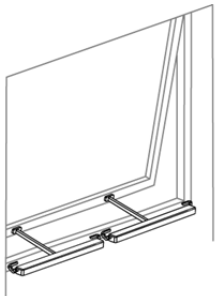


Functional Fenestration Inc (FFI)  
**Synchro-Quasar Actuators**

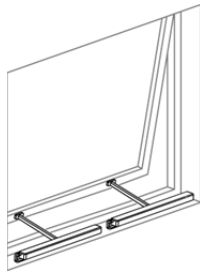


**Application Options**

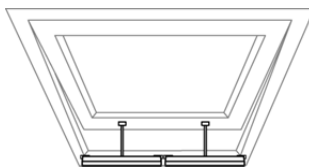
On Wall or Frame



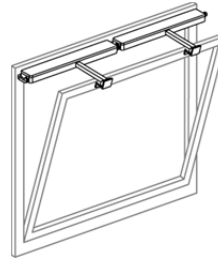
Awning



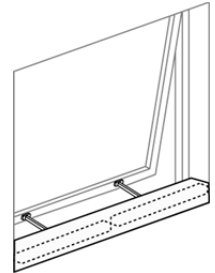
Skylight



Hopper



Concealed in Frame or Curtainwall



- CAD files available on request.
- Optional brackets for hopper and wall mounting are available separately.



motor installs on sash, sill or wall



chain operator attached to frame



Standard pivot brackets (sold separately)

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 electrical contractors, architects, and building management personnel.

### Synchro-Quasar Specifications

| Synchro-Quasar DC UL     |   |
|--------------------------|---|
| supply voltage           | 24 Vdc $\pm$ 10%  |
| normal current amp draw* | 0.9 amps average*   |
| power cable (3 meter)    | white color ; 2 conductors ( $\pm$ polarity inversion)  |
| chain stroke             | 380 mm (15 inches) or 500 mm (20 inches) opening stroke   |
| chain speed              | 15 mm (0.6 inches) per second   |
| limit stop               | electronic limit switch   |
| safety stop              | electronic overload switch  |
| typical switch           | DPDT maintained contact (6 leads)   |
| safety marks             | ANSI/UL Recognized ; CE mark  |
| UL projects              | UL Recognized   |
| push/pull force          | 66 lbs (200 N)  |
| environment              | 14 to 140 degrees F (-10 to 60 degrees C); maximum relative humidity 60%                            |
| control options          | Wall switch or CRM keypad; add remote control and weather sensors (rain, wind, thermostat) with CRM |

\* Quasar DC start up current is 3.5 amps for one actuator. Calculate power supplies based on peak draw of 2 times normal amp draw, or 1.8 - 3.5 amps per Quasar actuator.

#### List of parts included with this product

- **(1) Motor (actuator) with white color cable**
- **in 1 Bag:**
  - (1) Sash Connector**
  - (1) Threaded Sash Connector Pin** (to connect to chain)
  - (2) Screws** (to connect to sash)
  - (1) Lock Washer**

## Installation Overview and Preparation

### Preparation

- 1) Vega and Quasar actuators are designed for top- or bottom-hinged windows and skylights.
- 2) On **bottom-hinged hopper windows, hinge limit devices** (available from FFI) are recommended for safety. On **top-hinged awning windows** if using **4-bar hinges, loose-rivet type** are recommended (available from FFI); standard hinges would need additional actuator force due to their friction.
- 3) If mounted on a **PVC** frame, verify that the frame and sash are strong and rigid enough to withstand the forces produced by the motor, and the bracket is firmly fastened.
- 4) **Do not tamper with actuators, or warranty is void! Do not open the actuator case, disassemble the actuator, clip the wires, try to repair, or otherwise alter the product.**
- 5) **Wire Run Length Calculations** – Electrical contractor is responsible for calculating and confirming the appropriate wire gauge to provide adequate power to devices, and to minimize line loss. Load calculations should factor in distance, peak demand (allowing for at least twice the normal draw), temperature and any other factors that may contribute to power loss. **The use of heavier gauge conductor is always recommended in preventing field performance issues.** Low-voltage actuators require 24 Vdc + or – 10% under full load, including at start-up. Voltage of less than 22 volts can result in impaired performance. Actual voltage during operation can only be determined with an oscilloscope, as the potentially disruptive voltage drops occur too rapidly to be viewed on a standard volt meter. Supply lines to the power supply must also be adequate for the peak demand.
- 6) **Wiring Termination** – FFI recommends terminating wires into terminal blocks for positive connections.
- 7) **Calculating number of Power Supplies, RB24's, or other Controls for multiple actuator projects** – Power supplies and control devices should be selected to provide ample current for combined demand of all devices during normal operation, plus the additional surge (in-rush current) at start-up. Demand should be calculated according to peak draw, allowing at least 150% available amperage over normal current draw listed for each device. Where larger groups of devices are being operated simultaneously and at longer distances from the power supply, it is recommended to provide power in excess of the combined peak demand, or approximately 2 to 3 times normal amperage draw.
- 8) Ask for FFI LEED Notice about LEED points for Recycled Content & Natural Ventilation.

### During Actuator Installation

- 1) Avoid electrocution by making sure the power supply has been turned off before connecting actuator.
- 2) If actuator is installed on window or skylight as a part of a trade show exhibit, make sure that its power cable is protected from foot traffic in the exhibit area and otherwise not subject to mechanical stress.
- 3) Do not approach moving parts until they have come to a complete stop.
- 4) Do not cross wires; even momentary crossing of wires can damage circuitry and void the warranty.
- 5) After attaching the actuator to a window, connect the power, and **power the actuator to open the chain.** Do *not* open the actuator case to manually extend the chain.

### After Actuator Installation

- 1) Watch the installed actuator operate through its complete open and close cycles.
- 2) Make sure the operation is smooth and regular.
- 3) Verify that actuator is silent when chain is fully opened or closed.

**Do not tamper with actuators, or warranty is void!**



**Maintenance & Troubleshooting:** See following page.

## Maintenance and Troubleshooting

- 1) Do not approach moving parts until they have come to a complete stop.
- 2) To open window in case of power failure, remove Sash Connector Pin; see Case Dimensions Diagram.
- 3) At least once a year, remove any debris accumulated where the chain emerges from the case. Check for signs of damage or wear in the power cable.
- 4) Prevent water or other liquids from entering the actuator.
- 5) If experiencing problems, verify that power is working, switch is on, and that there is no debris blocking
- 6) the case aperture around the chain.
- 7) **Do not tamper with actuators, or warranty is void!** Do not open the actuator case, disassemble the
- 8) actuator, clip wires, attempt to repair, or otherwise alter the product.
- 9) **In case of malfunction, contact FFI Customer Service at 800-677-0228 or [service@fenestration.net](mailto:service@fenestration.net)** for instructions. For defect claims, FFI must inspect the motor.
- 10) The two-year manufacturer's warranty is provided by Ultraflex Control Systems.

