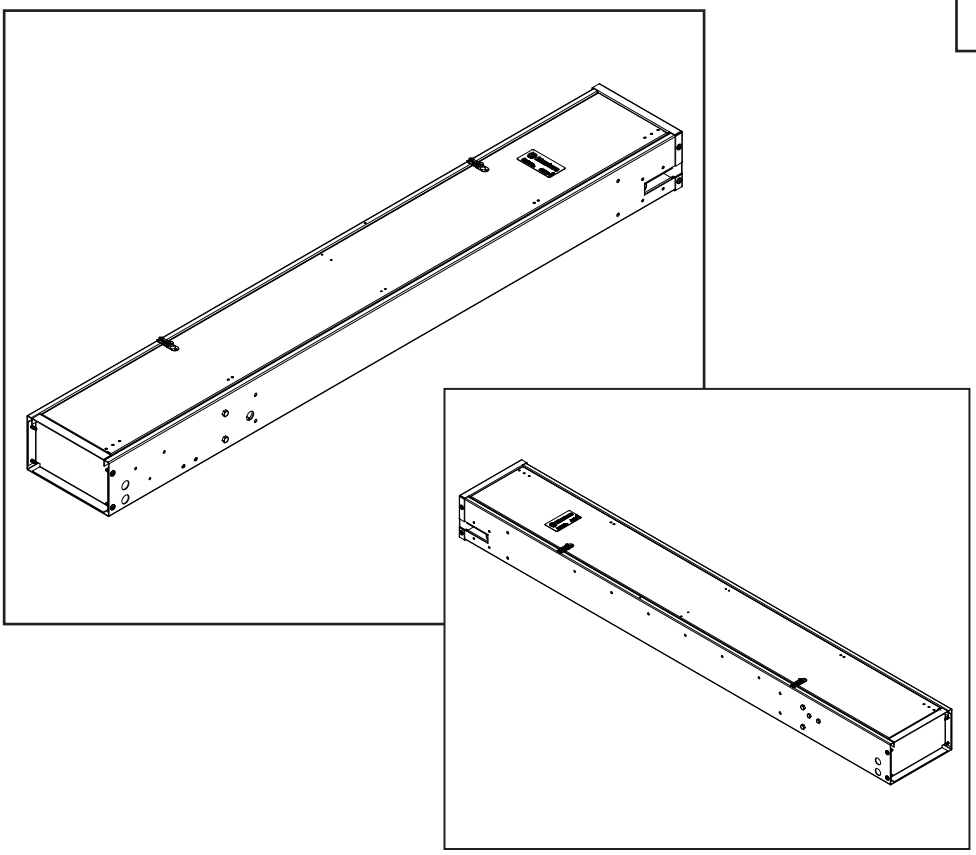
Aerotech
Curtain Machines

Instruction Manual



BA4000 Series Curtain Machine

Models: BA4002-03 • BA40002-30 • BA40003-03 •
BA40003-30 • BA40004-03 • BA40004-30

Munters

BA4000 Series Curtain Machine

Instructions for Use and Maintenance

Thank You:

Thank you for purchasing a Munters Curtain Machine. Munters equipment is designed to be the highest performing, highest quality equipment you can buy. With the proper installation and maintenance it will provide many years of service.

Please Note:

To achieve maximum performance and insure long life from your Munters product it is essential that it be installed and maintained properly. Please read all instructions carefully before beginning installation.

Warranty:

For Warranty claims information see the "Warranty Claims and Return Policy" form QM1021 available from the Munters Corporation office at 1-800-227-2376 or by e-mail at aghort.info@munters.com.

Conditions and Limitations:

- Products and Systems involved in a warranty claim under the "Warranty Claims and Return Policy" shall have been properly installed, maintained and operated under competent supervision, according to the instructions provided by Munters Corporation.
- Malfunction or failure resulting from misuse, abuse, negligence, alteration, accident or lack of proper installation or maintenance shall not be considered a defect under the Warranty.

Index

Unpacking the Equipment

1.

1.1 Parts List

Before beginning installation, check the overall condition of the equipment. Remove packing materials, and examine all components for signs of shipping damage. Any shipping damage is the customer's responsibility and should be reported immediately to your freight carrier.

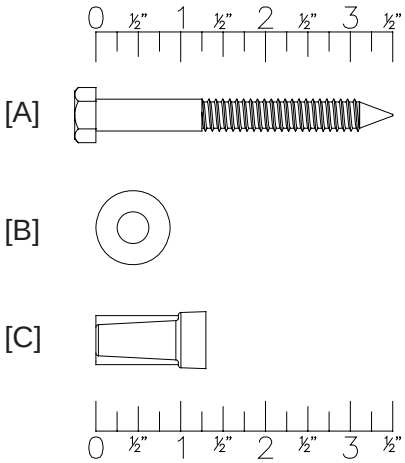
Each BA4000 includes:

1 - Curtain Machine with Internal Brake

1 - Hardware Package (HP1065)

HP1065 for Curtain Machine

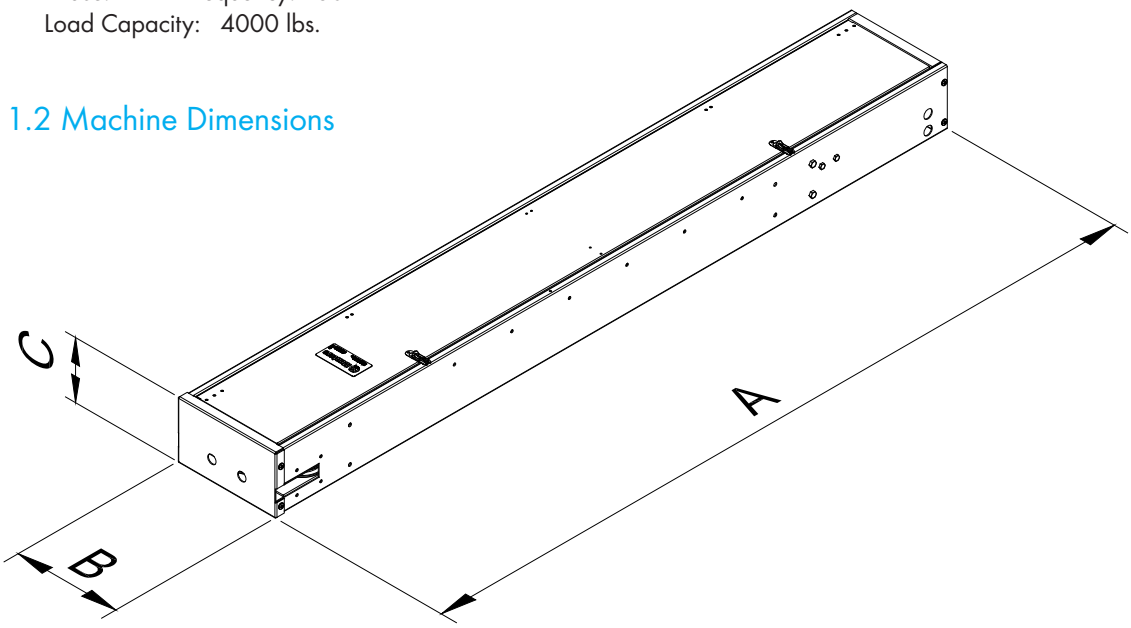
ID	Qty.	Cat. No.	Description
[A]	4	KS2462	⅜" x 3.5" Lag Screw, HOT DIP GALV.
[B]	4	KW3007	⅜" Type A, Narrow, Flat Washer, SS
[C]	3	KE1404	Wire Nut, Silicone Sealed, 8-18 AWG



Actuator Specifications

Power: 110-120 VAC
Amps: 1.0
Phase: 1 Frequency: 60 Hz
Load Capacity: 4000 lbs.

1.2 Machine Dimensions



Model	Travel Length	Drive Speed	Lift Rate	A	B	C
BA4002-03	25.5"	3 rpm	¾"/min.	58"	10¼"	6"
BA4002-30	25.5"	30 rpm	7½"/min.	58"	10¼"	6"
BA4003-03	37.5"	3 rpm	¾"/min.	70"	10¼"	6"
BA4003-30	37.5"	30 rpm	7½"/min.	70"	10¼"	6"
BA4004-03	49.5"	3 rpm	¾"/min.	82"	10¼"	6"
BA4004-30	49.5"	30 rpm	7½"/min.	82"	10¼"	6"

Note:

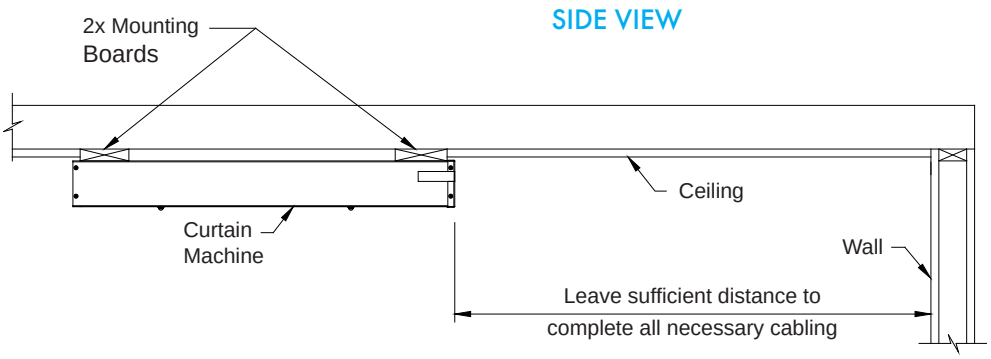
These actuators are designed to open or close Aero-Baffle, Munters modular-inlets or curtains accordingly from signals received from any one of Munters Air-Monitor Controls or Environmental Computer Controls.

Typical Mounting Configurations

2.

