

70677-00001B

NSV-SY Battery Back-Up System



- Provides Fail-Safe Operation for SY Series Industrial Electric Actuators, SY1 thru SY12.
- Field Selectable Fail Direction
- Readily Available Sealed Lead-Acid Battery Packs
- Provides 500% of Power Requirements for Full Load Cycle
- Key Lock Hinged Front Steel Controls Enclosure

NSV-SY Battery Back-Up System For Belimo SY Series Electric Actuators, 2 Position or Modulating



- Provides Fail-Safe Operation for SY Series Industrial Electric Actuators, SY1 thru SY12.
- Field Selectable Fail Direction
- Readily Available Sealed Lead-Acid Battery Packs
- Provides 500% of Power Requirements for Full Load Cycle
- Key Lock Hinged Front Steel Controls Enclosure

Application

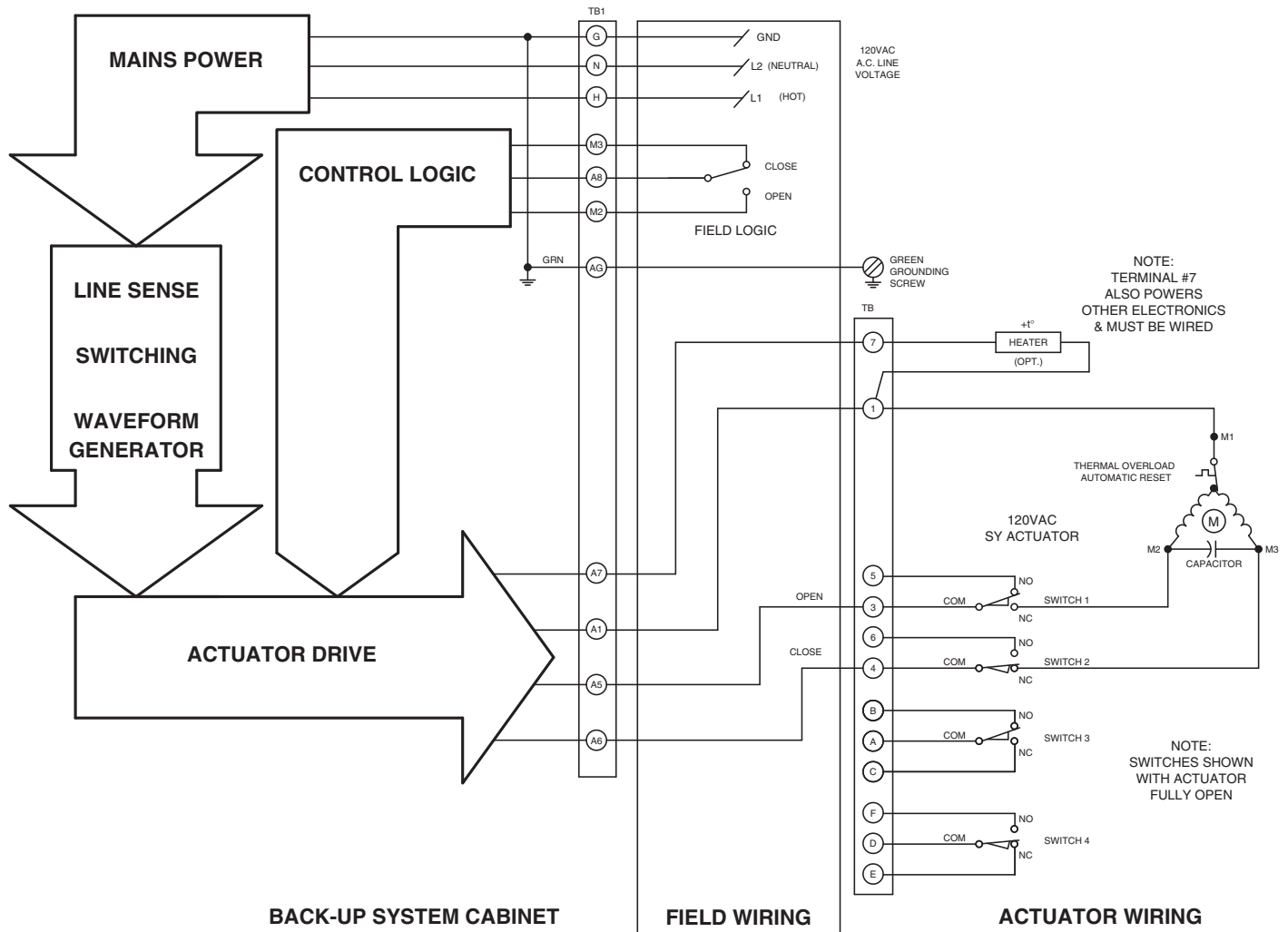
Typically, applications requiring fail-safe operation of actuated devices have had to rely on either the limited power of mechanical spring return actuators, or use costly high pressure pneumatic devices to provide fail-safe positioning. Model NSV series computer-grade UPS back-up systems designed for use with SY Series electric industrial quarter-turn actuators provides the power necessary to drive these actuators to a field selectable fail-safe position. The system consists of a painted steel key lock hinged door controls cabinet which houses the logic switching, all field wiring terminal points and a computer-grade back-up system. The back-up system is a component-level device which utilizes a replaceable spill-proof battery pack that can be readily purchased at most office-supply centers.

Safety in Numbers

The system is designed to provide at a minimum up to 500% of the power required to drive the various actuators through their full 90 degree rotation at full running amperage draws. However, when the actuators have reached their field-selectable end-of-travel positions, current draw drops to zero and the back-up system sits idle until either the time-out function integral to the battery is reached or the mains power returns, whichever occurs first.

Simple User Interface

Indicator lights visible through the viewport on the front and side of the control cabinet give status indication of mains power, back-up system charging and fail-safe operation. The NSV series is powered from building power and all power and logic interface wiring passes through the control cabinet. There are two different series produced, one is used for actuators which operate under 2 position or on/off control schemes, while the second series is used for actuators operating under proportional control schemes. Various models are available within these two series to provide the most cost effective and efficient means of providing fail-safe operation for these actuators.



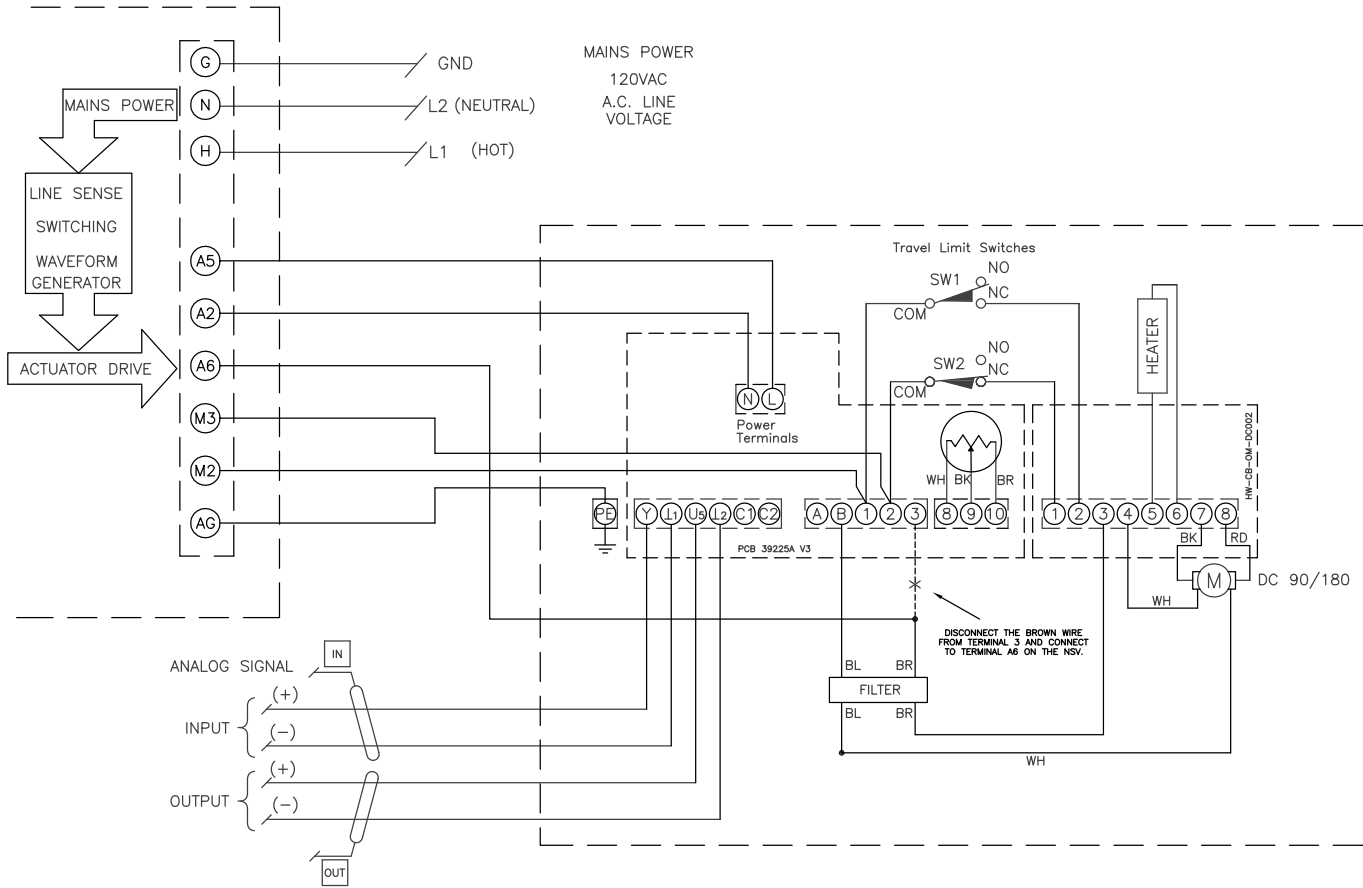
Sequence of Operation - 2 Position Control

The back up system is wired in series between the mains power and the actuator. Under normal operation, power supplied to TB1 H & N terminals will illuminate the green "LINE IN" indicator light and provide charging voltage to the battery system. While under mains power, the field select switch (or form A contacts) are enabled to control the positioning of the actuator. The end user can install a center-off switch for 3 point floating control, a SPDT toggle switch for 2 position control, or interface through an automation system's form A contacts. Any method of operation will not affect the back up unit's operation. While under mains power, the blue "BAT CHARGING" indicator light is illuminated while the yellow "B/U POWER" indicator light remains off. While under mains power, the position of the "FAIL POSITION SELECT" switch is irrelevant. Power is supplied through the interface cabinet and the actuator heater is enabled. No current is being drawn from the battery system during this mode of operation.