**Do not tamper with actuators,  
or warranty is void!**



**Mounting Brackets**



Standard



Long



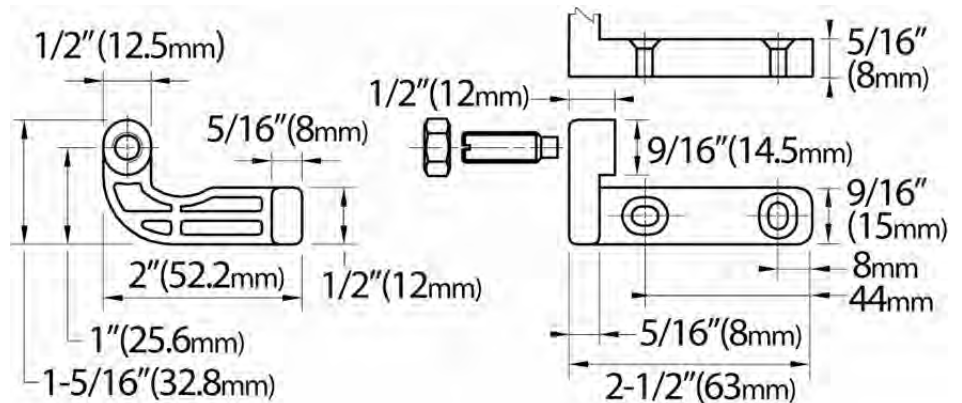
Hopper

| Paint Color    | Standard brackets pair<br>( sold separately ) | Long brackets pair ***<br>(sold separately) |
|----------------|---|---|
| gray RAL 9006  | 40843F  | 41455L                                      |
| black RAL 9005 | 40844G  | 41456M                                      |
| white RAL 9010 | 40845H  | 41454K                                      |

| Hopper bracket (packaged individually) |        |
|--|--------|
| Anodized Aluminum, adjustable          | 41200C |

- \* Additional brackets may be available. Consult with FFI.
- \*\* The Standard and Long brackets are packaged in pairs, while the Hopper bracket is packaged individually.

**Standard Bracket (sold separately)**

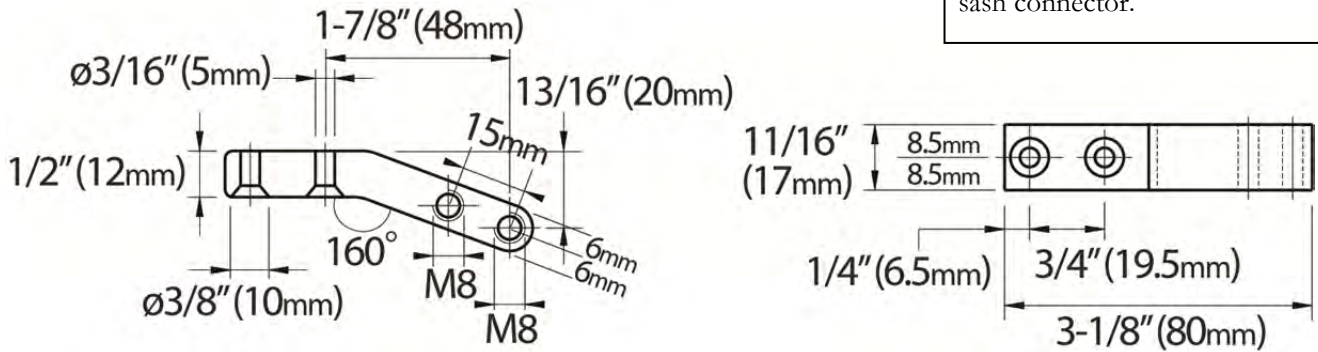
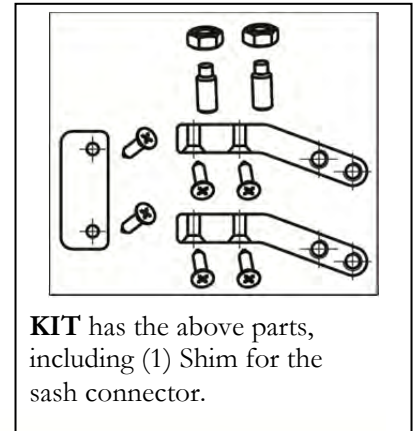


(brackets continued on next page)

**Long Bracket (optional)**

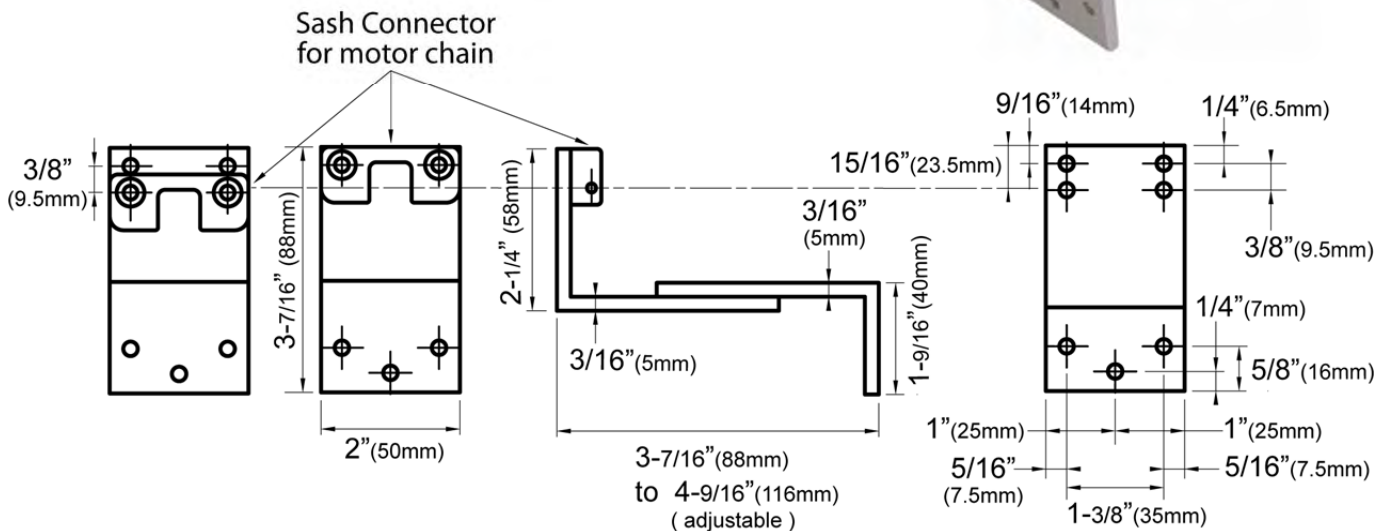


Can be included with actuator for orders of 50 or more actuators.