Figure 1

CEILING MOUNT



Model	A
BA4002	34.125″
BA4003	46.125″
BA4004	58.125″

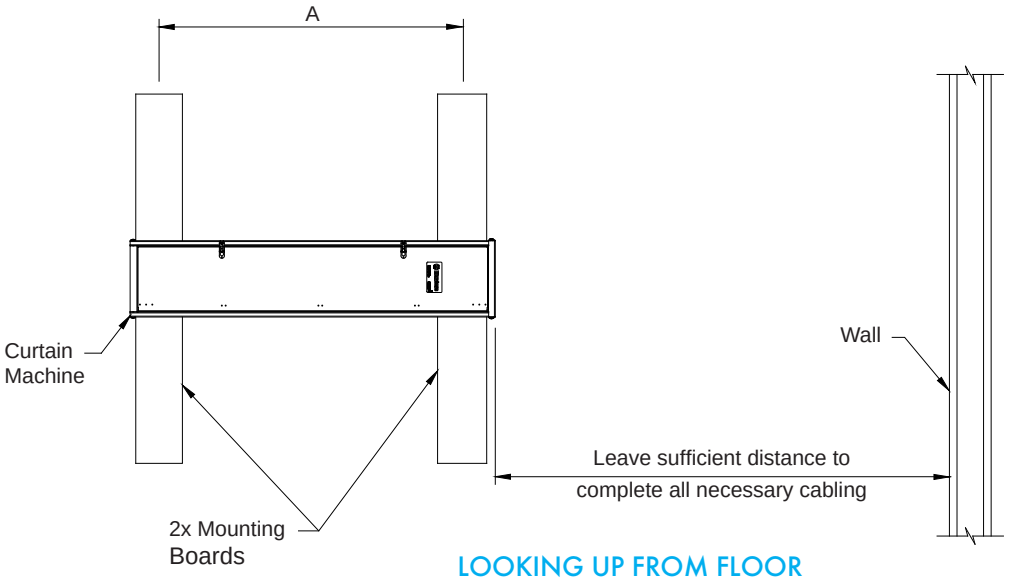
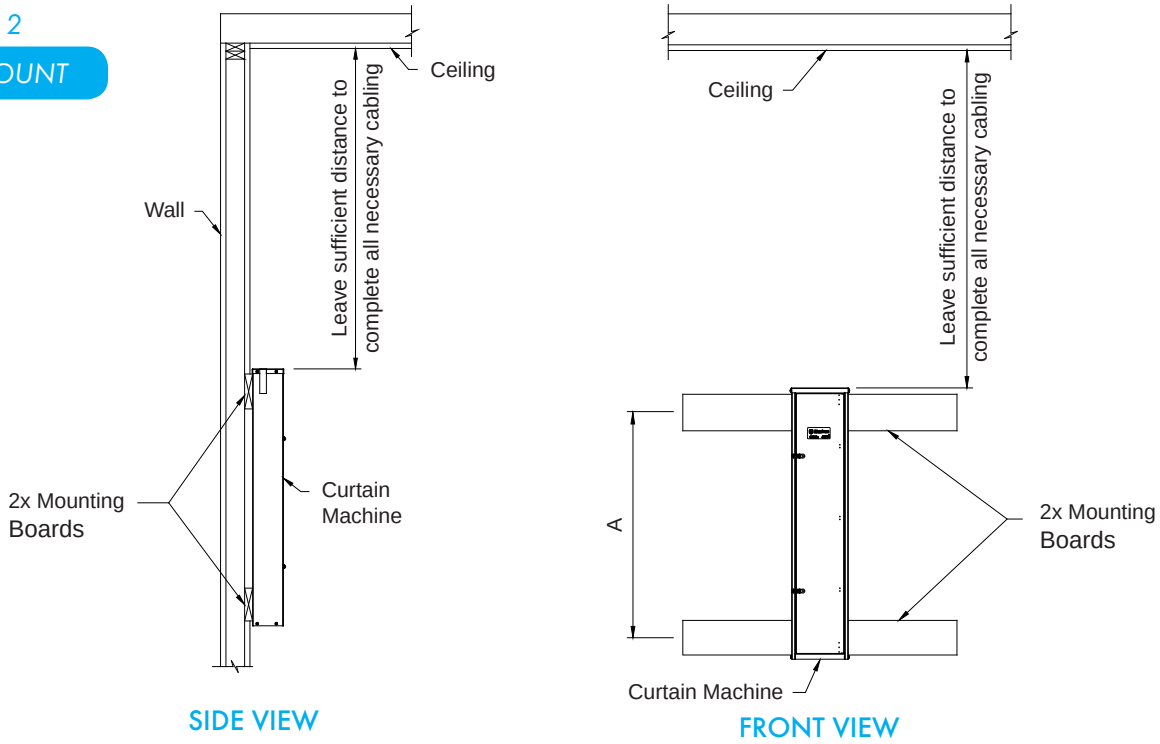


Figure 2

WALL MOUNT



Installation Instructions

3.

⚠ WARNING

The location for the curtain machine must be structured strong enough to withstand a 4000 lb. load. The wire rope cable used as a drive cable must also have a minimum capacity of 4000 lbs.

Step 1

Install the curtain machine in the location specified on your ventilation system drawing. Using (4) Lag Screws [A] and Washers [B]. For Typical Mounting Configurations, *See Figure 1 and 2, page 5.*

Step 2

If the curtain machine will be operating Aero-Baffle or Modular Inlets, install baffle and inlets according to their installation instructions. Install the curtains according to their installation instructions.

Step 3

Cable may be routed into the curtain machine through the slots provided on each side of the unit or through (2) knock-outs on the top of the unit. *See Figure 3A and 3B.*

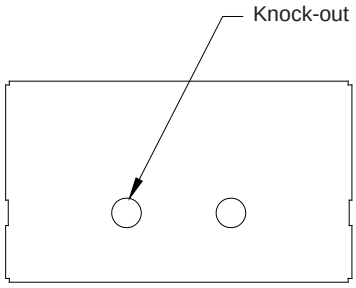


Figure 3A
END VIEW

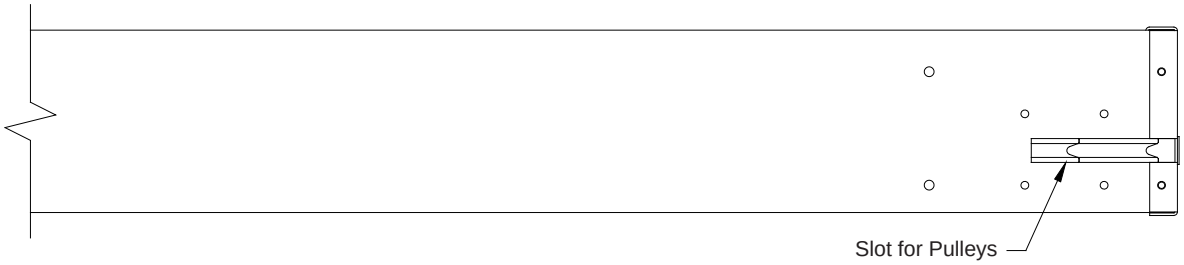


Figure 3B
SIDE VIEW

Step 4

The curtain machine needs to have a equal load on both sides of the Cable Puller Bracket to assure proper operation. *See Figures 4A.* This can be done by mounting the curtain machine in the center of run(s) for Aero-Baffle, Modular Inlets or Curtains. *See Figures 4B and 4C.*

Figure 4A

CABLE OUT END

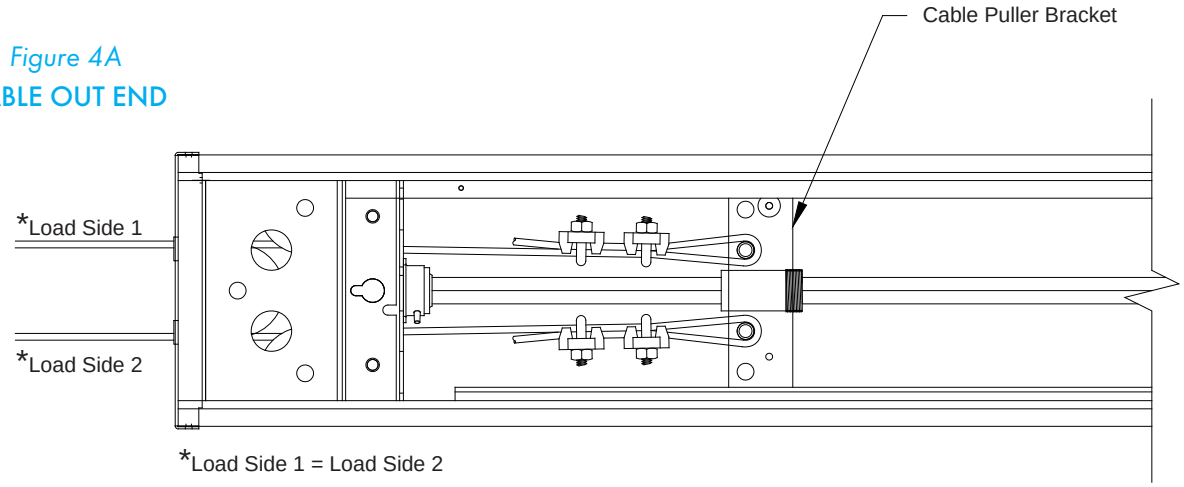


Figure 4B

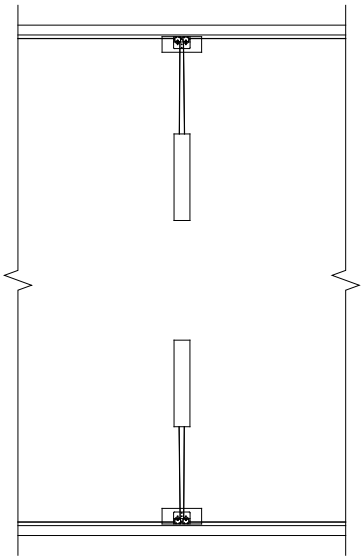
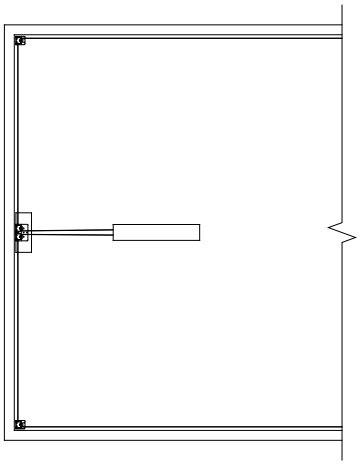


Figure 4C



Step 5

If curtain machine cannot be mounted in the center for even loading, then make a loop with cable, running the cable through a strap pulley and attaching the ends of cable to each side of pull bar. *See Figures 5.*

Step 6

If curtain machine is equipped with the Internal Double-Back option (BA400x-D) go to *Step 8*, otherwise proceed to *Step 7.*

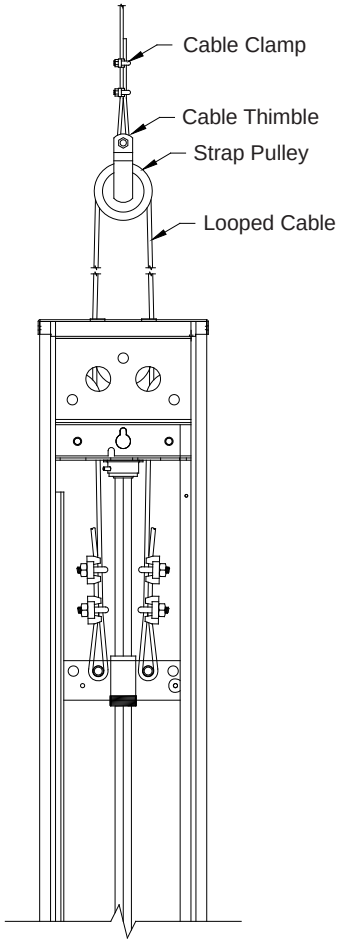


Figure 5

Step 7A

Route left drive cable down inside of the curtain machine to right side of Pin #1. Route right drive cable to left side of Pin #2. Wrap drive cables around corresponding pin to form a loop. Using (2) cable clamps, attach (1) cable clamp 2½" from top of pin and (1) cable clamp 1" above first cable clamp. Leaving a minimum of 1" of cable at end of each loop (clamps not provided). *See Figures 6A and 6B.* Follow this step for each drive cable.

