

**Building Management Systems
Installation Guide for FFI Actuator & Control Projects**

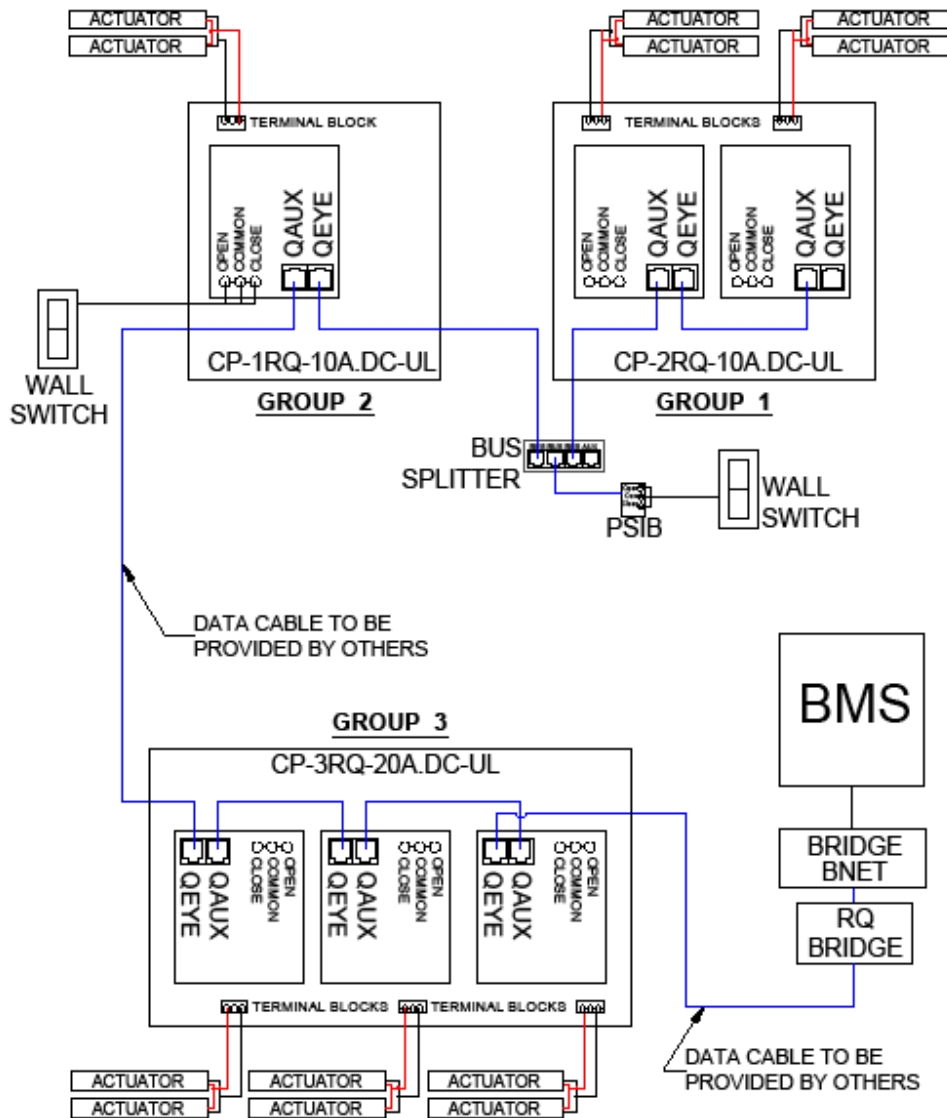


Mounting location must not exceed 104° F

System Layout

It is important to study the diagrams of your system layout from FFI and understand how the components are to be connected. Control panels must be placed in the correct locations of the building to operate as planned. There are multiple ways for FFI controllers to interface with building management systems.

Example: Building Management System layout diagram. For reference only – not project specific.



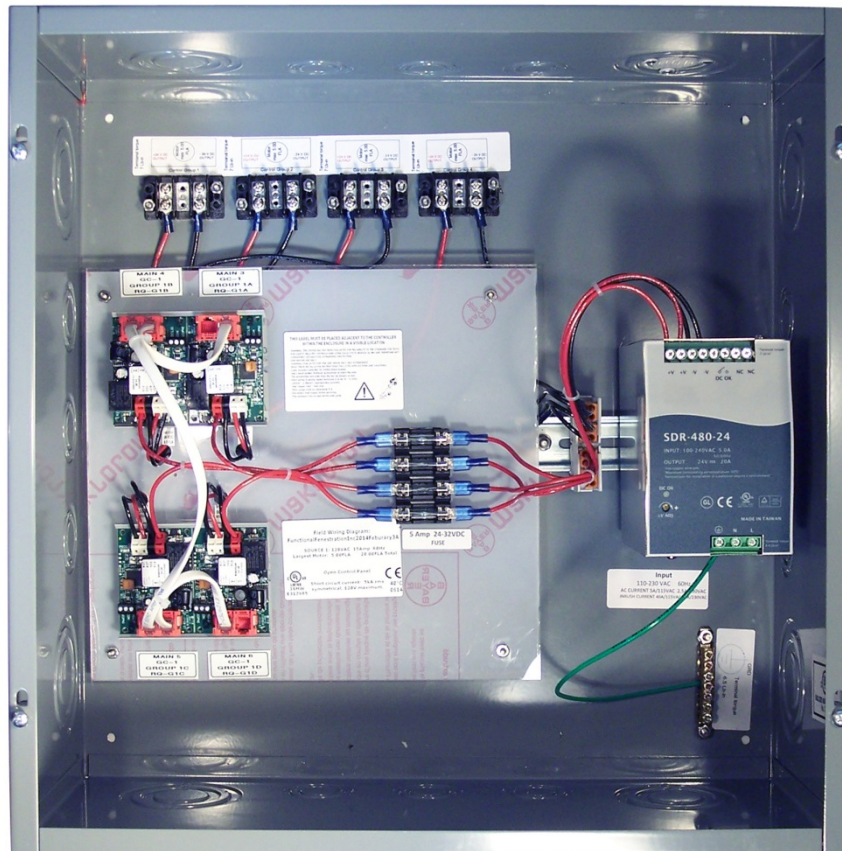
PSIB accessory can be used in many instances; it is used more often when there are 2 or more RQ's.
Diagram elements are not to scale.

