

MICRO GROW

GREENHOUSE SYSTEMS, INC

42065 ZEVO DR., UNIT B-1, TEMECULA, CA 92590 PHONE (951)-296-3340 FAX (951)-296-3350
www.microgrow.com

Revision 1.2, 03-11-02

**Series 100/200 Shade
Control Systems**

PRELIMINARY:

Securely mount the control panel in close proximity to the motor assembly. The motor assembly also contains the limit switches that the control panel will utilize. On the front cover of the control is the selector switch that the operator will need to use from time to time. Take the mounting height and convenience of the location into consideration when locating the control panel. The location should be relatively dry and vibration free.

ELECTRICAL CONNECTIONS:

As the greenhouse is a wet and damp environment, it is best to use weatherproof wiring methods when electrically connecting the control panel. Seal tight flexible conduit is recommended for all flexible conduit. Make all conduit openings in the bottom of the control.

For compliance with the National Electrical Code, install a fused safety switch on the power input conductors. The safety switch should be located adjacent to the control panel and motor. Use FRN (time delayed motor fuses) style fuses rated at no more than 125% of the full motor load.

Connect the motor to the control panel and terminate at the proper location.

Important grounding note: As the enclosure is fiberglass, it will be necessary to install a grounding wire through to the motor, or use approved grounding bushings with internal jumpers. In addition, always ground the metal back panel of the control.

LOW VOLTAGE WIRING:

The control uses low voltage limit switch wiring and low voltage automatic input wiring. Do not run the limit switch wiring in the same conduit as the power wiring. Use stranded copper low voltage wire. A six-conductor "BELDEN" type No. 20 gauge is acceptable for lengths up to 50' from the control. Use No. 16 gauge for lengths over 50'. Again, limit switch wiring must be run separately from any wiring over 24 volts.

BACKUP SAFETY LIMIT SWITCHES:

Locate and identify the backup safety limit switches on the motor and gearbox assembly. The purpose of these limits will be to disable the control in the event that the normal limits have failed to stop the system in the correct position. There will be two of these safety limits. Electrically tie each together in accordance with the drawing so that either switch opening will stop the control.

OPEN AND CLOSE LIMITS:

Located the normal and close limit switches located on the motor and gearbox assembly. Connect to the control in accordance with the drawing.

AUTOMATIC INPUTS:

The control will accept 24 volts AC signals from a remote source such as a computer control, solar sensor control, or temperature control in order to operate. Follow the drawing for the proper termination.

INTERNAL TIMER:

This system is equipped with an internal 24-hour time clock. The system may be operated by this time clock at any time desired. Simply push in the desired pins around the dial when it is desired to close the shading system. The system will open when the time clock senses pins that are not depressed. Set the actual time of day of the timer by rotating the dial to the correct setting.

SELECTOR SWITCH:

The control can be left **OFF**, manually **OPENED** or **CLOSED**, put in the **AUTOMATIC** position or left on the internal **TIMER** by rotating the desired operation on the selector switch.

INITIAL CHECKOUT

- A. Put the selector switch in the off position.
- B. Energize the power safety switch for 240 VAC or 120 VAC
- C. Double check correct limit and safety backup switch connections.
- D. Momentarily turn the selector switch to the manual close position. Make sure that the close contactor is pulled in. At this point, the shade system should start moving in the close position. If the system moves in the opposite or open position, stop the system and interchange any two motor leads.
- E. Verify that the correct open and close limit wires are correctly connected. Depending on the mechanical set up of the shade system, it may be required to interchange the open and close limit wire at the motor location. As the system runs open or close, you should be able to see the actuator moving towards the appropriate limit switch pair.

LIMIT SWITCH NOTE:

The limit switch connections and settings are the singly most important part of the system operation. Improper setting and/or connection can result in severe damage to the entire shade system. Always check and then double-check all connection and operation fully before putting the system in automatic operation.

CHECK-OUT RECAP:

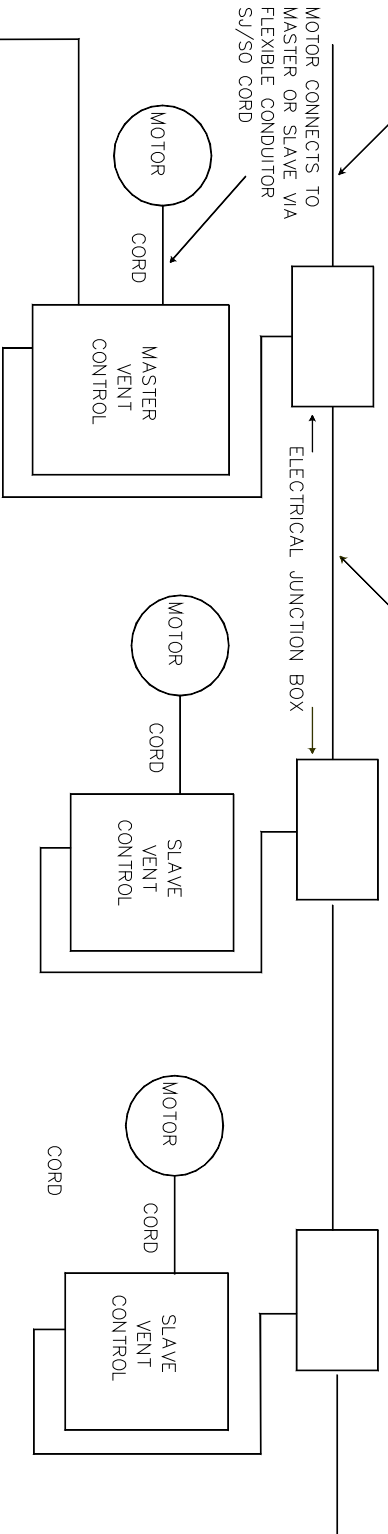
Visually check that the proper contactor in the control matches the correct motor rotation. Left contactor is for open the right contactor for close. Change the motor lead if required.

Locate the correct open and close limit pairs. Connect leads, check and then double-check proper operation. The safety limit, when open, should completely stop the system from operating in any mode, timer, manual or automatic.

Set all limits in accordance with manufacturer's instructions.

ELECTRICAL CONDUIT WILL CARRY VENT CIRCUITS AND SLAVE CONTROL LINES.

IN CONDUIT, 4 #16 TFFN COPPER CONTROL LINES FOR SLAVES ALONG WITH CIRCUITS FOR VENTS.



REMOTE BULB THERMOSTAT MOUNT AWAY FROM GREENHOUSE POSTS. (OR CONTROL RELAYS IF USING A CONTROL SYSTEM TO OPERATE)

VERY IMPORTANT: CONDUIT MUST ENTER AT THE BOTTOM OF THE MASTER AND SLAVE BOXES ONLY. THIS WILL PREVENT CONDENSATION AND MOISTURE FROM ENTERING THE BOX.

GROUNDING NOTE: THE MOTOR AND THE METAL BACK PLATE IN THE CONTROL BOX MUST BE GROUNDED, AS WELL AS THE ENTIRE ELECTRICAL SYSTEM.

NOTE: IT IS HIGHLY RECOMMENDED THAT WEATHER PROOF RAIN TIGHT GRADE WIRING BE USED. THIS INCLUDES SEAL TIGHT FLEXIBLE CONDUIT AND RAIN TIGHT JUNCTION BOXES.

DO NOT OVERLOAD VENT CIRCUITS. USE NO MORE THAN SIX VENT CONTROL AND MOTORS ON A 20 AMP CIRCUIT. (VENT MOTORS FIGURED AT 2.0 AMPS EACH, ADJUST ACCORDINGLY IF VENT MOTORS ARE LARGER THAN 2.0 AMPS EACH).

