper operation Wrong power supply, power supply defective.</td>
</tr>
<tr>
<td>13VDC or lower</td>
<td></td>
<td>Input voltage is too low for proper operation Wrong power supply, power supply defective or not set to the proper output voltage. To set, remove AC power from power supply, change power supply setting from 12 to 24VDC, then reapply AC power and verify proper operation.</td>
</tr>
<tr>
<td>0VDC</td>
<td>LED - off Latchbolt - not retracted</td>
<td>No input voltage Problem with the power supply, control switch or wiring</td>
</tr>
<tr>
<td>0VDC</td>
<td>LED - off Latchbolt - retracted</td>
<td>No input voltage Mechanical dogging is engaged</td>
</tr>
</tbody>
</table>

*For information about adjusting exit devices, you can find their installation instructions in the support area at www.allegion.com/us or call Technical Services at 1-877-671-7011
1. Make sure device is not dogged for SD-QEL/HD-QEL.
2. Depress pushbar and make sure latch bolt retracts and extends fully (see Figure 1).
3. If latch bolt does not retract or extend fully, adjustments may be required per the device installation instructions.

**Check Mechanical Operation**

<table>
<thead>
<tr>
<th>33A/3527A</th>
<th>98/9927</th>
<th>98/9947WDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>33A/3547A</td>
<td>98/9947</td>
<td>98/9957</td>
</tr>
</tbody>
</table>

1. Make sure device is not dogged for SD-QEL/HD-QEL.
2. Depress pushbar. Door should begin to open with pushbar depressed halfway.
3. Close door. Top latch should be secure. If two point latch, bottom latch should be secure as well.
4. If device does not function as described in steps 2 and 3, adjustments may be required per the device installation instructions.

**Any HD Device**

1. Fully depress pushbar.
2. Insert hex dogging key and turn clockwise.
4. Fully depress pushbar.
5. Insert hex dogging key and turn counter clockwise.
6. Release pushbar and verify latchbolt extends fully.

![Figure 1](image-url)
1 Drill Wire Access Hole

Drill $\frac{5}{16}$" dia. access hole through device side of door.

2 Route Two Wires from EL Exit Device to Power Supply

**EL Electrical Load**

| Voltage: | 24 VDC |
| Current: | 16 A inrush (0.3 sec.) 0.25 A holding |

- **Wire length (feet)** | **Wire gauge** |
  - EL 98/99
    - 0-500 | 12 |
    - 0-300 | 14 |
    - 0-200 | 16 |
  - EL 33A/35A
    - 0-250 | 12 |
    - 0-150 | 14 |
    - 0-100 | 16 |
  - All other EL 98/99 and EL 33A/35A device types
    - 0-250 | 12 |
    - 0-150 | 14 |
    - 0-100 | 16 |

1 Wire lengths include an EPT, door loop, electric hinge or pivot and are measured one way between the PS914/option board and the device.

**Tools for Installation**

- $\frac{5}{8}$" Drill Bit

**DANGER:**

To avoid risk of electric shock, turn off AC power to power supply before installing or wiring option board.

PS914 power supply with 900-2RS or 900-4RL option board installed

EPT shown. A door loop or electric hinge/pivot may also be used.
3 Review LED Functions

(For devices purchased after 8/15/12)

<table>
<thead>
<tr>
<th>Normal Operation</th>
<th>Fault Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED will flash &quot;ON&quot; briefly when +24V DC is applied. This is when PWM is operational and power is being applied to the exit device.</td>
<td>LED will turn &quot;ON&quot; and remain illuminated when over-voltage is detected. The PWM will remain in this state until power is removed from the module.</td>
</tr>
<tr>
<td>LED then goes into a steady &quot;OFF&quot; state and holds there, even with +24V continuing to be applied to the module.</td>
<td>NOTE: Input voltage greater than 30V will cause an over-voltage condition.</td>
</tr>
</tbody>
</table>

4 Check EL Device Operation

Activate input and verify that EL device operates properly. Solenoid should retract latch bolt(s). If device does not operate properly, see EL Troubleshooting section.

EL Troubleshooting (page 1 of 3)

A

If the solenoid fails to retract the latch bolt when power is applied, recheck wiring for proper connections.