System Connections

Cable routing recommendations

- Always keep data cable at least 18 inches away from an AC power line.
- If it is necessary to cross AC power, do so at a 90 degree angle to reduce electrical interference.
- Do not run data cabling with power lines inside conduit.
- Do not bend data wire any tighter than 4 times the diameter of the cable; any more will risk breaking conductors inside the jacket.
- Run data cable “High and Tight” by keeping cables away from other objects and securing them when possible.
- Install in a location that does not exceed 104° F

FFI Control Panel containing a power supply and controllers



Do not add non-essential components or disconnect internal wires or components!

Data Connections

Data Cable Selection

- **CAT5/5e** cable is best for long runs. CAT6 cable is not recommended.
- **RJ-25 (6P6C) modular connectors** are required for FFI control panels.
- **Always test your data cables.**
- Before installing, also read the *FFI Cables Data Sheet* for important instructions.
- Do not add non-essential components or disconnect internal wires or components!



**CAT5/5e
cable**

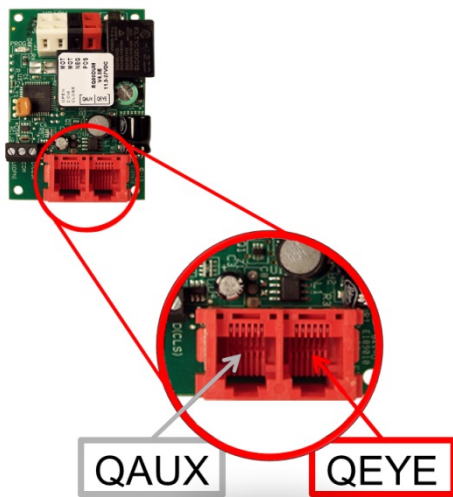


**RJ-25 modular
connector**

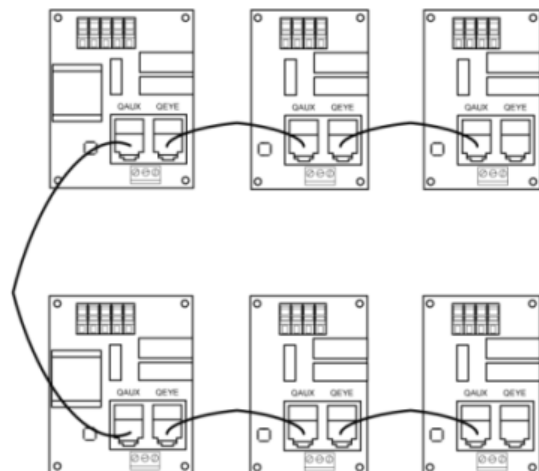
Data Ports

Controllers have a QAUX port and a QEYE port as shown below. Multiple controllers and control panels can be connected by EYE to AUX ports, or by AUX to AUX ports, but never by EYE to EYE ports. This applies to other FFI components as well such as bridges.

RQ controller orientation in the control panel may vary, so please pay close attention to each RQ controller to be certain you are connecting to the correct ports. See “RQ Controller Connections” page for more information.



**Controllers connected by EYE to AUX
ports and AUX to AUX ports**



**System Example: DC Actuators with FFI Control panel, dry-contact wall-switch, and connection to Building Management System.
For reference only – not project specific.**

