



**Solar Turbine  
Addendum  
Version 6.0**

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Instruction Manual D2-3406

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**Rockwell  
Automation**

The information in this manual is subject to change without notice.

Throughout this manual, the following notes are used to alert you to safety considerations:



**ATTENTION:** Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss.

**Important:** Identifies information that is critical for successful application and understanding of the product.



**ATTENTION:** Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, or service this equipment. Read and understand this manual and other applicable manuals in their entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.

**ATTENTION:** The user must provide an external, hardwired emergency stop circuit outside of the drive circuitry. This circuit must disable the system in case of improper operation. Uncontrolled machine operation may result if this procedure is not followed. Failure to observe this precaution could result in bodily injury.

**ATTENTION:** The user is responsible for conforming with all applicable local, national, and international codes. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

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## Introduction

This addendum covers the features and specifications that are unique to the GV3000/SE Solar Turbine drives. GV3000/SE Solar Turbine drives operate from a 120 VDC input, requiring a different power supply than standard GV3000/SE drives. Only product information that is unique to Solar Turbine drives is covered in this addendum. This addendum must be used along with the GV3000/SE software and hardware instruction manuals listed in section 1.2.

### 1.1 Intended Audience

This addendum is intended for the following qualified personnel:

- Rockwell Automation Global Technical Service personnel who are familiar with the features described.
- Product end users

### 1.2 Other Required Manuals

This addendum must be used with the following publications:

- D2-3359 GV3000/SE AC General Purpose (Volts/Hertz) and Vector Duty Drive Software Start-Up and Reference Manual
- D2-3360 GV3000/SE AC Power Modules Hardware Reference, Installation, and Troubleshooting



## About the Drive and Cabinet

This chapter describes how to identify the Solar Turbine drive and cabinet layout using the Solar Turbine model number and drive power ratings. Internal cabinet component drawings are also provided.

### 2.1 Identifying the Solar Turbine Drive by Model Number and Ratings

The Solar Turbine drive is available in 1 HP and 5 HP versions. Each drive can be identified by its model number. See figure 2.1. This number appears on the shipping label and on the drive's nameplate. The drive's model number includes the Power Module and the Regulator. Drive power ratings are provided in table 2.1.