LIMIT SWITCH WIRING: LIMIT SWITCH WIRING IS NOT ILLUSTRATED ABOVE, FOLLOW THE FOLLOWING GUIDELINES FOR ALL LIMIT SWITCH WIRING:
 * USE WIRE NO SMALLER THAN 18 GAUGE
 * BE CAREFUL NOT TO BIND OR KINK LIMIT SWITCH CABLE IN ANY MANNER DURING OPERATION OF VENT
 * USE STRANDED WIRE FOR FLEXIBILITY

VENT MASTER AND SLAVES POWER AND CONTROL LINE LAYOUT

Project			
VENT MASTER & SLAVES PWR & CTRL LINE LAYOUT			
Drawn by	Date	Distributor	Order ID
GH	03/12/02	N/A	N/A

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PRINTED
CIRCUIT
BOARD

SEE OTHER SHEET FOR
DETAILS ON INPUT AND LIMITS

DISCONNECT SWITCH

120 VAC 1 PHASE POWER INPUT

POWER INPUT FROM CIRCUIT BREAKER

BACKPANEL AND MOTOR MUST BE
GROUNDED. FOLLOW ALL ELECTRICAL
CODES

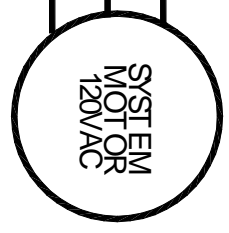
FUSE

1
2
3
4
5

CLOSE, 120 VAC

OPEN, 120 VAC

120 VAC COMMON LEAD



IN THE "OPEN" MODE, 120 VAC IS
PRESENT BETWEEN TERMINALS 3 & 4
IN THE "CLOSE" MODE, 120 VAC IS
PRESENT BETWEEN TERMINALS 3 & 5

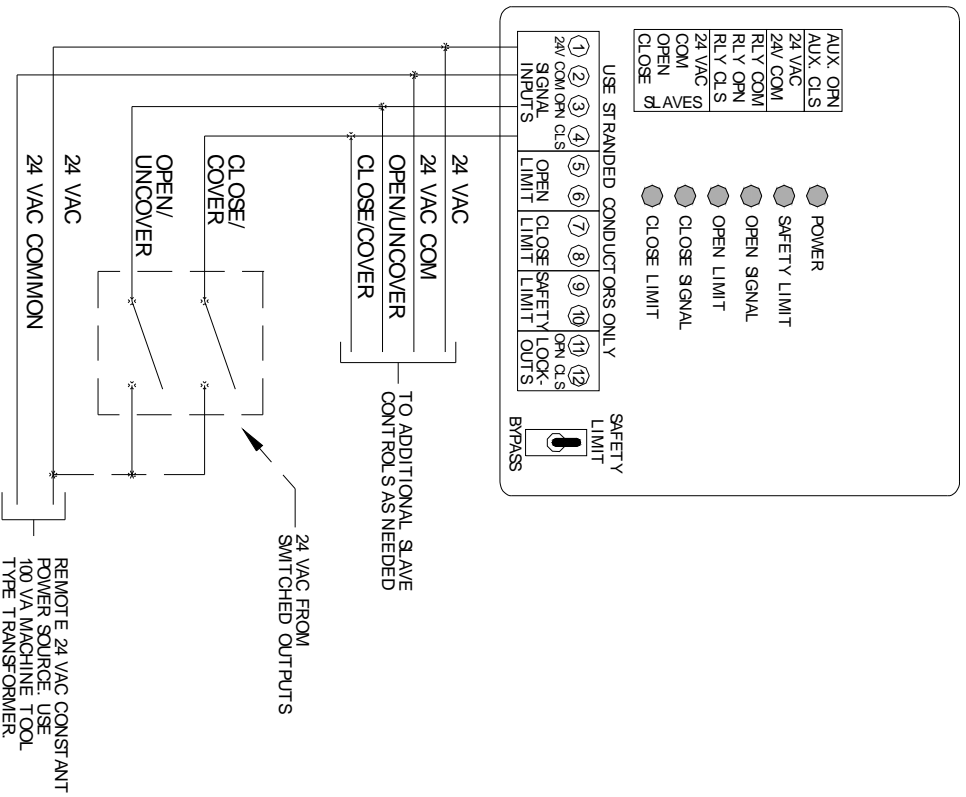
POWER AND MOTOR CONNECTIONS MG MOTOR 120 VAC SYSTEM

PLUMBING AND MOTOR CONNECTIONS (MG 120VAC)

Project				PWR AND MOTOR CONNECTIONS (MG 120 VAC)			
Drawn by		Date		Distributor		Order ID	
GH		03/12/02		N/A		N/A	

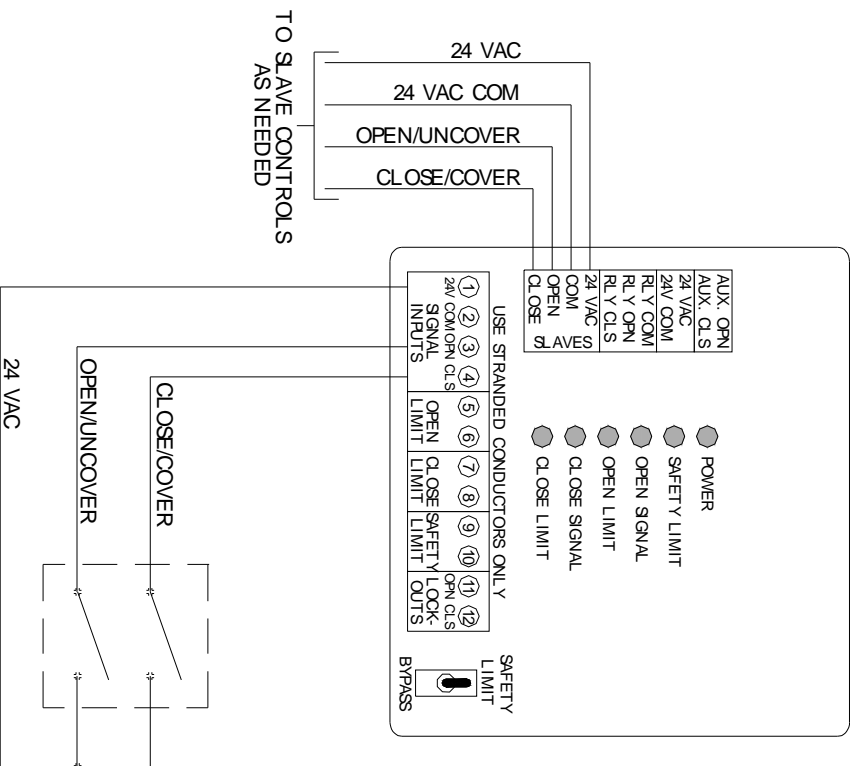
SLAVE CONNECTIONS

TYPICAL CONNECTION FOR PROCOM, GROWCOM, VENTMATE PLUS AND SIMILAR CONTROLS.



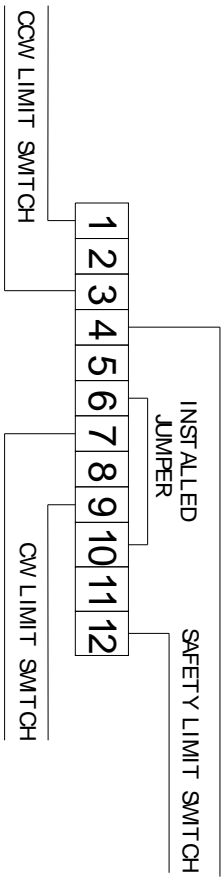
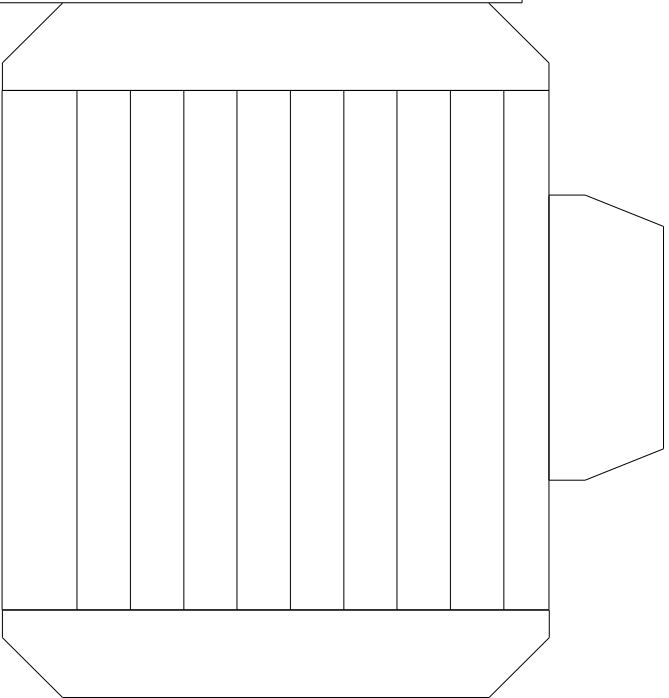
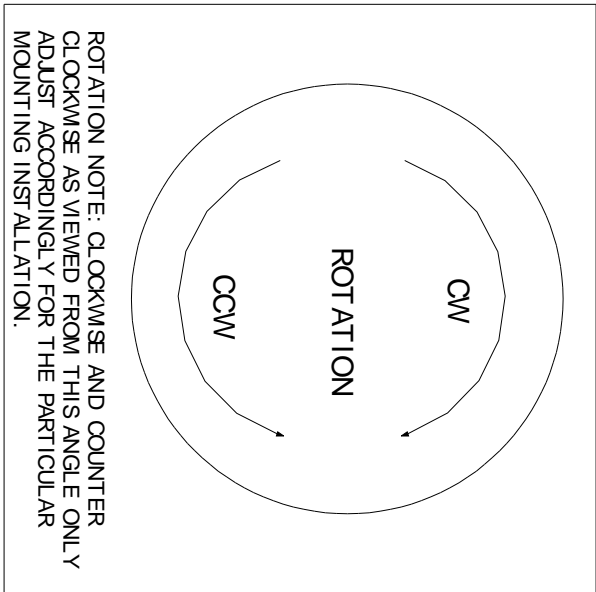
MASTER CONNECTIONS

TYPICAL CONNECTION FOR PROCOM, GROWCOM, VENTMATE PLUS AND SIMILAR CONTROLS.