**Hopper Bracket (optional)**

Anodized Aluminum, adjustable



**Attention:**

**Prior to installation it is essential to read these safety notices, warnings and installation instructions.**

**SAFETY NOTICES**

- 1) The actuator should be used only on windows or skylights that are out-of-reach of people. Installation below 8 feet (2.5 meters) wall height is not recommended. If sash will be accessible, provide an emergency off-switch.
- 2) Do not approach moving parts until they have come to a complete stop.
- 3) When installing or un-installing the actuator, take proper precautions to avoid accidental closing of the window which might cause injuries to people (for example, impact, squashing, cutting or shearing).
- 4) Unsuitable application or improper installation may result in a loss of system operating functions, window damage and/or injuries to people.
- 5) The actuator must be installed by skilled engineers and licensed electricians.
- 6) Prior to installation make sure that ...
  - a) The actuator is appropriate for the application.
  - b) Window profiles and hinges are suitable to withstand the forces produced by the actuator.
  - c) The windows and sashes can open and close completely and are free of obstacles.
  - d) The existing electrical system complies with local building codes and regulations.
  - e) The power supply is compatible with the actuator's specifications.
  - f) The power circuit is turned OFF before connecting the actuator to it.

**WARNINGS**

- (1) The actuator is for indoor use only.
- (2) Operating temperature range: 14° to 140° F (-10° to 60° C); maximum relative humidity 60%.
- (3) The actuator uses electronic circuits to sense end-stroke positions and to detect circuit overload.
- (4) Only original parts and fittings may be used to install the actuator.
- (5) Do not use more than one motor on a vent unless using:
  - a) "Synchro-" series motors, which are designed for use on extra-wide vents, or
  - b) Only two tandem motors (not "Synchro-" series) connected to a 40733T Control Box.
- (6) In most applications pivoting brackets are recommended for mounting the actuator.
- (7) **Do not tamper with actuators, or warranty is void!** Do not open the actuator case, disassemble the actuator, clip wires, attempt to repair, or otherwise alter the product. **In case of malfunction, contact FFI Customer Service at 800-677-0228 or [service@fenestration.net](mailto:service@fenestration.net) for instructions.** For defect claims, FFI must inspect the motor. The two-year manufacturer's warranty is provided by Ultraflex Control Systems.
- (8) After installation keep these instructions for later review.

**MANUFACTURER'S LIMITED WARRANTY**

Ultraflex Control Systems S.r.l. (UCS) products are guaranteed against defects in material and workmanship for a period of **two years** from the date of manufacture. Alleged defective products returned, freight prepaid, within the warranty period will be repaired or replaced free of charge, at UCS's option, if found effectively below UCS quality standards. This guarantee does not cover other claims for direct or indirect damages. In particular, UCS declines liability and excludes guarantee (except for what is stated above) if improper installation or misuse should result in a failure of UCS products. UCS motors should be used together with UCS-approved accessories. Substitutions must meet UCS specifications. Functional Fenestration Inc. (FFI) will honor the manufacturer's limited warranty (stated above) for two years from the date of sale listed on FFI's invoice.

**FFI TERMS**

Liability of Functional Fenestration Inc (FFI), Hawthorne, CA, as the seller for any defective product is limited to the replacement or credit of FFI product at original cost, and shall not include damages of any kind, whether incidental, consequential or otherwise. **Any claim and return must be made in accordance with FFI Terms and Conditions.**

**CORRECT DISPOSAL OF THIS PRODUCT**

Responsible disposal of this and other electronic products will help prevent potential negative consequences for the environment and human health. Its aluminum case and other re-usable elements should be re-cycled.

**INSTALLATION INSTRUCTIONS**

These instructions refer to the mounting and wiring diagrams on the following pages

**Installation on Top-Hinged Window with Windowsill or Skylights**

- (1) Mark the center-line of the sash and drill the holes.
- (2) Fasten the Sash Connector to the sash with the supplied screws.
- (3) Fasten the actuator to the window sill with Pivoting Brackets (recommended) or appropriate screws (not supplied). If the window is less than 35 inches tall, Pivoting Brackets must be used.
- (4) Attach the chain operator to the sash with the Sash Connector Pin.

**Installation on Top-Hinged Window with No Sill, using the Standard or Long Pivot Bracket**

- (1) Mark the center-line of the sash and drill the holes.
- (2) Fasten the Sash Connector with the supplied screws.
- (3) Fasten the actuator to the wall just below the window with Pivoting Brackets.
- (4) Attach the chain operator to the sash with the Sash Connector Pin.

**Installation on Bottom-Hinged (Hopper) Windows**

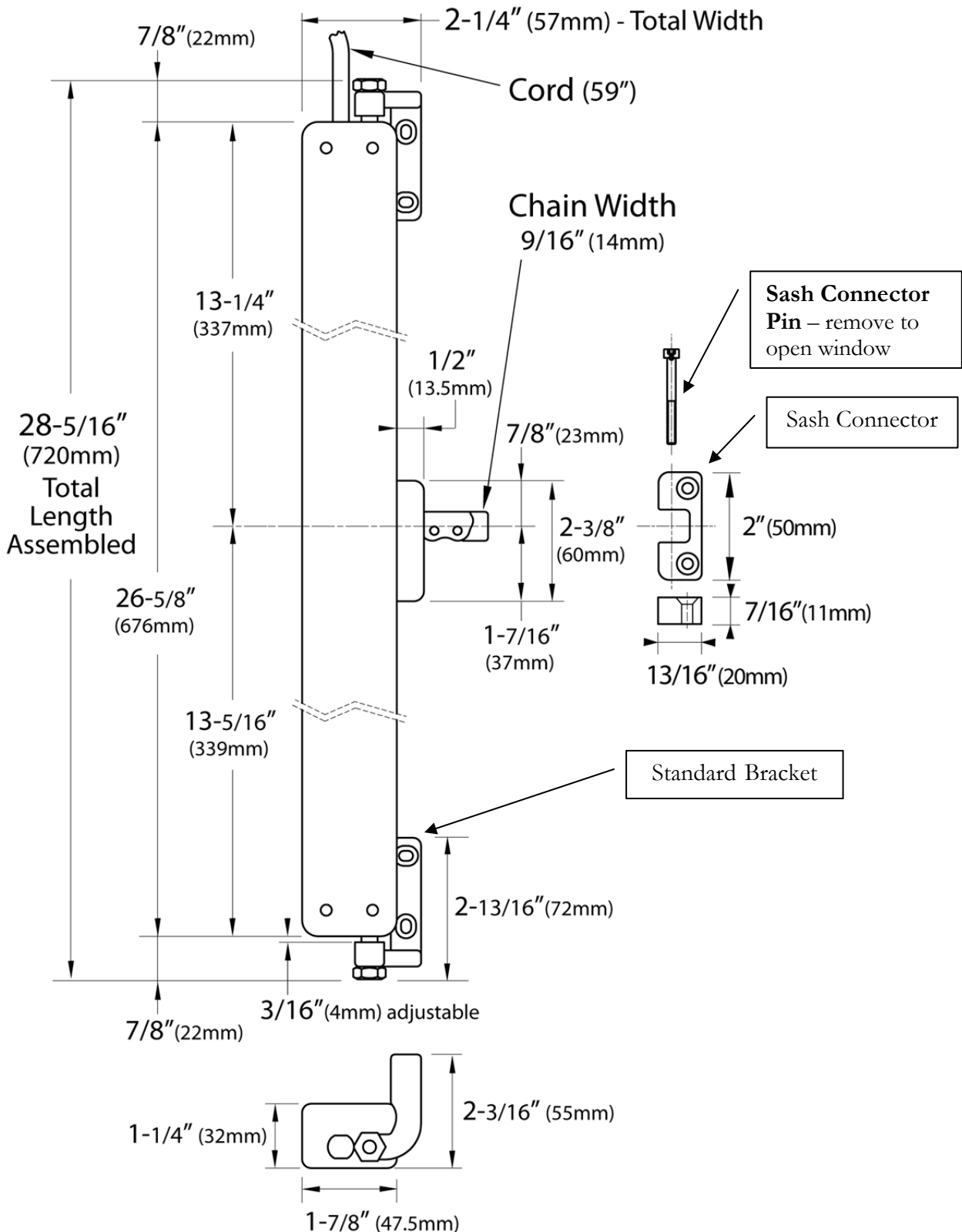
- (1) Mark the center-line of the sash and drill the holes.
- (2) Fasten the Sash Connector to the Hopper Bracket, and attach this assembly to the sash.
- (3) Fasten the actuator to the window frame using the Standard Pivoting Brackets.
- (4) Attach the chain operator to the sash with the Sash Connector Pin.