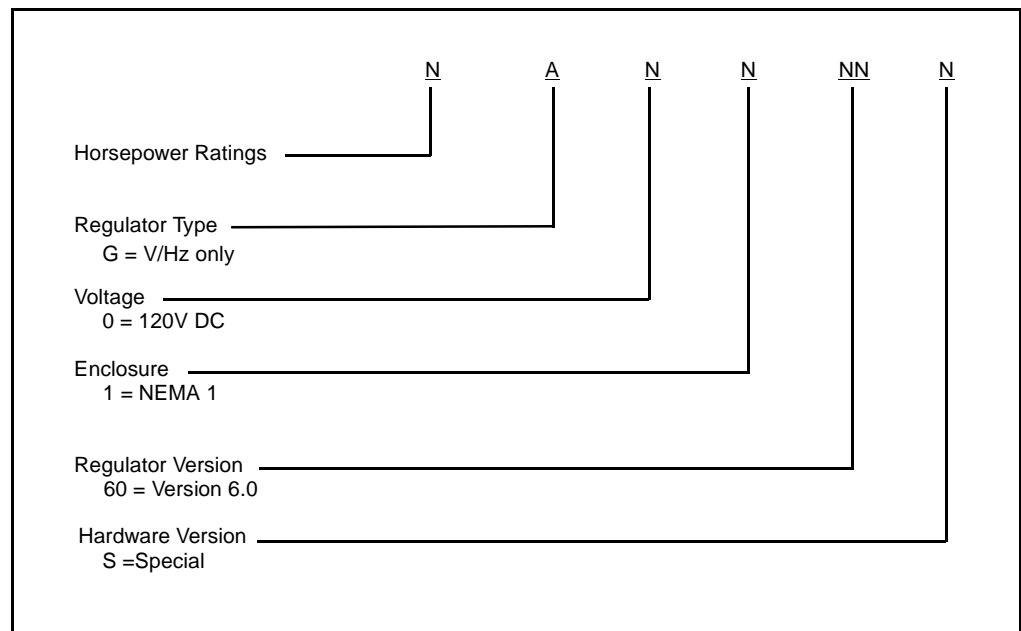


Figure 2.1 – Identifying the Drive Model Number

Table 2.1 – Drive Ratings

Drive M/N	Enclosure Type	Output Power	Input Volts	Input Amps	Output Volts	Output Amps	Output Frequency
1G0160S	NEMA 1 IP20 V6.04	1 HP	120 VDC	13.4 A	90 VAC	11.1 A	3 to 200 Hz
5G0160S	NEMA 1 IP20 V6.04	5 HP	120 VDC	37.0 A	90 VAC	30.4 A	3 to 200 Hz

## 2.2 Enclosure Rating

The Solar Turbine 1 HP and 5 HP cabinets have a NEMA 1 enclosure rating:

NEMA 1: Vented. Contains a communication access door that allows access to the communication port without removing the cover. Intended for general-purpose indoor applications.

## 2.3 Identifying Solar Turbine Cabinet Components

The Solar Turbine drive has the following main components. The identification numbers provided correspond to the numbers used in figure 2.2 (1 HP) and figure 2.3 (5 HP).

- |                                     |                           |
|-------------------------------------|---------------------------|
| 1. Capacitor Board/Input Capacitors | 6. Current Feedback Board |
| 2. Fan Assembly                     | 7. Regulator Board        |
| 3. Internal Fan Assembly            | 8. IGBT Module            |
| 4. Power Board                      | 9. Signal Board           |
| 5. Membrane Switch (Keypad/Bracket) | 10. Gate Driver Board     |