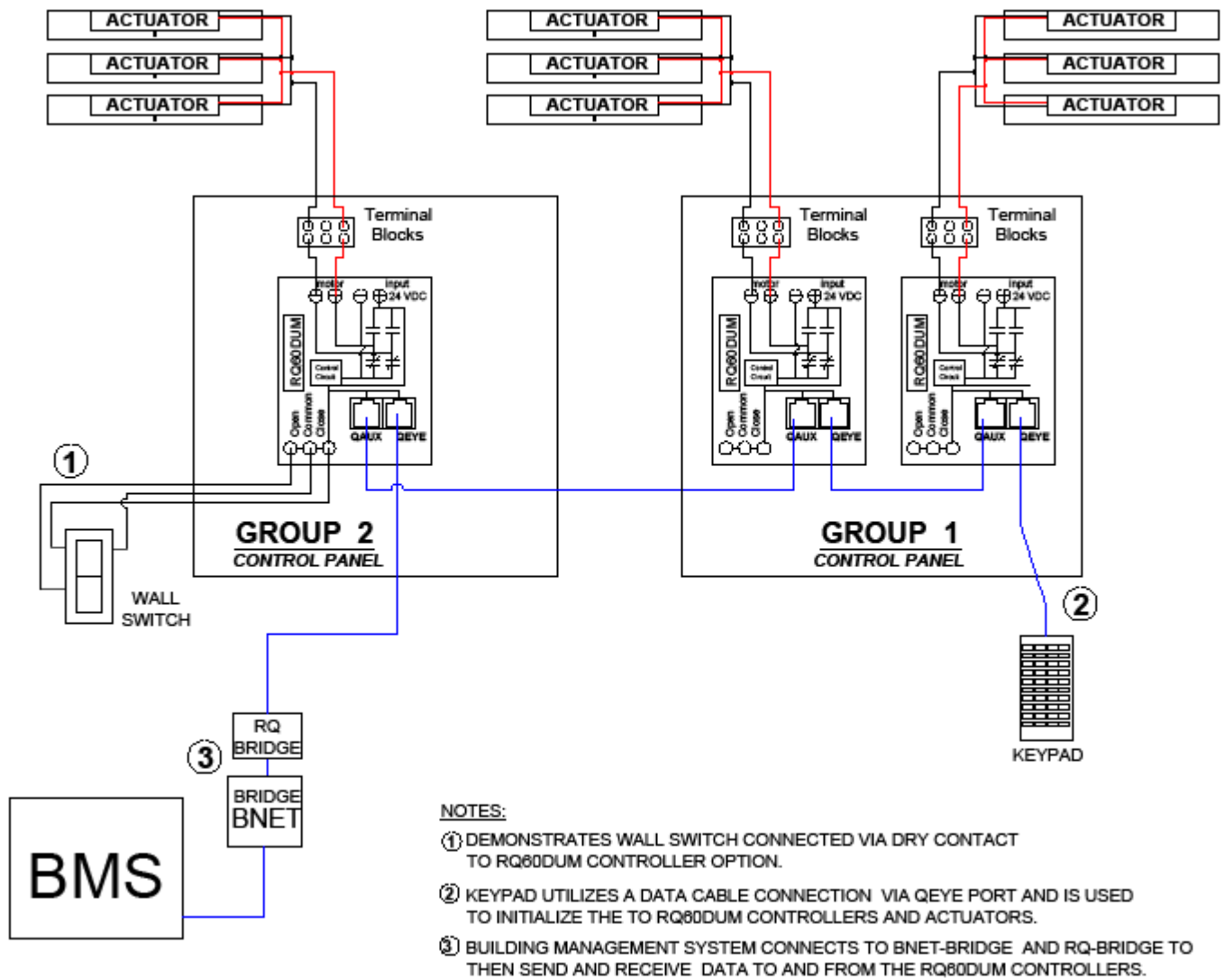
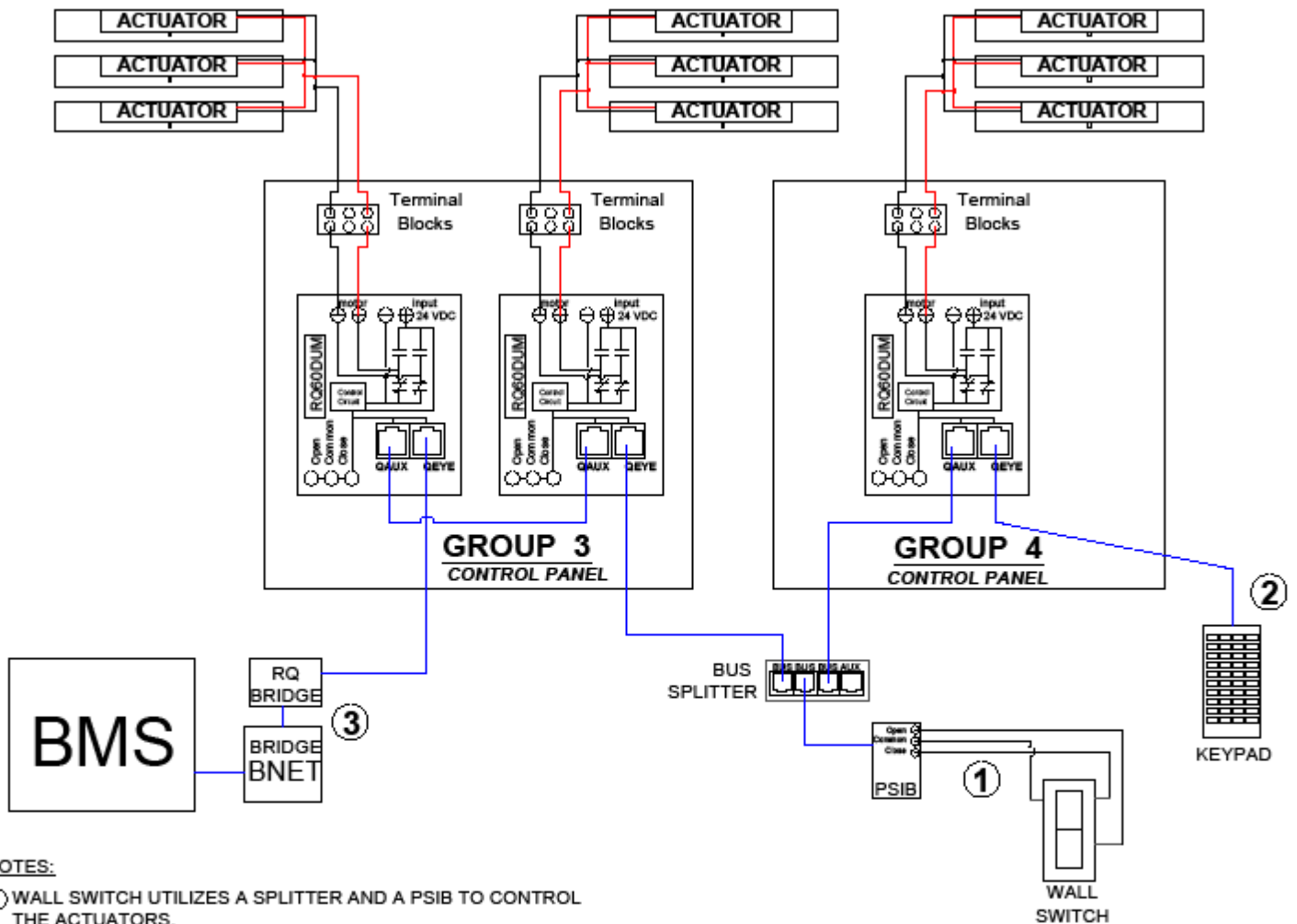


Diagram elements are not to scale.