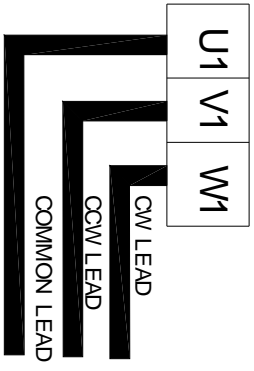
AUTOMATIC INPUTS FOR VENT AND SHADE CONTROLS

Project			
AUTOMATIC INPUTS FOR VENT & SHADE CONTROLS			
Drawn by	Date	Distributor	Order ID
GH	02/28/02	N/A	N/A



SAFETY LIMIT NOTE:
THE SAFETY LIMIT IS DESIGNED TO BE A BACKUP LIMIT TO NORMAL LIMITS

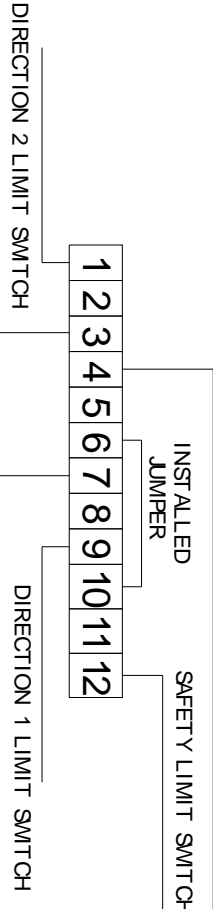
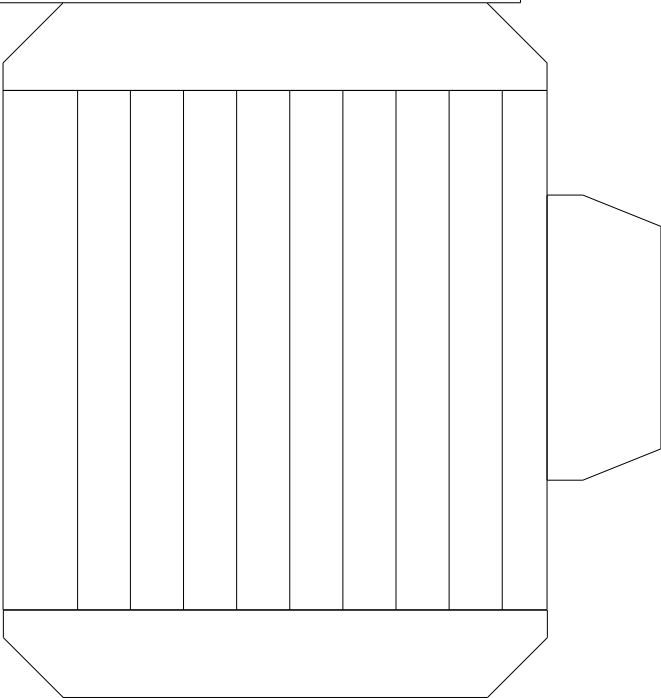
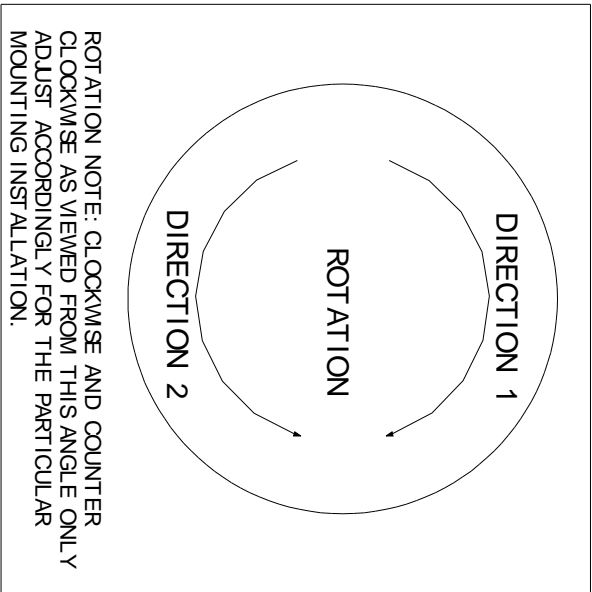
MOTOR POWER CONNECTIONS



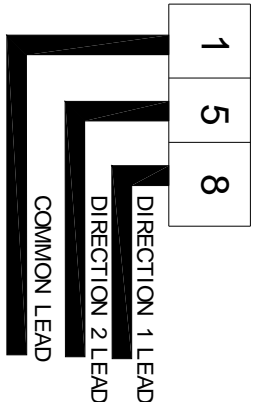
RIDDER MOTOR AND GEARBOX

11. DRAWING NUMBER: MOTOR AND GEARBOX

Project				RIDDER MOTOR AND GEARBOX			
Drawn by	Date	Distributor	Order ID	Drawn by	Date	Distributor	Order ID
GH	03/12/02	N/A	N/A	GH	03/12/02	N/A	N/A



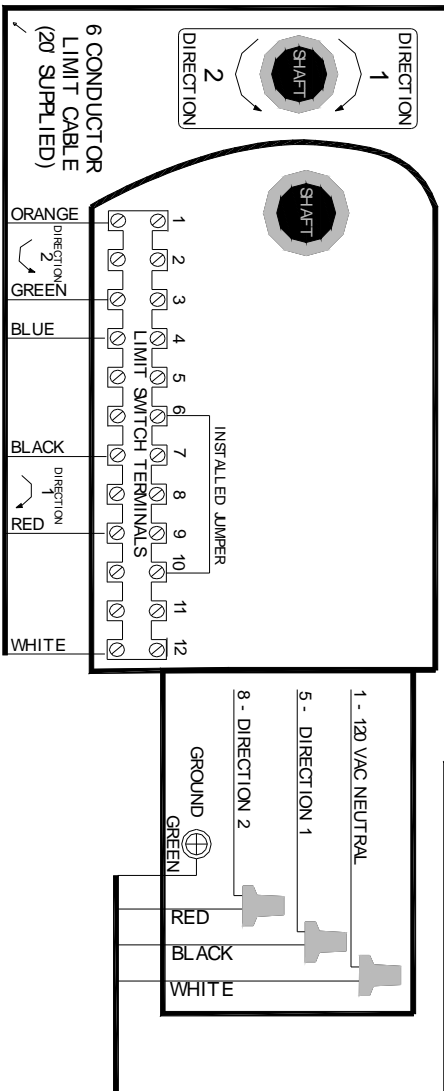
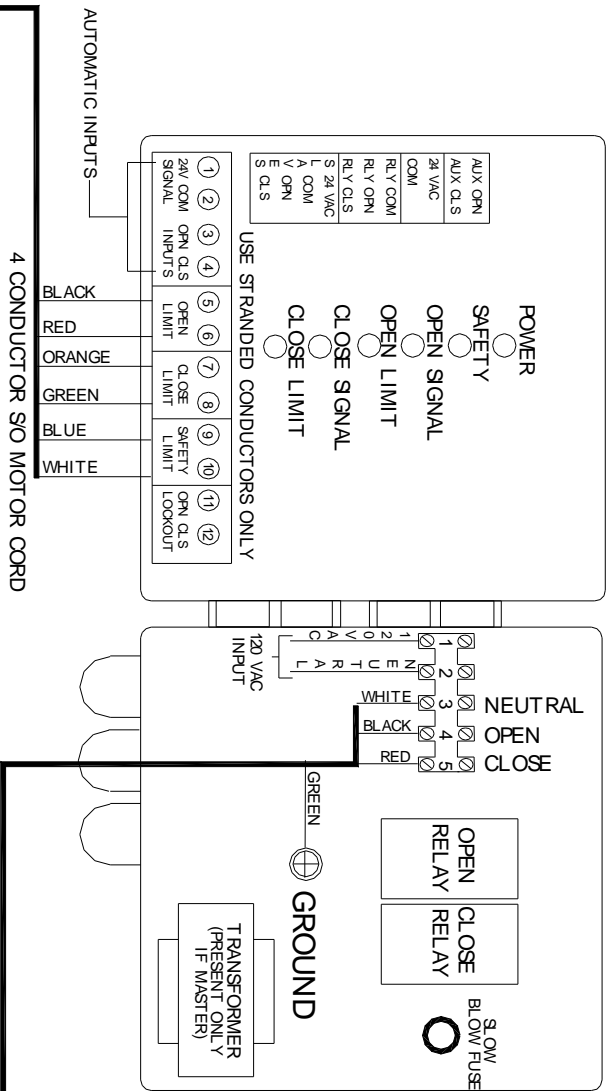
SAFETY LIMIT NOTE:
THE SAFETY LIMIT IS DESIGNED TO BE A BACKUP LIMIT TO NORMAL LIMITS



MG MOTOR AND GEARBOX

Project				MG MOTOR AND GEARBOX			
Drawn by	Date	Distributor	Order ID	GH	03/12/02	N/A	N/A

USE THIS DIAGRAM ONLY IF DIRECTION 1 IS OPEN



PROVIDE A SEPARATE MOTOR DISCONNECT SWITCH AS REQUIRED BY LOCAL AND NATIONAL ELECTRICAL CODES.