**ELECTRICAL CONNECTIONS**

Before specifying electrical connections, refer to **Guidelines for Planning Wiring and Power Supplies** in the following pages.

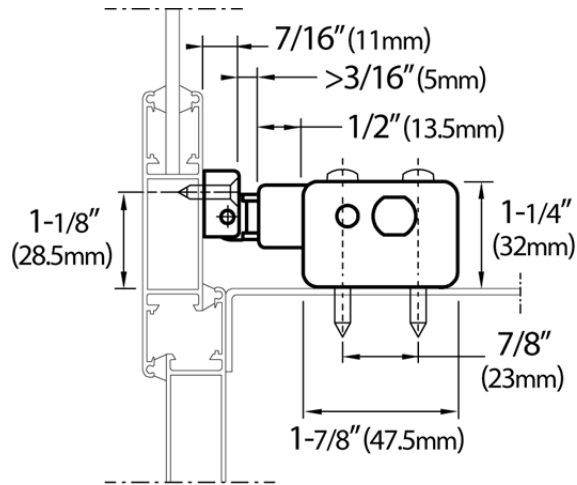
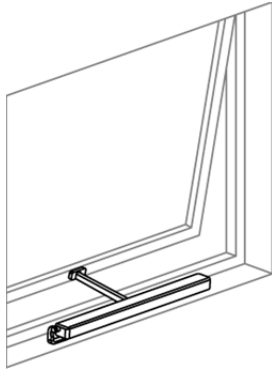


**Case Dimensions Diagram**



**Mounting Diagram (1)**

**Sill-mount without brackets**

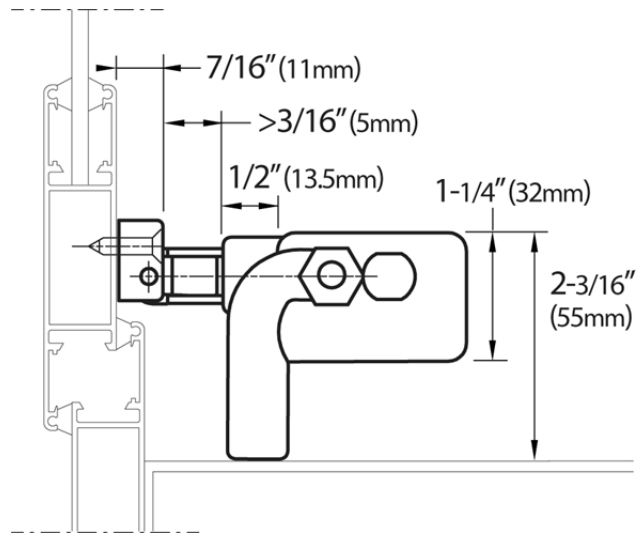
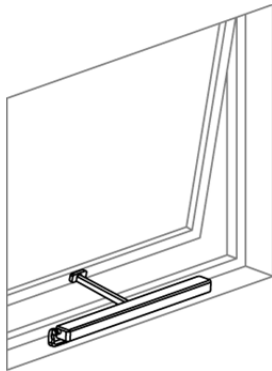


Minimum sash height is 3 times the chain length.

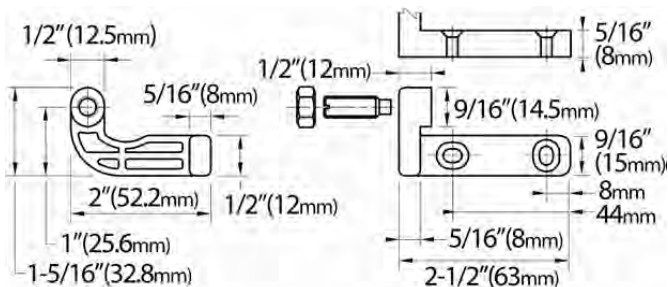
Screen applications are possible but not shown here.

**Mounting Diagram (2)**

**Sill-mount with Standard brackets**

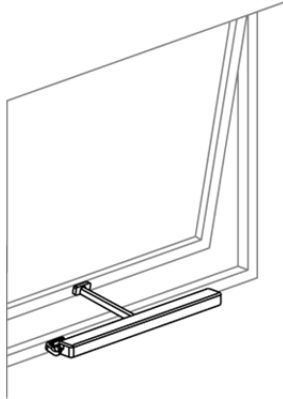


Screen applications are possible but not shown here.

