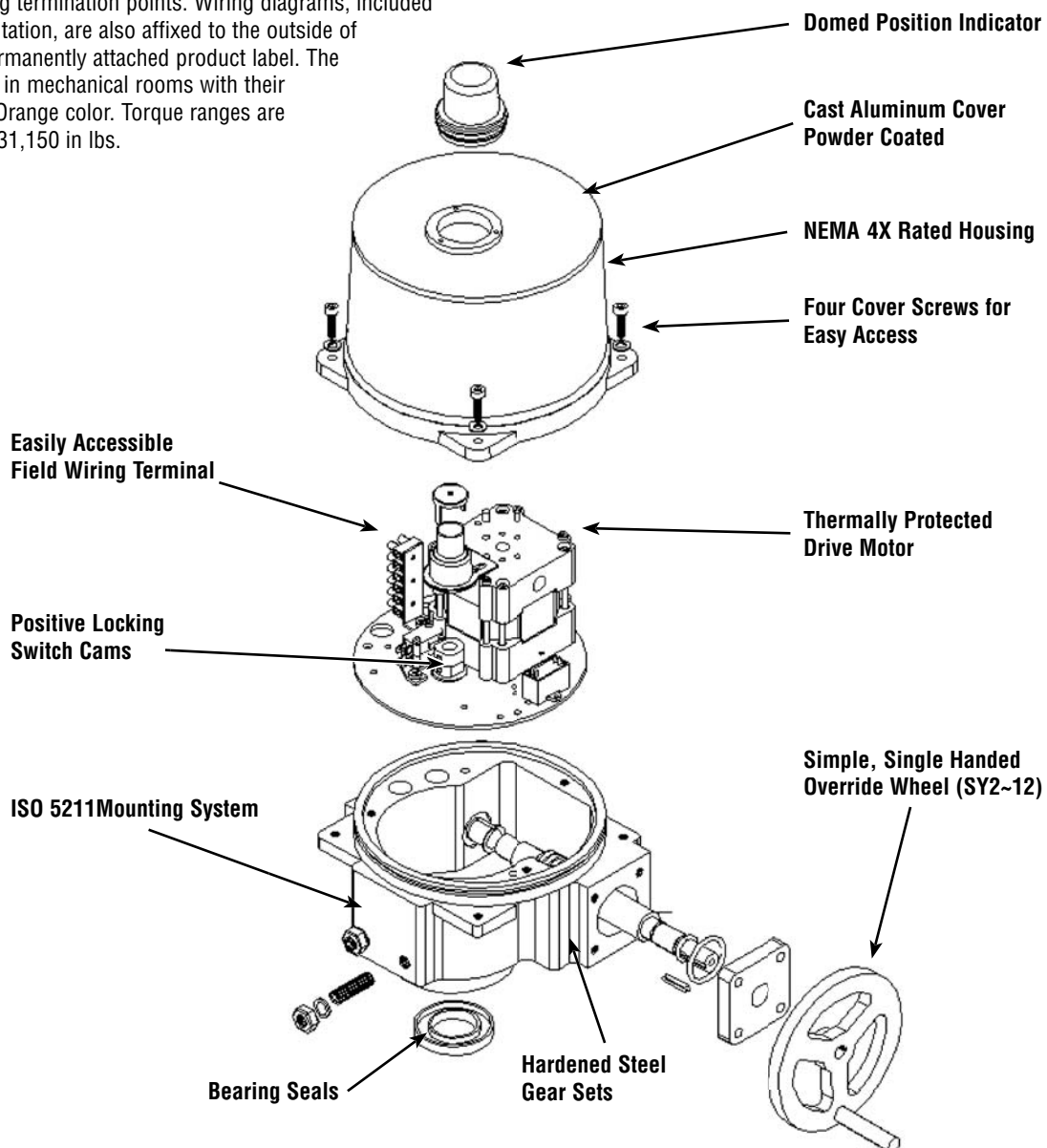


# SY Series Actuators

Belimo's SY series electric actuators have been designed to mate with our HD(U), Grooved and SHP... series butterfly valves and other quarter turn valve applications.

The patented gear drive mechanism provides for efficient, smooth operation while allowing easy manual override at any time. Drawing upon years of experience in the actuation industry, we have incorporated the most desirable features into the SY product range.

All units have NEMA 4X ratings, easily visible position indicators, international standard ISO5211 mounting systems, internal thermal motor overload protection, heater, dual auxiliary Form C switches, and easily accessible wiring termination points. Wiring diagrams, included in all printed documentation, are also affixed to the outside of the housing on the permanently attached product label. The units are easily visible in mechanical rooms with their characteristic Belimo Orange color. Torque ranges are available from 310 to 31,150 in lbs.





### Application:

The SY actuators are NEMA 4X rated and designed to meet the needs of HVAC and Commercial applications. Offered on Belimo standard and high performance valve series, these actuators are available for on/off and modulating applications. Depending on the application, they are available in 24 VAC/VDC, 120 VAC and 230 VAC.

| Technical Data            |                                                                              |
|---------------------------|------------------------------------------------------------------------------|
| Electrical connection     | ½" conduit connector, screw terminals                                        |
| Motor protection          | H Class insulation (SY-1), F Class (SY-2...5)                                |
| Gear train                | high alloy steel gear sets, self locking                                     |
| Operating range           | (SY...-24) on/off, floating point<br>(SY...24MFT) 2-10 VDC, 4-20mA, 0-10 VDC |
| Sensitivity               | (SY...24MFT) 0.4mA/200mV                                                     |
| Reversal hysteresis       | (SY...24MFT) 1.0mA/500mV                                                     |
| Feedback                  | (SY...24MFT) 2-10 VDC                                                        |
| Angle of rotation         | 90°                                                                          |
| Direction of rotation     | reversible                                                                   |
| Position indication       | top mounted domed indicator                                                  |
| Internal humidity control | resistive heating element                                                    |
| Auxiliary switches        | (2) SPDT, 10A 250 VAC<br>factory set for 5° and 85° change of state          |
| Ambient temperature       | -22°F to +150°F [-30°C to +65°C]                                             |
| Humidity range            | up to 95%                                                                    |
| Housing type              | IP67, NEMA 4X                                                                |
| Housing material          | die cast aluminum alloy                                                      |
| Agency listings           | ISO, CE, cCSAus                                                              |

### Power Supply

24 VAC/VDC 50/60Hz, single phase

| Model       | Torque            | Speed | Power Consumption | Duty Cycle |     | Override   | Weight        |
|-------------|-------------------|-------|-------------------|------------|-----|------------|---------------|
|             |                   |       |                   | On/Off     | MFT |            |               |
| SY1-24(P)   | 35Nm/310 in-lbs   | 15s   | 1.8A              | 30%        | 75% | 8mm Wrench | 2.0kg/4.9 lb. |
| SY2-24(MFT) | 90Nm/801 in-lbs   | 15s   | 3.0A              | 30%        | 75% | Hand Wheel | 11kg/24.5 lb. |
| SY3-24(MFT) | 150Nm/1335 in-lbs | 22s   | 3.0A              | 30%        | 75% | Hand Wheel | 11kg/24.5 lb. |
| SY4-24(MFT) | 400Nm/3560 in-lbs | 16s   | 6.0A              | 30%        | 75% | Hand Wheel | 22kg/48.5 lb. |
| SY5-24(MFT) | 500Nm/4450 in-lbs | 22s   | 6.5A              | 30%        | 75% | Hand Wheel | 22kg/48.5 lb. |

# SY...120V Series Non-Spring Return Actuator

## Technical Data - 120 VAC



### Application:

The SY actuators are NEMA 4X rated and designed to meet the needs of HVAC and Commercial applications. Offered on Belimo standard and high performance valve series, these actuators are available for on/off and modulating applications. Depending on the application, they are available in 24 VAC/ VDC, 120 VAC and 230 VAC.

| Technical Data            |                                                                                |
|---------------------------|--------------------------------------------------------------------------------|
| Electrical connection     | ½" conduit connector, screw terminals                                          |
| Motor protection          | H Class insulation (SY-1),<br>F Class (SY-2...12)                              |
| Gear train                | high alloy steel gear sets,<br>self locking                                    |
| Operating range           | (SY...-110) on/off, floating point<br>(SY...120MFT) 2-10 VDC, 4-20mA, 0-10 VDC |
| Sensitivity               | (SY...120MFT) 0.4mA/200mV                                                      |
| Reversal hysteresis       | (SY...120MFT) 1.0mA/500mV                                                      |
| Feedback                  | (SY...120MFT) 2-10 VDC                                                         |
| Angle of rotation         | 90°                                                                            |
| Direction of rotation     | reversible                                                                     |
| Position indication       | top mounted domed indicator                                                    |
| Internal humidity control | resistive heating element                                                      |
| Auxiliary switches        | (2) SPDT, 5A 250 VAC<br>factory set for 5° and 85° change of state             |
| Ambient temperature       | -22°F to +150°F [-30°C to +65°C]                                               |
| Humidity range            | up to 95%                                                                      |
| Housing type              | IP67, NEMA 4X                                                                  |
| Housing material          | die cast aluminum alloy                                                        |
| Agency listings           | ISO, CE, cCSAus                                                                |