PROVIDE BRANCH CIRCUIT PROTECTION AS REQUIRED BY THE LOCAL AND NATIONAL ELECTRICAL CODES.

FOLLOW ALL LOCAL AND NATIONAL ELECTRICAL CODES IN THE CONNECTION OF THIS DEVICE.

CONDUIT MUST ENTER AT THE BOTTOM OF THE MASTER AND SLAVE BOXES ONLY. THIS WILL PREVENT CONDENSATION AND MOISTURE FROM ENTERING THE BOX.

THE MOTOR AND THE METAL BACKPLATE IN THE CONTROL BOX MUST BE GROUNDED, AS WELL AS THE ENTIRE ELECTRICAL SYSTEM.

IT IS HIGHLY RECOMMENDED THAT WEATHERPROOF RAINTIGHT GRADE WIRING BE USED. THIS INCLUDES SEALED TIGHT FLEXIBLE CONDUIT AND RAINTIGHT JUNCTION BOXES.

MG20 40 MOTOR AND LIMIT WIRING
USE THIS DIAGRAM ONLY IF DIRECTION 1 OPENS YOUR SYSTEM (SEE OTHER SHEET IF DIRECTION 2 OPENS).

Project **MG20 40 MOTOR AND LIMIT WIRING (1 IS OPEN)**

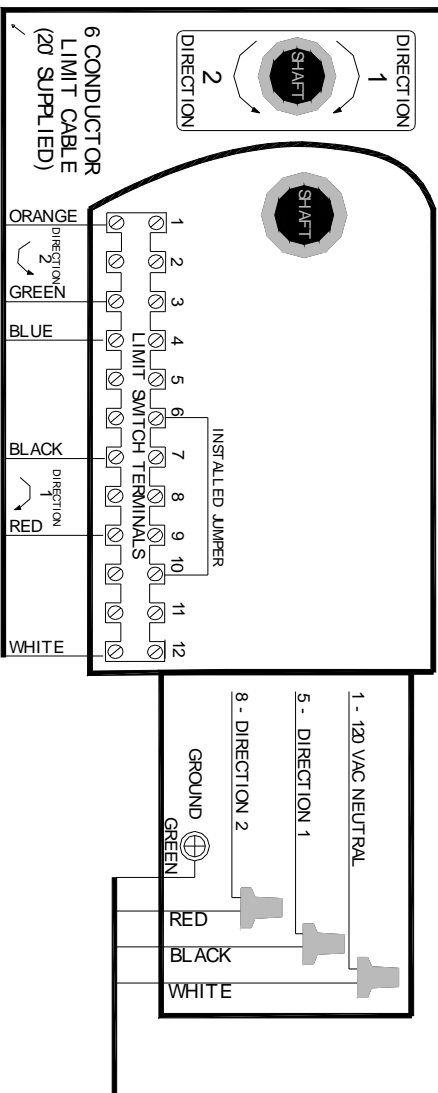
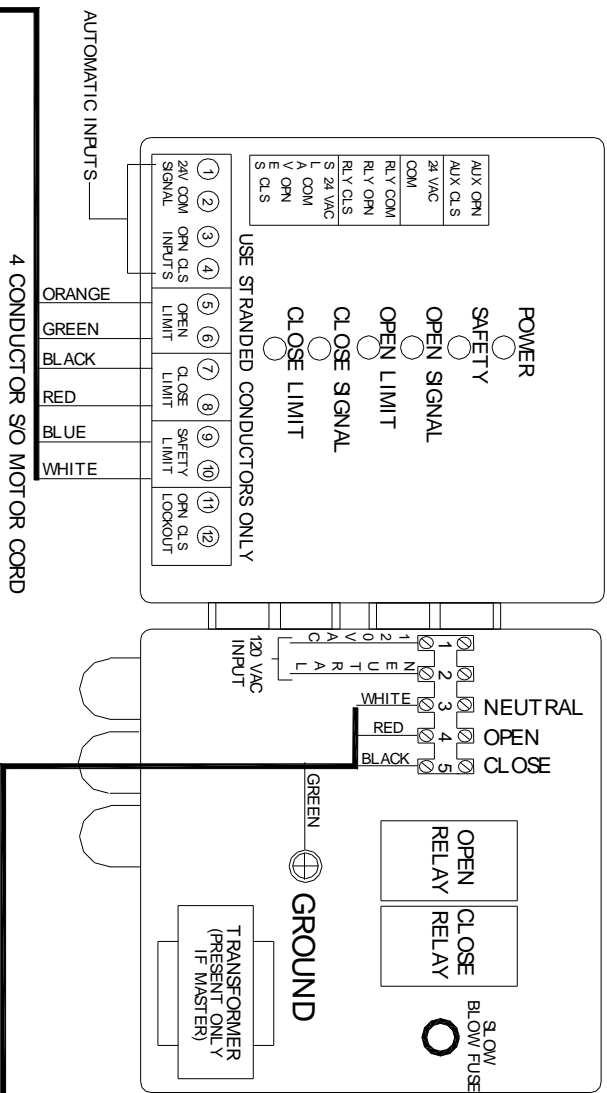
Drawn by **GH**

Date **03/12/02**

Distributor **N/A**

Order ID **N/A**

USE THIS DIAGRAM ONLY IF DIRECTION 1 IS CLOSED



↑ PROVIDE A SEPARATE MOTOR DISCONNECT SWITCH AS REQUIRED BY LOCAL AND NATIONAL ELECTRICAL CODES

↑ PROVIDE BRANCH CIRCUIT PROTECTION AS REQUIRED BY THE LOCAL AND NATIONAL ELECTRICAL CODES

↑ FOLLOW ALL LOCAL AND NATIONAL ELECTRICAL CODES IN THE CONNECTION OF THIS DEVICE.

↑ CONDUIT MUST ENTER AT THE BOTTOM OF THE MASTER AND SLAVE BOXES ONLY. THIS WILL PREVENT CONDENSATION AND MOISTURE FROM ENTERING THE BOX.

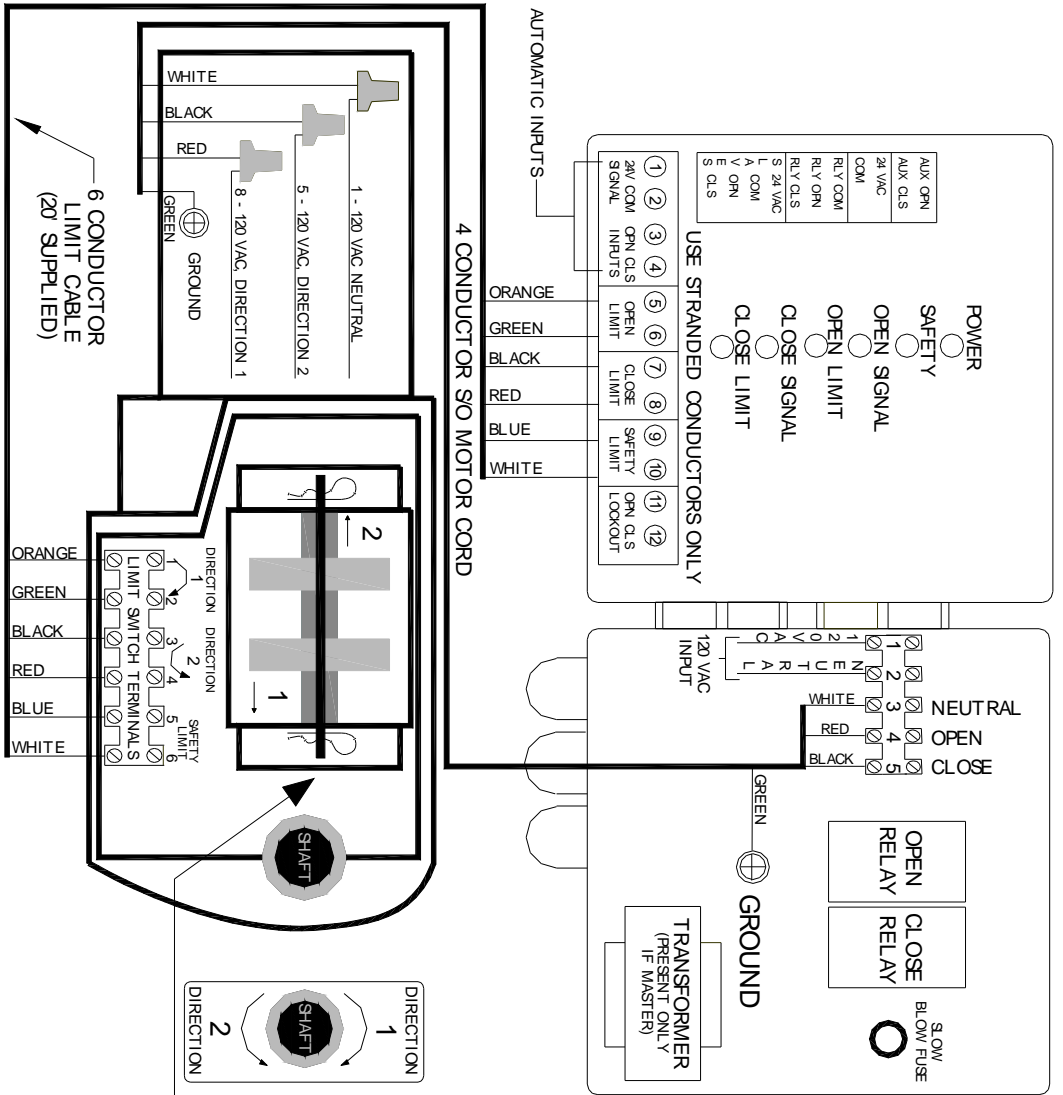
↑ THE MOTOR AND THE METAL BACKPLATE IN THE CONTROL BOX MUST BE GROUNDED, AS WELL AS THE ENTIRE ELECTRICAL SYSTEM.