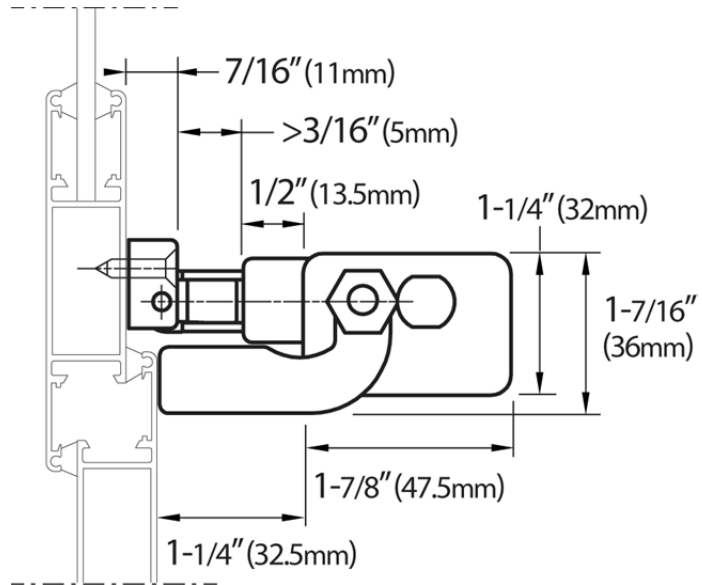


### Mounting Diagram (3)

Wall-mount with Standard brackets

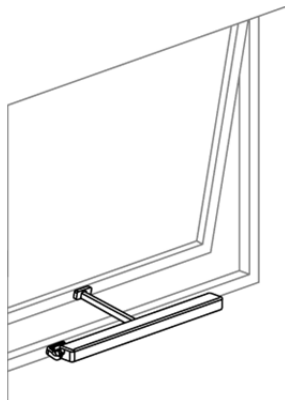


Screen applications are possible but not shown here.

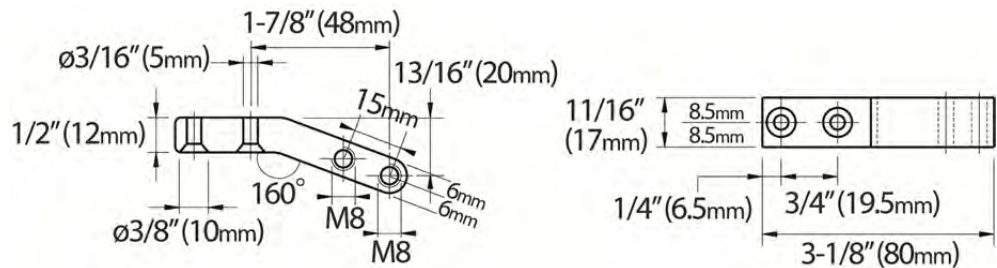
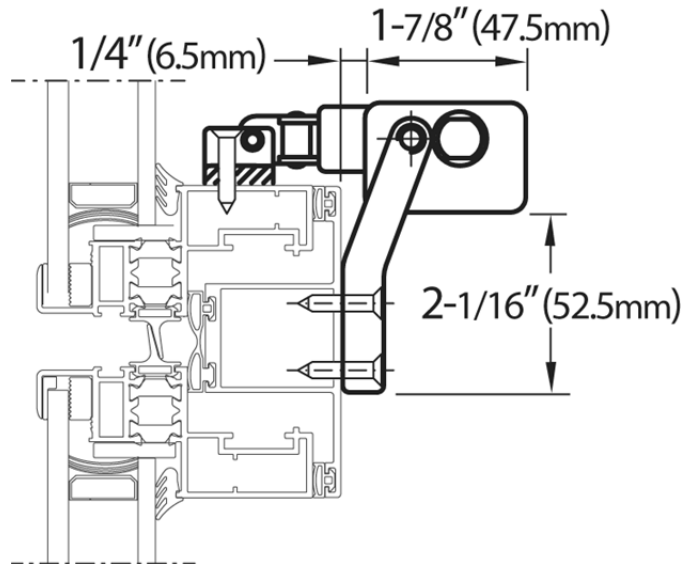


### Mounting Diagram (4)

Wall-mount with Long brackets



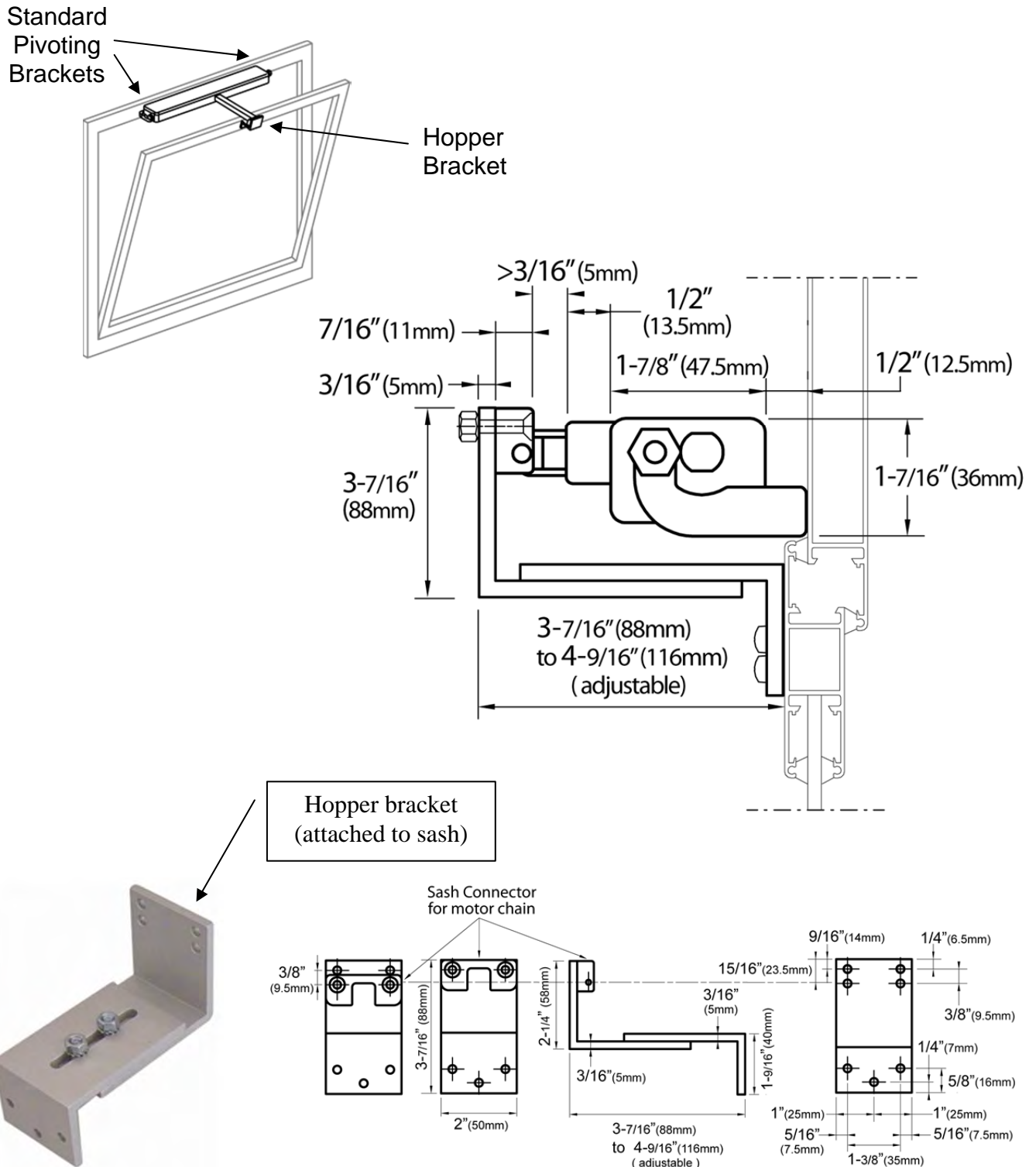
Screen applications are possible but not shown here.