**Note:** Leakage current is possible (<3.5 mA).  
Connect ground before applying voltage.

**Power Supply** 120 VAC 50/60Hz, single phase

| Model         | Torque              | Speed<br>60Hz | Speed<br>50Hz | Power<br>Consumption | Duty Cycle |              | Override   | Weight         |
|---------------|---------------------|---------------|---------------|----------------------|------------|--------------|------------|----------------|
|               |                     |               |               |                      | On/Off     | Proportional |            |                |
| SY1-110(P)    | 35Nm/310 in-lbs     | 12s           | 13s           | 0.5A                 | 30%        | 75%          | 8mm Wrench | 2.0kg/4.9 lb.  |
| SY2-110(MFT)  | 90Nm/801 in-lbs     | 15s           | 17s           | 1.0A                 | 30%        | 75%          | Hand Wheel | 11kg/24.5 lb.  |
| SY3-110(MFT)  | 150Nm/1335 in-lbs   | 22s           | 26s           | 1.0A                 | 30%        | 75%          | Hand Wheel | 11kg/24.5 lb.  |
| SY4-110(MFT)  | 400Nm/3560 in-lbs   | 16s           | 18s           | 1.3A                 | 30%        | 75%          | Hand Wheel | 22kg/48.5 lb.  |
| SY5-110(MFT)  | 500Nm/4450 in-lbs   | 22s           | 25s           | 1.5A                 | 30%        | 75%          | Hand Wheel | 22kg/48.5 lb.  |
| SY6-110(MFT)  | 650Nm/5785 in-lbs   | 28s           | 31s           | 1.8A                 | 30%        | 75%          | Hand Wheel | 22kg/48.5 lb.  |
| SY7-110(MFT)  | 1000Nm/8900 in-lbs  | 46s           | 55s           | 3.2A                 | 30%        | 75%          | Hand Wheel | 36kg/79.5 lb.  |
| SY8-110(MFT)  | 1500Nm/13350 in-lbs | 46s           | 55s           | 4.0A                 | 30%        | 75%          | Hand Wheel | 36kg/79.5 lb.  |
| SY9-110(MFT)  | 2000Nm/17800 in-lbs | 58s           | 70s           | 3.2A                 | 30%        | 50%          | Hand Wheel | 56kg/123.5 lb. |
| SY10-110(MFT) | 2500Nm/22250 in-lbs | 58s           | 70s           | 4.0A                 | 30%        | 50%          | Hand Wheel | 56kg/123.5 lb. |
| SY11-110(MFT) | 3000Nm/26700 in-lbs | 58s           | 70s           | 3.0A                 | 30%        | 50%          | Hand Wheel | 56kg/123.5 lb. |
| SY12-110(MFT) | 3500Nm/31150 in-lbs | 58s           | 70s           | 4.0A                 | 30%        | 50%          | Hand Wheel | 56kg/123.5 lb. |

800-543-9038 USA

866-805-7089 CANADA

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### Application:

The SY actuators are NEMA 4X rated and designed to meet the needs of HVAC and Commercial applications. Offered on Belimo standard and high performance valve series, these actuators are available for on/off and modulating applications. Depending on the application, they are available in 24 VAC/ VDC, 120 VAC and 230 VAC.

| Technical Data            |                                                                                |
|---------------------------|--------------------------------------------------------------------------------|
| Electrical connection     | ½" conduit connector, screw terminals                                          |
| Overload protection       | thermally protected 135°C cut-out                                              |
| Motor protection          | H Class insulation (SY-1), F Class (SY-2...12)                                 |
| Gear train                | high alloy steel gear sets, self locking                                       |
| Operating range           | (SY...-220) on/off, floating point<br>(SY...230MFT) 2-10 VDC, 4-20mA, 0-10 VDC |
| Sensitivity               | (SY...230MFT) 0.4mA/200mV                                                      |
| Reversal hysteresis       | (SY...230MFT) 1.0mA/500mV                                                      |
| Feedback                  | (SY...230MFT) 2-10 VDC                                                         |
| Angle of rotation         | 90°                                                                            |
| Direction of rotation     | reversible                                                                     |
| Position indication       | top mounted domed indicator                                                    |
| Internal humidity control | resistive heating element                                                      |
| Auxiliary switches        | (2) SPDT, 5A 250 VAC<br>factory set for 5° and 85° change of state             |
| Ambient temperature       | -22°F to +150°F [-30°C to +65°C]                                               |
| Humidity range            | up to 95%                                                                      |
| Housing type              | IP67, NEMA 4X                                                                  |
| Housing material          | die cast aluminum alloy                                                        |
| Agency listings           | ISO, CE, cCSAus                                                                |

### Power Supply

230 VAC 50/60Hz, single phase

| Model         | Torque              | Speed<br>60Hz | Speed<br>50Hz | Power<br>Consumption | Duty Cycle |     | Override   | Weight         |
|---------------|---------------------|---------------|---------------|----------------------|------------|-----|------------|----------------|
|               |                     |               |               |                      | On/Off     | MFT |            |                |
| SY1-220(P)    | 35Nm/310 in-lbs     | 12s           | 13s           | 0.3A                 | 30%        | 75% | 8mm Wrench | 2.0kg/4.9 lb.  |
| SY2-220(MFT)  | 90Nm/801 in-lbs     | 15s           | 17s           | 0.5A                 | 30%        | 75% | Hand Wheel | 11kg/24.5 lb.  |
| SY3-220(MFT)  | 150Nm/1335 in-lbs   | 22s           | 26s           | 0.5A                 | 30%        | 75% | Hand Wheel | 11kg/24.5 lb.  |
| SY4-220(MFT)  | 400Nm/3560 in-lbs   | 16s           | 18s           | 0.6A                 | 30%        | 75% | Hand Wheel | 22kg/48.5 lb.  |
| SY5-220(MFT)  | 500Nm/4450 in-lbs   | 22s           | 25s           | 0.7A                 | 30%        | 75% | Hand Wheel | 22kg/48.5 lb.  |
| SY6-220(MFT)  | 650Nm/5785 in-lbs   | 28s           | 31s           | 0.8A                 | 30%        | 75% | Hand Wheel | 22kg/48.5 lb.  |
| SY7-220(MFT)  | 1000Nm/8900 in-lbs  | 46s           | 55s           | 1.6A                 | 30%        | 75% | Hand Wheel | 36kg/79.5 lb.  |
| SY8-220(MFT)  | 1500Nm/13350 in-lbs | 46s           | 55s           | 2.0A                 | 30%        | 75% | Hand Wheel | 36kg/79.5 lb.  |
| SY9-220(MFT)  | 2000Nm/17800 in-lbs | 58s           | 70s           | 1.6A                 | 30%        | 50% | Hand Wheel | 56kg/123.5 lb. |
| SY10-220(MFT) | 2500Nm/22250 in-lbs | 58s           | 70s           | 2.0A                 | 30%        | 50% | Hand Wheel | 56kg/123.5 lb. |
| SY11-220(MFT) | 3000Nm/26700 in-lbs | 58s           | 70s           | 1.6A                 | 30%        | 50% | Hand Wheel | 56kg/123.5 lb. |
| SY12-220(MFT) | 3500Nm/31150 in-lbs | 58s           | 70s           | 2.2A                 | 30%        | 50% | Hand Wheel | 56kg/123.5 lb. |

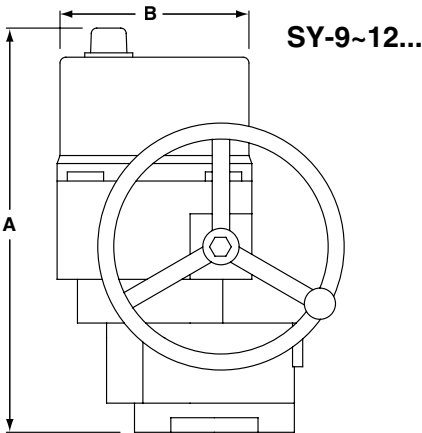
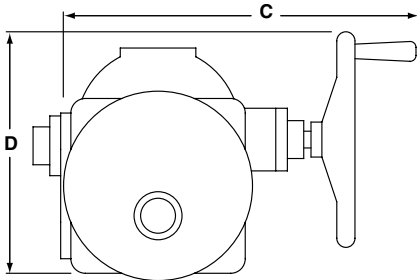
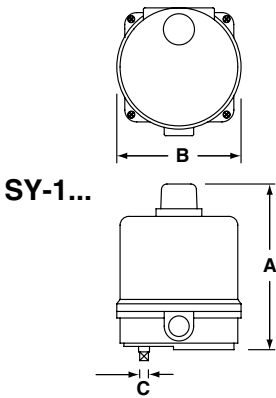
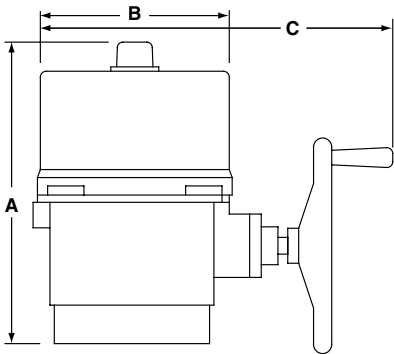
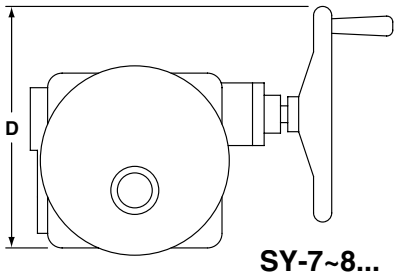
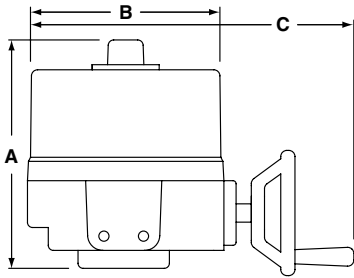
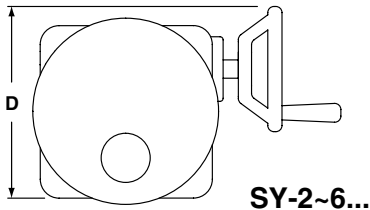
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SY... Series Non-Spring Return Actuator