**System Example: DC Actuators with FFI Control panel, wall-switch, PSIB and bus splitter, and connection to BMS.
For reference only – not project specific.**



NOTES:

- ① WALL SWITCH UTILIZES A SPLITTER AND A PSIB TO CONTROL THE ACTUATORS.
- ② KEYPAD UTILIZES A DATA CABLE CONNECTION VIA QEYE PORT AND IS USED TO INITIALIZE THE TO RQ80DUM CONTROLLERS AND ACTUATORS.
- ③ BUILDING MANAGEMENT SYSTEM CONNECTS TO BNET-BRIDGE AND RQ-BRIDGE TO THEN SEND AND RECEIVE DATA TO AND FROM THE RQ80DUM CONTROLLERS.

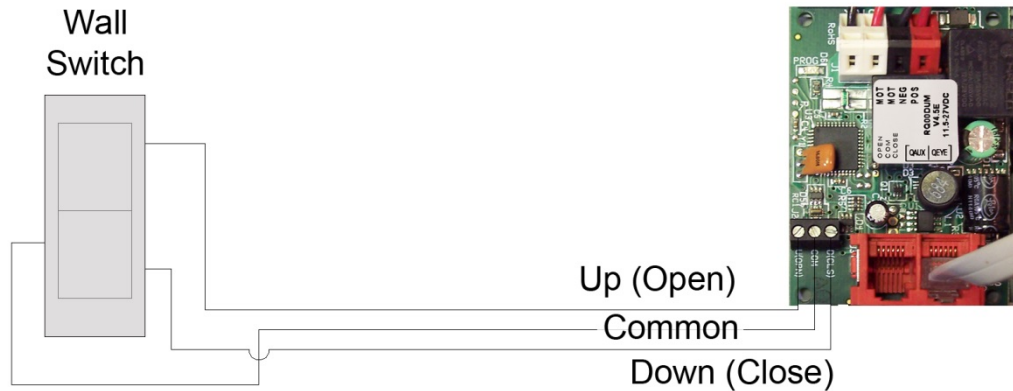
PSIB accessory can be used in many instances, it is used more often when there are 2 or more RQ's.
Diagram elements are not to scale.

Building Management Systems – Dry Contact

Momentary Single Pole Double Throw (SPDT)

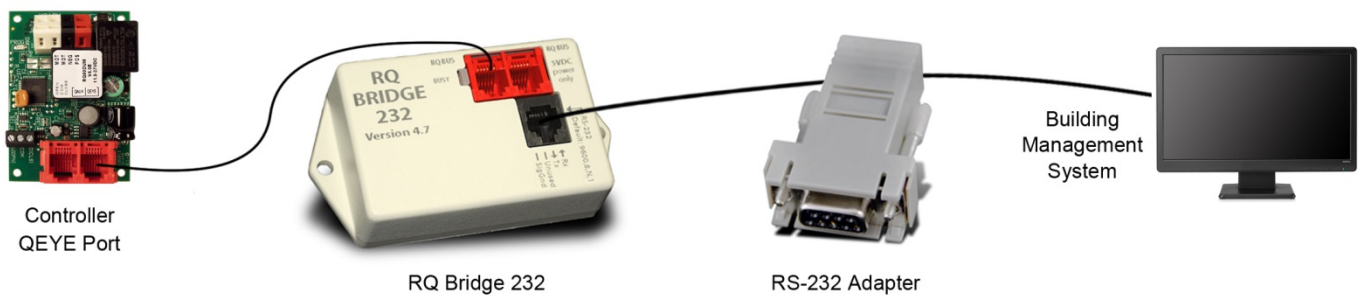
Warning! Do not apply voltage to the dry contact inputs.

SPDT switch connection to a controller



Building Management Systems – RS-232 protocol

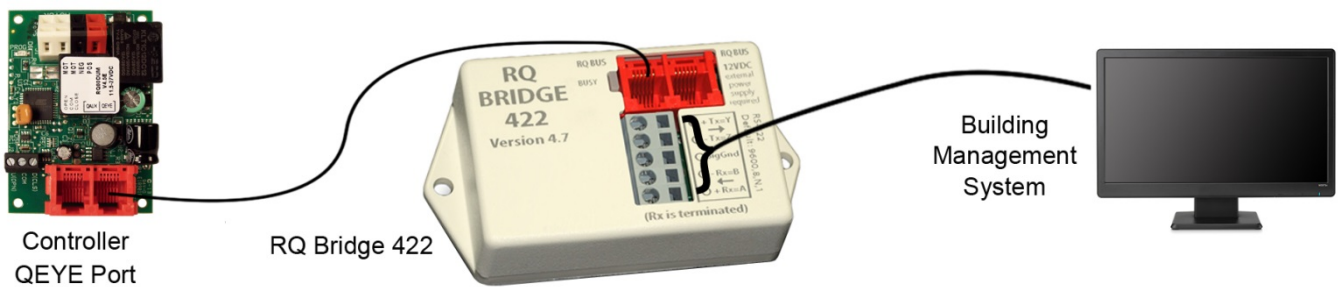
RS-232 system requires a bridge and RS-232 adapter to connect controller with building management system.



Building Management Systems – RS-422 protocol

RS-422 system requires a bridge to connect with building management systems.