When the mains power is lost, charging power is no longer supplied to the battery system, and the green "LINE IN" indicator light is turned off. The battery system automatically generates modified-sine wave line voltage to provide power for the actuator. The blue "BAT CHARGING" indicator light is turned off, and the yellow "B/U POWER" indicator light is turned on. The "FAIL POSITION SELECT" switch becomes active, and depending on its position, drives the actuator either fully open or fully closed. During this mode of operation, the heater is NOT energized, and the position of any field interface switching is irrelevant. The battery system will provide ample power to drive the actuator more than 5 full torque cycles. However, once the actuator reaches its end-of-travel limit switch, power drain from the back-up system is reduced to the requirements of the yellow "B/U POWER" indicator light. After 15 minutes, the battery system turns itself off and waits for the mains power to return. The gear train design of the SY actuator provides automatic locking of the actuator position after the battery system shuts down. Normal operation is resumed when mains power returns.

NSV-SY Battery Back-Up System

For Belimo SY Series Electric Actuators, 2 Position or Modulating



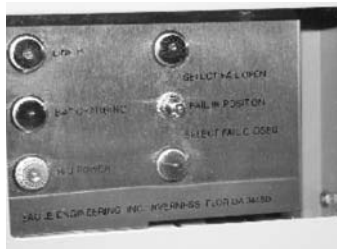
Sequence of Operation - Modulating Control

Note: This Model requires modification to SY-MFT Model interface wiring inside the SY actuator.

The back up system is wired in series between the mains power and the actuator. Under normal operation, power supplied to TB1 H & N terminals will illuminate the green "LINE IN" indicator light and provide charging voltage to the battery system. While mains power is present, the SY drive logic interface card is enabled and provides proportional positioning of the SY actuator in response to incoming signals from customer supplied field automation devices. While under mains power, the blue "BAT CHARGING" indicator light is illuminated while the yellow "B/U POWER" indicator light remains off. While under mains power, the position of the "FAIL POSITION SELECT" switch is irrelevant. Power is supplied through the interface cabinet and the actuator heater is enabled. All internal actuator controls are otherwise not affected by the backup system. All movement of the actuator is controlled by the automation control system. No current is being drawn from the battery system during this mode of operation.

When the mains power is lost, charging power is no longer supplied to the battery system, and the green "LINE IN" indicator light is turned off. The battery system automatically generates modified-sine wave line voltage to provide power for the actuator. The blue "BAT CHARGING" indicator light is turned off, and the yellow "B/U POWER" indicator light is turned on. The "FAIL POSITION SELECT" switch becomes active, and depending on its position, drives the actuator either fully open or fully closed. During this mode of operation the incoming proportional signal is irrelevant. The battery system will provide ample power to drive the actuator more than 5 full torque cycles. However, once the actuator reaches its end-of-travel limit switch, power drain from the back-up system is reduced to the requirements of the yellow "B/U POWER" indicator light. After 15 minutes, the battery system turns itself off and waits for the mains power to return. The gear train design of the SY actuator provides automatic locking of the actuator position after the battery system shuts down. Normal operation is resumed when mains power returns.

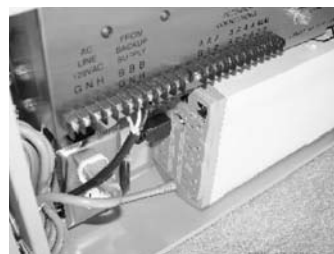
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Key Access and Status Viewports