Dimensions



| MODEL  | DIM A (MAX) | Add to Dim A for cover removal | DIM B       | DIM C (MAX) | DIM D       |
|--------|-------------|--------------------------------|-------------|-------------|-------------|
|        | Inches [mm] | Inches [mm]                    | Inches [mm] | Inches [mm] | Inches [mm] |
| SY1    | 6.10 [155]  | 3.94 [100]                     | 4.25 [108]  | 8mm         | -           |
| SY2~3  | 10.04 [255] | 7.48 [190]                     | 7.87 [200]  | 12.99 [330] | 7.87 [200]  |
| SY4~6  | 12.40 [315] | 8.86 [225]                     | 9.21 [234]  | 14.96 [380] | 11.81 [300] |
| SY7~8  | 16.54 [420] | 8.86 [225]                     | 9.21 [234]  | 17.72 [450] | 13.39 [340] |
| SY9~12 | 23.23 [590] | 8.86 [225]                     | 10.24 [260] | 18.50 [470] | 13.78 [350] |

Note: ~ indicates range of actuator i.e., SY2~3 = SY-2 and SY-3

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| 24 VAC                                          |      |      |      |      |      |
|-------------------------------------------------|------|------|------|------|------|
|                                                 | SY1  | SY2  | SY3  | SY4  | SY5  |
|                                                 | Amps | Amps | Amps | Amps | Amps |
| wire gauge                                      | 1.8  | 3    | 3    | 6    | 6.5  |
| MAX Distance between Actuator and Supply (feet) |      |      |      |      |      |
| 18                                              | 92   | 55   | 55   |      |      |
| 16                                              | 144  | 87   | 87   | 43   | 40   |
| 14                                              | 233  | 140  | 140  | 70   | 65   |
| 12                                              | 357  | 214  | 214  | 107  | 99   |
| 10                                              | 606  | 364  | 364  | 182  | 168  |
| 8                                               | 905  | 543  | 543  | 271  | 250  |

| 110 VAC                                         |       |      |      |      |      |      |      |      |      |      |      |      |
|-------------------------------------------------|-------|------|------|------|------|------|------|------|------|------|------|------|
|                                                 | SY1   | SY2  | SY3  | SY4  | SY5  | SY6  | SY7  | SY8  | SY9  | SY10 | SY11 | SY12 |
|                                                 | Amps  | Amps | Amps | Amps | Amps | Amps | Amps | Amps | Amps | Amps | Amps | Amps |
| wire gauge                                      | 0.5   | 1    | 1    | 1.3  | 1.5  | 1.8  | 3.2  | 4    | 3.2  | 4    | 3    | 4    |
| MAX Distance between Actuator and Supply (feet) |       |      |      |      |      |      |      |      |      |      |      |      |
| 18                                              | 1515  | 758  | 758  | 583  | 505  | 421  | 237  | 189  | 237  | 189  | 253  | 189  |
| 16                                              | 2381  | 1190 | 1190 | 916  | 794  | 661  | 372  | 298  | 372  | 298  | 397  | 298  |
| 14                                              | 3846  | 1923 | 1923 | 1479 | 1282 | 1068 | 601  | 481  | 601  | 481  | 641  | 481  |
| 12                                              | 5882  | 2941 | 2941 | 2262 | 1961 | 1634 | 919  | 735  | 919  | 735  | 980  | 735  |
| 10                                              | 10000 | 5000 | 5000 | 3846 | 3333 | 2778 | 1563 | 1250 | 1563 | 1250 | 1667 | 1250 |
| 8                                               | 14925 | 7463 | 7463 | 5741 | 4975 | 4146 | 2332 | 1866 | 2332 | 1866 | 2488 | 1866 |

| 220 VAC    |                                                 |       |       |       |       |       |      |      |      |      |      |      |
|------------|-------------------------------------------------|-------|-------|-------|-------|-------|------|------|------|------|------|------|
|            | SY1                                             | SY2   | SY3   | SY4   | SY5   | SY6   | SY7  | SY8  | SY9  | SY10 | SY11 | SY12 |
|            | Amps                                            | Amps  | Amps  | Amps  | Amps  | Amps  | Amps | Amps | Amps | Amps | Amps | Amps |
| wire gauge | 0.3                                             | 0.5   | 0.5   | 0.6   | 0.7   | 0.8   | 1.6  | 2    | 1.6  | 2    | 1.6  | 2.2  |
|            | MAX Distance between Actuator and Supply (feet) |       |       |       |       |       |      |      |      |      |      |      |
| 18         | 5051                                            | 3030  | 3030  | 2525  | 2165  | 1894  | 947  | 758  | 947  | 758  | 947  | 689  |
| 16         | 7937                                            | 4762  | 4762  | 3968  | 3401  | 2976  | 1488 | 1190 | 1488 | 1190 | 1488 | 1082 |
| 14         | 12821                                           | 7692  | 7692  | 6410  | 5495  | 4808  | 2404 | 1923 | 2404 | 1923 | 2404 | 1748 |
| 12         | 19608                                           | 11765 | 11765 | 9804  | 8403  | 7353  | 3676 | 2941 | 3676 | 2941 | 3676 | 2674 |
| 10         | 33333                                           | 20000 | 20000 | 16667 | 14286 | 12500 | 6250 | 5000 | 6250 | 5000 | 6250 | 4545 |
| 8          | 49751                                           | 29851 | 29851 | 24876 | 21322 | 18657 | 9328 | 7463 | 9328 | 7463 | 9328 | 6784 |

The NEC mandates that 24 VAC over 100 VA power requires CLASS 1 wiring conduit. Local codes may vary. Do NOT mix CLASS 1 & CLASS 2 circuits in the same conduit. Generally, 24 VAC actuators over 100 VA should be changed to 120 VAC models.

# SY... Series Non-Spring Return Actuator

## Current Draws



| 24V AC/DC | Model | Torque | Speed (90°) | Motor Power | Run  | Start | Lock  |
|-----------|-------|--------|-------------|-------------|------|-------|-------|
|           | SY1   | 35     | 15s         | 10W         | 0.6A | .08A  | 1.4A  |
|           | SY2   | 90     | 15s         | 70W         | 3.0A | 5.0A  | 13.0A |
|           | SY3   | 150    | 22s         | 70W         | 3.0A | 5.0A  | 13.0A |
|           | SY4   | 400    | 16s         | 180W        | 6.0A | 8.0A  | 30.0A |
|           | SY5   | 500    | 22s         | 180W        | 6.5A | 8.0A  | 30.0A |

| 110V | Model | Torque | Speed (90°) | Motor Power | Run  | Start | Lock  |
|------|-------|--------|-------------|-------------|------|-------|-------|
|      | SY1   | 35     | 15s         | 10W         | 0.5A | 1.5A  | 0.6A  |
|      | SY2   | 90     | 15s         | 70W         | 1.0A | 3.0A  | 1.8A  |
|      | SY3   | 150    | 22s         | 70W         | 1.0A | 3.0A  | 1.8A  |
|      | SY4   | 400    | 16s         | 180W        | 1.3A | 3.1A  | 3.6A  |
|      | SY5   | 500    | 22s         | 180W        | 1.5A | 3.0A  | 3.6A  |
|      | SY6   | 650    | 28s         | 120W        | 1.8A | 3.0A  | 3.6A  |
|      | SY7   | 1000   | 46s         | 120W        | 3.2A | 12.0A | 10.0A |
|      | SY8   | 1500   | 46s         | 120W        | 4.0A | 14.0A | 10.0A |
|      | SY9   | 2000   | 58s         | 180W        | 3.2A | 12.0A | 6.0A  |
|      | SY10  | 2500   | 58s         | 220W        | 4.0A | 12.0A | 6.0A  |
|      | SY11  | 3000   | 58s         | 250W        | 3.0A | 10.0A | 5.0A  |
|      | SY12  | 3500   | 58s         | 300W        | 4.0A | 14.0A | 5.0A  |

| 230V | Model | Torque | Speed (90°) | Motor Power | Run  | Start | Lock  |
|------|-------|--------|-------------|-------------|------|-------|-------|
|      | SY1   | 35     | 15s         | 10W         | 0.3A | 1.0A  | 0.5A  |
|      | SY2   | 90     | 15s         | 70W         | 0.5A | 1.5A  | 0.9A  |
|      | SY3   | 150    | 22s         | 70W         | 0.5A | 1.5A  | 0.9A  |
|      | SY4   | 400    | 16s         | 180W        | 0.6A | 1.5A  | 1.8A  |
|      | SY5   | 500    | 22s         | 180W        | 0.7A | 1.5A  | 1.8A  |
|      | SY6   | 650    | 28s         | 120W        | 0.8A | 1.5A  | 1.8A  |
|      | SY7   | 1000   | 46s         | 120W        | 1.6A | 4.0A  | 4.00A |
|      | SY8   | 1500   | 46s         | 120W        | 2.0A | 3.6A  | 5.0A  |
|      | SY9   | 2000   | 58s         | 180W        | 1.6A | 5.0A  | 4.0A  |
|      | SY10  | 2500   | 58s         | 220W        | 2.0A | 4.0A  | 3.0A  |
|      | SY11  | 3000   | 58s         | 250W        | 1.6A | 4.0A  | 3.0A  |
|      | SY12  | 3500   | 58s         | 300W        | 2.2A | 4.0A  | 3.0A  |