**Mounting Diagram (5)**

**Hopper mount with Standard brackets and Hopper bracket**

- \* More Hopper mounting options are available.
- \* Screen applications are possible but not shown here.



## **Guidelines for Planning Wiring, Power Supplies, and Other Accessories**

Every automation project is different and will require varying electrical wiring and power arrangements, which are the responsibility of the project electrical contractor. FFI is a material supplier and not a project subcontractor. Based on project experiences, however, FFI does have some general advice for project electrical contractors who are planning electrical wiring and power requirements:

The **distance between power supply and actuator** is a critical factor in the design of every project. The distance means the actual length of wire, not the distance “as the crow flies” between the actuators, power supplies, and power source. Electrical contractors are responsible to **plan and account for voltage drop** that occurs along the distance of wire. Therefore **voltage drop calculations** are critical to ensure adequate power to actuators. (There are electrical calculators for voltage drop available online for reference, for example at [http://www.electrician2.com/calculators/vd\\_calculator\\_initial.html](http://www.electrician2.com/calculators/vd_calculator_initial.html)).

**Power supplies and wiring** need to provide for normal actuator amperage current draw and also for exceptional current demands at open and close, which can produce amperage spikes up to 2 to 3 times normal demand.

**A reliable and consistent current supply is critical to the operation of actuators and accessories.** Even a momentary drop in voltage below the stated requirement of 24VDC +\ - 10% may result in malfunction. For these reasons, FFI strongly recommends that power supplies, controls, and conductors be sized to provide capacity of minimally 150%, and up to 250%, of normal operating amperage requirements.

**Supply lines to the power supply** must also be ample for peak demand. Additional factors (such as temperature or number of connections) may affect performance of the conductor.

**Arrangements for proper field wiring must be coordinated by the electrical contractor.** Project specifications for number of actuators and wire run distance will affect the size of wire gauge, conduits, and raceways. Consult with FFI before ordering power supplies and wiring for your project.

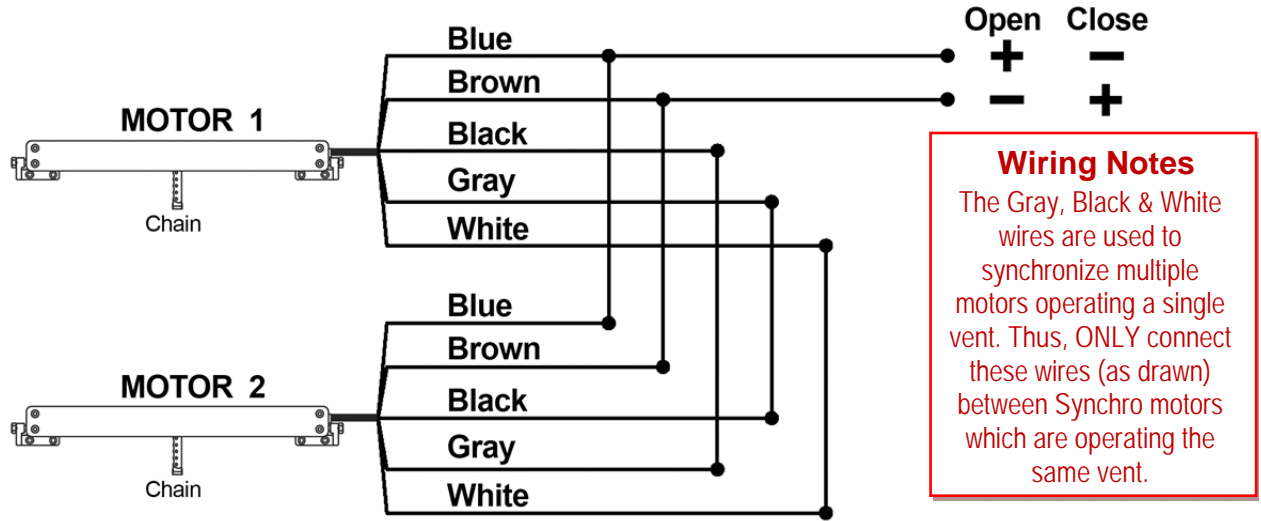
In the past, FFI provided a generic sample wire gauge and run length chart, which was for reference for a single motor only, under standard operating conditions, and not intended as a job-specific guide. However, due to situations of this information being mis-interpreted in planning for multiple-motor projects, FFI no longer supplies this chart.

Again, proper field materials and wiring must be confirmed by the project electrical contractor. While planning project, refer to last page of this guide: ‘Automation Project Material Supply Chart’. Consult with FFI for additional advice for your project.

View Synchro-Quasar diagram A, B, C, D or E to match actuator model & project requirements.

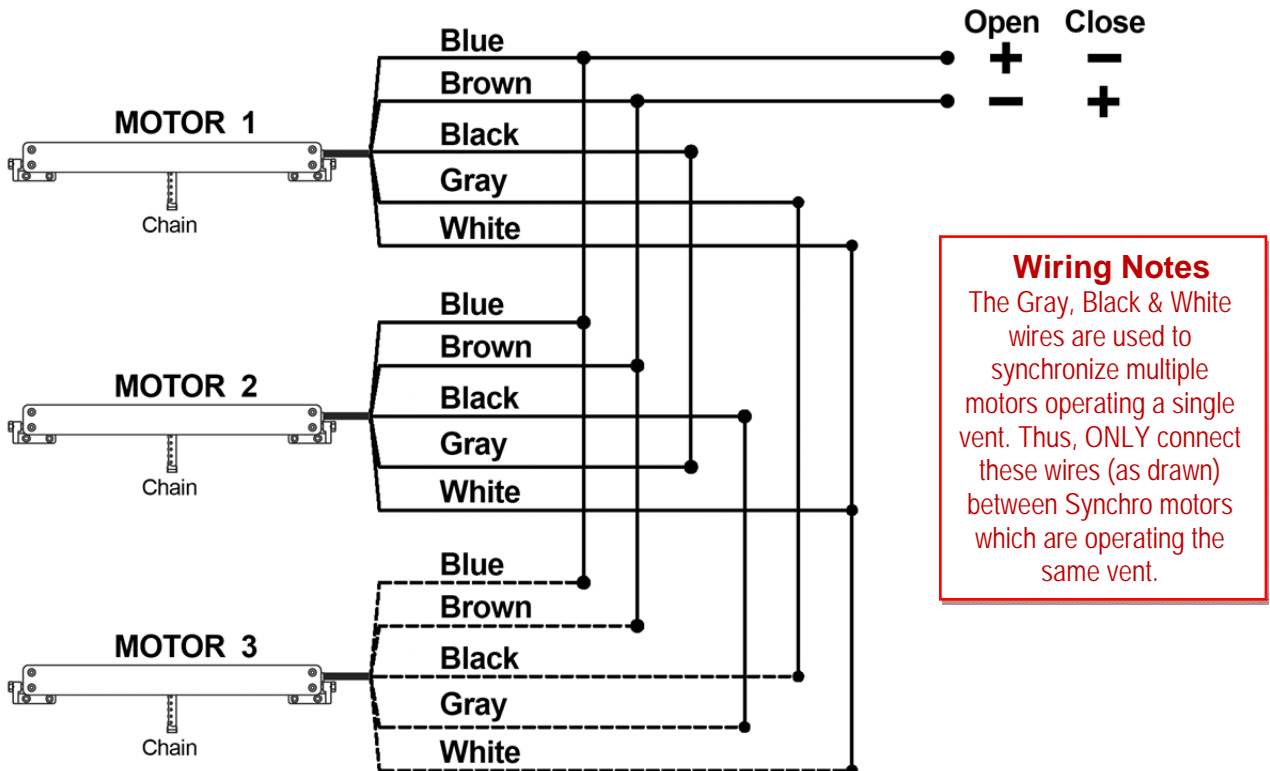
Sample Wiring Diagram (A): for connecting 2 DC Synchro-Quasar motors