↑ IT IS HIGHLY RECOMMENDED THAT WEATHERPROOF RAINTIGHT GRADE WIRING BE USED. THIS INCLUDES SEALTIGHT FLEXIBLE CONDUIT AND RAINTIGHT JUNCTION BOXES

MG20 40 MOTOR AND LIMIT WIRING
 USE THIS DIAGRAM ONLY IF DIRECTION 2 OPENS YOUR SYSTEM (SEE OTHER SHEET IF DIRECTION 1 OPENS).

Project MG20 40 MOTOR AND LIMIT WIRING			
Drawn by GH	Date 03/12/02	Distributor N/A	Order ID N/A

USE THIS DIAGRAM ONLY IF DIRECTION 1 OPENS



PROVIDE A SEPARATE MOTOR DISCONNECT SWITCH AS REQUIRED BY LOCAL AND NATIONAL ELECTRICAL CODES.

PROVIDE BRANCH CIRCUIT PROTECTION AS REQUIRED BY THE LOCAL AND NATIONAL ELECTRICAL CODES.

FOLLOW ALL LOCAL AND NATIONAL ELECTRICAL CODES IN THE CONNECTION OF THIS DEVICES.

CONDUIT MUST ENTER AT THE BOTTOM OF THE MASTER AND SLAVE BOXES ONLY. THIS WILL PREVENT CONDENSATION AND MOISTURE FROM ENTERING THE BOX.

THE MOTOR AND THE METAL BACKPLATE IN THE CONTROL BOX MUST BE GROUNDED, AS WELL AS THE ENTIRE ELECTRICAL SYSTEM.

IT IS HIGHLY RECOMMENDED THAT WEATHERPROOF RAINIGHT GRADE WIRING BE USED. THIS INCLUDES SEALTIGHT FLEXIBLE CONDUIT AND RAINIGHT JUNCTION BOXES.

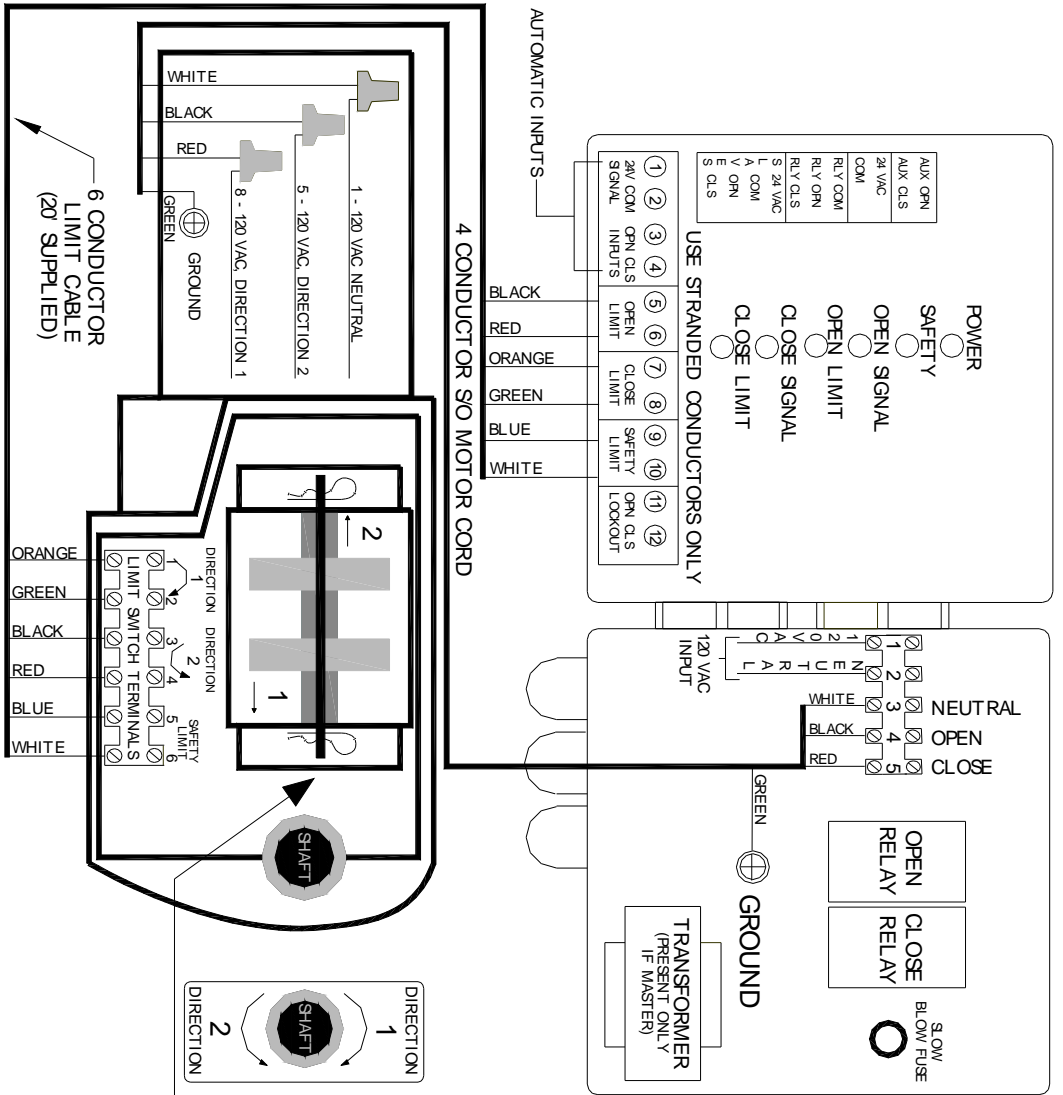
**** WARNING ****
 THE LIMIT CAPTURE BAR MUST BE INSTALLED FOR AUTOMATIC OPERATION.
 THE HOLDING PINS MUST BE INSTALLED FLAT AS TO NOT INTERFERE WITH THE COVER PLATE.

MG 2000/4000 MOTOR AND LIMIT WIRING

USE THIS DIAGRAM ONLY IF DIRECTION 1 OPENS YOUR SYSTEM (SEE OTHER SHEET IF DIRECTION 2 OPENS).

Project MG2000 4000 MOTOR AND LIMIT WIRING (1 IS OPEN)			
Drawn by GH	Date 03/12/02	Distributor N/A	Order ID N/A

USE THIS DIAGRAM ONLY IF DIRECTION 2 OPENS



PROVIDE A SEPARATE MOTOR DISCONNECT SWITCH AS REQUIRED BY LOCAL AND NATIONAL ELECTRICAL CODES.

PROVIDE BRANCH CIRCUIT PROTECTION AS REQUIRED BY THE LOCAL AND NATIONAL ELECTRICAL CODES.

FOLLOW ALL LOCAL AND NATIONAL ELECTRICAL CODES IN THE CONNECTION OF THIS DEVICES.

CONDUIT MUST ENTER AT THE BOTTOM OF THE MASTER AND SLAVE BOXES ONLY. THIS WILL PREVENT CONDENSATION AND MOISTURE FROM ENTERING THE BOX.