**RUN**- normal operation

**START**- initial current draw

**LOCK**- power to the actuator but the motor is not moving

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Actuators: SYx-MFT



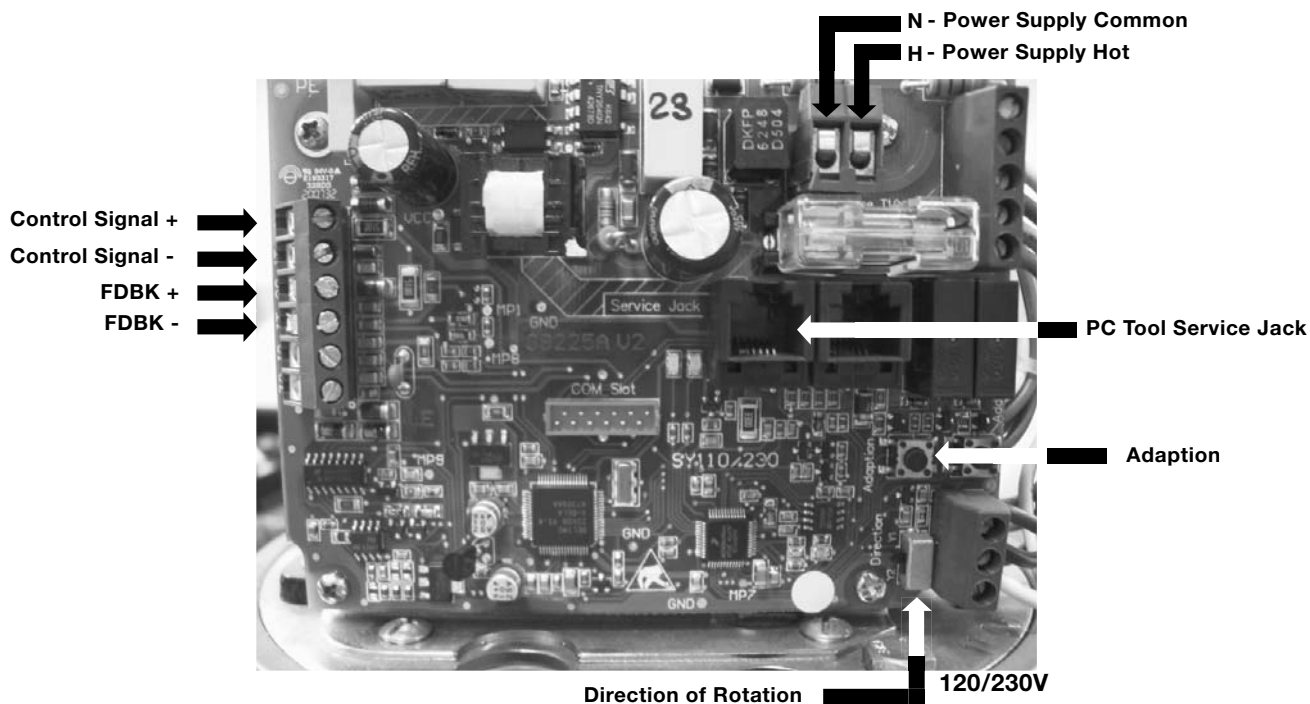
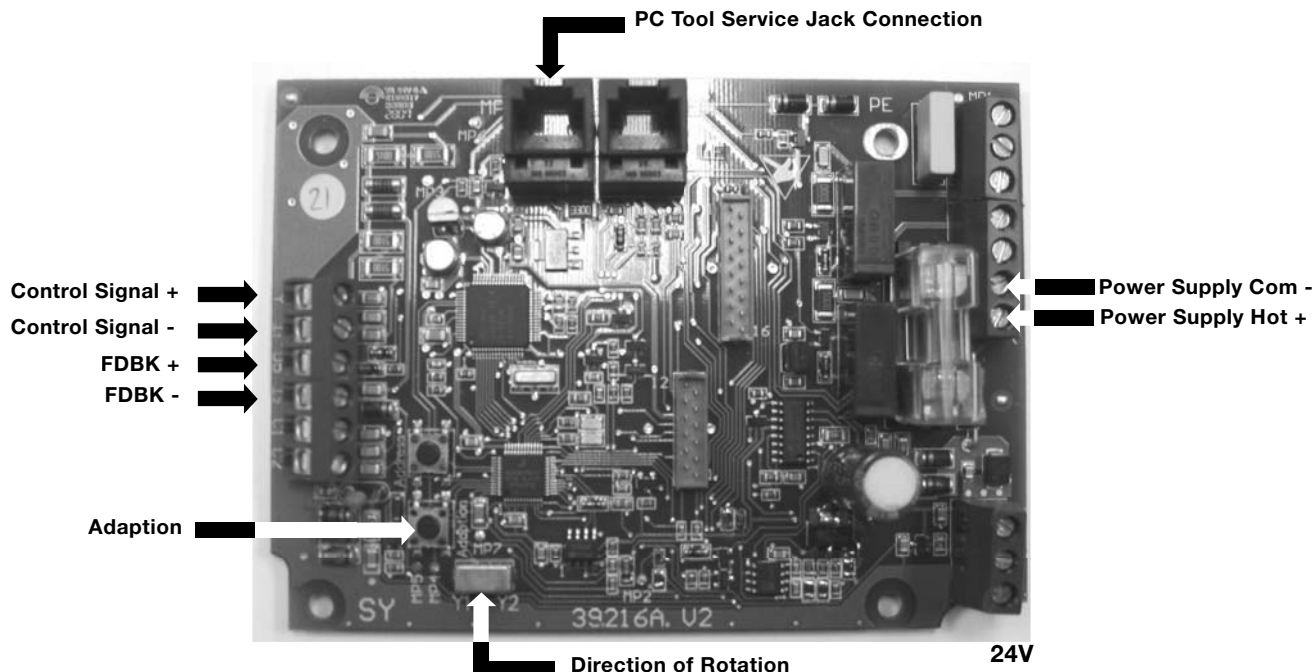
### INSTALLATION NOTES

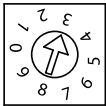
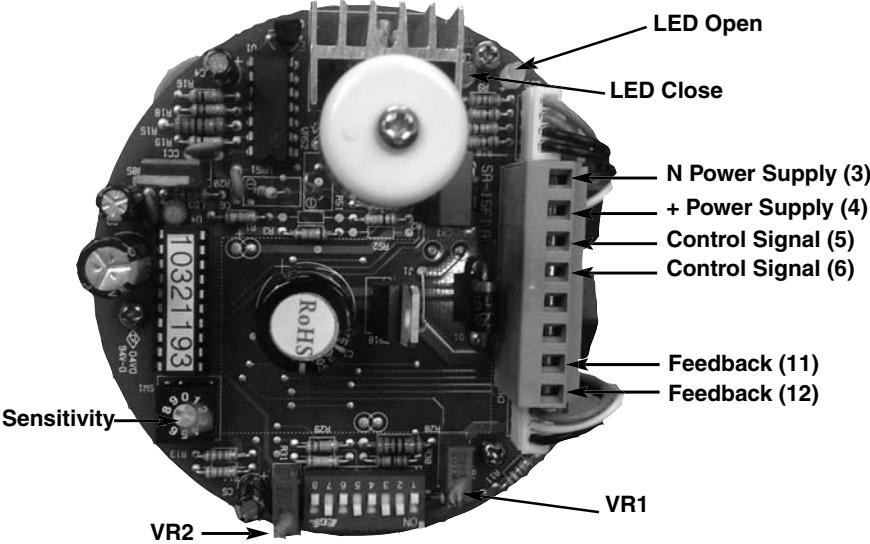


**CAUTION**

#### Notes:

1. Motor CAMS have been factory calibrated and should not be moved.
2. An adaption must be performed if any limit switch is adjusted. This will calibrate the beginning and end stopping points. Press the adaption button for 3 seconds and release.



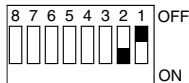


**INSTALLATION NOTES**

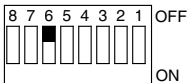
**CAUTION**

- Notes:**
1. Do not change sensitivity or dip switch settings with power applied!
  2. VR1 and VR2 are factory calibrated and should not be moved.
  3. Motor CAMS have been factory calibrated and should not be moved.

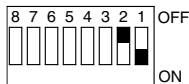
**Dip Switch Settings**



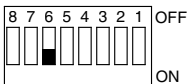
INPUT = 2-10 VDC



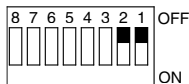
RESPONSE = DIRECT



INPUT = 4-20mA



RESPONSE = REVERSE

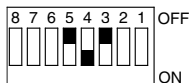


INPUT = 1-5 VDC

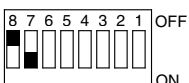


LOSS OF SIGNAL = CLOSED  
(Direct Acting)

LOSS OF SIGNAL = OPEN  
(Reverse Acting)



OUTPUT = 4-20mA

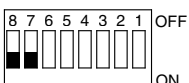


LOSS OF SIGNAL = OPEN  
(Direct Acting)

LOSS OF SIGNAL = CLOSED  
(Reverse Acting)



OUTPUT = 2-10 VDC



LOSS OF SIGNAL = STOP

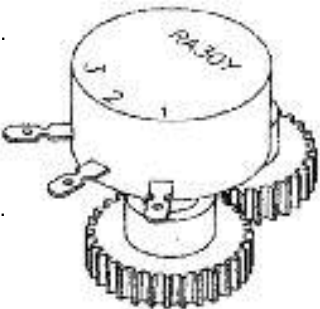
**WARNING**

**Potentiometer  
(Factory Pre-set)**

**For 2-position actuators with 1k feedback option**  
Potentiometer points 1, 2, 3 are wired to terminal blocks 8, 9, 10.  
When a valve is closed: 8, 9 → 1k Ω  
9, 10 → 0k Ω  
When a valve is opened: 8, 9 → 0k Ω  
9, 10 → 1k Ω

**For modulating actuators with 1k feedback option\***  
Potentiometer points 1, 2, 3 are wired to terminal blocks 8, 9, 10.  
When a valve is closed: 8, 9 → 1k Ω  
9, 10 → 0k Ω  
When a valve is opened: 8, 9 → 0k Ω  
9, 10 → 1k Ω

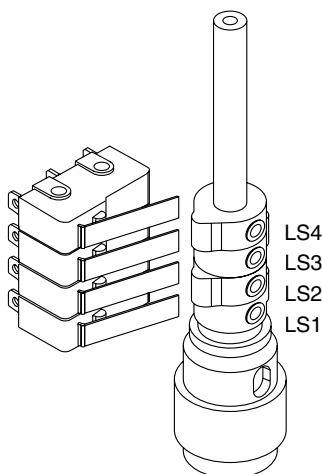
\*On modulating actuators **DO NOT** master/slave using optional potentiometer.