Battery System Status Indicators



All Connections to APC Backup are Modular

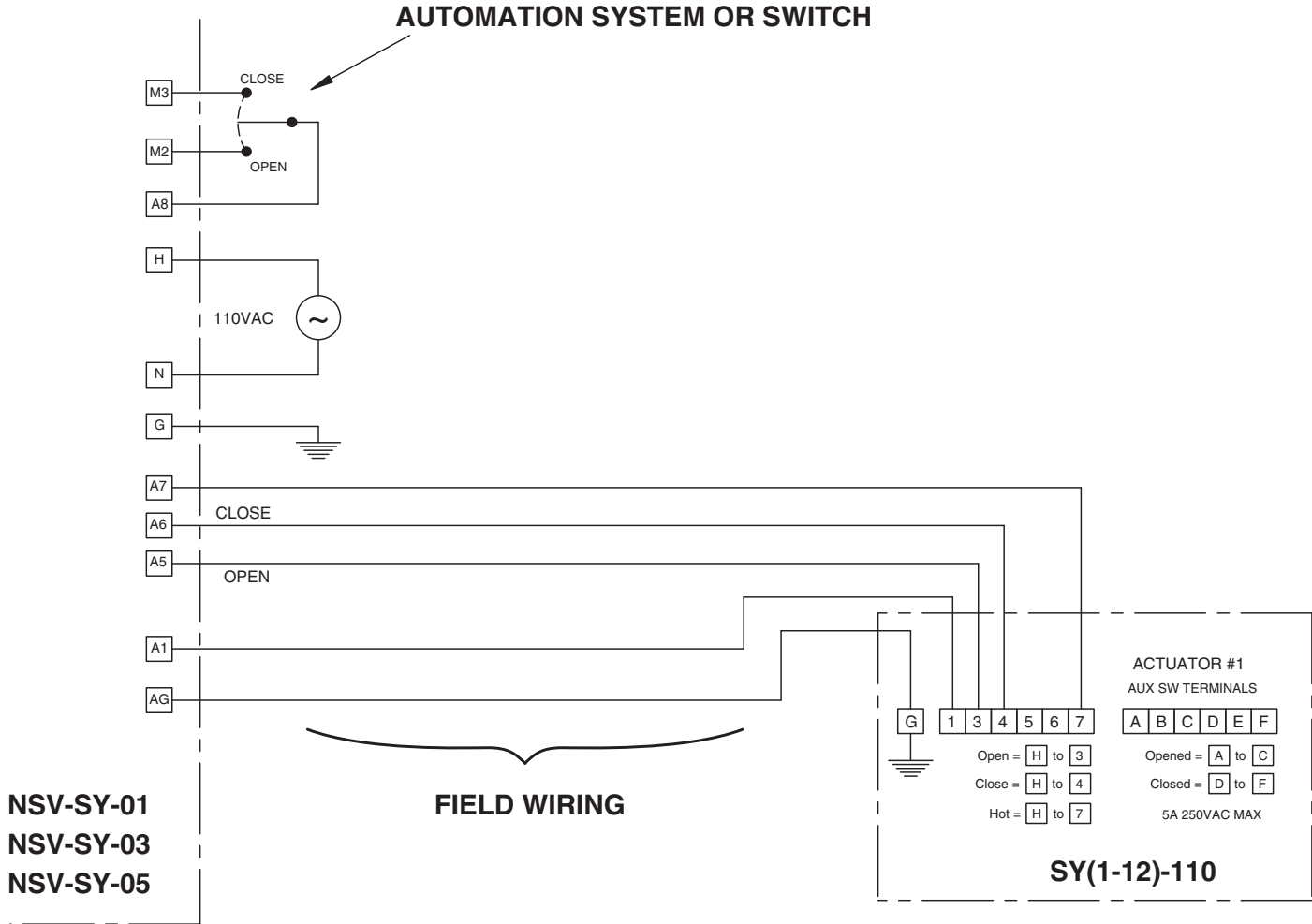


Connection to PCB Interface

SIZING AND PERFORMANCE CHART

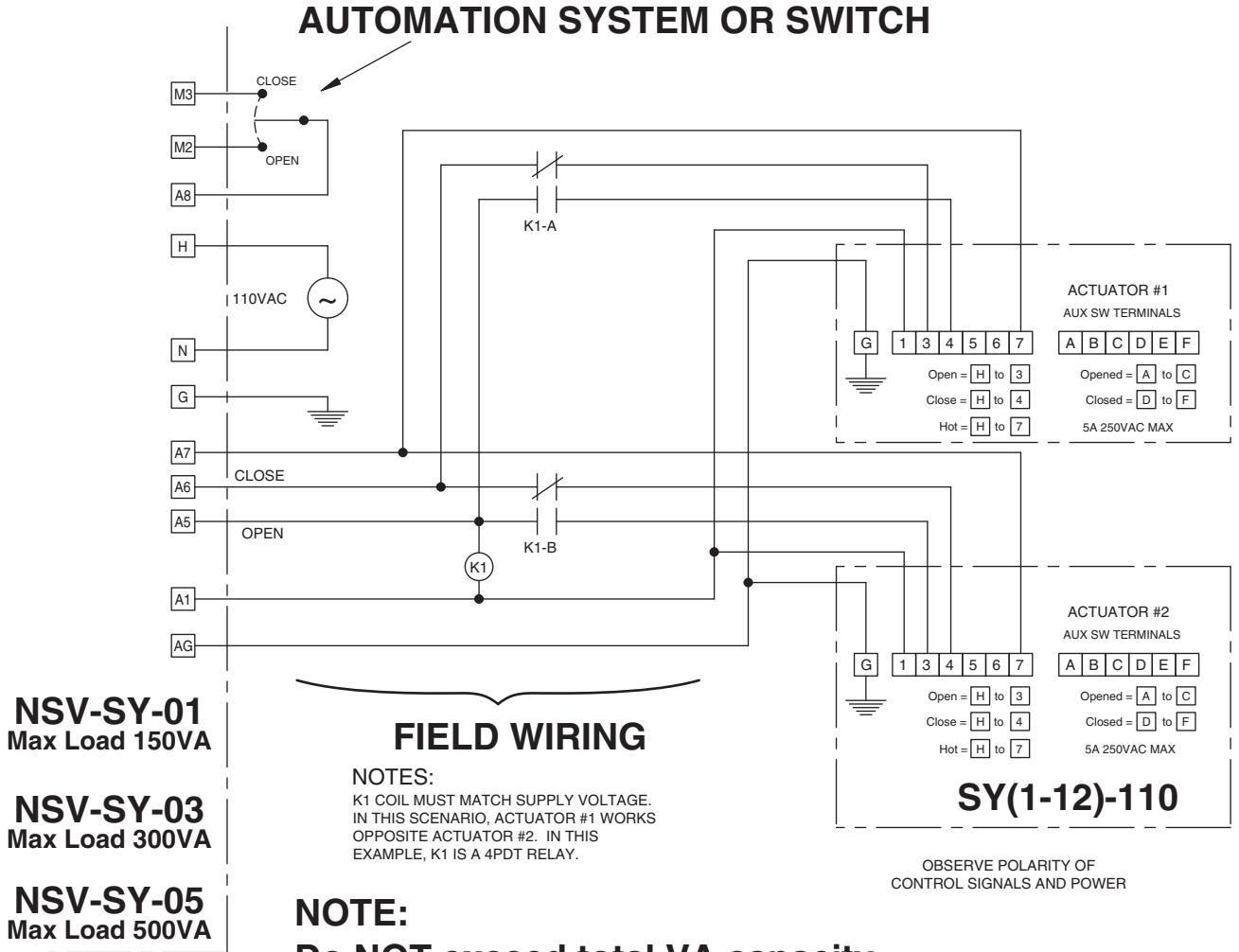
Actuator Model	Torque Output	Runtime (secs)	Draw (amps)	2 Position Model	Modulating Model	Runtime at 50% Capacity (minutes)	% Capacity Used at Full Runtime	Replacement Battery
SY1-110(P)	310	12	0.5	NSV-SY-01	NSV-SY-02	47	0.4%	RBC2
SY2-110(MFT)	801	15	1.0	NSV-SY-01	NSV-SY-02	35	0.7%	RBC2
SY3-110(MFT)	1335	22	1.0	NSV-SY-01	NSV-SY-02	35	1.0%	RBC2
SY4-110(MFT)	3560	16	1.3	NSV-SY-01	NSV-SY-02	19	1.4%	RBC2
SY5-110(MFT)	4450	22	1.5	NSV-SY-01	NSV-SY-02	17	2.2%	RBC2
SY6-110(MFT)	5785	28	1.85	NSV-SY-01	NSV-SY-02	17	2.7%	RBC2
SY7-110(MFT)	8900	46	3.2	NSV-SY-03	NSV-SY-04	5	15.3%	RBC2
SY8-110(MFT)	13350	46	4.0	NSV-SY-05	NSV-SY-06	15	5.1%	RBC32
SY9-110(MFT)	17800	58	3.2	NSV-SY-05	NSV-SY-06	24	4.0%	RBC32
SY10-110(MFT)	22250	58	4.0	NSV-SY-05	NSV-SY-06	15	6.4%	RBC32
SY11-110(MFT)	26700	58	3.0	NSV-SY-05	NSV-SY-06	25	3.9%	RBC32
SY12-110(MFT)	31150	58	4.0	NSV-SY-05	NSV-SY-06	15	6.4%	RBC32
SY1-24(P)	310	15	1.8	NSV-SY-11	NSV-SY-12	60	0.4%	RBC2
SY2-24(MFT)	801	15	3.0	NSV-SY-11	NSV-SY-12	40	0.6%	RBC2
SY3-24(MFT)	1335	22	3.0	NSV-SY-11	NSV-SY-12	40	0.9%	RBC2
SY4-24(MFT)	3560	16	6.0	NSV-SY-11	NSV-SY-12	20	1.3%	RBC2
SY5-24(MFT)	4450	22	6.5	NSV-SY-11	NSV-SY-12	19	1.9%	RBC2
SY1-220(P)	310	12	0.3	NSV-SY-21	NSV-SY-22	42	0.5%	RBC2
SY2-220(MFT)	801	15	0.5	NSV-SY-21	NSV-SY-22	36	0.7%	RBC2
SY3-220(MFT)	1335	22	0.5	NSV-SY-21	NSV-SY-22	36	1.0%	RBC2
SY4-220(MFT)	3560	16	0.6	NSV-SY-21	NSV-SY-22	22	1.2%	RBC2
SY5-220(MFT)	4450	22	0.7	NSV-SY-21	NSV-SY-22	19	1.9%	RBC2
SY6-220(MFT)	5785	28	0.8	NSV-SY-21	NSV-SY-22	17	2.7%	RBC2
SY7-220(MFT)	8900	46	1.6	NSV-SY-23	NSV-SY-24	6	12.8%	RBC32
SY8-220(MFT)	13350	46	2.0	NSV-SY-23	NSV-SY-24	4	19.2%	RBC32
SY9-220(MFT)	17800	58	1.6	NSV-SY-23	NSV-SY-24	6	16.1%	RBC32
SY10-220(MFT)	22250	58	2.0	NSV-SY-25	NSV-SY-26	18	5.4%	RBC32
SY11-220(MFT)	36700	58	1.6	NSV-SY-25	NSV-SY-26	26	3.7%	RBC32
SY12-220(MFT)	31150	58	2.2	NSV-SY-25	NSV-SY-26	15	6.4%	RBC32

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Wiring diagram for a single on/off SY series 110vac actuator.

Building **mains power** is connected to G, N & H terminals. A control switch or dry contacts are connected between terminal A8 and M2 or M3 to control the positioning of the actuator under power. Terminals AG, A1, A5, A6 & A7 are connected to the SY actuator as shown. Observe wire size rules for longer wire runs.