THE MOTOR AND THE METAL BACKPLATE IN THE CONTROL BOX MUST BE GROUNDED, AS WELL AS THE ENTIRE ELECTRICAL SYSTEM.

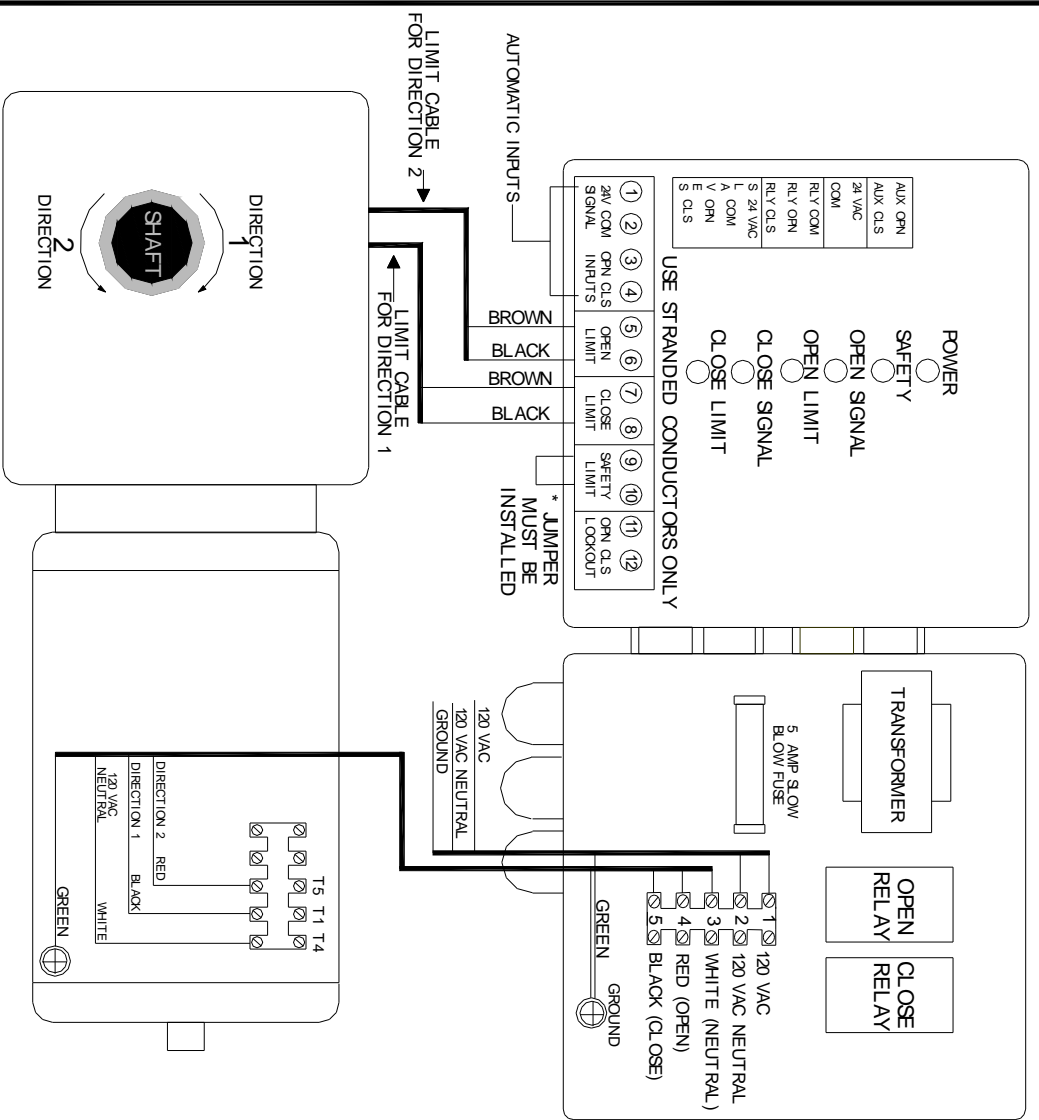
IT IS HIGHLY RECOMMENDED THAT WEATHERPROOF RAIN/TIGHT GRADE WIRING BE USED. THIS INCLUDES SEALTIGHT FLEXIBLE CONDUIT AND RAIN/TIGHT JUNCTION BOXES.

**** WARNING ****
THE LIMIT CAPTURE BAR MUST BE INSTALLED FOR AUTOMATIC OPERATION.
THE HOLDING PINS MUST BE INSTALLED FLAT AS TO NOT INTERFERE WITH THE COVER PLATE.

MG 2000/4000 MOTOR AND LIMIT WIRING

USE THIS DIAGRAM ONLY IF DIRECTION 2 OPENS YOUR SYSTEM (SEE OTHER SHEET IF DIRECTION 1 OPENS).

Project MG2000 4000 MOTOR AND LIMIT WIRING (2 IS OPEN)			
Drawn by GH	Date 03/12/02	Distributor N/A	Order ID N/A



PROVIDE A SEPARATE MOTOR DISCONNECT SWITCH AS REQUIRED BY LOCAL AND NATIONAL ELECTRICAL CODES.

PROVIDE BRANCH CIRCUIT PROTECTION AS REQUIRED BY THE LOCAL AND NATIONAL ELECTRICAL CODES.

FOLLOW ALL LOCAL AND NATIONAL ELECTRICAL CODES IN THE CONNECTION OF THIS DEVICES.

CONDUIT MUST ENTER AT THE BOTTOM OF THE MASTER AND SLAVE BOXES ONLY. THIS WILL PREVENT CONDENSATION AND MOISTURE FROM ENTERING THE BOX.

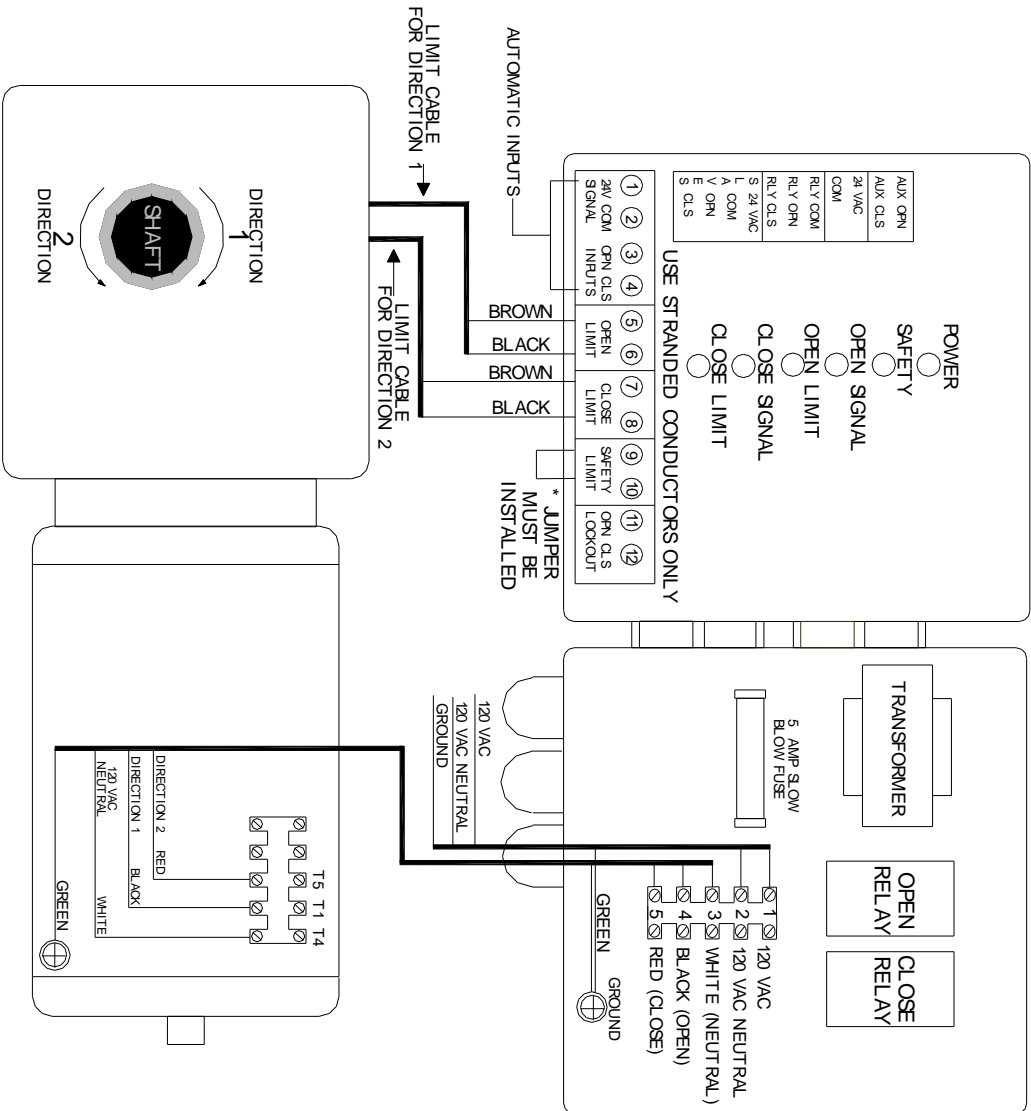
THE MOTOR AND THE METAL BACKPLATE IN THE CONTROL BOX MUST BE GROUNDED, AS WELL AS THE ENTIRE ELECTRICAL SYSTEM.