### Electrical Travel Adjustment (Factory Pre-set)

SY-1



Factory pre-set see chart below. Field adjustable if required



LS4  
Auxiliary Switch for Closed Indication



LS3  
Auxiliary Switch for Opened Indication

Factory pre-set and calibrated. Do not adjust - warranty voided



LS2  
"CLOSE"  
Clockwise Decrease Closed Angle  
Counter-clockwise Increase Closed Angle

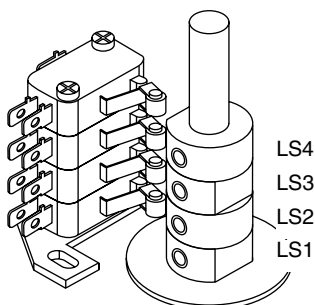


LS1  
"OPEN"  
Clockwise Increase Opening Angle  
Counter-clockwise Decrease Opening Angle



### Electrical Travel Adjustment

SY-2-12



Factory pre-set see chart below. Field adjustable if required



LS4  
Auxiliary Switch for Closed Indication



LS3  
Auxiliary Switch for Opened Indication

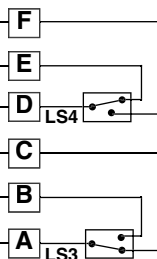
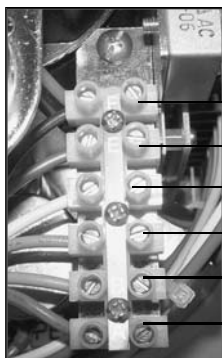
Factory pre-set and calibrated. Do not adjust - warranty voided



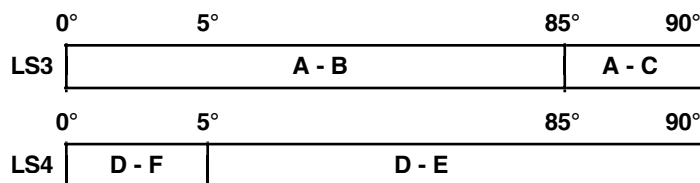
LS2  
"CLOSE"  
Clockwise Decrease Closed Angle  
Counter-clockwise Increase Closed Angle



LS1  
"OPEN"  
Clockwise Increase Opening Angle  
Counter-clockwise Decrease Opening Angle



Switches at left are shown with actuator fully open.



### INSTALLATION NOTES



CAUTION

#### Notes:

1. An adaption must be performed when the limit switches are adjusted. For the SYx-MFT actuators. This will calibrate the beginning and end stopping points. Press the adaption button for 3 seconds and release.

W546\_12

SY Actuator Wiring Diagram, SY1...5-24V – On/Off  
SY1...12-120V or 230V On/Off

Hazard Identification

Warnings and Cautions appear at appropriate sections throughout this manual. Read these carefully.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Indicates an action or condition that may cause irreversible damage to the actuator(s) or associated equipment.

Equipment damage!  
Power consumption and input impedance must be observed.


INSTALLATION NOTES

Observe class 1 and class 2 wiring restrictions.

Transformer sizing = SY actuator draw X 1.25 (safety margin)  
(Ex. SY2-24 requires 3.0A x 1.25 = 3.75A,  
3.75A X 24 VAC = 90VA Transformer).

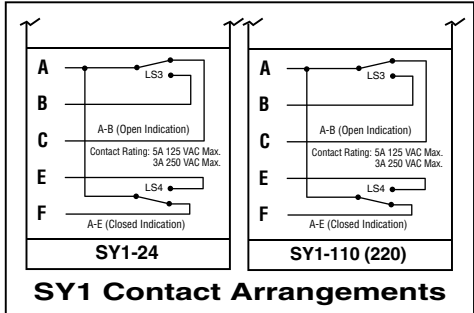
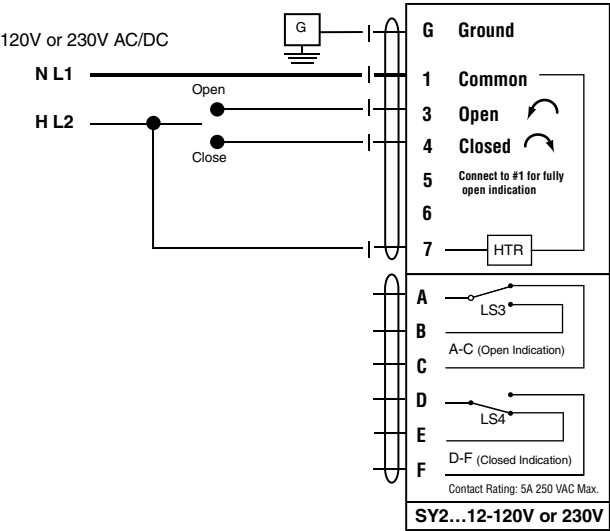
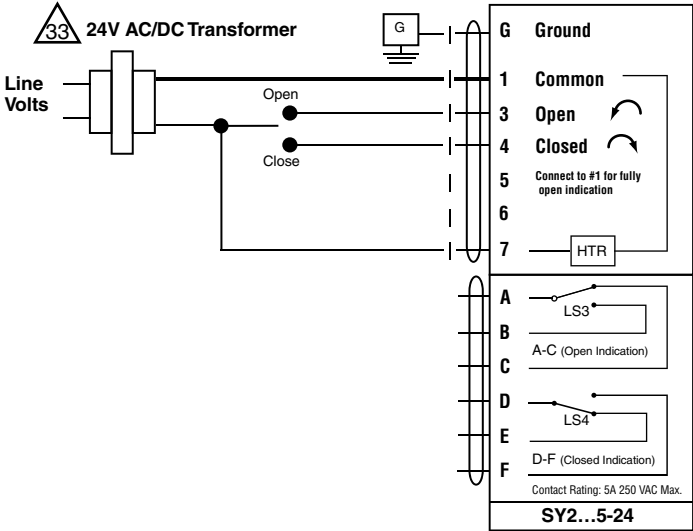

NOTES SY1...12-120V or 230V

- **Caution:** Power Supply Voltage
- Isolation relays must be used in parallel connection of multiple actuators using a common control signal input.
- "H" (L2) cannot be connected to terminal #3 and #4 simultaneously.


NOTES SY1...5-24

 Each actuator should be powered by a single, isolated control transformer.

- Isolation relays must be used in parallel connection of multiple actuators using a common control signal input.
- "H" cannot be connected to terminal #3 and #4 simultaneously.



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W547\_11

## SY Actuator Wiring Diagram, SY1-24P and SY1-110P (220P)

### Hazard Identification

Warnings and Cautions appear at appropriate sections throughout this manual. Read these carefully.

### CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

**Indicates an action or condition that may cause irreversible damage to the actuator(s) or associated equipment.**

Equipment damage!  
Power consumption and input impedance must be observed.



### INSTALLATION NOTES

Observe Class 1 and Class 2 wiring restrictions.

Transformer sizing = SY actuator draw X 1.25 (safety margin)  
(Ex. SY2-24 requires 3.0A x 1.25 = 3.75A, 3.75A X 24 VAC = 90VA Transformer)



### APPLICATION NOTES



Ground shielded wire at control panel chassis.  
Tape back ground at actuator.



Use of feedback is optional.



### NOTES SY1...24P

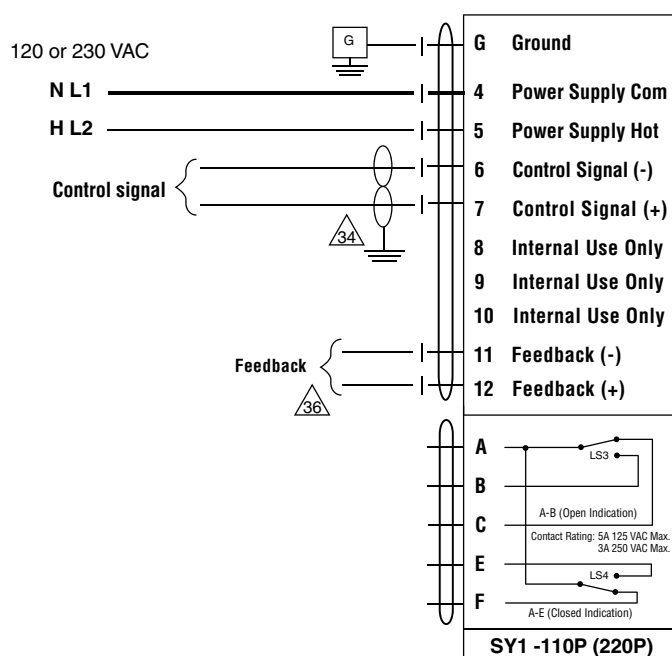
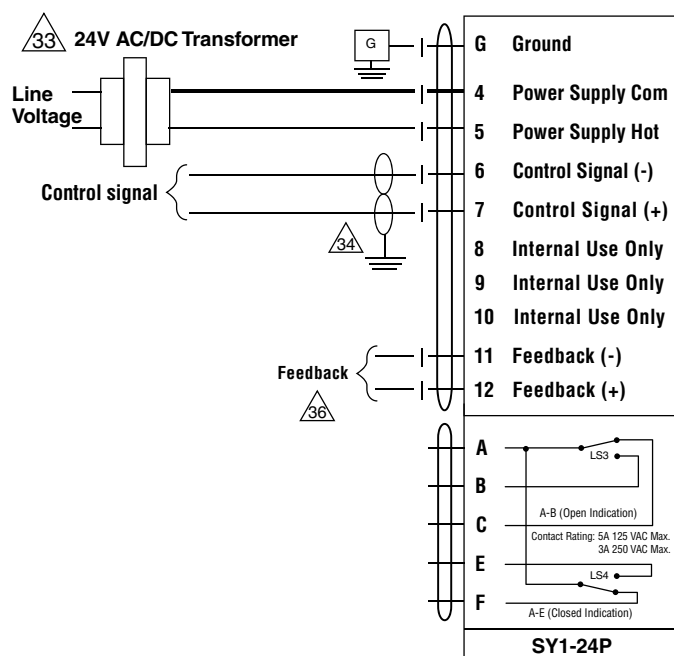
**33** Each actuator should be powered by a single, isolated control transformer.