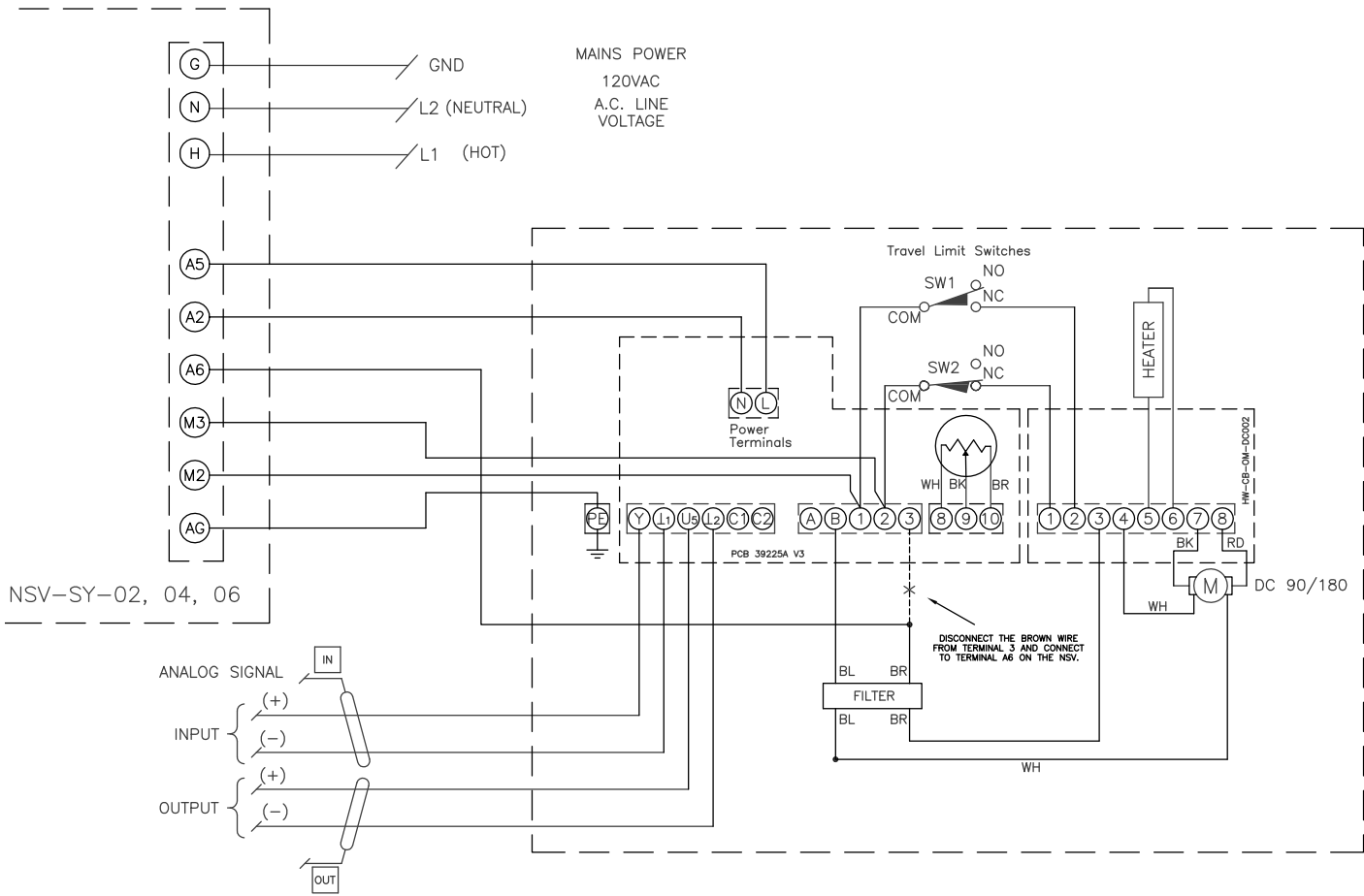


Wiring diagram for multiple on/off SY series 110vac actuators.

Do NOT exceed the Max Loads as stated above when connecting multiple actuators. Actuators connected in this manner operate in parallel from the common automation control switch and will fail-safe position together.

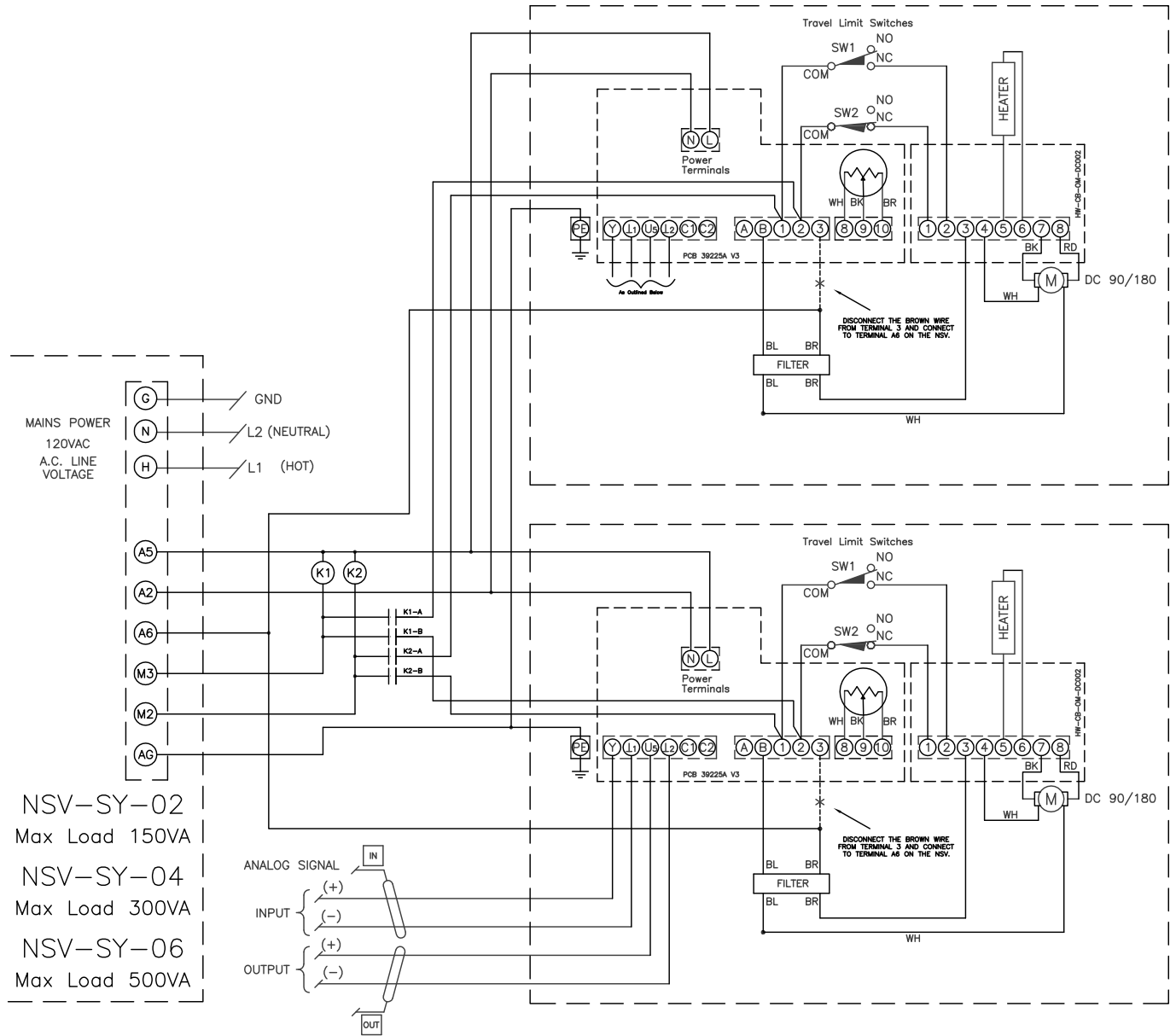
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Wiring diagram for a single proportional SY series 110vac actuator.

Building **mains power** is connected to G, N & H terminals. The control signal from the automation system is wired directly to the SY actuator. Terminals AG, A2, A5, A6, M2 & M3 are connected to the SY actuator as shown. Observe wire size rules for longer wire runs.

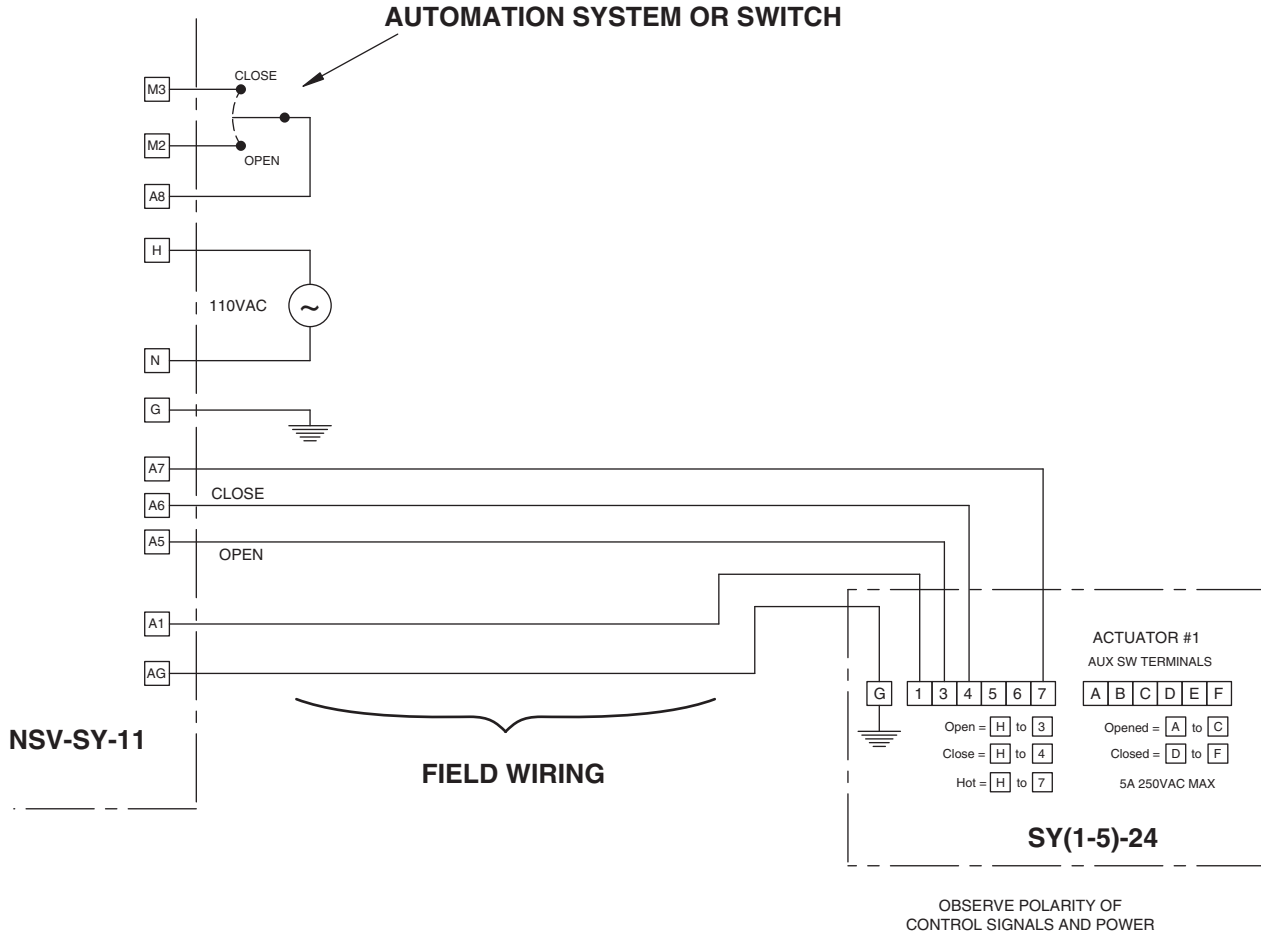


Wiring diagram for multiple proportional SY series 110vac actuators.