IT IS HIGHLY RECOMMENDED THAT WEATHERPROOF RAIN/TIGHT GRADE WIRING BE USED. THIS INCLUDES SEAL/TIGHT FLEXIBLE CONDUIT AND RAIN/TIGHT JUNCTION BOXES.

LOCK MOTOR AND LIMIT WIRING
 USE THIS DIAGRAM ONLY IF DIRECTION 1 CLOSES YOUR SYSTEM (SEE OTHER SHEET IF DIRECTION 1 OPENS).

Project LOCK MOTOR AND LIMIT WIRING (1 CLOSES)

Drawn by GH	Date 03/18/02	Distributor N/A	Order ID N/A
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PROVIDE A SEPARATE MOTOR DISCONNECT SWITCH AS REQUIRED BY LOCAL AND NATIONAL ELECTRICAL CODES.

PROVIDE BRANCH CIRCUIT PROTECTION AS REQUIRED BY THE LOCAL AND NATIONAL ELECTRICAL CODES.

FOLLOW ALL LOCAL AND NATIONAL ELECTRICAL CODES IN THE CONNECTION OF THIS DEVICES.

CONDUIT MUST ENTER AT THE BOTTOM OF THE MASTER AND SLAVE BOXES ONLY. THIS WILL PREVENT CONDENSATION AND MOISTURE FROM ENTERING THE BOX.

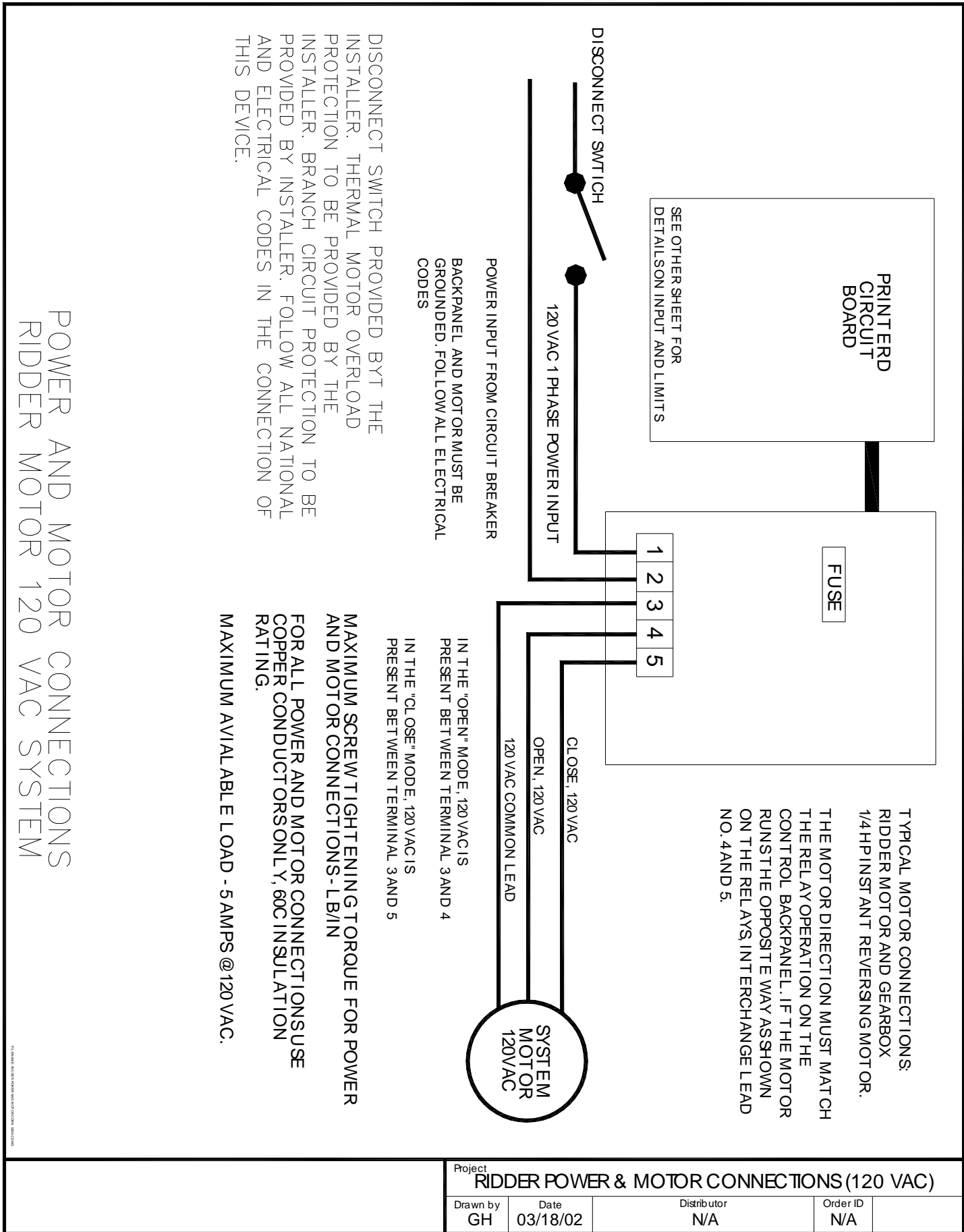
THE MOTOR AND THE METAL BACKPLATE IN THE CONTROL BOX MUST BE GROUNDED, AS WELL AS THE ENTIRE ELECTRICAL SYSTEM.

IT IS HIGHLY RECOMMENDED THAT WEATHERPROOF RAINIGHT GRADE WIRING BE USED. THIS INCLUDES SEALTIGHT FLEXIBLE CONDUIT AND RAINIGHT JUNCTION BOXES.

LOCK MOTOR AND LIMIT WIRING
 USE THIS DIAGRAM ONLY IF DIRECTION 1 OPENS YOUR SYSTEM (SEE OTHER SHEET IF DIRECTION 1 CLOSES).

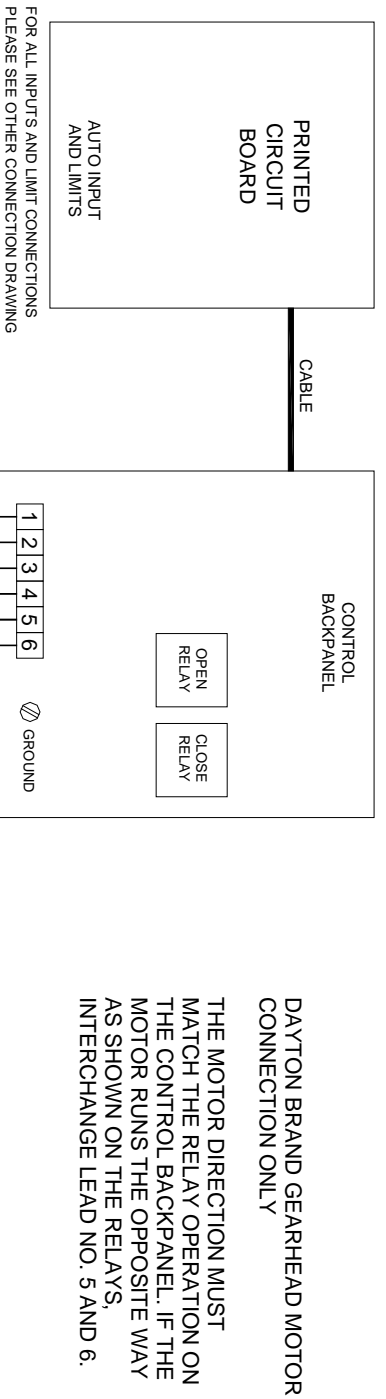
Project LOCK MOTOR AND LIMIT WIRING (1 OPENS)