The RS-422 Data BUS is capable of a combined length of 3200 feet in four networks. This is an electrical limit and cannot be exceeded on a single network. For more information contact FFI.



Building Management Systems – BACnet / Modbus and LON protocols

These require a bridge 232, BMS interface, and adapter to connect with building management systems. The pictures below show the kits containing these parts.

BACnet / Modbus Bridge

Supports:

- BACnet MSTP
- BACnet IP
- Modbus TCP
- Modbus RTU



RQ Bridge BNET kit

LON Bridge

Supports:

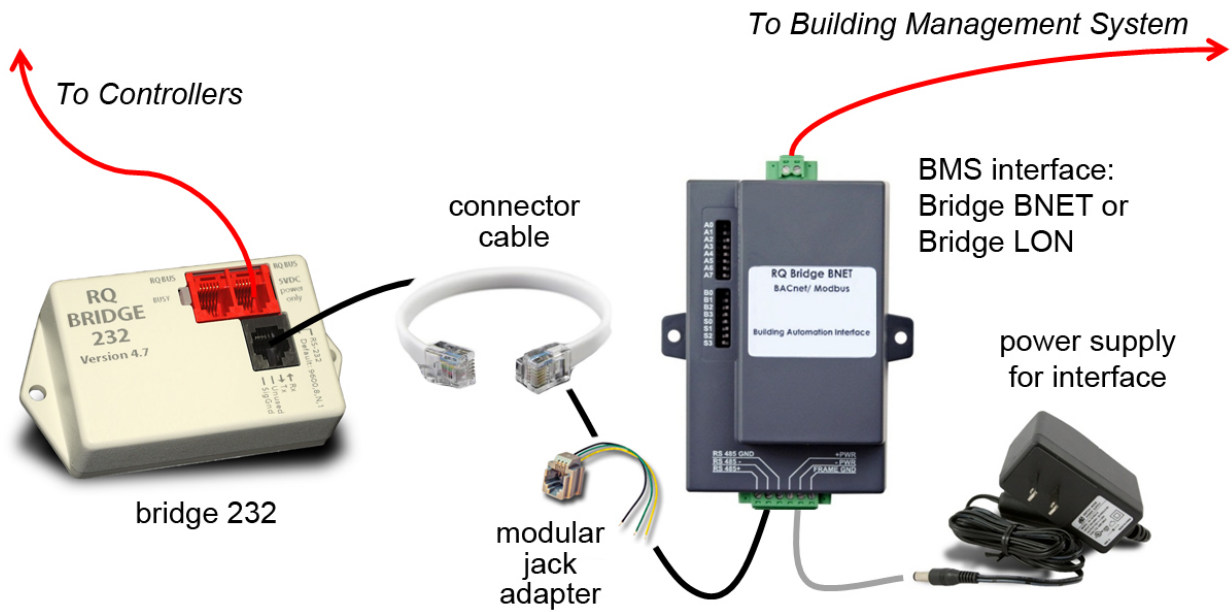
- LON Works
- LON Talk, natively



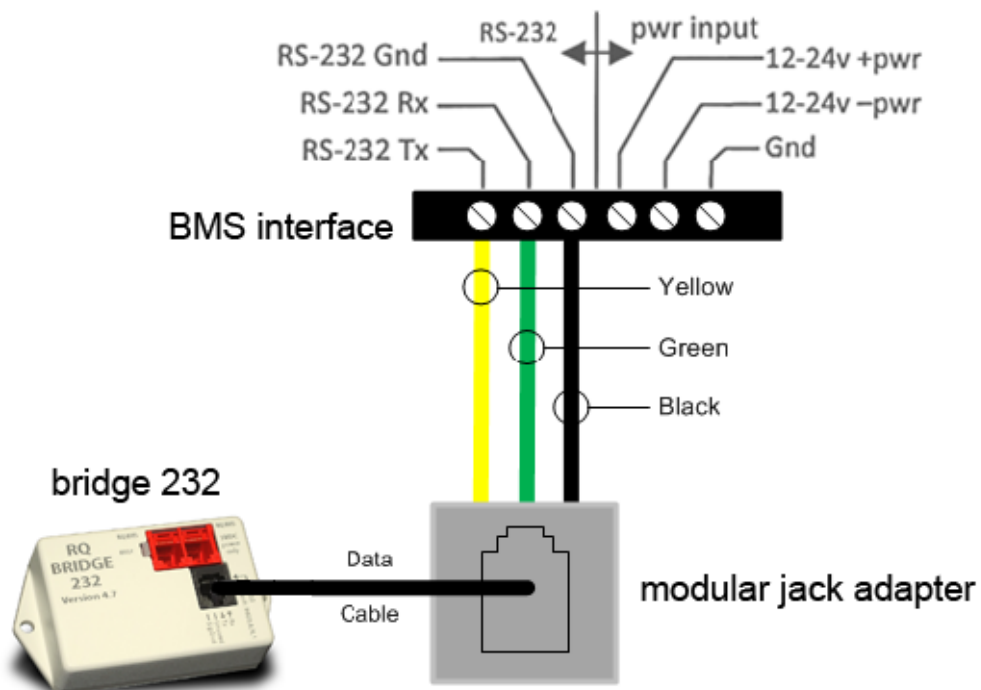
RQ Bridge LON kit

Both interfaces are field configurable through dip switch settings; see “Dip Switch Settings” section.

The modular jack adapter connects the bridge 232 with the BMS interface.