Step 7B

Alternative cable routing shown in *Figure 6C and 6D.*

Figure 6A
CABLE OUT END

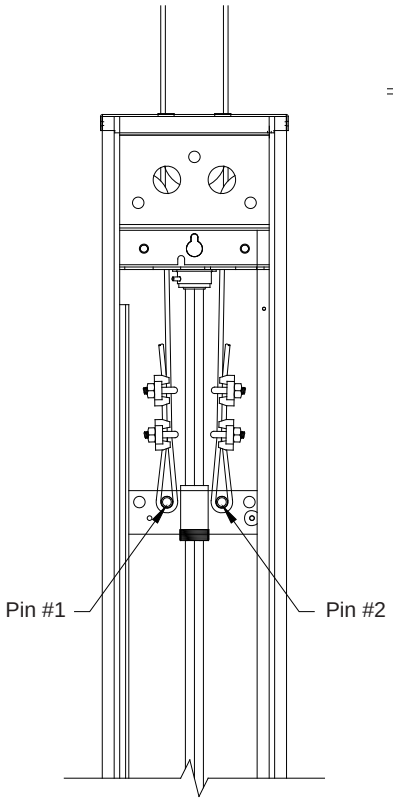


Figure 6B
CABLE OUT EACH SIDE

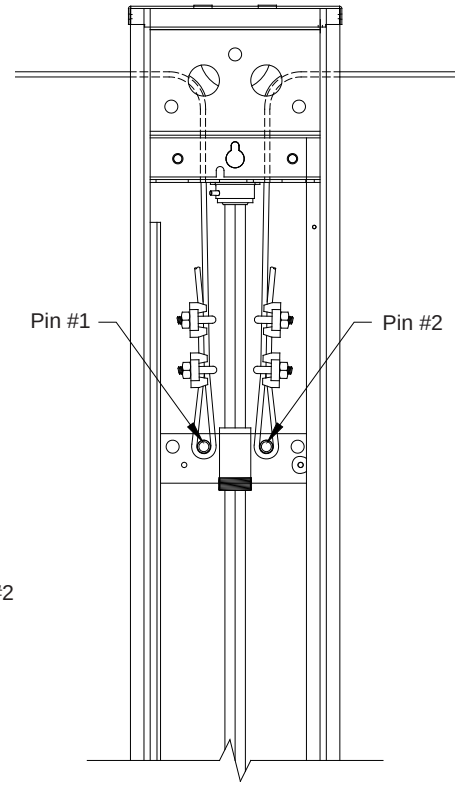


Figure 6C
CABLE OUT LEFT SIDE

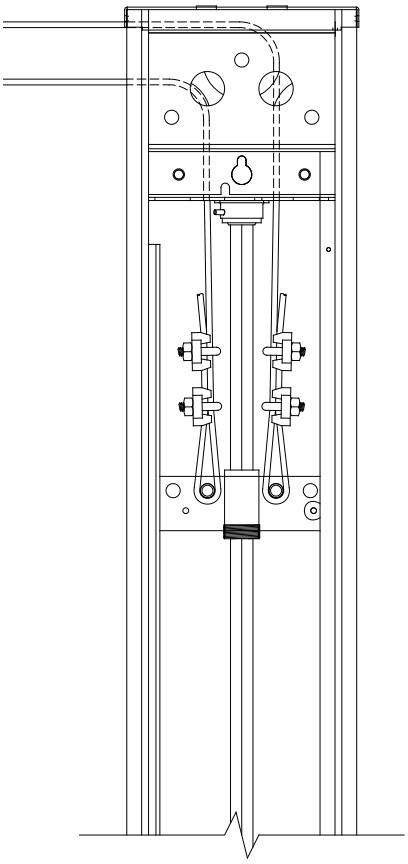
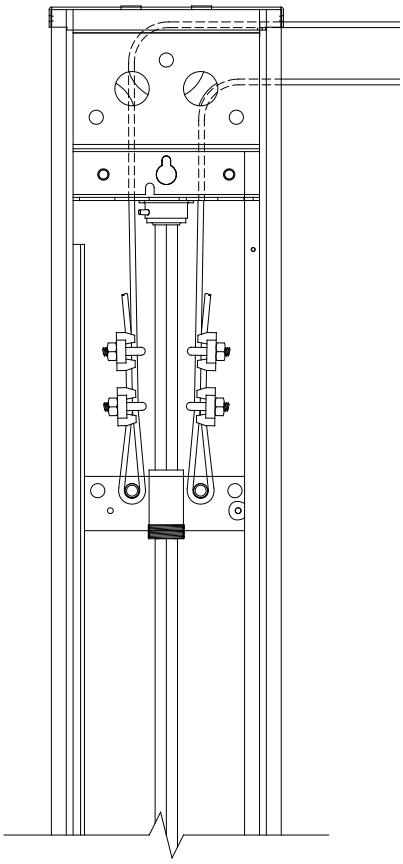


Figure 6D
CABLE OUT RIGHT SIDE



Step 8A

If optional Internal Double-Back was purchased, route left drive cable down inside of curtain machine on right side of Pulley #1. Route right drive cable to left side of Pulley #2. Wrap drive cables around bottom of its corresponding pulley, and take each drive cable to upper bulkhead and through its corresponding hole. Using (2) cable clamps, attach (1) cable clamp 1" from cable end and (1) cable clamp below, but as close as possible to the first cable clamp. *See Figures 7A.* Refer to Steps 4-7 for cable routing options.

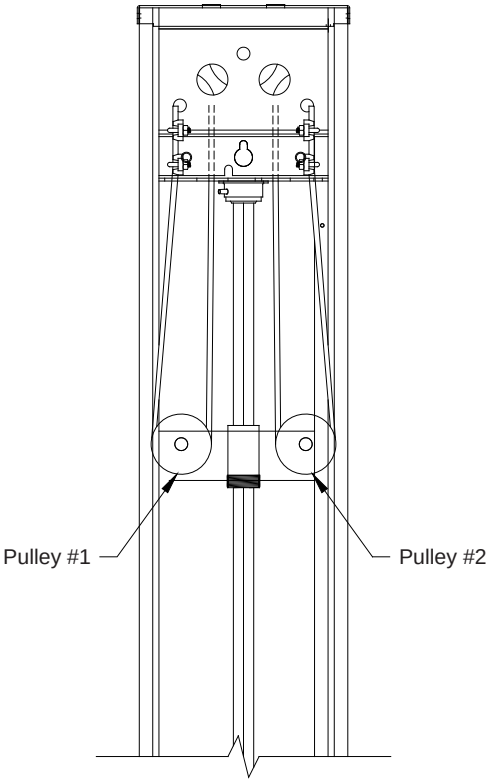


Figure 7A
DOUBLE BACK

Step 8B

If adding the optional Internal Double-Back Kit (AC1950), in the field, remove 2 non-greaseable pins from Cable Puller Bracket. Install (2) greaseable pins, pulleys and hairpin cotters. *See Figures 7B.*