If solenoid retracts latch bolt momentarily but will not remain in energized position:

1. Check wiring for proper connections, gauge, and distances.
2. Make sure PS914-2RS or PS914-4RL power supply is installed.
3. Check for latch bolt binding caused by improper strike installation, warped door, etc.
4. If device still does not function properly, continue to Section B.
B  Check For Proper Function

1. Make sure device is not dogged for SD/HD-EL.
2. Depress pushbar and make sure latch bolt retracts and extends fully (see Figure 1). If latch bolt does not retract or extend fully, adjustment may be required per the device installation instructions.
3. Electrically energize solenoid and hold.
4. Check latch bolt(s) for full retraction (must clear strike, see Figure 1).
5. Release solenoid and check latch bolt extension (see Figure 1)
6. Continue to Section C if device does not function electrically.

33A/35A Rim, 98/99 Rim, 98/9957

Latch bolt retracted
Flush within $\frac{1}{16}$".

Latch bolt extended
$\frac{3}{4}$".

33A/3527A, 98/9927, 98/9957

Latch bolt deadlocked (will not push in)
Latch bolt stays retracted
Release trigger extended

with door closed

$\frac{3}{16}$".

with door open

33A/3547A, 98/9947, 98/9947WDC

Latch bolt deadlocked (will not push in)

$\frac{5}{8}$"

Flush within $\frac{1}{16}$"

Latch bolt retracted

98/9975

Latch bolt extended
$\frac{3}{4}$"

Latch bolt retracted
Flush within $\frac{1}{16}$"

33/3549A

1. Make sure device is not dogged for SD/HD-EL.
2. Using a ruler, locate the extended position of the bell crank (see Figure 2).
3. Electrically energize solenoid and hold.
4. Check bell crank travel. Bell crank must be a minimum of $\frac{3}{8}$" from extended position and must not run out of travel (see Figure 2).
5. Continue to Section C if bell crank travel is too short or long.

33/3549A

98/9949

98/9949WDC
C Determine if Dogging Rod Adjustment is Too Long or Short

<table>
<thead>
<tr>
<th>Device</th>
<th>Adjustments</th>
</tr>
</thead>
<tbody>
<tr>
<td>33A/35A Rim 98/9927</td>
<td>1. The dogging rod adjustment is too long if latch bolt does not retract and clear strike (see Section D for adjustment). 2. The dogging rod adjustment is too short if latch bolt does not fully extend or latch bolt fully retracts but solenoid releases while energized (see Section D for adjustment).</td>
</tr>
<tr>
<td>33A/3527A 98/9947</td>
<td>1. The dogging rod adjustment is too long if latch bolt does not retract and clear strike (see Section D for adjustment). 2. The dogging rod adjustment is too short if latch bolt does not fully extend or latch bolt fully retracts but solenoid releases while energized (see Section D for adjustment).</td>
</tr>
<tr>
<td>33A/3547A 98/9947WDC</td>
<td>1. The dogging rod adjustment is too long if latch bolt does not retract and clear strike (see Section D for adjustment). 2. The dogging rod adjustment is too short if latch bolt does not fully extend or latch bolt fully retracts but solenoid releases while energized (see Section D for adjustment).</td>
</tr>
<tr>
<td>98/99 Rim 98/9975</td>
<td>1. The dogging rod adjustment is too long if latch bolt does not retract and clear strike (see Section D for adjustment). 2. The dogging rod adjustment is too short if latch bolt does not fully extend or latch bolt fully retracts but solenoid releases while energized (see Section D for adjustment).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Device</th>
<th>Adjustments</th>
</tr>
</thead>
<tbody>
<tr>
<td>33/3549A</td>
<td>1. The dogging rod adjustment is too long if bell crank moves less than ( \frac{3}{8} )&quot; (see Section D for adjustment). 2. The dogging rod adjustment is too short if bell crank runs out of travel (see Section D for adjustment).</td>
</tr>
<tr>
<td>98/9949 98/9949WDC</td>
<td>1. The dogging rod adjustment is too long if bell crank pin moves less than ( \frac{3}{8} )&quot; (see Section D for adjustment). 2. The dogging rod adjustment is too short if bell crank pin bottoms out on the end of the slot (see Section D for adjustment).</td>
</tr>
</tbody>
</table>

D Adjust Solenoid Plunger if Required (See Figure 4)