Drawn by GH	Date 03/18/02	Distributor N/A	Order ID N/A
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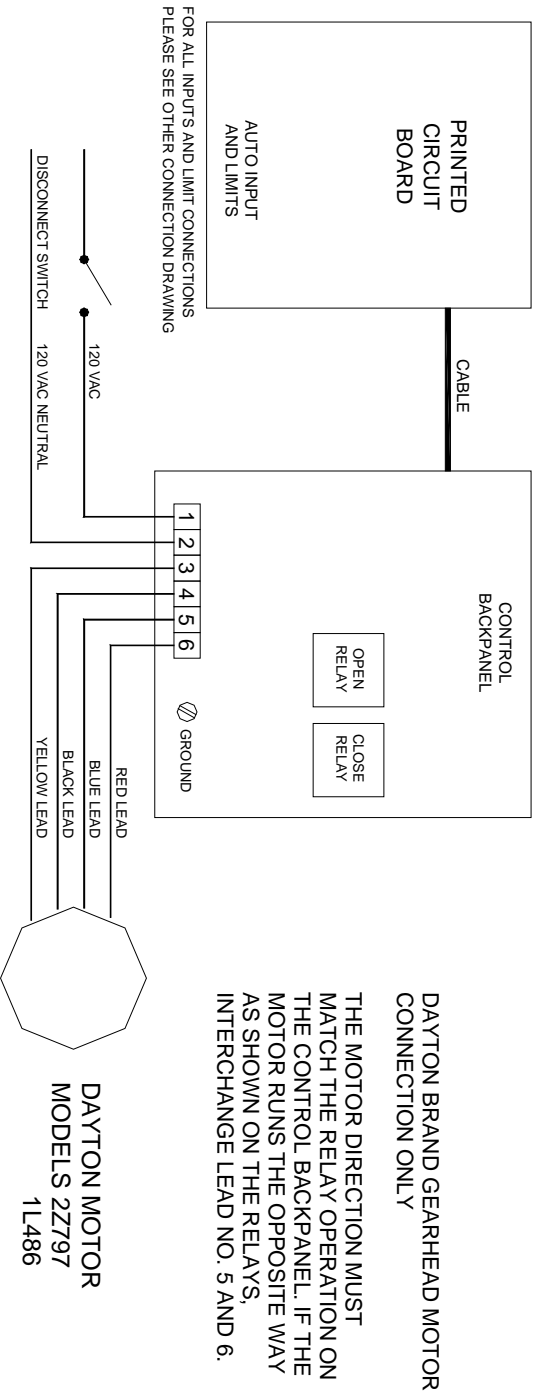


POWER AND MOTOR CONNECTIONS
RIDDER MOTOR 120 VAC SYSTEM

Project RIDDER POWER & MOTOR CONNECTIONS (120 VAC)			
Drawn by GH	Date 03/18/02	Distributor N/A	Order ID N/A

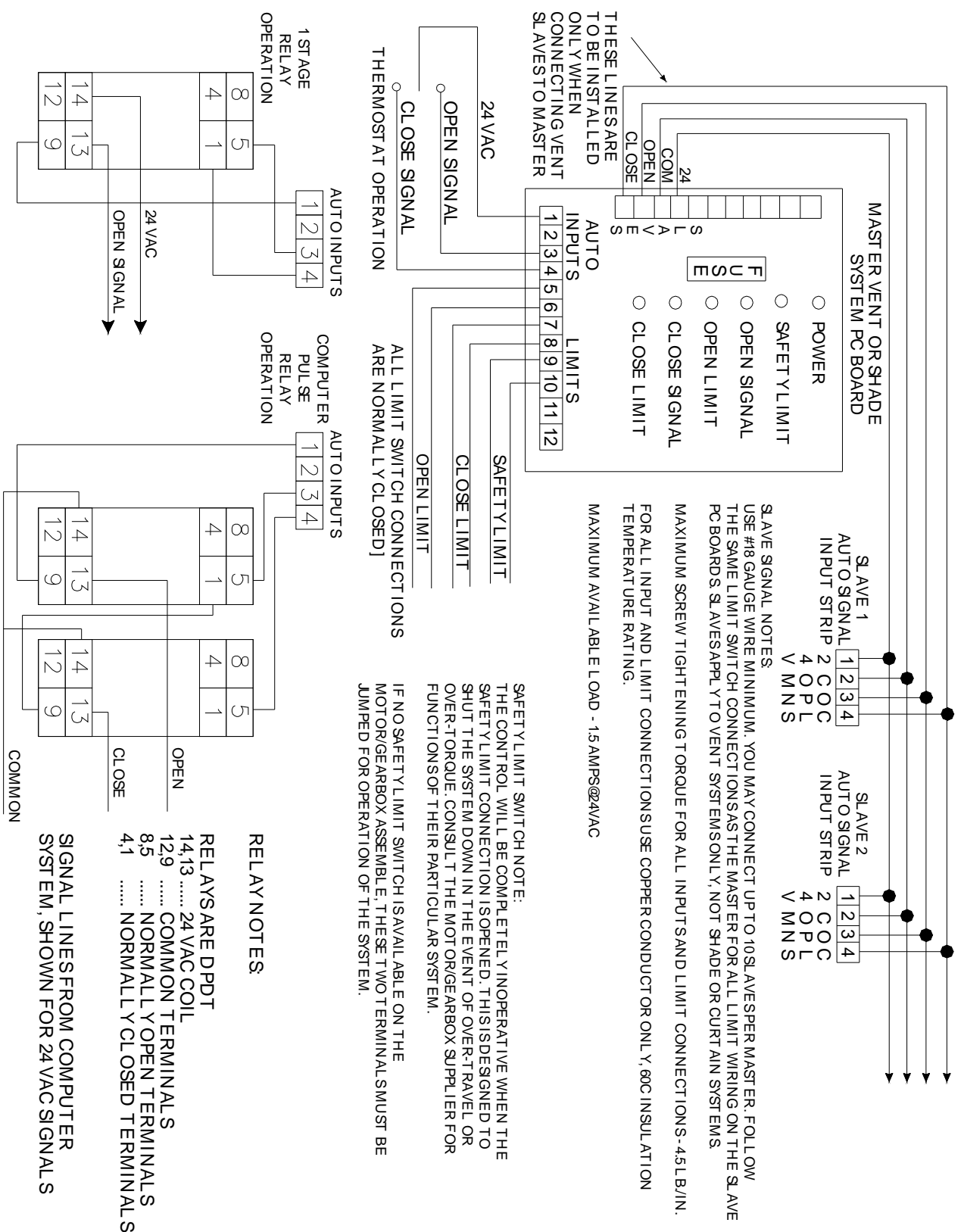


PROVIDE PROPER GROUNDING OF THE METAL BACKPANEL AND MOTOR



POWER AND MOTOR CONNECTIONS DAYTON MOTORS SERIES 100 MASTER & SLAVES

Project DAYTON POWER & MOTOR CONNECTIONS			
Drawn by GH	Date 03/18/02	Distributor N/A	Order ID N/A



INPUT/LIMIT WIRING - VENT MASTER, SLAVE CURTAIN CONTROL SYSTEM

Project VENT MASTER-SLAVE CURTAIN CONTROL SYSTEM			
Drawn by GH	Date 03/22/02	Distributor N/A	Order ID N/A

LIMITED WARRANTY

Micro Grow Greenhouse Systems, Inc. warrants that all of the products Micro Grow Greenhouse Systems, Inc. manufactures are free from defects at the time of shipment by Micro Grow Greenhouse Systems, Inc. This warranty covers defects in workmanship and materials. No warranty is extended on any parts, materials, or components manufactured by others and purchased by Micro Grow Greenhouse Systems, Inc., and any warranty on these materials is limited to the warranty supplied by the original manufacturer or supplier of said products only. This warranty excludes any and all damages cause by installation by unqualified individuals, damage by misuse or neglect, shipment damage, alterations to original manufacturing, and improper installation or use for any reason than intended by manufacturer. This warranty may not be altered in any manner except with the written authorization of one the officers or owners of Micro Grow Greenhouse Systems, Inc. The only and sole liability of Micro Grow Greenhouse Systems, Inc. under this warranty is limited to repairing, replacing or the issuance of credit for any products returned to Micro Grow Greenhouse Systems, Inc., during the warranty period of twelve (12) months from date of shipment. This warranty is specifically conditioned upon Micro Grow Greenhouse Systems, Inc. being notified in writing promptly upon discovery of any product defects by the buyer or end user. The product must then be returned prepaid to Micro Grow Greenhouse Systems, Inc. within the twelve month warranty period for inspection by Micro Grow Greenhouse Systems, Inc. Upon inspection of said product, Micro Grow Greenhouse Systems, Inc. will notify buyer or end user of its findings. At Micro Grow Greenhouse Systems, Inc. sole discretion, the product will be replaced, repaired or a credit will be issued for the original sale price of the product, provided that damage has not occurred due to misuse, neglect, improper use or installation as outlined above, shipping damages or accident.

MICRO GROW GREENHOUSE SYSTEMS, INC. SHALL NOT BE LIABLE FOR ANY DAMAGES BEYOND THE ACTUAL ORIGINAL COST OF THEIR PRODUCT EITHER DIRECTLY OR INDIRECTLY ARISING FROM DEFECTIVE PRODUCTS OR WORKMANSHIP.