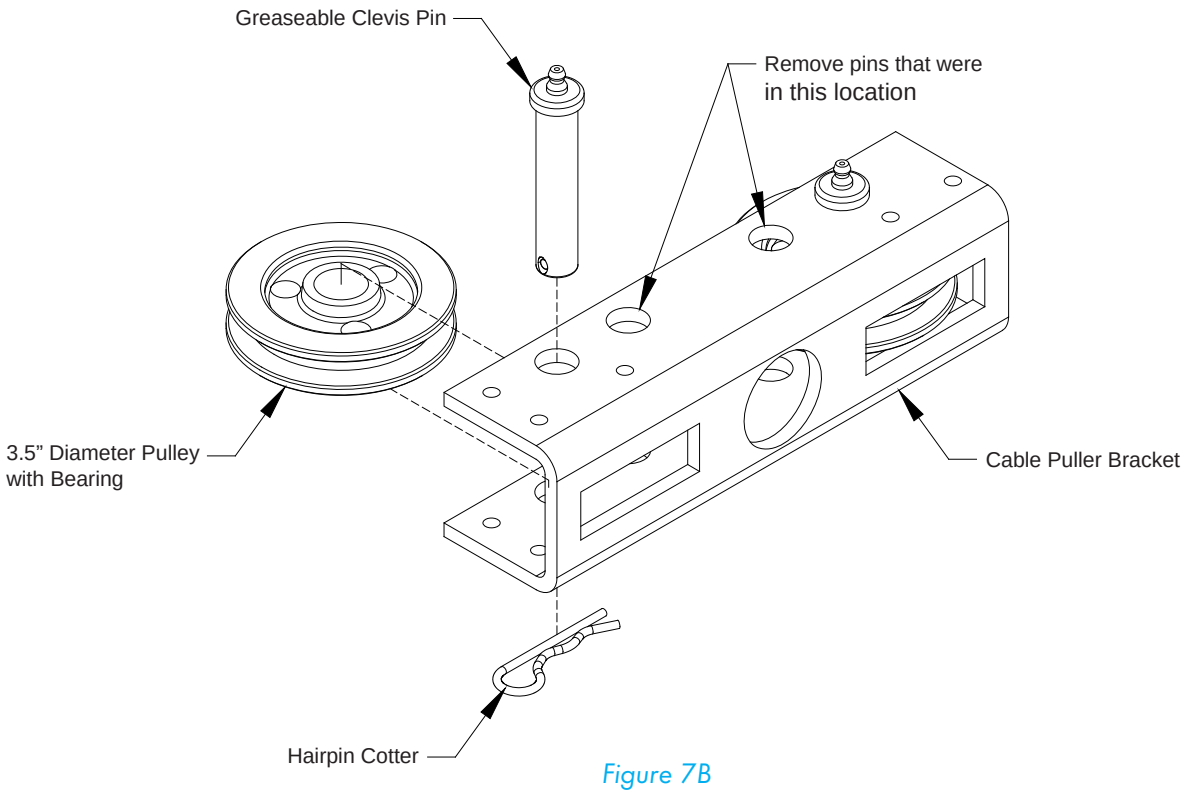
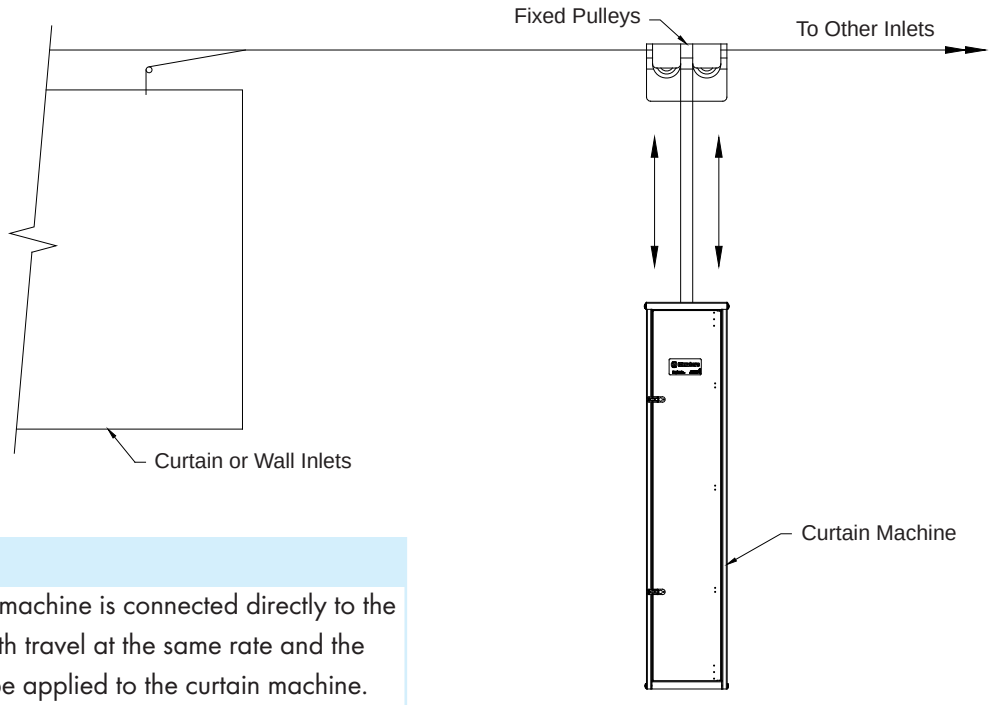


Figure 7B

External Cabling Methods

4.

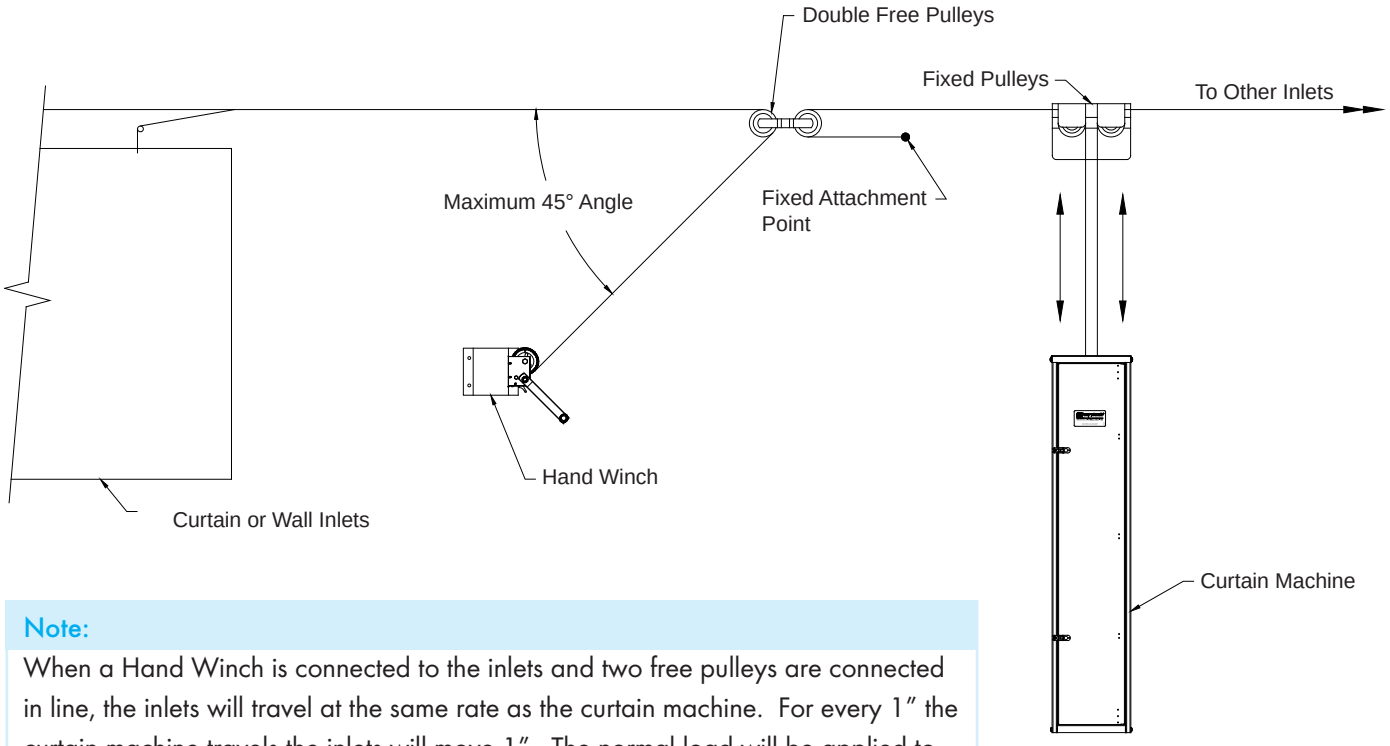
CURTAIN MACHINE AND CABLING WITHOUT HAND WINCH



Note:

When the curtain machine is connected directly to the inlets, they will both travel at the same rate and the normal load will be applied to the curtain machine.

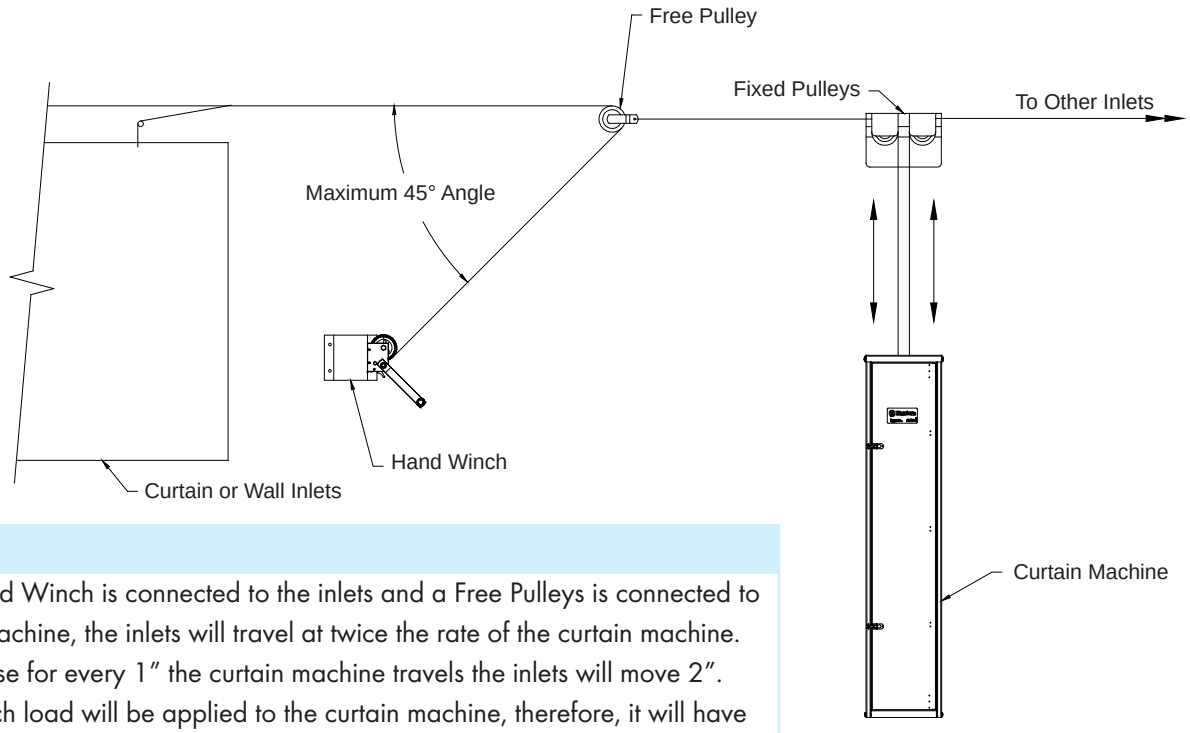
CURTAIN MACHINE AND CABLING WITH HAND WINCH INSTALLED



Note:

When a Hand Winch is connected to the inlets and two free pulleys are connected in line, the inlets will travel at the same rate as the curtain machine. For every 1" the curtain machine travels the inlets will move 1". The normal load will be applied to the curtain machine.