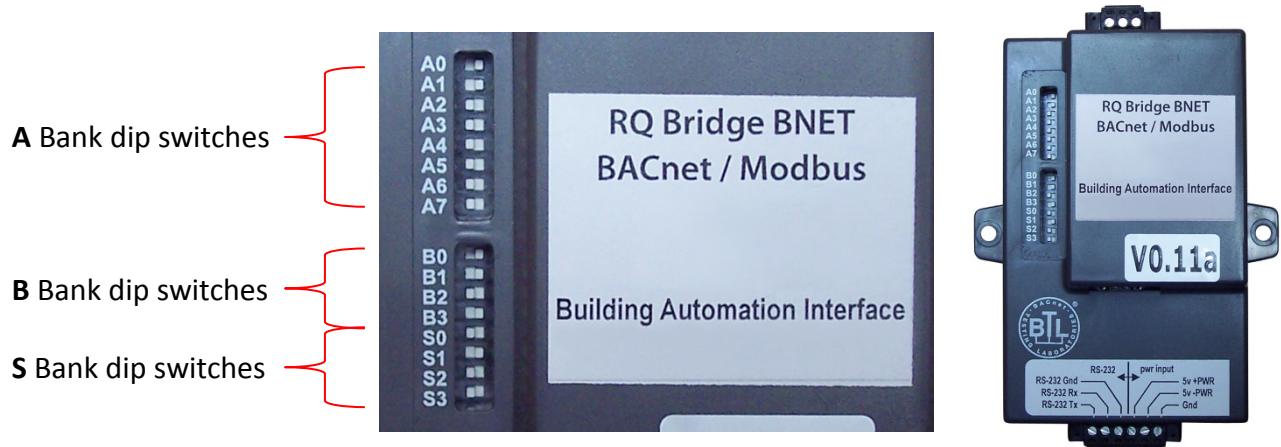
Wiring from the modular jack adapter to the BMS interface -
Do this before you power up the system.



Dip Switch settings for Bridge BNET or Bridge LON - performed in the field.

There are three banks of dip switches you must set:

- **A Bank** sets the MAC Address (device instance).
- **B Bank** sets the baud rate to match the BMS system.
- **S Bank** sets the communication type and turns on and off the auto-discovery function.



Bank A – for both BACnet/Modbus and LON:

This should match the device instance in the BMS. Default MAC address is 3.

For the complete list of values as shown below, please contact FFI.



Address	A0	A1	A2	A3	A4	A5	A6	A7
0	Off	Off	Off	Off	Off	Off	Off	Off
1	On	Off	Off	Off	Off	Off	Off	Off
2	Off	On	Off	Off	Off	Off	Off	Off
3	On	On	Off	Off	Off	Off	Off	Off
4	Off	Off	On	Off	Off	Off	Off	Off
5	On	Off	On	Off	Off	Off	Off	Off
6	Off	On	On	Off	Off	Off	Off	Off
7	On	On	On	Off	Off	Off	Off	Off
8	Off	Off	Off	On	Off	Off	Off	Off

Bank B – for both BACnet/Modbus and LON:

This needs to match the baud rate of the BMS.



Baud	B0	B1	B2	B3
9600	On	On	On	Off
19200	Off	Off	Off	On
38400	On	On	Off	On
57600	Off	Off	On	On
76800	On	Off	On	On

Bank S – for BACnet / Modbus only:

Set the Communication type and Auto-Config with the S bank dip switches

- First turn on auto-config then power up
- Wait five minutes then save configuration



RQ BRIDGE BNET Auto Configure	S0	S1	S2	S3
BACnet MSTP/BACnet IP Run Auto-Config	Off	On	Off	Off
Modbus RTU/Modbus TCP Run Auto-Config	On	On	Off	Off
RQ BRIDGE BNET Save Current Configuration				
BACnet MSTP/BACnet IP Run previously stored config	Off	Off	Off	Off
Modbus RTU/Modbus TCP Run previously stored config	On	Off	Off	Off

Bank S – for LON only:

Set the Communication type and Auto-Config with the S bank dip switches

- First turn on auto-config then power up
- Wait five minutes then save configuration



RQ BRIDGE LON Auto Configure	S0	S1	S2	S3
Lonworks Run Auto-Config	On	Off	Off	Off
RQ BRIDGE LON Save Current Configuration				
Lonworks Run previously stored config	Off	Off	Off	Off

Actuator and Power Connection to the FFI Control Panel

⊘ Do not add non-essential components or disconnect internal wires or components!

The FFI Control Panel has knock-outs on all sides for easy access to connect actuators and power.

Actuator connection

- Connect to the terminal strip provided inside the FFI Control Panel.
- Connect positive wire to positive terminal, and negative wire to negative terminal.

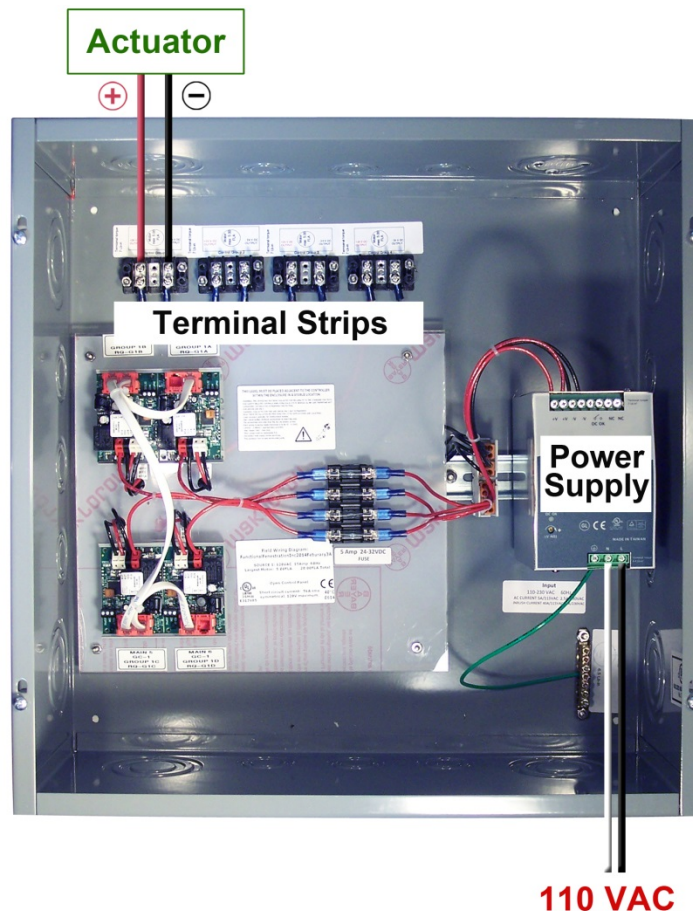
For actuator wire colors and details, see the Installation Guide for your actuator model.