Do NOT exceed the Max Loads as stated above when connecting multiple actuators. Actuators connected in this manner operate in parallel from the common automation control signal and will fail-safe position together.

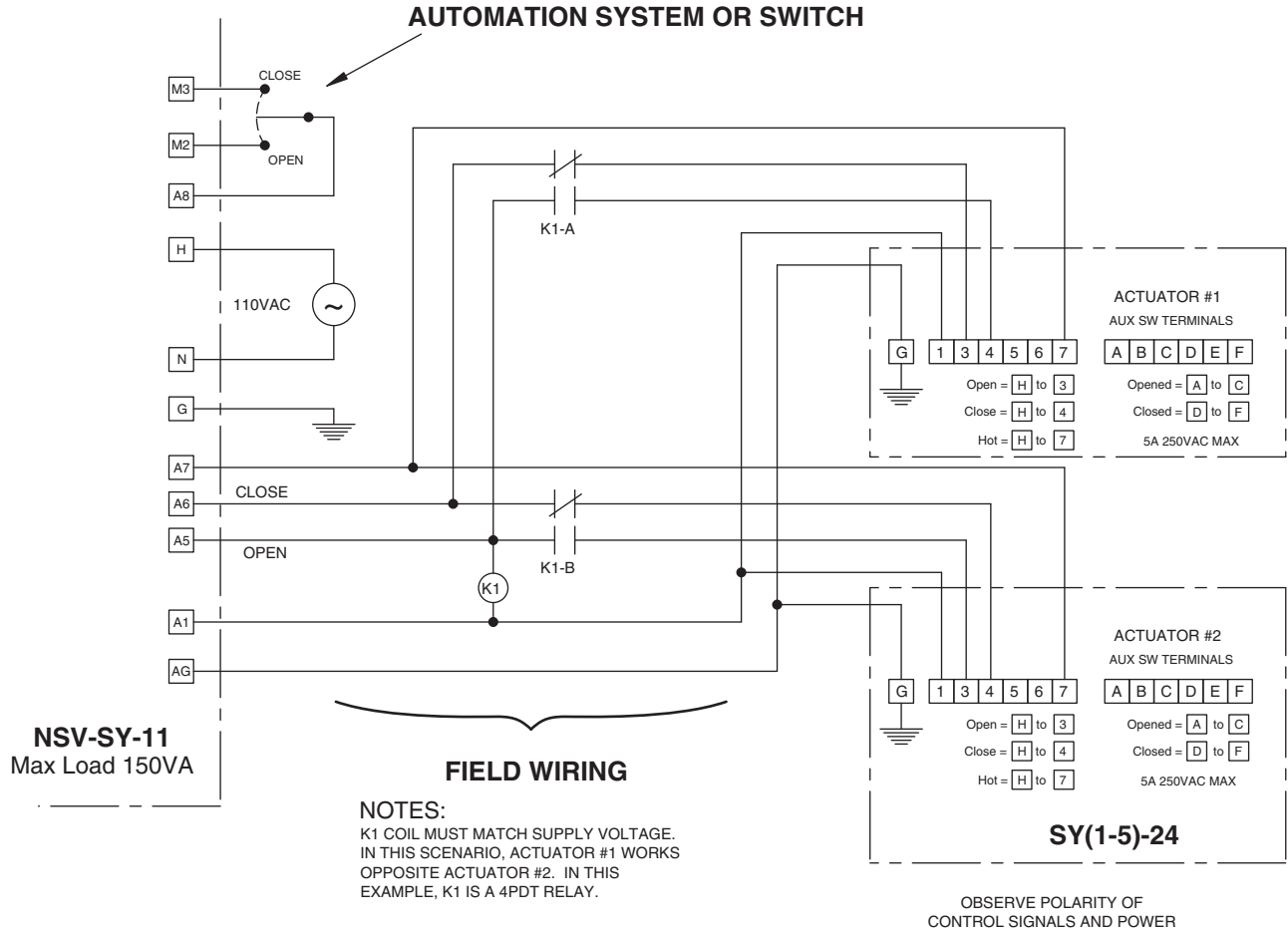
Building **mains power** is connected to G, N & H terminals. The control signal from the automation system is wired directly to the SY actuator. Terminals AG, A2, A5, A6, M2 & M3 are connected to the SY actuators as shown. Observe wire size rules for longer wire runs.

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Wiring diagram for a single on/off SY series 24vac actuator.

Building **mains power** is connected to G, N & H terminals. A control switch or dry contacts are connected between terminal A8 and M2 or M3 to control the positioning of the actuator under power. Terminals AG, A1, A5, A6 & A7 are connected to the SY actuator as shown. Observe wire size rules for longer wire runs. The 24vac transformer required to run the SYxxx-24 actuator is **built in** to the NSV cabinet.



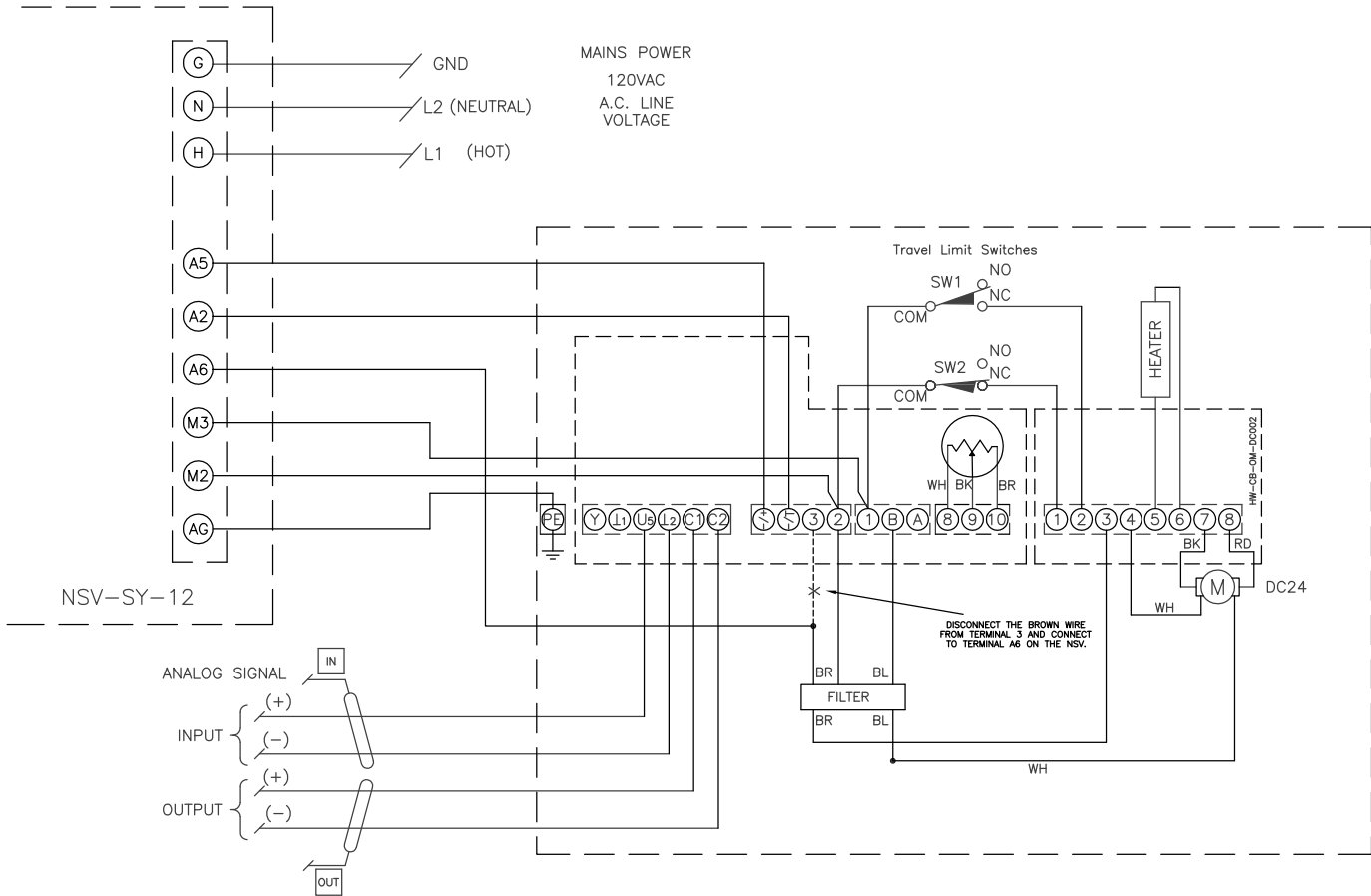
NOTE:
**Do NOT exceed total VA capacity
of NSV-SY backup system.**

Wiring diagram for multiple on/off SY series 24vac actuators.

Do NOT exceed the Max Loads as stated above when connecting multiple actuators. Actuators connected in this manner operate in parallel from the common automation control switch and will fail-safe position together.