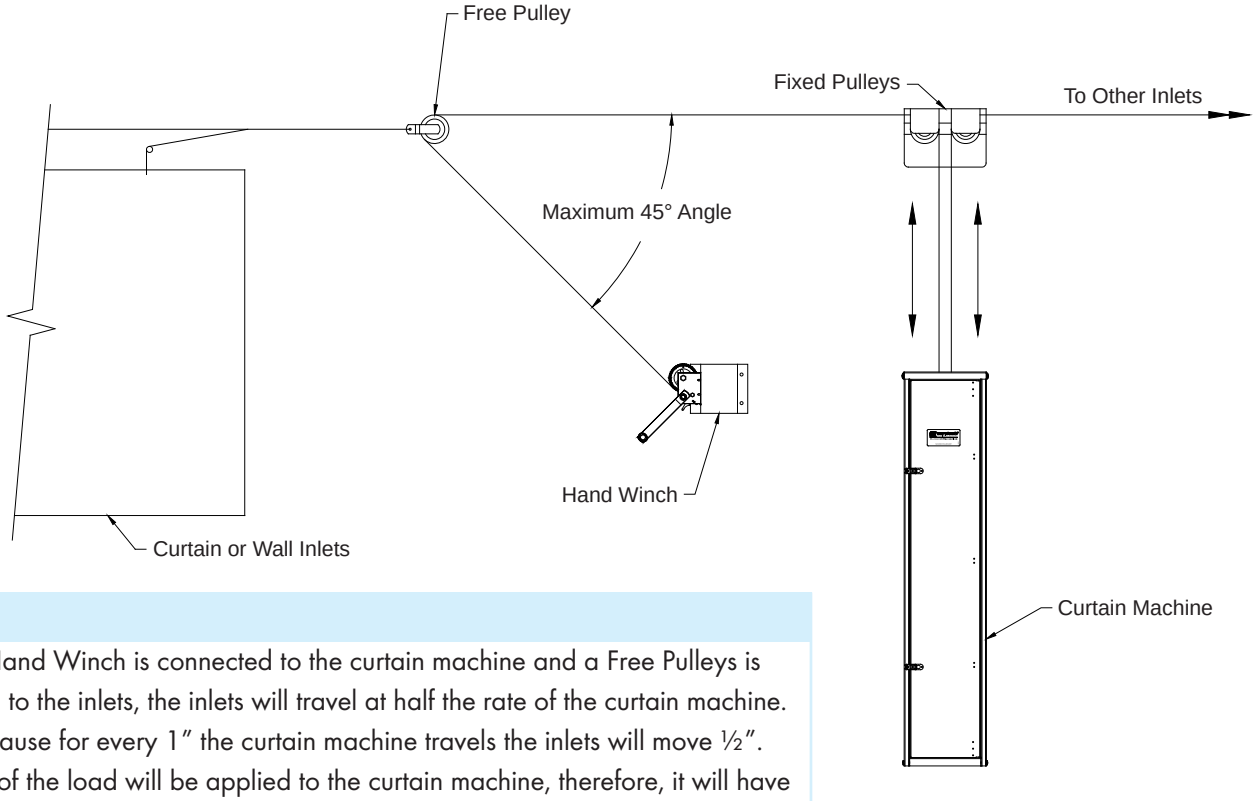
CURTAIN MACHINE AND CABLING WITH HAND WINCH INSTALLED



Note:

When a Hand Winch is connected to the inlets and a Free Pulleys is connected to the curtain machine, the inlets will travel at twice the rate of the curtain machine. This is because for every 1" the curtain machine travels the inlets will move 2". Twice as much load will be applied to the curtain machine, therefore, it will have half the pulling capacity.

CURTAIN MACHINE AND CABLING WITH HAND WINCH INSTALLED



Note:

When a Hand Winch is connected to the curtain machine and a Free Pulleys is connected to the inlets, the inlets will travel at half the rate of the curtain machine. This is because for every 1" the curtain machine travels the inlets will move ½". Only half of the load will be applied to the curtain machine, therefore, it will have twice the pulling capacity.

Electrical Wiring

5.

Step 1

All wiring should be in accordance with National, State and Local electrical codes. Make electrical connections as shown on terminal block label inside actuator. *See Figure 8.* Open, Close and Neutral outputs from the Air-Monitor control are to be wired to the Open (brown), Close (black) and Neutral (white) inputs of the curtain machine. *See Figure 8.*

Step 2

If curtain machine is equipped with the Potentiometer Feedback option (BA400x-P), connect the inlet position output from the curtain machine to an environmental computer control having inlet capability. *See Figure 9.* Control requires 5kΩ as maximum input.

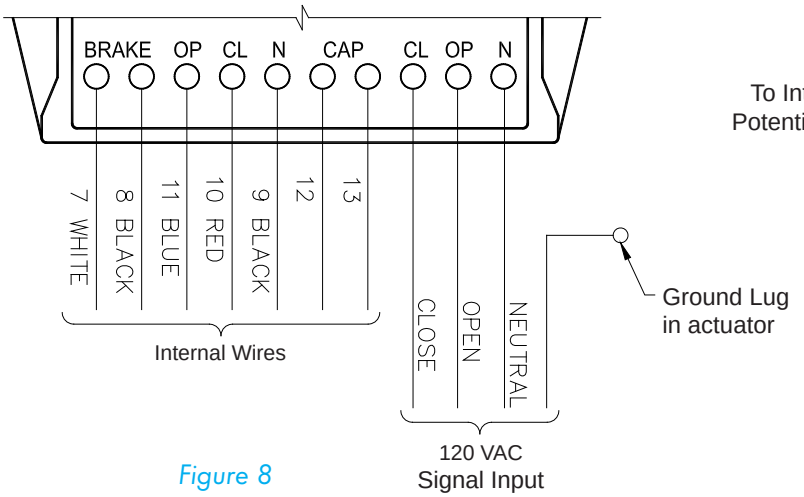


Figure 8

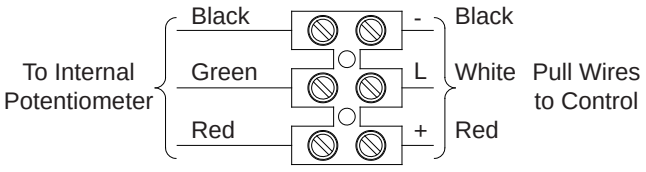


Figure 9

Step 3

If curtain machine is equipped with the Fan Limit Switch option (BA400x-F). *See Figure 10.* Limit switch is rated for ⅓ HP or 11 Amps maximum load. If load is less than rating proceed to *Step 4,* otherwise proceed to *Step 6.*

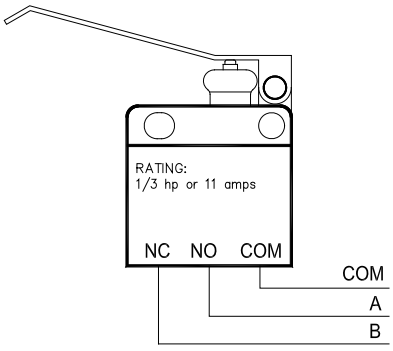


Figure 10

FAN LIMIT SWITCH

Step 4

If the limit switch is to turn off the fan when the inlets or curtains open, and turn on when curtains close, connect one leg of fan power to wire marked 'COM' and connect fan wire to 'NO' contact marked 'A'. *See Figure 11.*

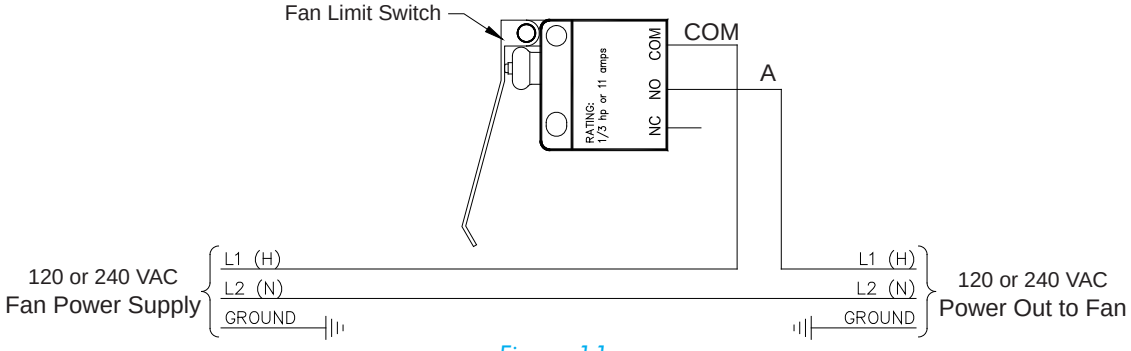


Figure 11

Step 5

If the limit switch is to turn on the fan when inlets or curtains open, and turn off when curtains close, connect one leg of fan power to wire marked 'COM' and connect fan wire to contact marked 'B'. *See Figure 12.*

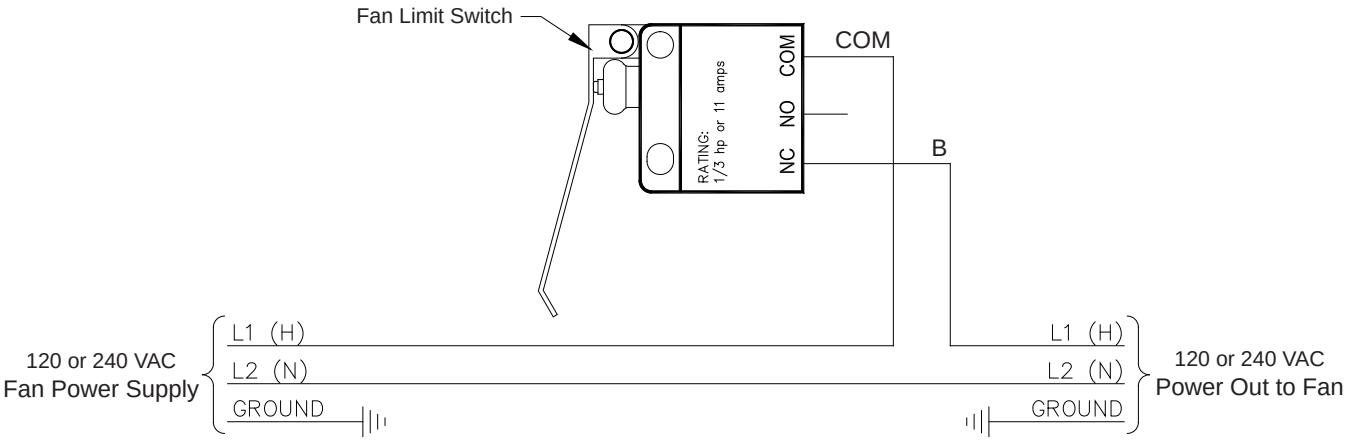


Figure 12

Step 6

When the fan load exceeds the rating of the limit switch, an external load carrying relay (Munters SH4120 series) must be used in conjunction with the limit switch. If the load (fan) is to turn off when inlets or curtains open and turn on when inlets or curtains close, wire limit switch and relay as shown if *Figure 13*. If the load (fan) is to turn on when inlets or curtains open and turn off when inlets or curtains close, wire limit switch and relay as shown in *Figure 14, on next page.*