1. Remove end cap \( \text{①} \) and dogging cover \( \text{②} \).
2. Loosen cap screw \( \text{③} \) with \( \frac{5}{32} \)" hex key.
3. Hold plunger \( \text{④} \) so it does not rotate.
4. Turn threaded bushing \( \text{⑤} \) in or out to see 8 to 10 threads showing so plunger \( \text{④} \) just bottoms in solenoid housing \( \text{⑥} \) and latch bolt is fully retracted.
5. Tighten cap screw \( \text{③} \).
   Note: Cap screw \( \text{③} \) must be tightened against flat on threaded bushing \( \text{⑤} \). Apply a few drops of Loc-Tite 222 to threads of cap screw \( \text{③} \).
6. Replace dogging cover \( \text{②} \) and end cap \( \text{①} \).
7. Return to Section B to check for proper function.

Figure 4
1. Obtain a 1¼" mortise cylinder.

2. Make sure cylinder cam is in position shown with key removed (Figure A). If not, remove key, remove cam, and reinstall in position shown (Figure B).

3. Remove center case cover from device.

4. Orient cylinder as shown at right and insert cylinder into bracket.

5. Tighten bracket set screw with a ¼" hex wrench.

   If you cannot reach bracket set screw with wrench, remove bracket from center case, install cylinder in bracket, tighten bracket set screw, and reinstall bracket in center case.

6. Install center case cover.

   **To dog RHR device**, depress pushbar, insert key, and turn key 180 degrees counterclockwise. **To dog LHR device**, turn key clockwise.

   **To undog RHR device**, insert key and turn key 180 degrees clockwise. **To undog LHR device**, turn key counterclockwise.
RX - Switch is intended for signaling purposes only and is rated for a maximum 2 ampere resistance load at 24VDC/AC. Use with inductive or capacitive loads (magnetic locks or solenoid devices) derates the capacity of the switch. Consult the factory for assistance.

RX-LC - Switch is intended for systems using low current signals and is rated for a maximum 50mA. Consult the factory for assistance.

1. The RX touchbar monitor switch is activated whenever the touchbar is depressed.
2. The switch function is shown with the latchbolt extended and the touchbar not depressed.

3. Mark and drill wiring access hole on inside face of door (only after device is cut to length).
4. The Von Duprin EPT-10 power transfer (for three wires) or EPT-2 power transfer (for two wires) is required to transfer the wiring from the door to the frame.
5. Connect the power transfer wires and switch assembly wires with crimp connectors. Unused wires should be insulated separately.

EPT shown. A door loop or electric hinge/pivot may also be used.
1. Follow directions for fitting and cutting trim (see next page). See trim installation schedule below to determine proper formula to use.

2. Use lock stile mounting bracket to mark lock stile mounting holes, then prepare lock stile mounting holes. Be sure bracket is flush against mechanism case on both ends before marking holes; be sure trim is level.

3. Temporarily install trim using lock stile mounting bracket.

4. Insert hinge stile mounting bracket in hinge stile end of trim and mark hinge stile mounting holes.

5. Remove trim from door and prepare hinge stile mounting holes.

6. For RX-330/350 wiring, see page 10.

7. Install trim on door and attach end caps.

### Trim Installation Schedule

<table>
<thead>
<tr>
<th>Installation</th>
<th>Stile Size</th>
<th>Backset</th>
<th>Cutoff Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single door ½&quot; stop and back to back with 386DT, 337DT or 696/697DT trim on single door ½&quot; stop</td>
<td>1 3/4&quot; - 3&quot;</td>
<td>1(\frac{3}{16})&quot;</td>
<td>Fig. 1A</td>
</tr>
<tr>
<td>Single door ¾&quot; stop and back to back with 386DT, 337DT or 696/697DT trim on single door ¾&quot; stop</td>
<td>1(\frac{1}{8})&quot; - 3&quot;</td>
<td>1(\frac{7}{16})&quot;</td>
<td>Fig. 1A</td>
</tr>
<tr>
<td>Pair of doors without mullion and back to back with 386DT, 337DT or 696/697DT trim on pair of doors without mullion</td>
<td>1(\frac{3}{4})&quot; - 3&quot;</td>
<td>1(\frac{3}{16})&quot;</td>
<td>Fig. 1B</td>
</tr>
<tr>
<td>Single door, pair of doors without mullion, and back to back with 990DT, 991DT, 992DT, or 230DT trim</td>
<td>3&quot; flush</td>
<td>½ of stile</td>
<td>Fig. 1C</td>
</tr>
</tbody>
</table>