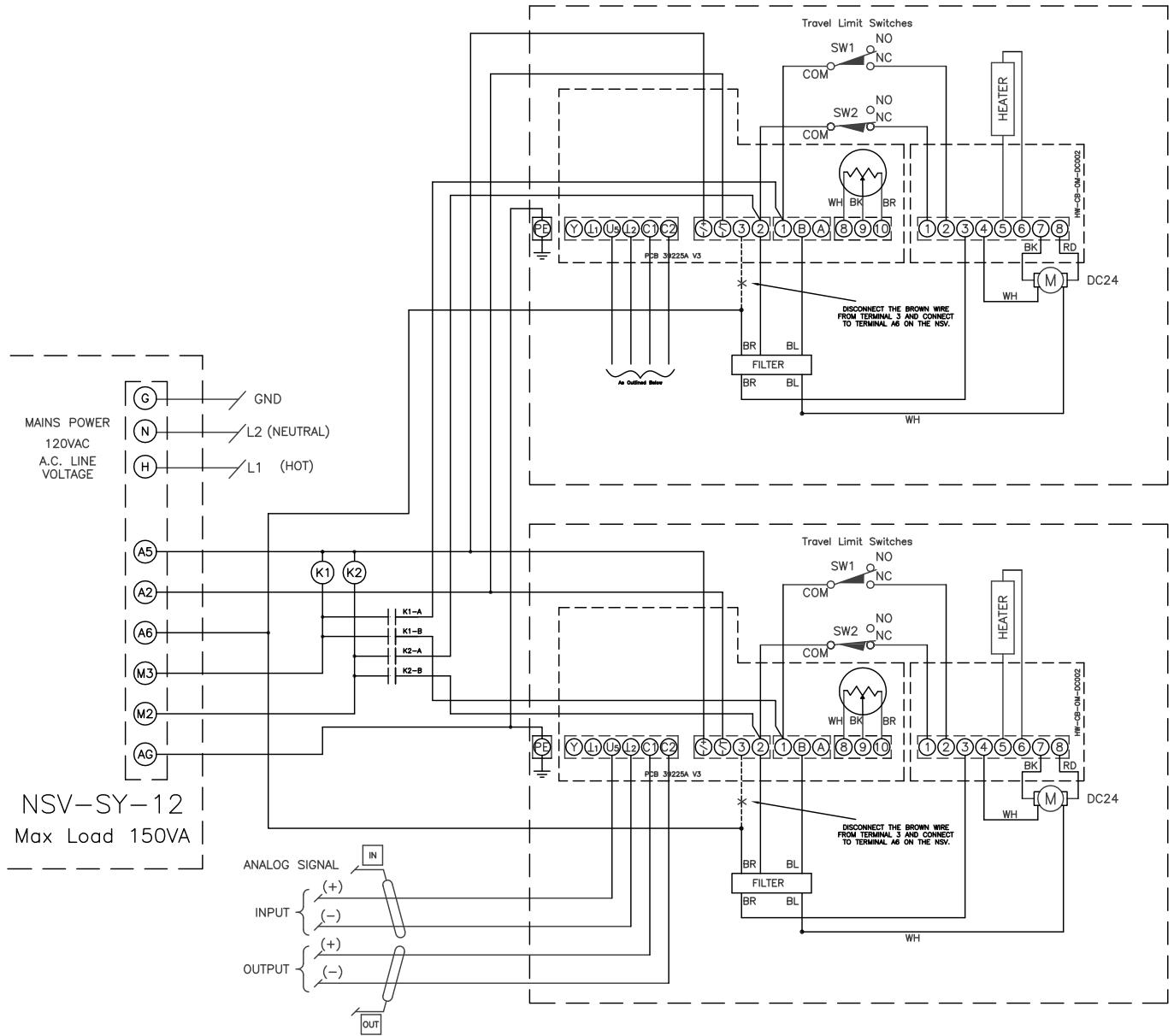
Building **mains power** is connected to G, N & H terminals. A control switch or dry contacts are connected between terminal A8 and M2 or M3 to control the positioning of the actuator under power. Terminals AG, A1, A5, A6 & A7 are connected to the SY actuator as shown. Observe wire size rules for longer wire runs. The 24vac transformer required to run the SYxxx-24 actuator is **built in** to the NSV cabinet.

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Wiring diagram for a single proportional SY series 24vac actuator.

Building **mains power** is connected to G, N & H terminals. The control signal from the automation system is wired directly to the SY actuator. Terminals AG, A2, A5, A6, M2 & M3 are connected to the SY actuator as shown. Observe wire size rules for longer wire runs. The 24vac transformer required to run the SYxxx-24 actuator is **built in** to the NSV cabinet.

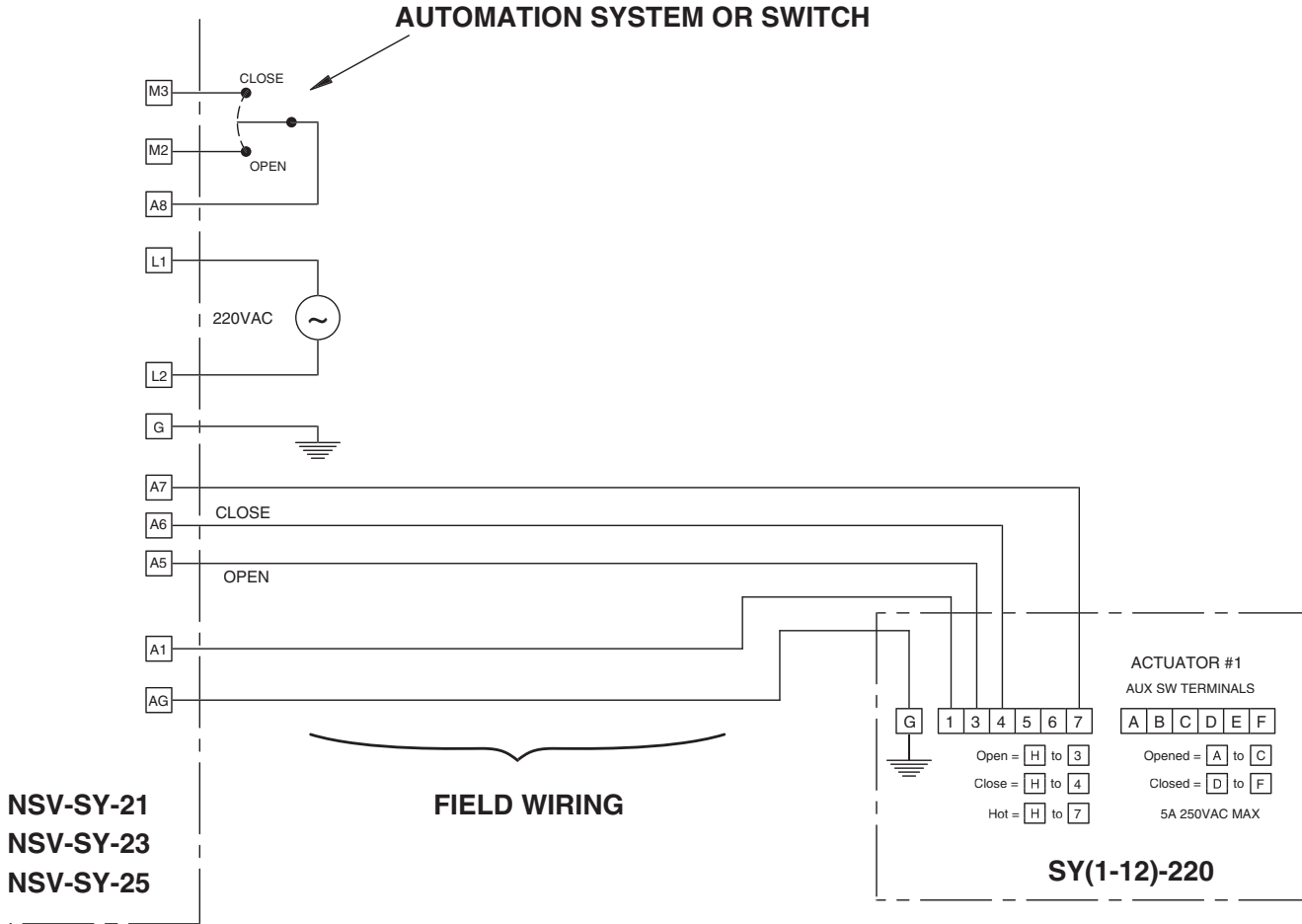


Wiring diagram for multiple proportional SY series 24vac actuators.

Do NOT exceed the Max Loads as stated above when connecting multiple actuators. Actuators connected in this manner operate in parallel from the common automation control signal and will fail-safe position together.