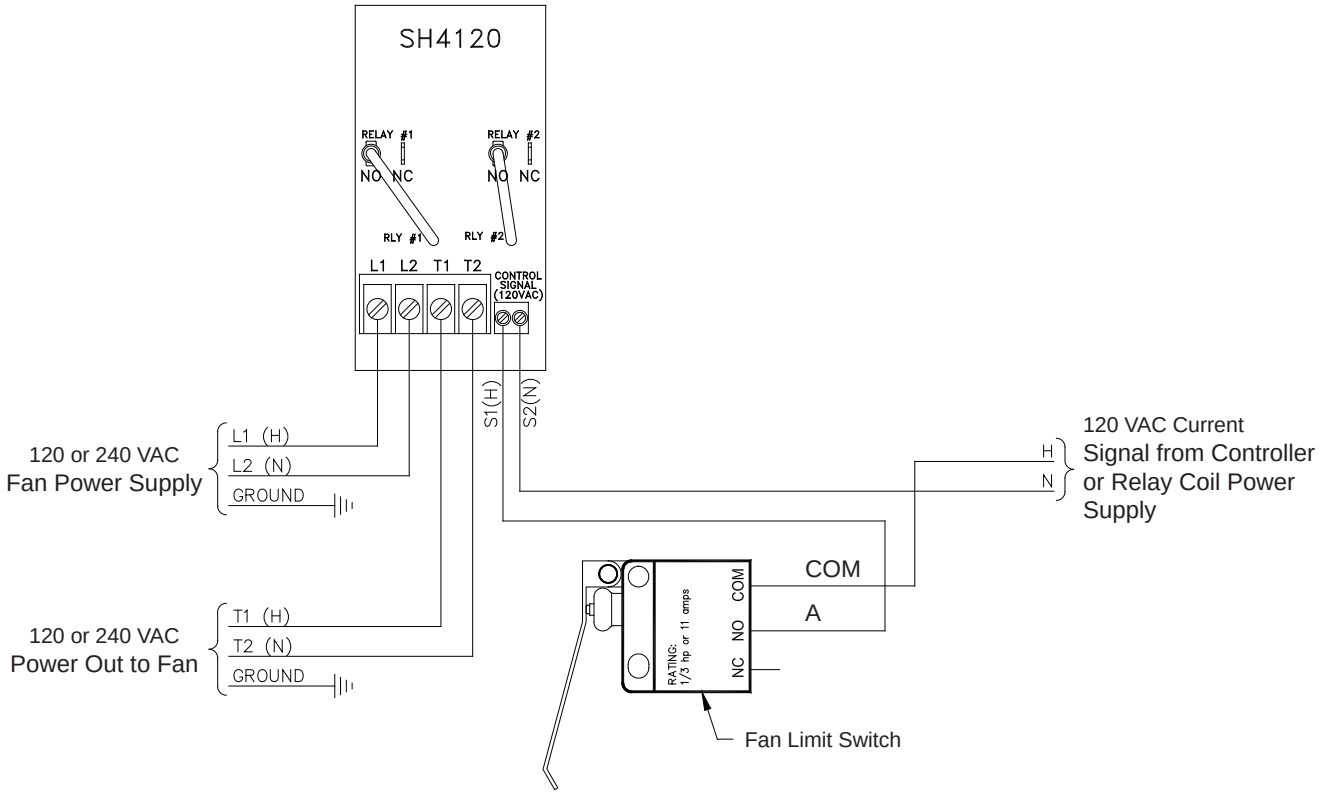


Figure 13

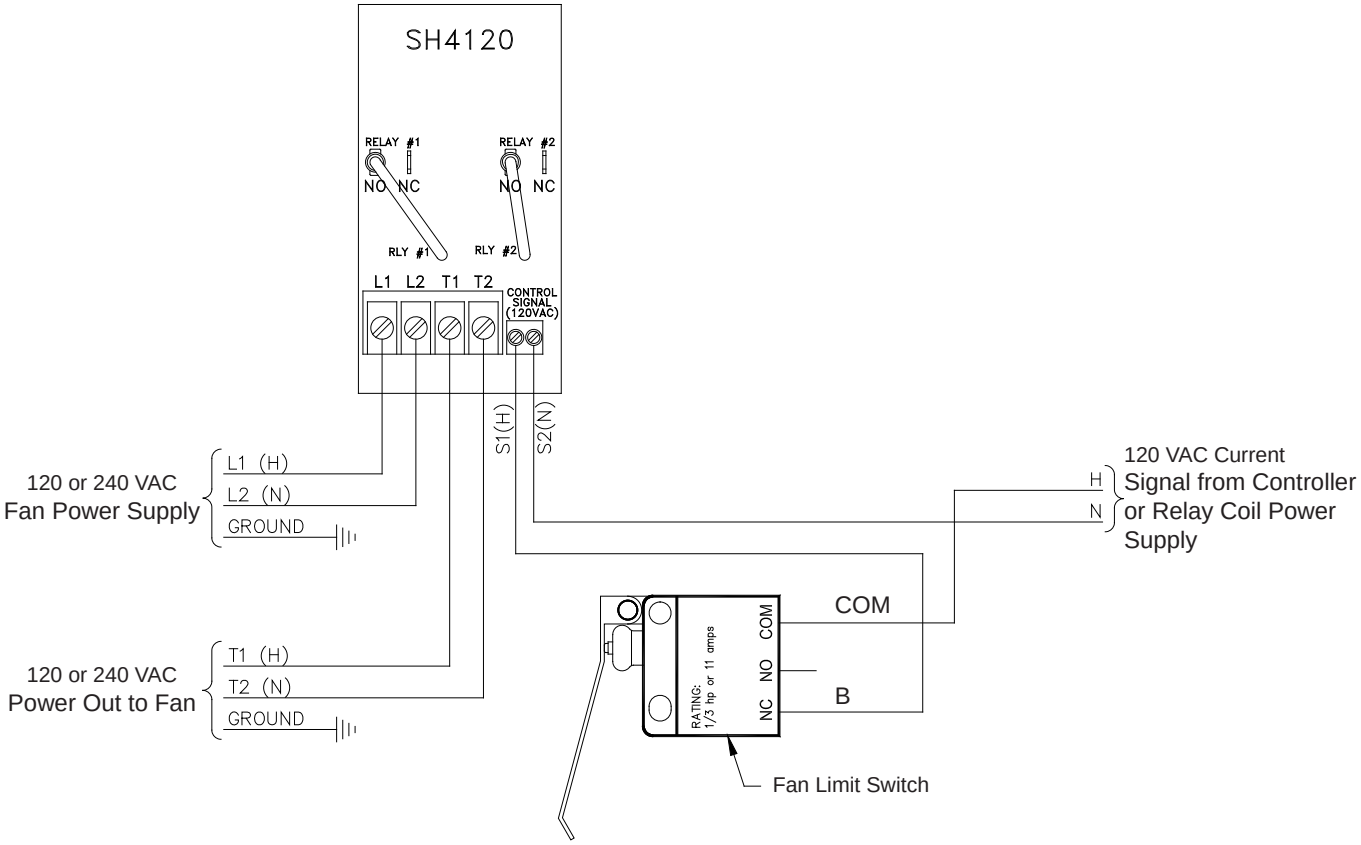


Figure 14

Step 7

Turn on the electrical supply to the curtain machine and the Air-Monitor Control or environmental computer control. Proceed to Chapter 6, Operation.

Operation

6.

Note:

The curtain machine is shipped from the factory with the open and close limit clamps set for mid range operation. These clamps MUST be set for your installation to assure proper operation.

Step 1

To adjust the close limit switch, manually run the curtain machine to the full close position for the curtains or inlets. Position the Close Limit Adjustment Clamp against Cable Puller Bracket and tighten clamp, so that it activates the close limit switch. Manually run curtain machine partially open and back close to check for proper operation of switch. Readjust clamp as necessary. *See Figure 15.*

Step 2

To adjust the open limit switch, manually run the curtain machine to the full open position for the curtains or inlets. Position the Open Limit Adjustment Clamp against Cable Puller Bracket and tighten clamp, so that it activates the open limit switch. Manually run curtain machine partially close and back open to check for proper operation of switch. Readjust clamp as necessary. *See Figure 15.*

Step 3

Place all switches and controls in auto. Test operation of curtain machine using the Air-Monitor control or Environmental Computer Control.

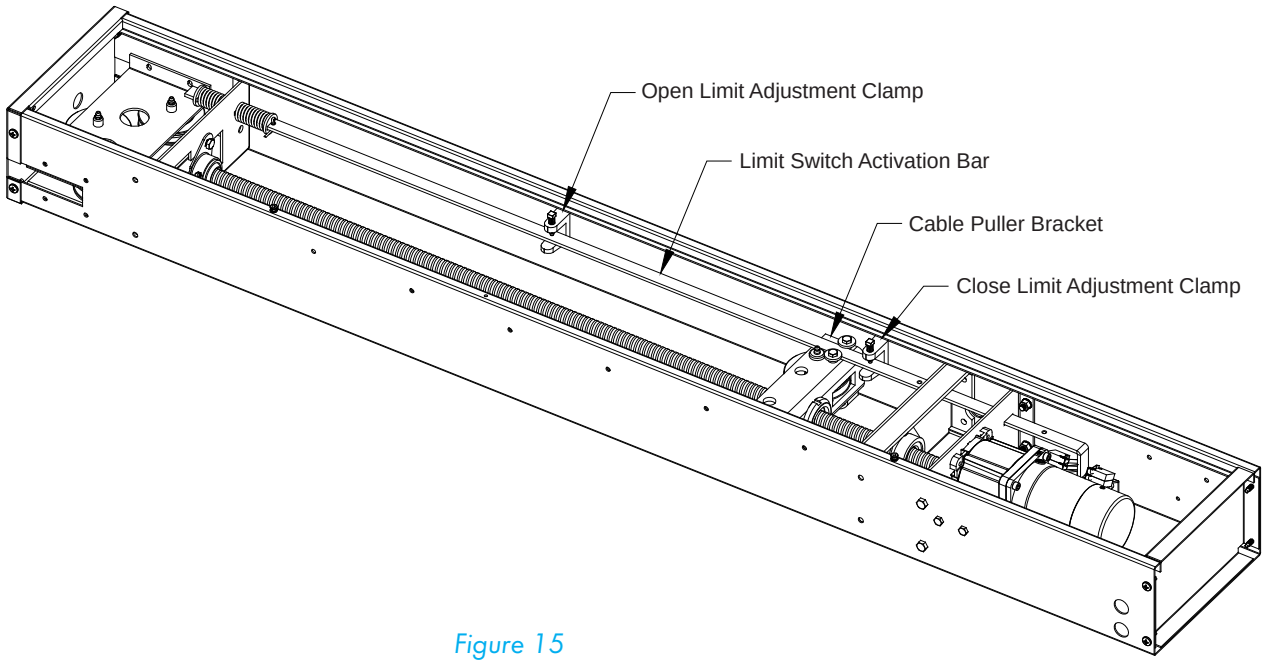


Figure 15

Maintenance

7.