- Power supply Com/Neutral and Control Signal "-" wiring to a common is prohibited. Terminals 4 and 6 need to be wired separately.
- Do not change sensitivity or dip switch settings with power applied.



### NOTES SY1...110P (220P)

- Caution:** Power supply voltage.
- Power supply Com/Neutral and Control Signal "-" wiring to a common is prohibited. Terminals 4 and 6 need to be wired separately.
- Do not change sensitivity or dip switch settings with power applied.



Wiring for Control Valves  
Proportional, 24V, 120/230V



W547\_2\_11

Actuator: SY2...5-24MFT SY2...12-120MFT SY2...12-230MFT

**Hazard Identification**  
Warnings and Cautions appear at appropriate sections throughout this manual. Read these carefully.

**CAUTION**  
Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Indicates an action or condition that may cause irreversible damage to the actuator(s) or associated equipment.

Equipment damage!  
Power consumption and input impedance must be observed.

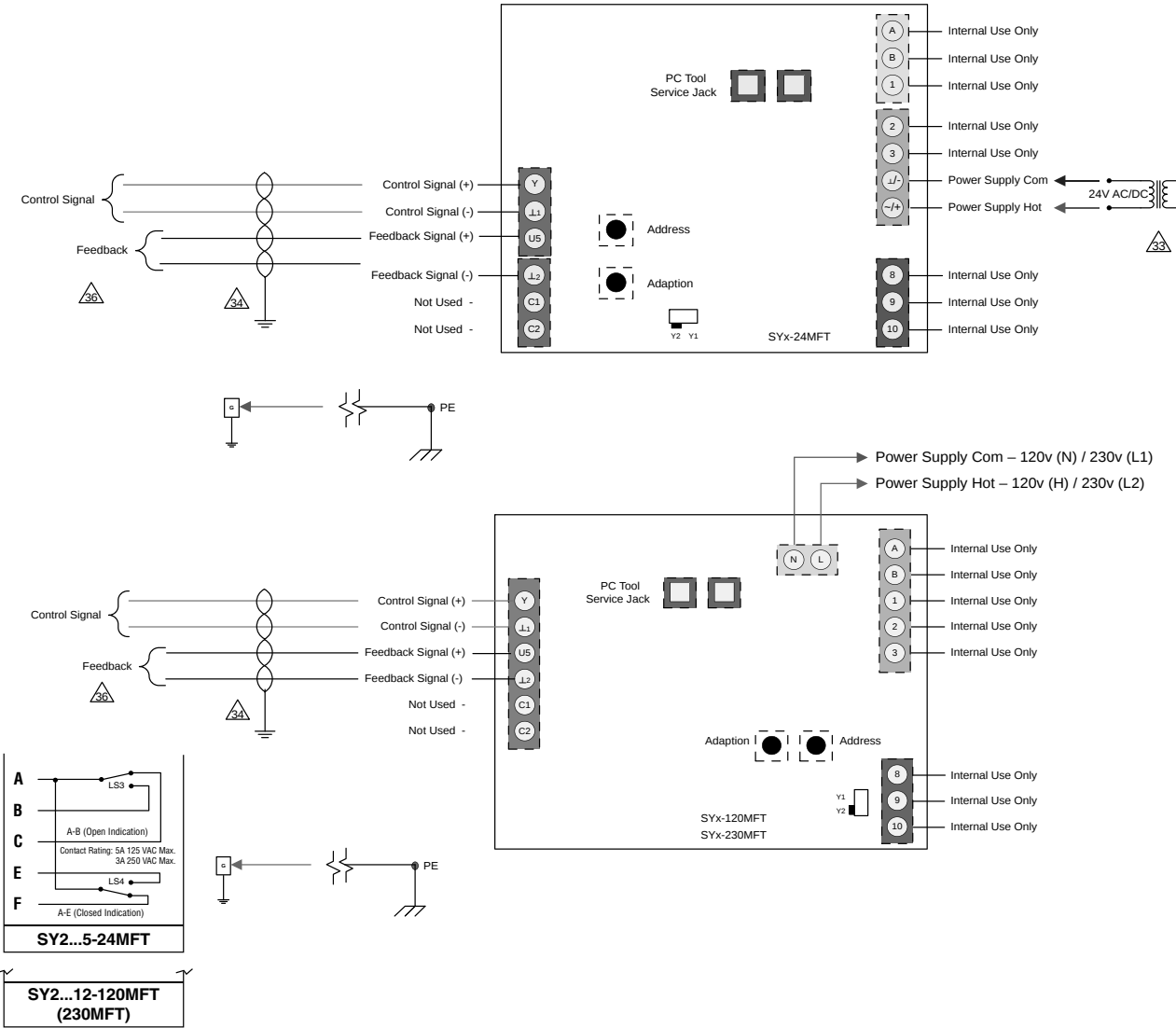
- NOTES SY2...5-24MFT**
- Each actuator should be powered by a single, isolated control transformer.
  - Power supply Com/Neutral and Control Signal "-" wiring to a common is prohibited.

**INSTALLATION NOTES**  
Observe Class 1 and Class 2 wiring restrictions.

Transformer sizing = SY actuator draw X 1.25 (safety margin)  
(Ex. SY2-24 requires 3.0A x 1.25 = 3.75A, 3.75A X 24 VAC = 90VA Transformer)

- APPLICATION NOTES**
- Ground shielded wire at control panel chassis. Tape back ground at actuator.
  - Use of feedback is optional.

- NOTES SY2...12-120MFT (230MFT)**
- Caution:** Power supply voltage.



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W549\_11

**SY Actuator Wiring Diagram, SY1...5-24 – Multiple Wiring  
SY1...12-110 (220) – Multiple Wiring**

**Hazard Identification**

Warnings and Cautions appear at appropriate sections throughout this manual. Read these carefully.

**CAUTION**

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

**Indicates an action or condition that may cause irreversible damage to the actuator(s) or associated equipment.**

Equipment damage!

Power consumption and input impedance must be observed.

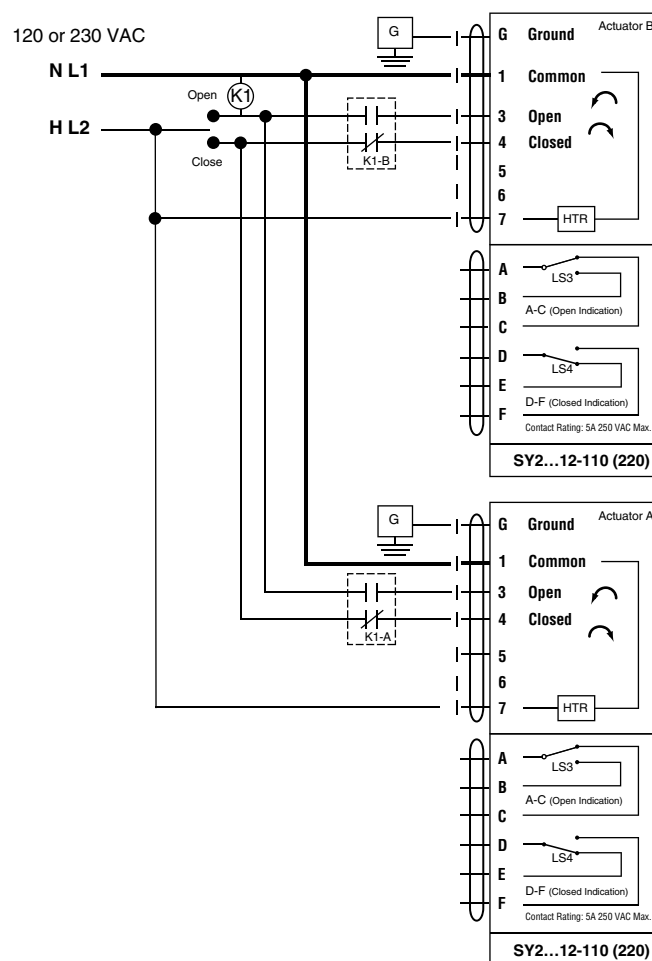
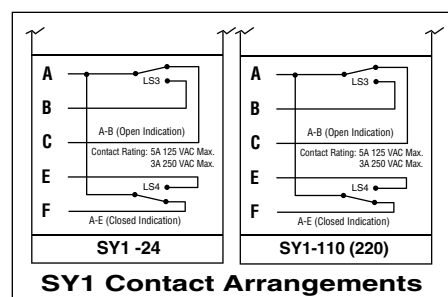
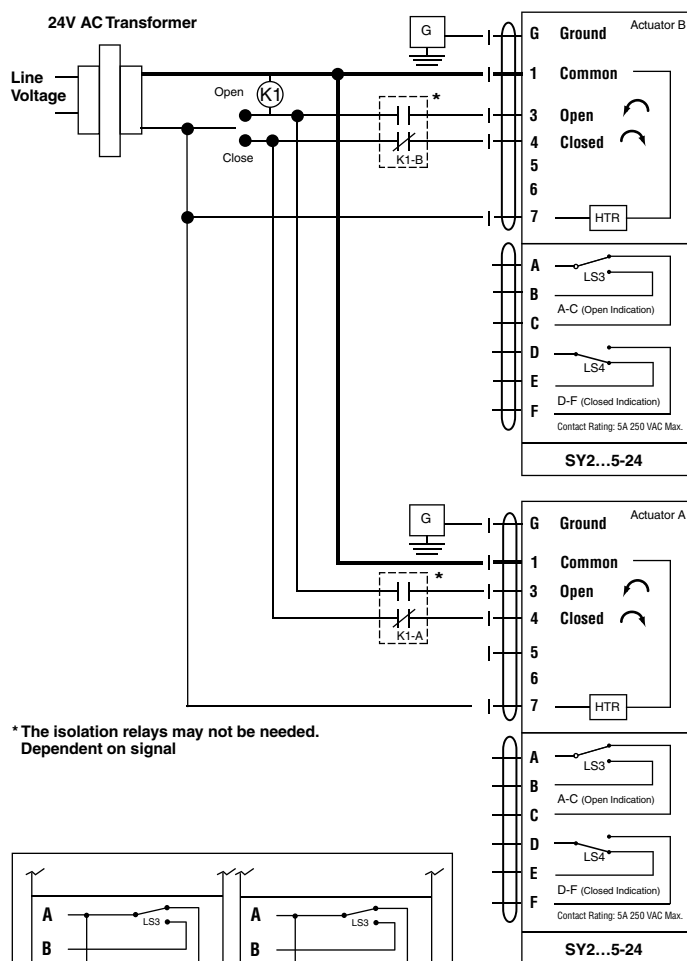
**INSTALLATION NOTES**

Observe class 1 and class 2 wiring restrictions.