FOR REFERENCE ONLY – NOT PROJECT SPECIFIC



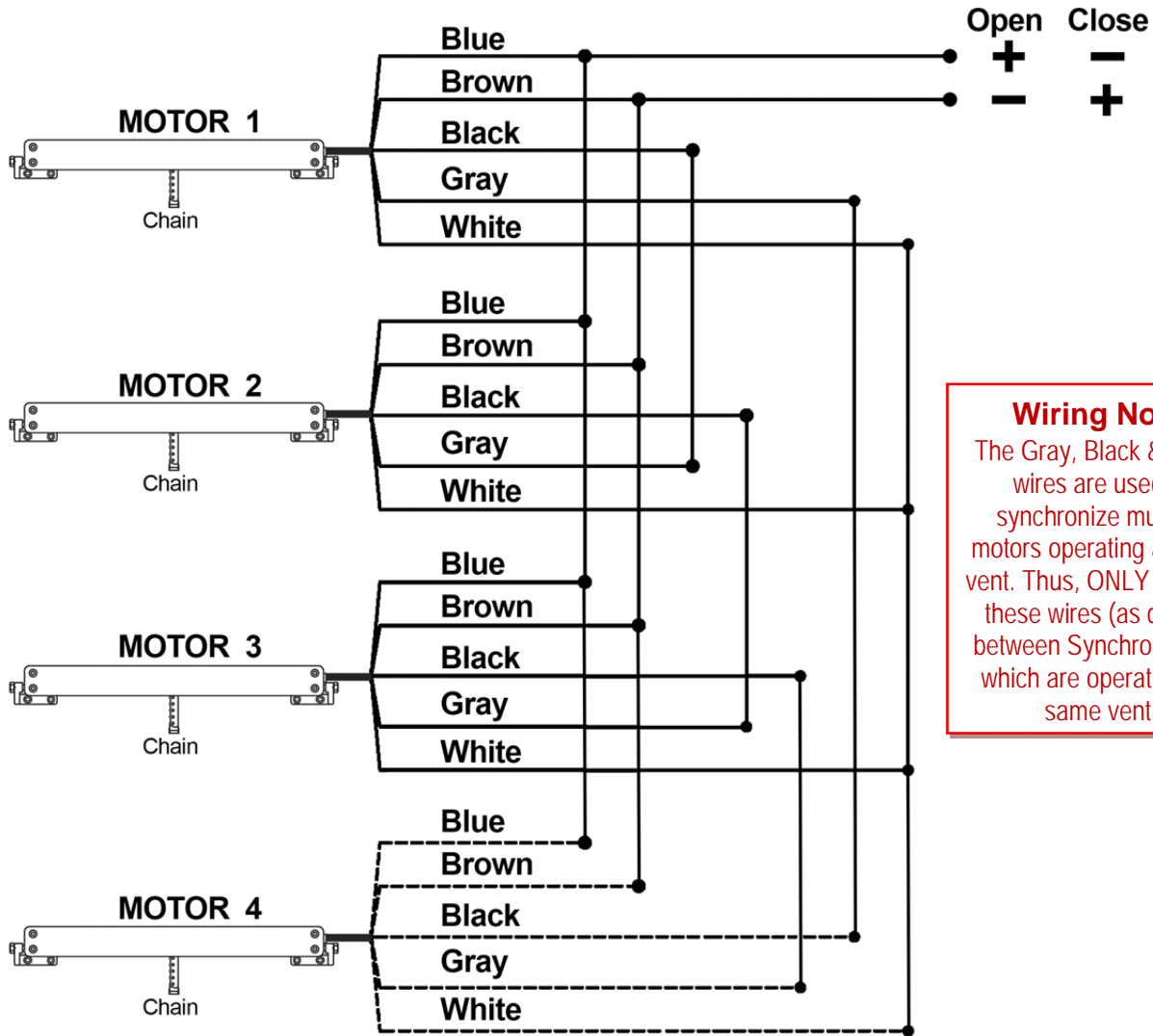
Sample Wiring Diagram (B): for connecting 3 DC Synchro-Quasar motors