1) REMOVE DUST BUILDUP FROM CURTAIN MACHINE: Using a soft brush or dry cloth. Never use liquids to clean electrical cords or wires.

2) GREASE BALL SCREWS, THRUST BEARING AND CHECK PULLEYS: A high quality Lithium based grease should be applied to the ball screw, bearing and pulleys every 6 months depending on the frequency of operation. Also, check to make sure that the pulleys will turn freely.

3) CHECK CABLES: Confirm that all cables are in good condition and are properly positioned in the groove of the pulleys. Check this regularly to avoid damage to the building or equipment. Check any clamps being used to verify they are secure.

4) CHECK LIMIT CLAMPS: Verify that the limit clamps are adjusted to allow the air inlet to open and close within the inlets operating range. This should be performed every 6 months.

5) CHECK ELECTRICAL CONNECTIONS: With the power turned off to the unit, verify that the termination points are secure and all wires are in good condition. This should be done yearly.

6) CHECK GEARMOTOR AND BRAKE: No lubrication or adjustment is needed on the gearmotor/brake assembly. Some maintenance may be necessary for reliable operation if the unit will sit idle for an extended period of time. If the unit will sit idle for more than one month, the following steps should be performed before actuator is put back into service.
   Step 1 - Apply power to the actuator in the open and then the close direction.
   Step 2 - Verify that the gearmotor will operate in both directions.
   Step 3 - If the unit will not operate, refer to the Troubleshooting procedures for further instructions.

Troubleshooting

8.

SYMPTOM	POSSIBLE CAUSES	CORRECTIVE ACTION
Curtain Machine will not close	1. Close limit switch is activated	1. Run Curtain Machine off the Close limit
	2. No 120 VAC at the close input	2. Check for voltage from the Air-Monitor Control
	3. Brake has not released	3. Turn Curtain Machine off and listen at brake for click when turning machine on. If 120 VAC is on wires #7 & #8, brake is bad, replace Gearmotor/brake.
	4. Bad circuit board	4. Check for 120 VAC on wires #9 & #10.
Curtain Machine will not open	1. Open limit switch is activated	1. Run Curtain Machine off the Open limit

OTHER SYMPTOMS:

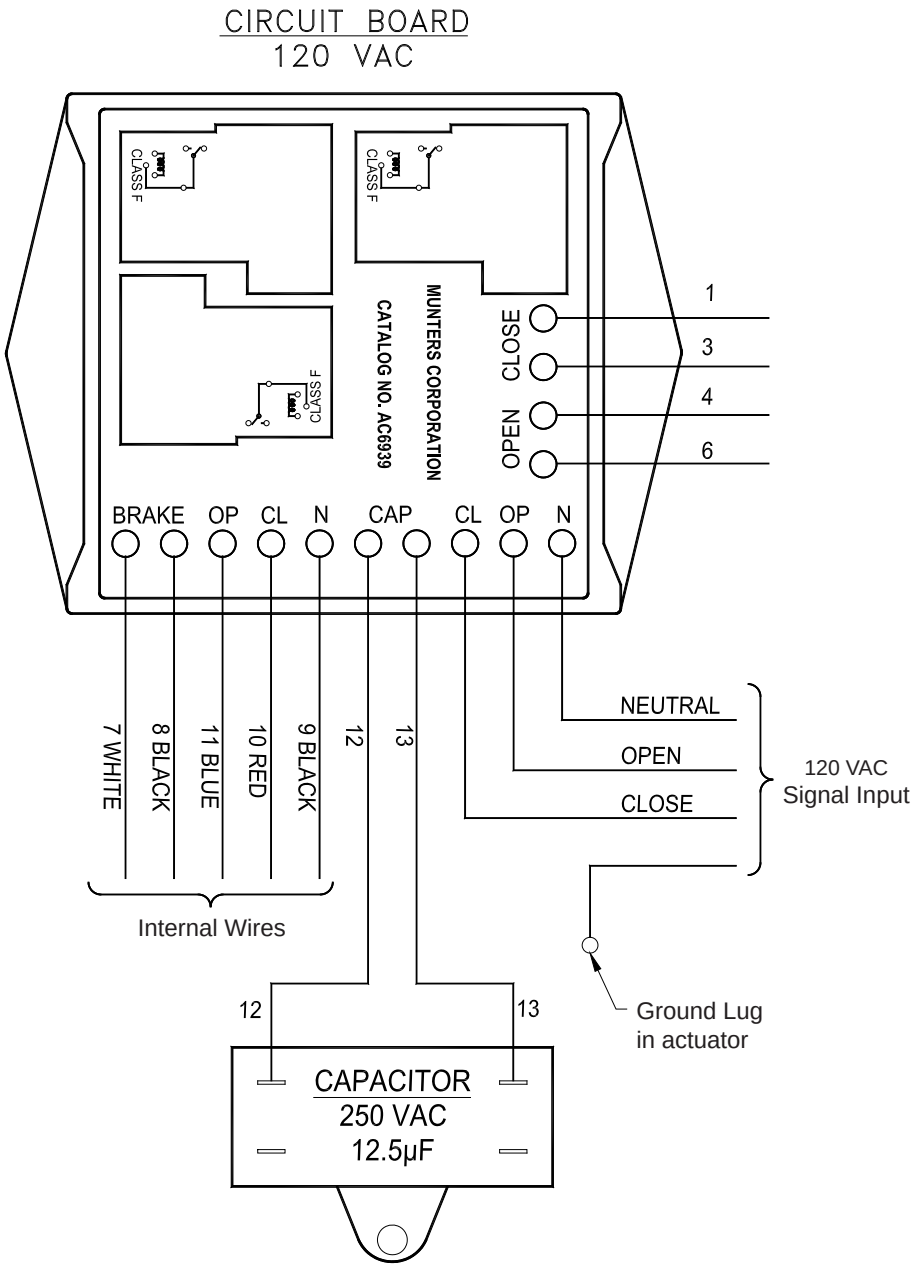
If a BA4xxx Series Actuator will not operate, some testing can be performed to determine the cause of the problem. A voltmeter capable of measuring 120VAC will be needed to test the unit thoroughly. To troubleshoot, power must be on. Use EXTREME CAUTION when checking voltage. DO NOT attempt these tests if you are not experienced in working on electrical control systems, instead contact a qualified electrician or service technician. Refer to the wiring diagram on page 19 when performing these tests. It is recommended to perform all of the steps listed below in the event that more than one problem is present.

STEP 1: With Open or Close Signal, verify that 120VAC is present between Open & Neutral or Close & Neutral on the circuit board in the actuator. If no voltage is present, the problem is not with the actuator and further testing of the wiring to the actuator should be done. If voltage is present, proceed to Step #2.

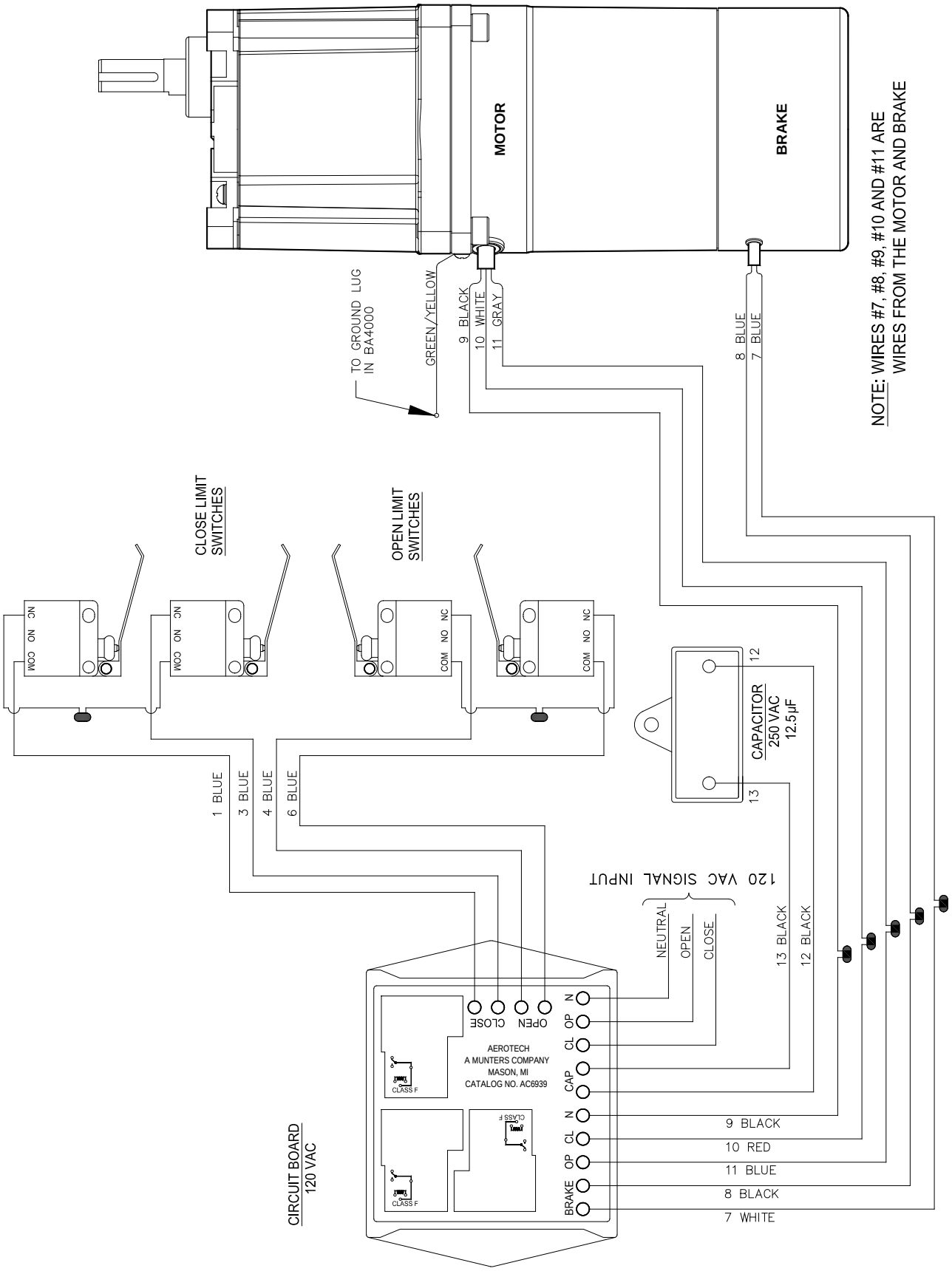
STEP 2: Confirm that the limit switch portion of the actuator circuit board is functioning properly. With a close signal present on the input to the board, verify that there is 120VAC between wire #1 and Neutral (N). Change the input signal from a close to an open signal and test for 120VAC between wire #4 and N. If no voltage is present at either of these points, replace the circuit board.