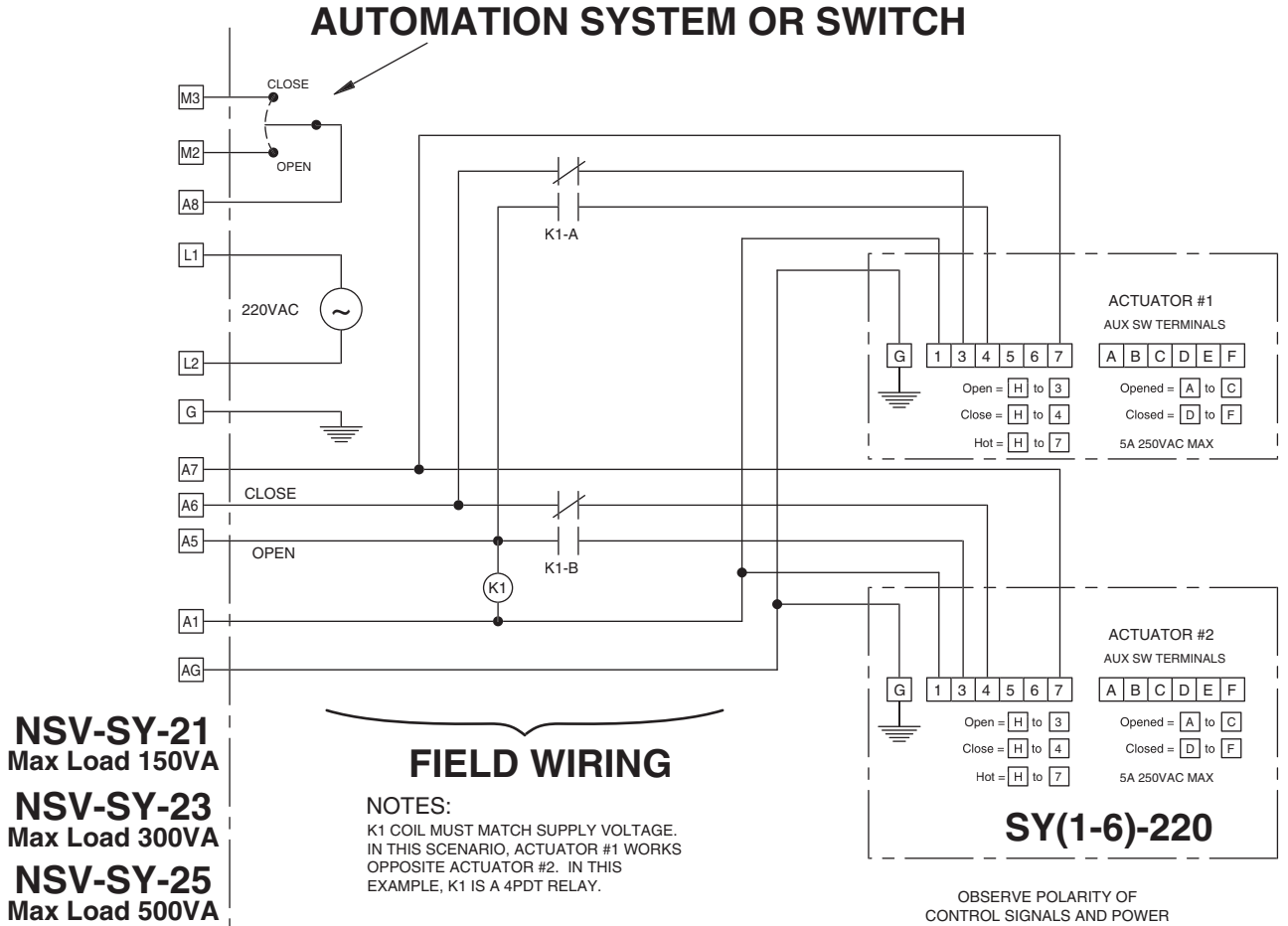
Building **mains power** is connected to G, N & H terminals. The control signal from the automation system is wired directly to the SY actuator. Terminals AG, A2, A5, A6, M2 & M3 are connected to the SY actuators as shown. Observe wire size rules for longer wire runs. The 24vac transformer required to run the SYxxx-24 actuator is **built in** to the NSV cabinet.

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Wiring diagram for a single on/off SY series 220vac actuator.

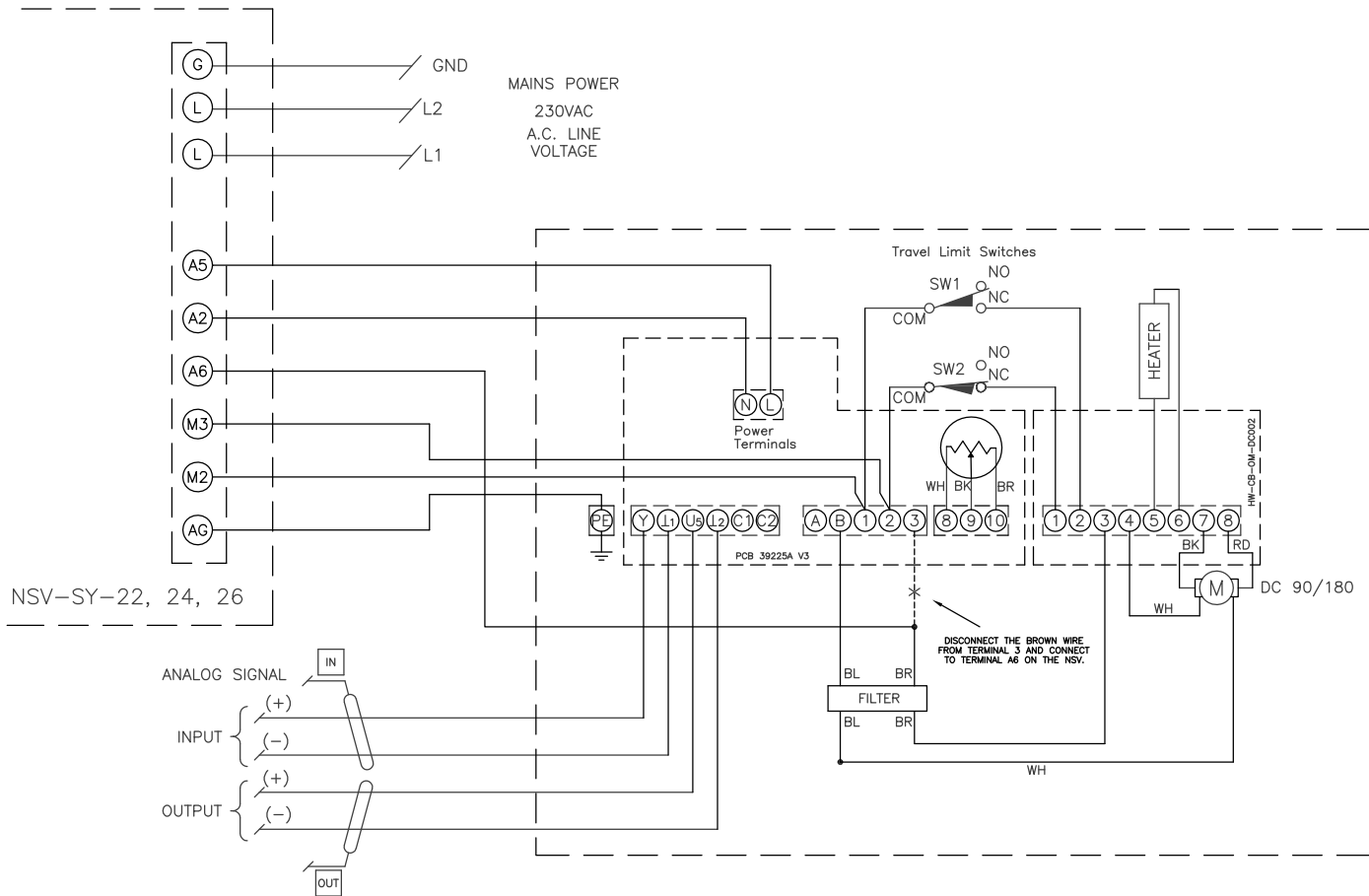
Building **mains power** is connected to G, N & H terminals. A control switch or dry contacts are connected between terminal A8 and M2 or M3 to control the positioning of the actuator under power. Terminals AG, A1, A5, A6 & A7 are connected to the SY actuator as shown. Observe wire size rules for longer wire runs.



Wiring diagram for multiple on/off SY series 220vac actuators.

Do NOT exceed the Max Loads as stated above when connecting multiple actuators. Actuators connected in this manner operate in parallel from the common automation control switch and will fail-safe position together.