Transformer sizing = SY actuator draw X 1.25 (safety margin)  
(Ex. SY2-24 requires 3.0A x 1.25 = 3.75A,  
3.75A X 24 VAC = 90VA Transformer).

**NOTES**

- **Caution:** Power Supply Voltage.
- Isolation relays must be used in parallel connection of multiple actuators using a common control signal input.
- "H" (L2) cannot be connected to terminal #3 and #4 simultaneously.
- **Required:** Terminal #7 needs to be field wired to enable heater circuit.



W550\_11

SY Actuator Wiring Diagram, SY1-24P – Multiple Wiring

Hazard Identification

Warnings and Cautions appear at appropriate sections throughout this manual. Read these carefully.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Indicates an action or condition that may cause irreversible damage to the actuator(s) or associated equipment.

Equipment damage!  
Power consumption and input impedance must be observed.

INSTALLATION NOTES

Observe class 1 and class 2 wiring restrictions.

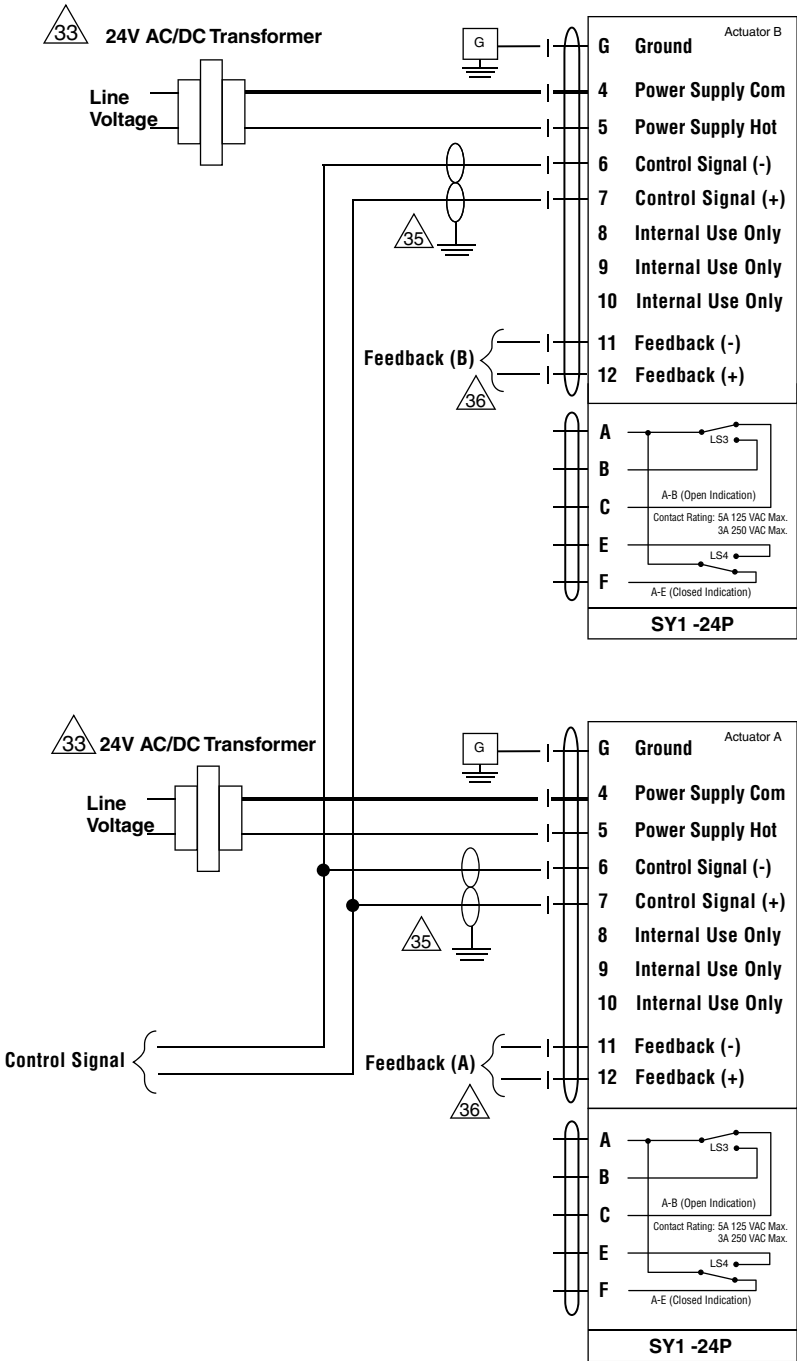
Transformer sizing = SY actuator draw X 1.25 (safety margin)  
(Ex. SY2-24 requires 3.0A x 1.25 = 3.75A,  
3.75A X 24 VAC = 90VA Transformer).

NOTES SY1-24P

- Each actuator should be powered by a single, isolated control transformer.
- SY1-24P notes:** Power supply Com/Neutral and Control Signal "-" wiring to a common is prohibited. Terminals 4 and 6 need to be wired separately otherwise irreversible damage will occur.
- Do not change sensitivity or dip switch settings with power applied.

APPLICATION NOTES

- Recommended twisted shielded pair for control wiring. Ground shielded wire at control panel chassis. Tape back ground at actuator.
- Use of feedback is optional.



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W550\_2\_11

**Actuators: SY2...5-24MFT**

### Hazard Identification

Warnings and Cautions appear at appropriate sections throughout this manual. Read these carefully.

### CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

**Indicates an action or condition that may cause irreversible damage to the actuator(s) or associated equipment.**

Equipment damage!  
Power consumption and input impedance must be observed.



### INSTALLATION NOTES

Observe class 1 and class 2 wiring restrictions.

Transformer sizing = SY actuator draw X 1.25 (safety margin)  
(Ex. SY2-24 requires 3.0A x 1.25 = 3.75A,  
3.75A X 24 VAC = 90VA Transformer).



### NOTES SY2...5-24MFT

Each actuator should be powered by a single, isolated control transformer.



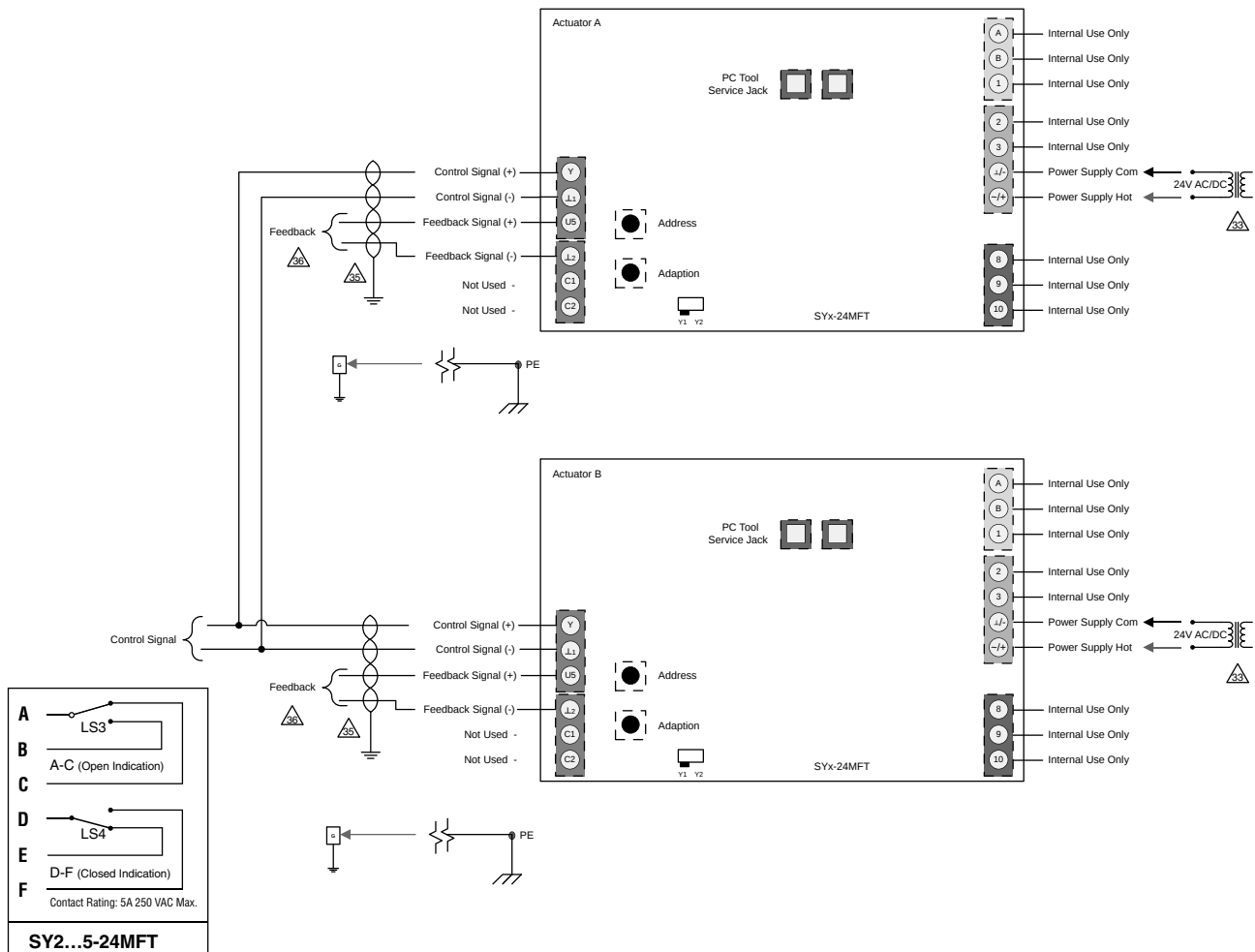
### APPLICATION NOTES



Recommended twisted shielded pair for control wiring.  
Ground shielded wire at control panel chassis.  
Tape back ground at actuator.