STEP 3: Check the operation of the open and close limit switches. With a close signal to the board, test for voltage between Neutral and #3. If no voltage is present, one of the close limit switches is defective or is in the activated position. With an open signal present, test between wire # 6 and N. If no voltage is present, one of the open limit switches is defective or is in the activated position.

STEP 4: Confirm that the remaining areas of the actuator circuit board are functioning properly. With a close signal present on the input to the board, verify that there is 120VAC on the following points. Test between wires #7 and #8, #9 and #10, N and #13. Change the input signal from a close to an open signal and test for 120VAC at the following points. Test between wires #7 and #8, #9 and #11, N and #12. If no voltage is present at any of these points, replace the circuit board.

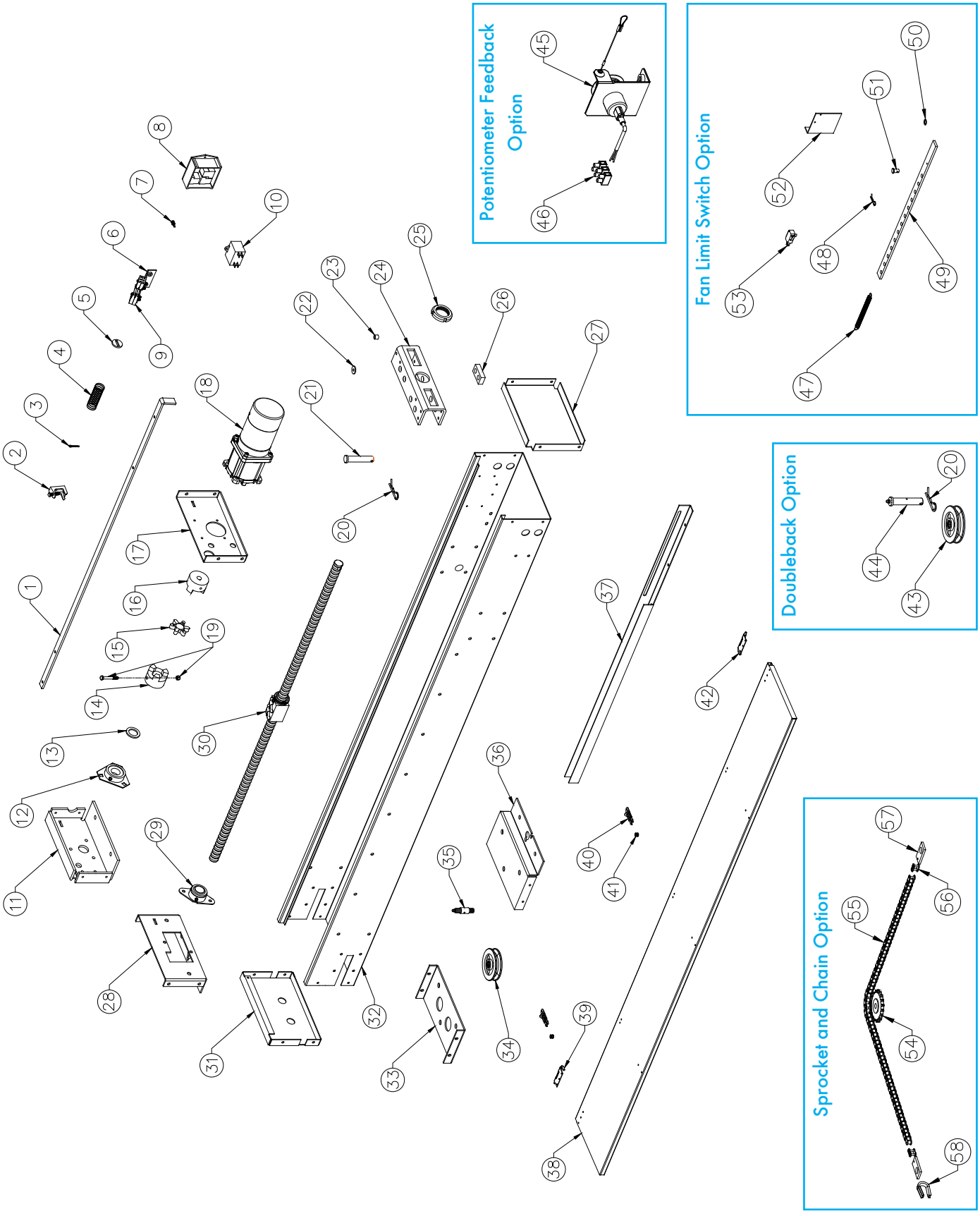


BA4000



Exploded View

9.



Item	Catalog No.	Description	Qty.
1	AC1955	Bar, Limit Switch Activation, 42.75"L., BA4002, AL	1
	AC1956	Bar, Limit Switch Activation, 54.75"L., BA4003, AL	1
	AC1957	Bar, Limit Switch Activation, 66.75"L., BA4004, AL	1
2	AC1941	Clamp, Limit Adjustment	2
3	KP1052	Cotter Pin	2
4	KX1455	Spring, Compression	2
5	AC1937	Retainer, Limit Switch Spring	2
6	AC1995	Limit Switch Assembly Kit	1
	AC1914	Bracket, Open/Close Switch	1
7	KE1154	Connector, Moisture Resistant 14-22 AWG	11
8	AC1939	Circuit Board	1
9	AC1954	Switch, Micro	4
10	AC2503	Capacitor KIT, 12.5 mfd for BA4000	1
11	AC1903	Bulkhead, Middle, BA4xxx Series, PWD CTD STEEL	1
12	AC1905	Thrust Bearing, 3-bolt flange, 1" I.D.	1
13	KW4150	Flat Washer, ZP	1
14	AC1601	Coupler body, 1" bore, 095	1
15	AC1602	Spider insert, for 090/095, (6-Legs), Rubber	1
16	AC1616	Coupler body, ½" bore, 095	1
17	AC1904	Bulkhead, Lower, BA4xxx Series, PWD CTD STL	1
18	AC1436	Gearmotor with brake, 3 RPM	1
	AC1437	Gearmotor with brake, 30 RPM	1
19	KS1026	5/16"-18 x 2.5" Hex Bolt, ZP	1
	KN1706	5/16"-18 Nylock Nut, ZP	1
20	KP1108	Cotter Hairpin, 1/8"D x 2.5"L	2
21	KP1252	Clevis Pin, non-greaseable	2
22	KW3023	Flat Washer, NY	2
23	KX1255	Spacer, NY	2
24	AC1901	Cable Puller Bracket, BA4xxx Series, PWD CTD STL	1
25	KN1951	Locknut for Ballnut	1
26	AC1915	Guide Block, on Cable Puller Bracket, PL	3
27	AC1910	Chassis Cap, Bottom End, GZ	1
28	AC1902	Bulkhead, Upper, BA4xxx Series, PWD CTD STL	1
29	AC1948	Bearing, 2-bolt flange, 1" I.D.	1
30	AC1486	Ball Screw Assembly, 32.75"L., BA4002	1
	AC1487	Ball Screw Assembly, 44.75"L., BA4003	1
	AC1488	Ball Screw Assembly, 56.75"L., BA4004	1
31	AC1909	Chassis Cap, Top End, GZ	1
32	AC1922	Chassis, 58"L., BA4002	1
	AC1923	Chassis, 70"L., BA4003	1
	AC1924	Chassis, 82"L., BA4004	1
33	AC1908	Bracket Pulley Cover, GZ	1
34	AC1943	Pulley, 3.5"D, with Bearing, STL	3

Item	Catalog No.	Description	Qty.
35	AC1961	Spindle for 3.5" Pulley	3
36	AC1907	Bracket, Pulley Base, GZ	1
37	AC1916 AC1917 AC1918	Pull Retainer, 28.75"L., BA4002, GZ Pull Retainer, 40.75"L., BA4003, GZ Pull Retainer, 52.75"L., BA4004, GZ	1 1 1
38	AC1928 AC1929 AC1930	Cover, BA4002, w/ hinges/latch, 56"L., GZ Cover, BA4003, w/ hinges/latch, 68"L., GZ Cover, BA4004, w/ hinges/latch, 80"L., GZ	1 1 1
39	AC1947	Hinge, cane bolt, Right Hand, ZP	1
40	KX1041	Latch, Slide Bar Assembly, SS	varies
41	KX1042	Latch, Lock Bushing, ZP	varies
42	AC1933	Hinge, cane bolt, Left Hand, ZP	1
Double Back Option - BA400x-xx-D or Add-on Kit AC1950			
43	AC1943	Pulley, with Bearing	2
44	KP1253	Clevis Pin, greaseable	2
Potentiometer Feedback Option - BA400x-xx-P or Add-on Kit AC1425			
45	AC1425	Potentiometer Kit, 5kΩ w/ bracket and cable	1
46	FC1205	3 Pole Terminal Block, 16 AWG max.	1
Fan Limit Switch Option - BA400x-xx-F or Add-on Kit AC1951			
47	KX1454	Spring, Tension	1
48	KP1106	Hairpin, Cotter	1
49	AC1911	Bar, Fan Limit Activation, AL	1
50	KW3022	Flat Washer, NY	1
51	KP1254	Clevis Pin	1
52	AC1912	Bracket, Fan Switch, GZ	1
53	AC1954	Switch, Micro	1
Sprocket and Chain Option - BA400xSC-xx or Add-on Kit AC1981			
54	AC1984	Sprocket, Idler, #40, 17 Tooth, ⅝" Bore	2
55	KX1036	Roller Chain, #40, 36"L.	2
56	KX1037	Connecting Link, #40, Spring Clip Type	4
57	AC1986	Connecting Strap for #40 Chain, STL	8
58	AC1060	Thimble, for 3/16" Dia. Cable, ZP	2

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BA4000 Curtain Machines are developed and produced by Munters Corporation, Lansing, Michigan U.S.A. 1-800-227-2376

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