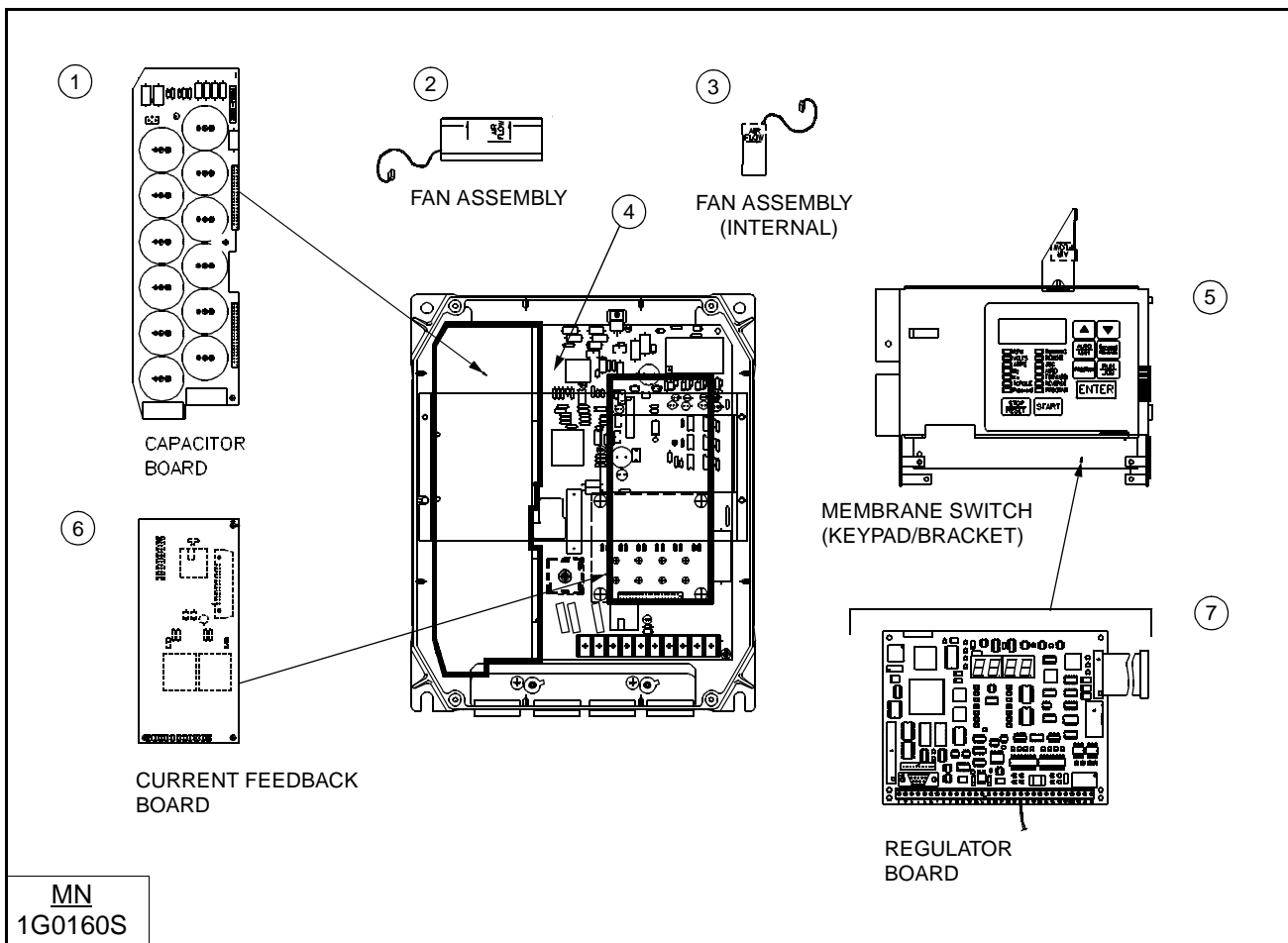


Figure 2.2 – Solar Turbine 1 HP Drive Component Locations

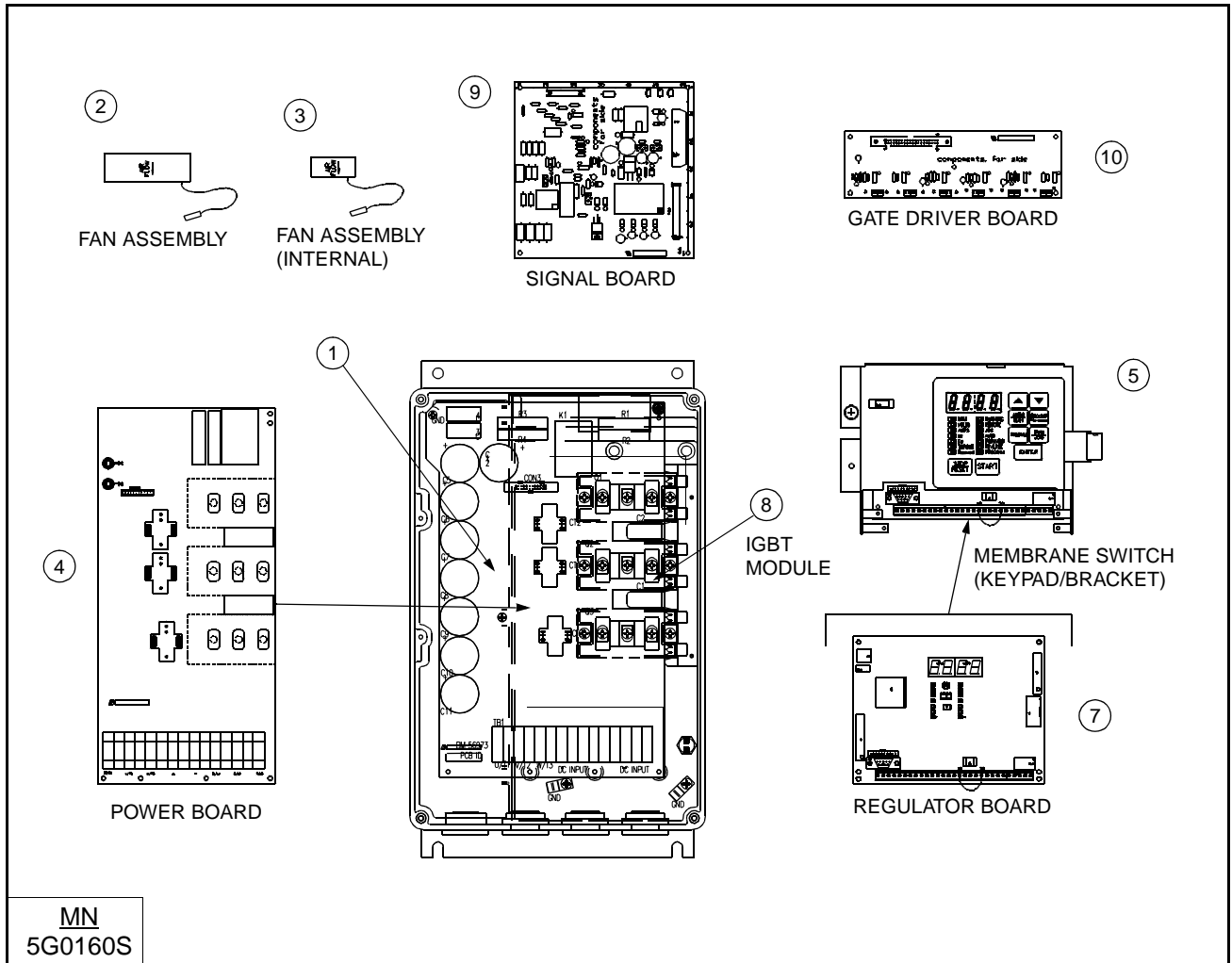


Figure 2.3 – Solar Turbine 5 HP Drive Component Locations



## Cabinet Mounting and Wire Routing

This chapter provides information on how to mount the Solar Turbine drive. Also shown are the entry areas where wiring is to be routed in and out of the drive.

Please refer to instruction manual D2-3360 for detailed information on planning your drive installation and for further information on proper wiring routing of power and signal wiring and grounding of GV3000/SE drives.

### 3.1 Mounting the Drive

Attach the drive to the vertical surface selected using the four (4) mounting holes provided. In order to maintain a flat mounting surface and to ensure that bolt tightness is maintained, use washers under the bolt heads. Refer to table 3.1 and figure 3.1 for mounting dimensions. Use the following user-supplier mounting bolts and washers:

1 HP Solar Turbine Drives: M8 (5/16")

5 HP Solar Turbine drives: M8 or M10 (5/16" or 3/8")

Table 3.1 – Drive Dimensions and Weights

HP Rating	Dim. A	Dim. B	Dim. C	Dim. D	Dim E.	Weight
1 HP	280.6 mm 11.05"	338.4 mm 13.32"	248.0 mm 9.76"	309.1 mm 12.17"	200.0 mm 7.87"	9 kg 20 lbs
5 HP	288.0 mm 11.34"	463.0 mm 18.23"	223.0 mm 8.78"	442.0 mm 17.40"	238.1 mm 9.37"	15.75 kg 35 lbs