FOR REFERENCE ONLY – NOT PROJECT SPECIFIC



**Sample Wiring Diagram (C): for connecting 4 DC Synchro-Quasar motors**

FOR REFERENCE ONLY – NOT PROJECT SPECIFIC

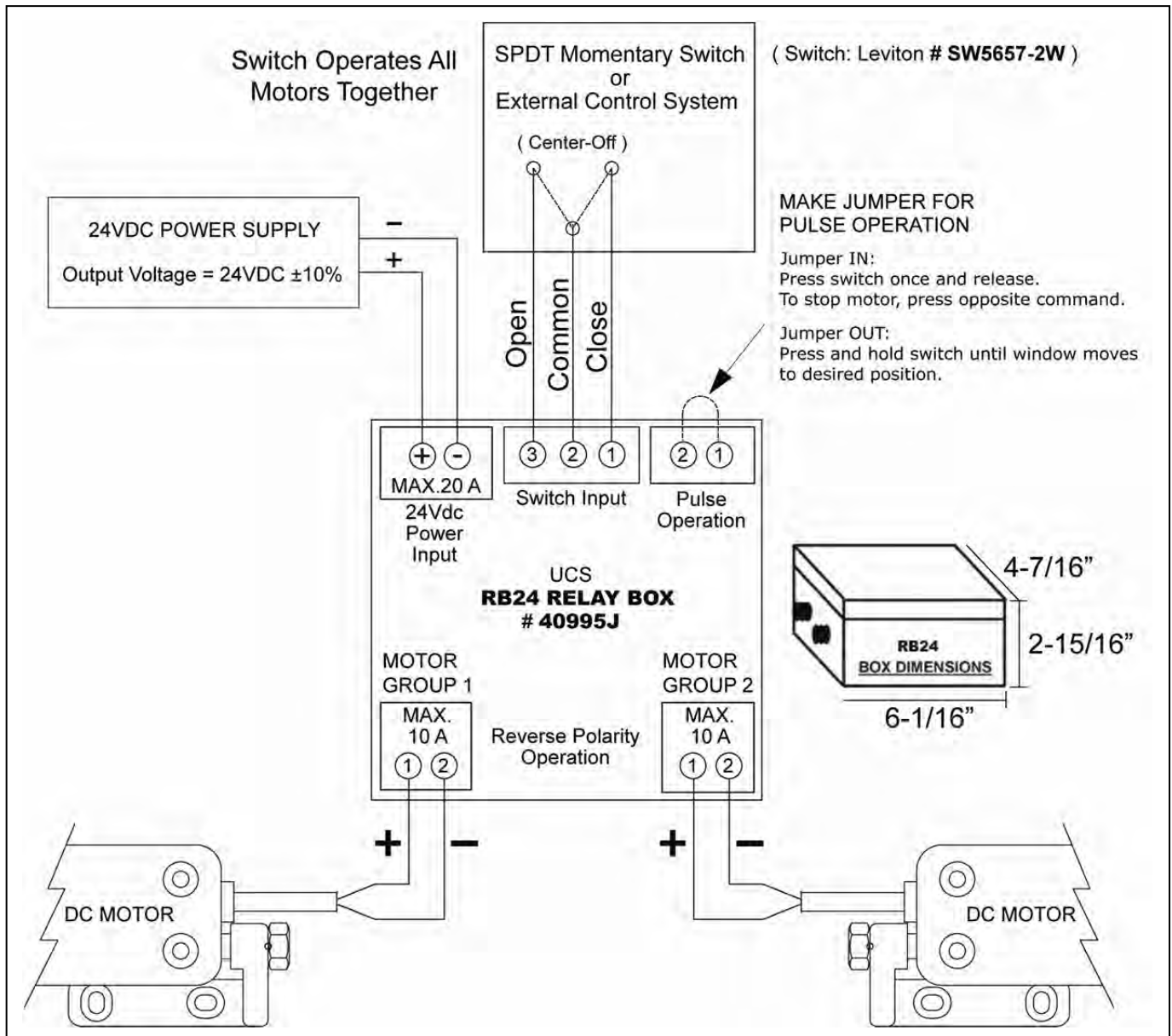


**Wiring Notes**  
 The Gray, Black & White wires are used to synchronize multiple motors operating a single vent. Thus, ONLY connect these wires (as drawn) between Synchro motors which are operating the same vent.

**Sample Wiring Diagram (D): for Synchro-Quasar DC with Control Relay Box for interface with DDS, BMS, BAS, HVAC, or Home Automation Systems**

**FOR REFERENCE ONLY – NOT PROJECT SPECIFIC**

This wiring scheme is recommended for low voltage systems because it turns off power to motors after a time delay (< 1 minute), in accordance with the manufacturer’s recommendation.

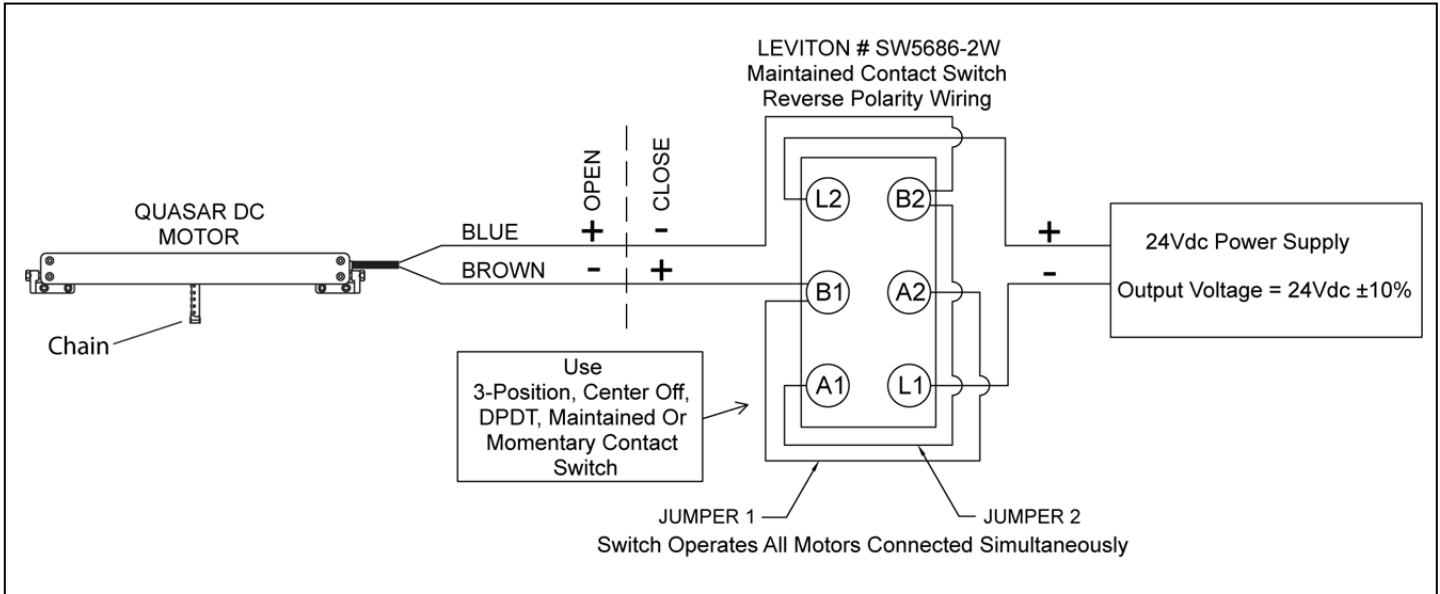


**Power Supplies:** FFI has a variety of Power Supplies that are UL listed; ask for part numbers and advise.  
**Relay Boxes/Control Boxes:** In addition to the RB24 control relay box model shown above, FFI has a variety of **UL Listed Control Boxes** for interface with direct Digital Control (DDC) and Building Management Systems (BMS); ask for part numbers and advise.



**Sample Wiring Diagram (E): Synchro-Quasar DC with maintained contact switch**

FOR REFERENCE ONLY – NOT PROJECT SPECIFIC



**Operation of Maintained Contact Switch DPDT (Double Pole-Double Throw):**

- Maintained contact means switch must be pressed continuously until actuator(s) reach open or closed position.
- To **open**, **press and hold** the switch up until the actuator chain has fully extended.
- To **close**, **press and hold** the switch down until the actuator chain has fully retracted.