### Sex Bolt Application

- **(Metal Door)**
  - ¼" dia., 4 holes, inside face only
  - 1\(\frac{1}{8}\)" dia., 4 holes, outside face only

- **(Wood Door)**
  - 1\(\frac{3}{8}\)" dia., 4 holes, drill thru

### Surface Mount Application

- **(Metal Door)**
  - #25 drill, #10-24 tap
  - 4 holes
330, 350, RX-330 and RX-350 Push Bar Trim
Mechanical Installation (page 2 of 2)

**Cutoff Instructions**

1. To determine required trim length, fill in appropriate chart below Figure 1A, 1B, or 1C. See trim installation schedule on previous page to determine proper formula to use.

2. Cut trim as shown in Figure 2.

---

**NOTE**

Measure trim with both end caps and mounting brackets removed.

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**Trim Cutoff Formula for Single Doors 1\(\frac{1}{4}\) - 3\" Stile**

<table>
<thead>
<tr>
<th>Trim Length</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>44(\frac{15}{16})&quot; (4' door)</td>
<td>+ 2(\frac{1}{8})&quot;</td>
</tr>
<tr>
<td>32(\frac{15}{16})&quot; (3' door)</td>
<td>+ 2(\frac{1}{2})&quot;</td>
</tr>
</tbody>
</table>

**Trim Cutoff Formula for Double Doors without Mullion**

<table>
<thead>
<tr>
<th>Trim Length</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>44(\frac{15}{16})&quot; (4' door)</td>
<td>+ 2(\frac{1}{8})&quot;</td>
</tr>
<tr>
<td>32(\frac{15}{16})&quot; (3' door)</td>
<td>+ 2(\frac{1}{2})&quot;</td>
</tr>
</tbody>
</table>

**Trim Cutoff Formula for 3" Stile - Flush**

<table>
<thead>
<tr>
<th>Trim Length</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>44(\frac{15}{16})&quot; (4' door)</td>
<td>+ 2(\frac{1}{8})&quot;</td>
</tr>
<tr>
<td>32(\frac{15}{16})&quot; (3' door)</td>
<td>+ 2(\frac{1}{2})&quot;</td>
</tr>
</tbody>
</table>

* "A" trim length is measured with both end caps and mounting brackets removed.

---

1. Mark dimension "C" on mechanism case and cover plate. (Measure trim with both end caps and mounting brackets removed.)

2. Cut mechanism case and cover plate. Cover plate ① must be flush against end of mechanism case ② when cutting.
**LX or LX-LC Switch Wiring**

**LX** - Switch is intended for signaling purposes only and is rated for a maximum 2 ampere resistance load at 24VDC/AC. Use with inductive or capacitive loads (magnetic locks or solenoid devices) derates the capacity of the switch. Consult the factory for assistance.

**LX-LC** - Switch is intended for systems using low current signals and is rated for a maximum 50mA. Consult the factory for assistance.

1. The latchbolt monitor switch is activated whenever the latch bolt is retracted.
2. The switch function is shown with the latchbolt extended and the touchbar not depressed.

![Diagram of LX or LX-LC Switch Wiring](attachment:image)

3. Mark and drill wiring access hole on inside face of door (only after device is cut to length).
4. The Von Duprin EPT-10 power transfer (for three wires) or EPT-2 power transfer (for two wires) is required to transfer the wiring from the door to the frame.
5. Connect the power transfer wires and switch assembly wires with crimp connectors. Unused wires should be insulated separately.

![Diagram of LX or LX-LC Switch Wiring](attachment:image)
SS Wiring

Applies to all SS33/35, SS33A/35A, & SS98/99 series exit devices

Notes:

1. The latch bolt switch is actuated whenever the touchbar is depressed or the device latch bolt is retracted. This switch may be used for initiating an alarm.
2. The cylinder switch is actuated when the key is inserted into the lock cylinder and turned clockwise. This switch may be used for shunting or resetting an alarm.
3. A continuous current electric hinge or equivalent is required to transfer the wiring from the door to the frame.
4. Splice electric hinge wires and cable wires together with wire nuts. Unused wires should be cut off or insulated separately.
5. Cut device to proper length before connecting cable and switch wires.