Power connection

- Connect to the internal power supply, 110 VAC from external source.
- Connect Black (hot) wire to L.
- Connect White (neutral) wire to N.

FFI Control Panel

For reference only – not project specific. Contact FFI for details and options.
RQ controller orientation in panel may vary; for more on this, see “RQ Controller Connections” page.



RQ Controller Connections

The white label on top of the RQ controller card shows where all of the connections are located on the RQ controller. The white label shows where to find the connections for the following:

- The QAUX and QEYE ports.
- The dry contacts for OPEN, COMMON, and CLOSE.
- The Actuator connections (MOT) and Power connections (NEG and POS).
Note: Do not tamper with these, as they are pre-wired for every Control Panel.



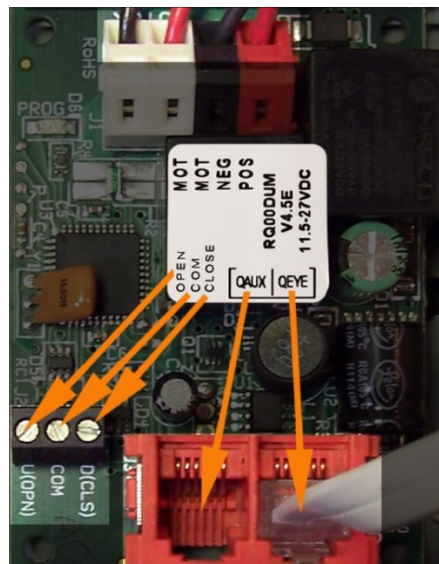
Important: The label may be in any of four orientations as you look at it. The orientation can change depending on the design of the Control Panel containing the RQ controllers. Please pay close attention to each RQ controller to be certain you are connecting to the correct contacts.

The QAUX and QEYE ports are particularly important to connect correctly, as it can be easy to confuse the two. Below are examples to illustrate this.

The white label may have different orientations as you look at different RQ controllers, as shown below.



The white label indicates the location of the connections on the particular RQ controller, as shown below. Connect only at orange arrow points; do not tamper with other wiring or components.

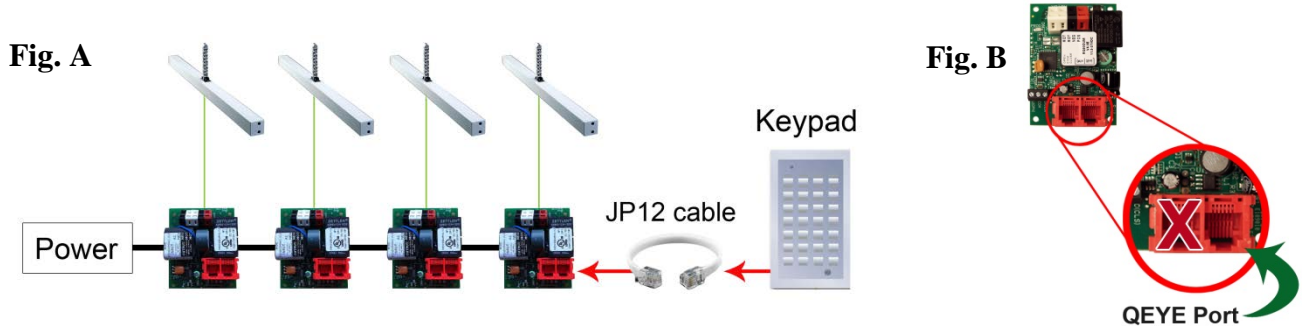


Initializing the system using keypad or PC program

Initialization tells the controllers the amount of time it takes for the actuators to fully open and close. Please note if you have a custom keypad overlay, please contact FFI to confirm these instructions.