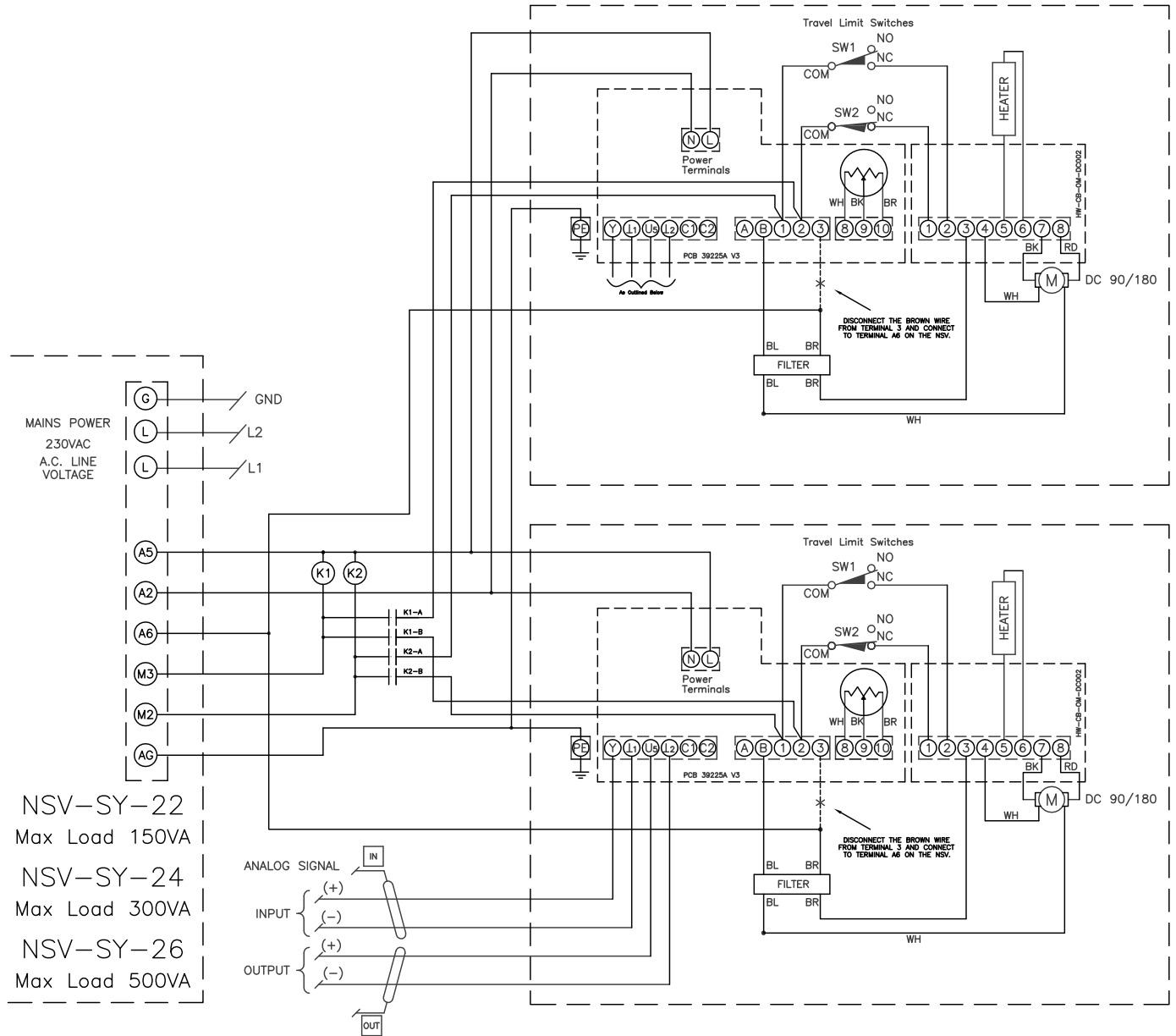
Building **mains power** is connected to G, N & H terminals. A control switch or dry contacts are connected between terminal A8 and M2 or M3 to control the positioning of the actuator under power. Terminals AG, A1, A5, A6 & A7 are connected to the SY actuator as shown. Observe wire size rules for longer wire runs.



Wiring diagram for a single proportional SY series 220vac actuator.

Building **mains power** is connected to G, N & H terminals. The control signal from the automation system is wired directly to the SY actuator. Terminals AG, A2, A5, A6, M2 & M3 are connected to the SY actuator as shown. Observe wire size rules for longer wire runs.

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Wiring diagram for multiple proportional SY series 220vac actuators.

Do NOT exceed the Max Loads as stated above when connecting multiple actuators. Actuators connected in this manner operate in parallel from the common automation control signal and will fail-safe position together.

Building **main power** is connected to G, N & H terminals. The control signal from the automation system is wired directly to the SY actuator. Terminals AG, A2, A5, A6, M2 & M3 are connected to the SY actuators as shown. Observe wire size rules for longer wire runs.

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Battery Back-Up System

For Belimo SY Series Electric Actuators, 2 Position or Modulating



BACK-UPS CS 350VA/PART NUMBER: BK350

Availability: North America, Latin America

Product Overview

Description

APC Back-UPS, 350VA/210W,
Input 120V/ Output 120V

General Features

Add Surge Protected Outlets, Audible Alarms, Cord Management, Intelligent Battery Management, Internet FAX - modem - DSL protection, Overload Indicator, Replace Batt Indicator, Site wiring fault indicator, Software, User Replaceable batteries

Documentation

User Manual



BACK-UPS CS 500VA/PART NUMBER: BK500

Availability: North America, Latin America

Product Overview

Description

APC Back-UPS, 500VA/300W,
Input 120V/ Output 120V

General Features

Add Surge Protected Outlets, Audible Alarms, Cord Management, Intelligent Battery Management, Internet FAX - modem - DSL protection, Overload Indicator, Replace Batt Indicator, Site wiring fault indicator, Software, User Replaceable batteries

Documentation

User Manual



Technical Specifications

Input

Nominal input 120 V
Input frequency 50/60
Hz +/- 5 Hz (auto sensing)
Input Connection Type
NEMA 5-15P
Cord Length 6 feet
Input voltage range for
main operations 98 - 140 V

Output

Output power
capacity 350 VA
Output power
capacity 210 Watts
Nominal output
voltage 120 V
Waveform type Stepped
approximation to a
sinewave



Output Connections (3)
NEMA 5-15R (3)
NEMA 5-15R (Surge)



Technical Specifications

Input

Nominal input 120 V
Input frequency 50/60
Hz +/- 5 Hz (auto sensing)
Input Connection Type
NEMA 5-15P
Cord Length 6 feet
Input voltage range for
main operations 98 - 140 V

Output

Output power
capacity 500 VA
Output power
capacity
300 Watts
Nominal output
voltage 120 V
Waveform type Stepped
approximation to a
sinewave



Output Connections (3)
NEMA 5-15R (3)
NEMA 5-15R (Surge)



Batteries

Typical backup time at half load 11.4 minutes
Battery type Maintenance-free sealed Lead-Acid battery with
suspended electrolyte: leakproof
Typical recharge time ** 8 hour(s)
Replacement battery cartridge (1) RBC2

Batteries

Typical backup time at half load 11.4 minutes
Battery type Maintenance-free sealed Lead-Acid battery with
suspended electrolyte: leakproof
Typical recharge time ** 8 hour(s)
Replacement battery cartridge (1) RBC2

Communications & Management

Control panel LED status display with On Line: On Battery: Replace
Battery and Overload indicators
Audible alarm Alarm when on battery: distinctive low battery alarm :
overload continuous tone alarm

Communications & Management

Control panel LED status display with On Line: On Battery: Replace
Battery and Overload indicators
Audible alarm Alarm when on battery: distinctive low battery alarm:
overload continuous tone alarm

Surge Protection and Filtering

Surge energy rating 480 joules
Filtering Full time multi-pole noise filtering: 5% IEEE surge let-
through: zero clamping response time: meets UL 1449
Dataline protection RJ-11 Modem/Fax/DSL protection
(two wire single line)

Surge Protection and Filtering

Surge energy rating 480 joules
Filtering Full time multi-pole noise filtering: 5% IEEE surge let-
through: zero clamping response time: meets UL 1449
Dataline protection RJ-11 Modem/Fax/DSL protection
(two wire single line)

BACK-UPS 900VA/PART NUMBER: BR900

Availability: North America, Latin America

Product Overview

Description

APC Back-UPS, 900VA/540W,
Input 120V/ Output 120V

General Features

Audible Alarms, Automatic Voltage Regulation (AVR), Easy Overload Recovery, Ethernet Protection, Hot Swap Batteries, Modem Protection, Overload Indicator, Replace Batt Indicator, Site wiring fault indicator, User Replaceable batteries

Documentation

User Manual



Technical Specifications

Input

Nominal input voltage 120 V
Input frequency 50/60 Hz +/- 3 Hz (auto sensing)
Input Connection Type NEMA 5-15P
Cord Length 6 feet
Input voltage range for main operations 88 - 139 V

Output

Output power capacity 900 VA
Output power capacity 540 Watts
Nominal output voltage 120 V
Waveform type Stepped approximation to a sinewave



Output Connections
(7)NEMA 5-15R



Batteries

Typical backup time at half load 17.6 minutes
Battery type Maintenance-free sealed Lead-Acid battery with suspended electrolyte: leakproof
Typical recharge time ** 8 hour(s)
Replacement battery cartridge (1) RBC32

Communications & Management

Control panel LED status display with On Line: On Battery: Replace Battery and Overload indicators
Audible alarm Alarm when on battery: distinctive low battery alarm: overload continuous tone alarm

Surge Protection and Filtering

Surge energy rating 320 joules
Filtering Full time multi-pole noise filtering: 5% IEEE surge let-through: zero clamping response time: meets UL 1449
Dataline protection RJ-11 Modem/Fax/DSL protection (two wire single line) plus RJ-45 ethernet

PHYSICAL DIMENSIONS

NSV-SY Series Back-Up Systems

Maximum Dimensions	NSV	NSV-SY	NSV-SY
	01, 02 21, 22	03, 04, 11 12, 23, 24	05, 06 25, 26
Height	13	13	15
Width	22	22	22
Depth	5	5	5
Net weight	36#	42#	44#
Shipping Weight	38#	44#	48#

Environmental

Operating Relative Humidity 0 - 95%
Operating Elevation 0-10000 feet (0-3000 m)
Storage Temperature -15 - 45 °C (5 - 113°F)
Storage Relative Humidity 0 - 95%
Storage Elevation 0-50000 feet (0-15000 m)
Audible noise at 1 meter from surface of unit 45 dBA
Online thermal dissipation 24 BTU/hr

Conformance - APC Back UP Module

Approvals CSA, FCC B, UL 1778
Approvals FCC Part 15 Class B, Industry Canada, UL 1778, cUL Listed

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

Belimo worldwide: www.belimo.com

BELIMO Americas

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Tel. 866-805-7089, Fax 905-712-3124, marketing@us.belimo.com

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