Use of feedback is optional.



Wiring for Control Valves  
Proportional, 110/220V, 120/230V



W552\_1\_11

Actuators: SY1-110P SY1-220P

Hazard Identification

Warnings and Cautions appear at appropriate sections throughout this manual. Read these carefully.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Indicates an action or condition that may cause irreversible damage to the actuator(s) or associated equipment.

Equipment damage!  
Power consumption and input impedance must be observed.



INSTALLATION NOTES

Observe class 1 and class 2 wiring restrictions.



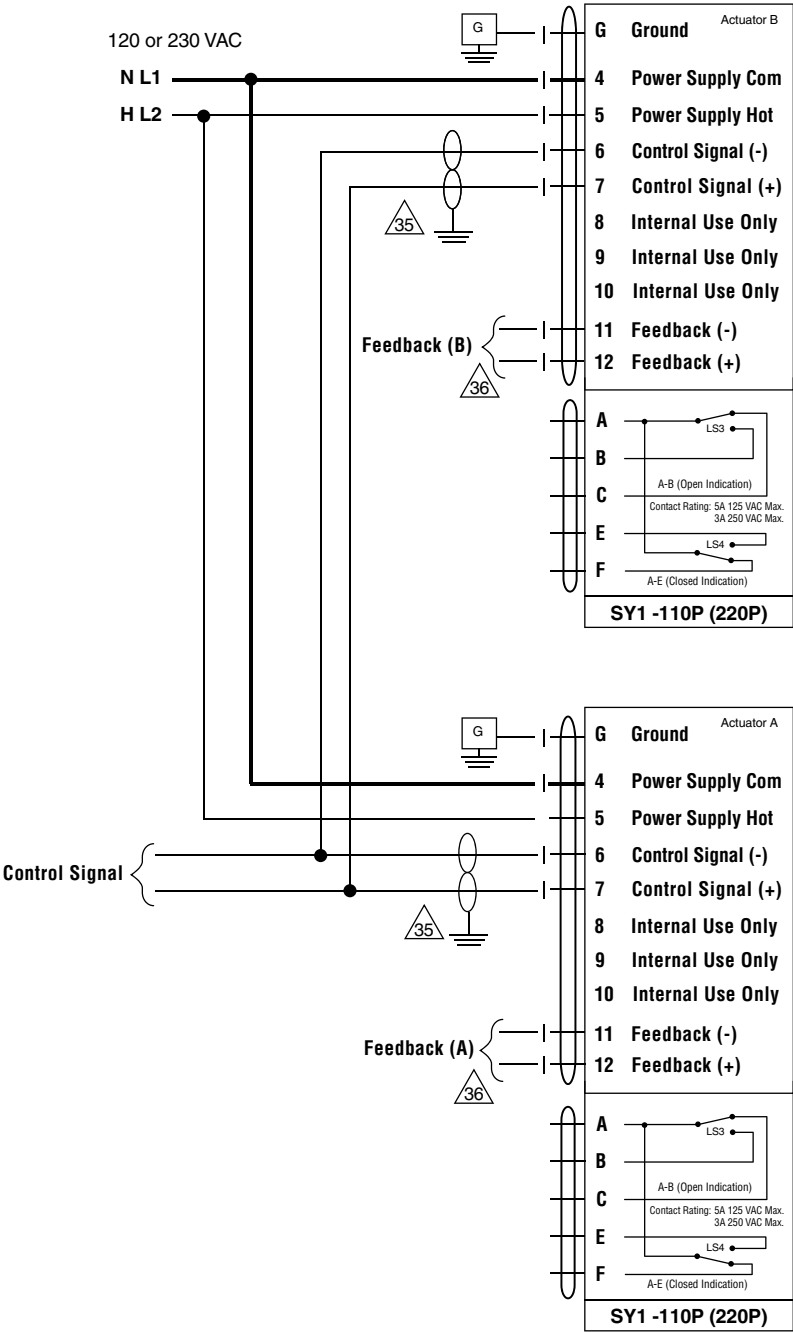
APPLICATION NOTES

- 35 Recommended twisted shielded pair for control wiring. Ground shielded wire at control panel chassis. Tape back ground at actuator.
- 36 Use of feedback is optional.



NOTES SY1-110P (220P)

- Caution: Power supply voltage.
- Do not change sensitivity or dip switch settings with power applied.



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W552\_2

Actuators: SY2...12-120MFT SY2...12-230MFT

### Hazard Identification

Warnings and Cautions appear at appropriate sections throughout this manual. Read these carefully.

### CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

**Indicates an action or condition that may cause irreversible damage to the actuator(s) or associated equipment.**

Equipment damage!  
Power consumption and input impedance must be observed.



### INSTALLATION NOTES

Observe class 1 and class 2 wiring restrictions.



### APPLICATION NOTES



Recommended twisted shielded pair for control wiring.  
Ground shielded wire at control panel chassis.  
Tape back ground at actuator.

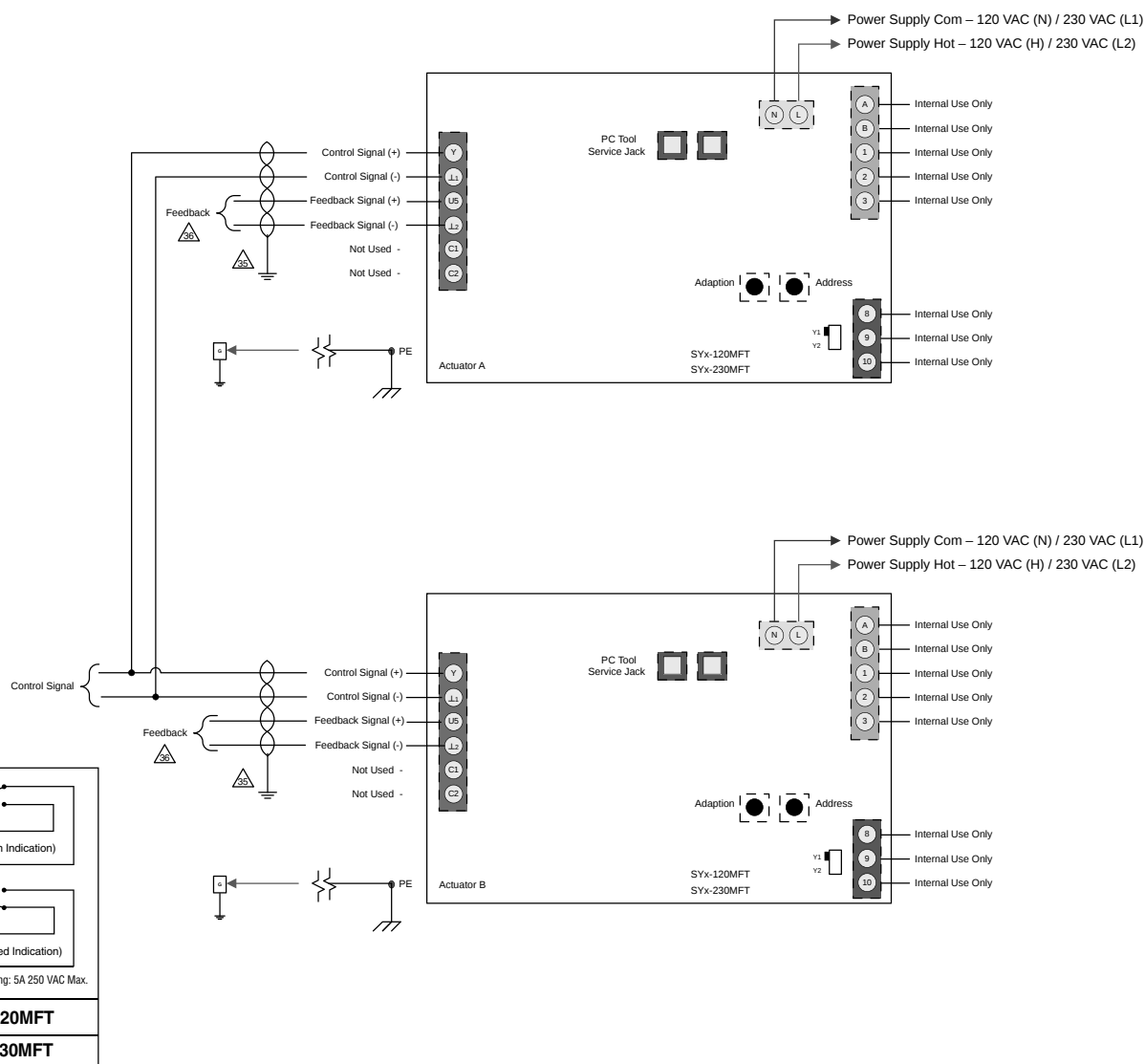


Use of feedback is optional.



### NOTES SY2...12-120MFT (230MFT)

- **Caution:** Power supply voltage.



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