Initialize using FFI Keypad, part # K24ST

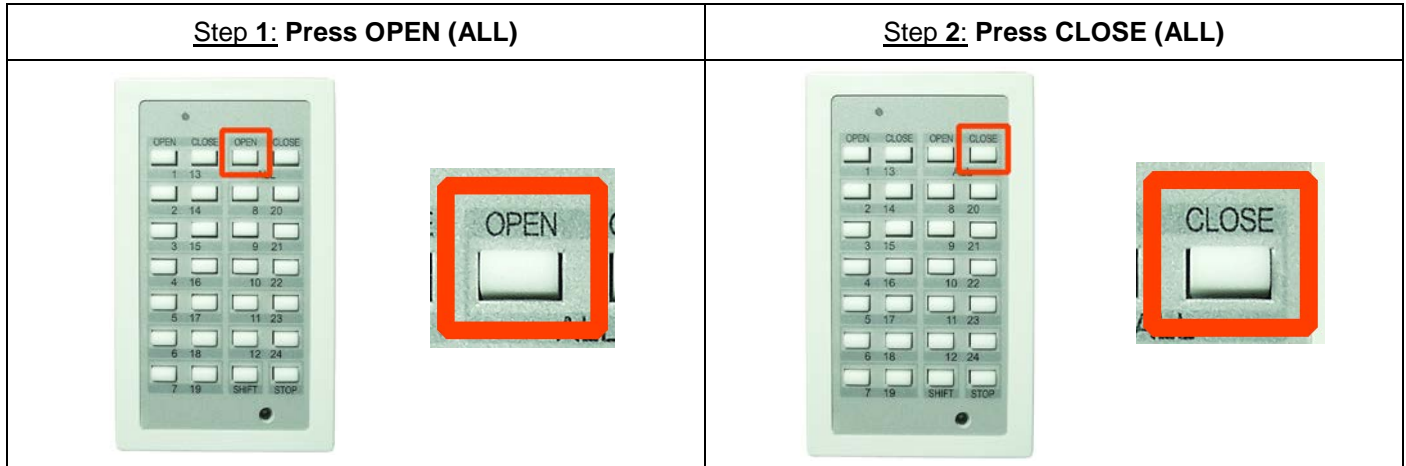
1. Connect the FFI Keypad to the control panel at the end of the string of connected controllers (see Fig. A). Connect using a JP12 cable (part# JP12) into a QEYE port (see Fig. B). First unplug any cable currently in that port. The keypad indicator light will blink a few times to show it is powered.



2. Enter the following into the FFI Keypad as shown in the steps below. Each step must be entered within approx. 3 seconds of the previous step, or the command sequence will stop.

<p>Step 1: Press and hold together: 7 and 19 and STOP (also known as OPEN 7, CLOSE 7, STOP.)</p>	<p>Step 2: When red LED light begins to flash, Press OPEN (ALL)</p>
<p>Step 3: Press 22 (also known as CLOSE 10.)</p>	<p>Step 4: Press 10 (also known as OPEN 10.)</p>

3. The actuators will all open, close, then finish in the open position. This will take a few minutes.
4. To close the actuators and windows, press the CLOSE (ALL) button.
5. To re-test opening and closing all of the actuators in the string of controllers, use the steps below.
If all of the actuators in the string open and close at the same time, then initialization is complete.



6. Finally, disconnect the JP12 cable from the control panel, and initialization is done.
7. If the actuators do not all open and close at the same time:
 - a) Repeat at least 2 more times entering the commands into the FFI Keypad.
 - b) Check that the cable from the keypad is connected to the correct port on the correct controller card.
 - c) Check that all cables are plugged in securely, and to appropriate QEYE or QAUX ports.
 - d) If these do not work, see Troubleshooting section.

Initializing using a PC with Terminal Emulator program (optional, instead of keypad)

Terminal Emulator software can give commands and perform system inquiries as well as perform Initialization. For more information, contact FFI.



Troubleshooting

Questions? Troubleshooting? Call FFI at 800-677-0228. But first –

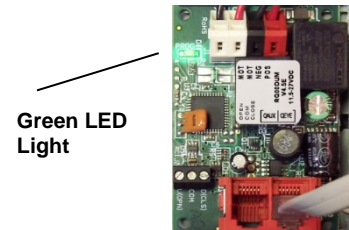
(1) Always test your data cables.

Use a cable tester to check all cables connected to the card and control panel. For more details, see FFI Cables Data Sheet.



(2) Test for Power.

Check that the controller card is getting power. The controller card has a green LED that lights up briefly when it receives a command; if it is lighting up, then it is getting power. This can be checked by connecting a keypad to the QEYE port and pressing the STOP button.

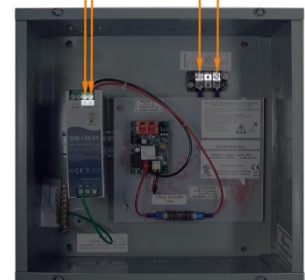
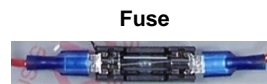
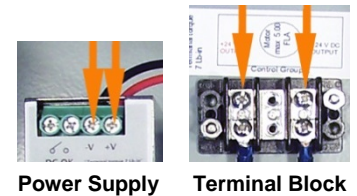


(3) Test for Continuity with a multi-meter.

Use a multi-meter to check the continuity between the power supply and the terminal block(s). As shown on diagram to the right, touch the multi-meter to the screw-heads on the power supply and each terminal block in the control panel as indicated by the orange arrows. Test between these negative connections, then positive connections.

Do not disconnect any internal wiring.

If you do find a continuity problem, next test the fuse by probing at each end of the fuse.



(4) Do not add non-essential components or disconnect internal wires or components!

(5) Check system status using a PC Terminal Emulator program.

For more information, contact FFI.



(6) If all of the actuators are working together to a certain point in the string, and beyond that point no actuators are working, then the first non-operational actuator indicates which controller card is experiencing a problem. Check that card to look for the problem.

(7) **The FFI Field Power Switch** is available for use with FFI DC actuators, for testing and installation.

**FFI Field Power Switch
Part # SW.FPS.01**



(8) Contact FFI for assistance.

Recommendations for FFI Actuators & Controls: FFI only recommends UL compliant systems. FFI is a UL Registered firm. Read FFI data sheets & installation guides before specifying project details. Project-specific needs vary depending on the number of actuators, electrical layouts, building management systems, distance between power supplies & actuators, and other details. Project specifications to comply with electric & building codes—for wire gauge, wire connections and run distance, conduits, junction boxes—must be arranged by the project electrical contractors.
Distribute this guide to all project parties, including electric contractors, architects and building management personnel!