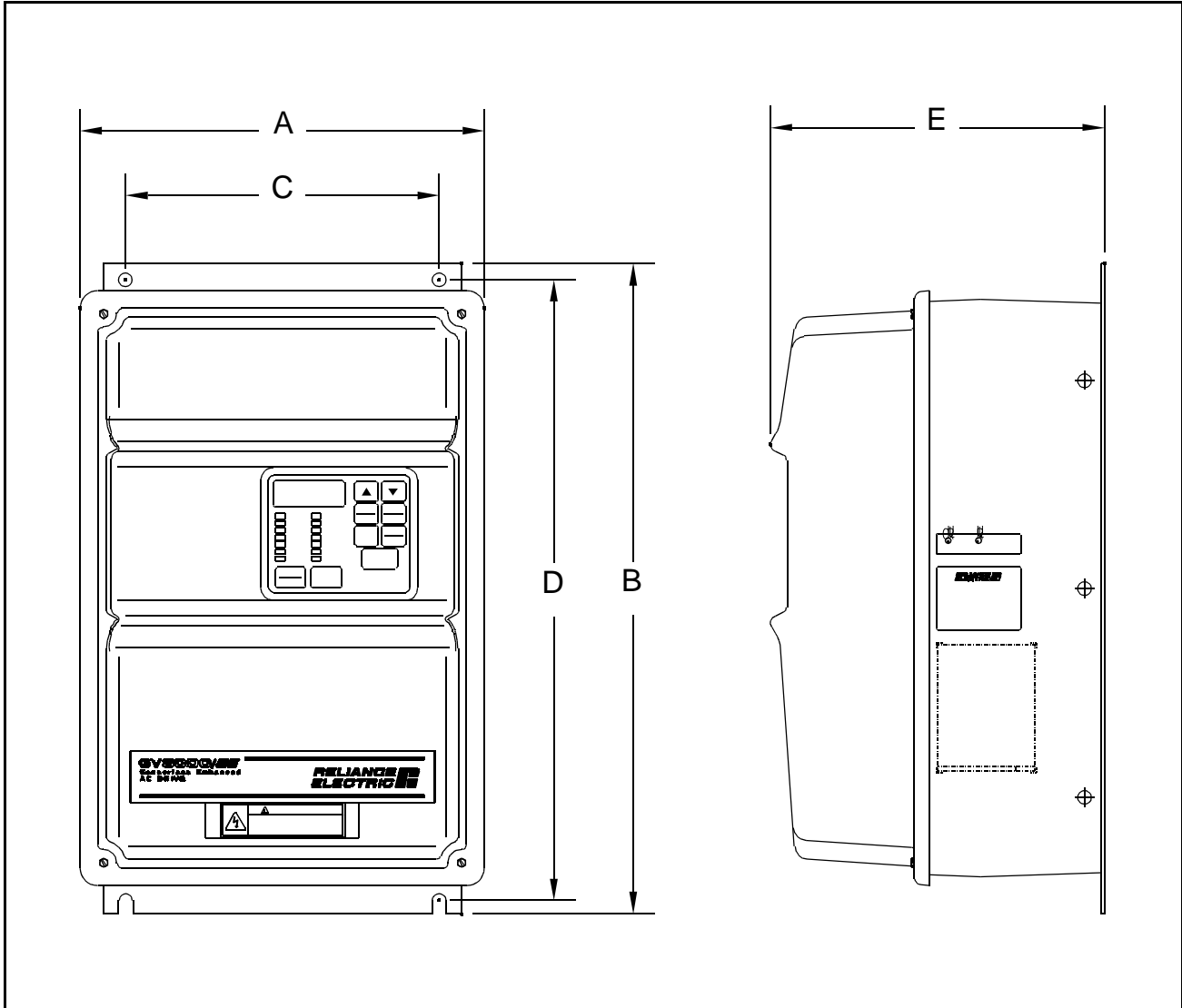


Figure 3.1 – Drive Dimensions

### 3.1.1 Verifying the Drive's Watts Loss Rating

When mounting the drive inside another enclosure, you should determine the watts loss rating of the drive from table 3.2. Ensure adequate ventilation is provided based on the drive's watts loss rating.

Table 3.2 – Power and NEMA Enclosure Ratings

HP Rating	NEMA Rating	Input Volts	Input Amps	Output Amps at 2kHz	Output Amps at 4 kHz	Output Amps at 8 kHz	Power Loss Watts (Full Load)
1 HP	1	120	13.4	11.1	11.1	11.1	210
5 HP	1	120	37.0	30.4	30.4	30.4	600



## 3.2 Cabinet Wire Routing

All wiring should be installed in conformance with the applicable local, national, and international codes (for example, NEC/CEC). Signal wiring, control wiring, and power wiring must be routed in separate conduits to prevent interference with drive operation. Figures 3.2 and 3.3 show the wire routing of the cabinet for 1 HP and 5 HP drives, respectively.



**ATTENTION:** Do not route signal and control wiring with power wiring in the same conduit. This can cause interference with drive operation. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

Refer to instruction manual D2-3360 for detailed instructions on cabinet wire routing.

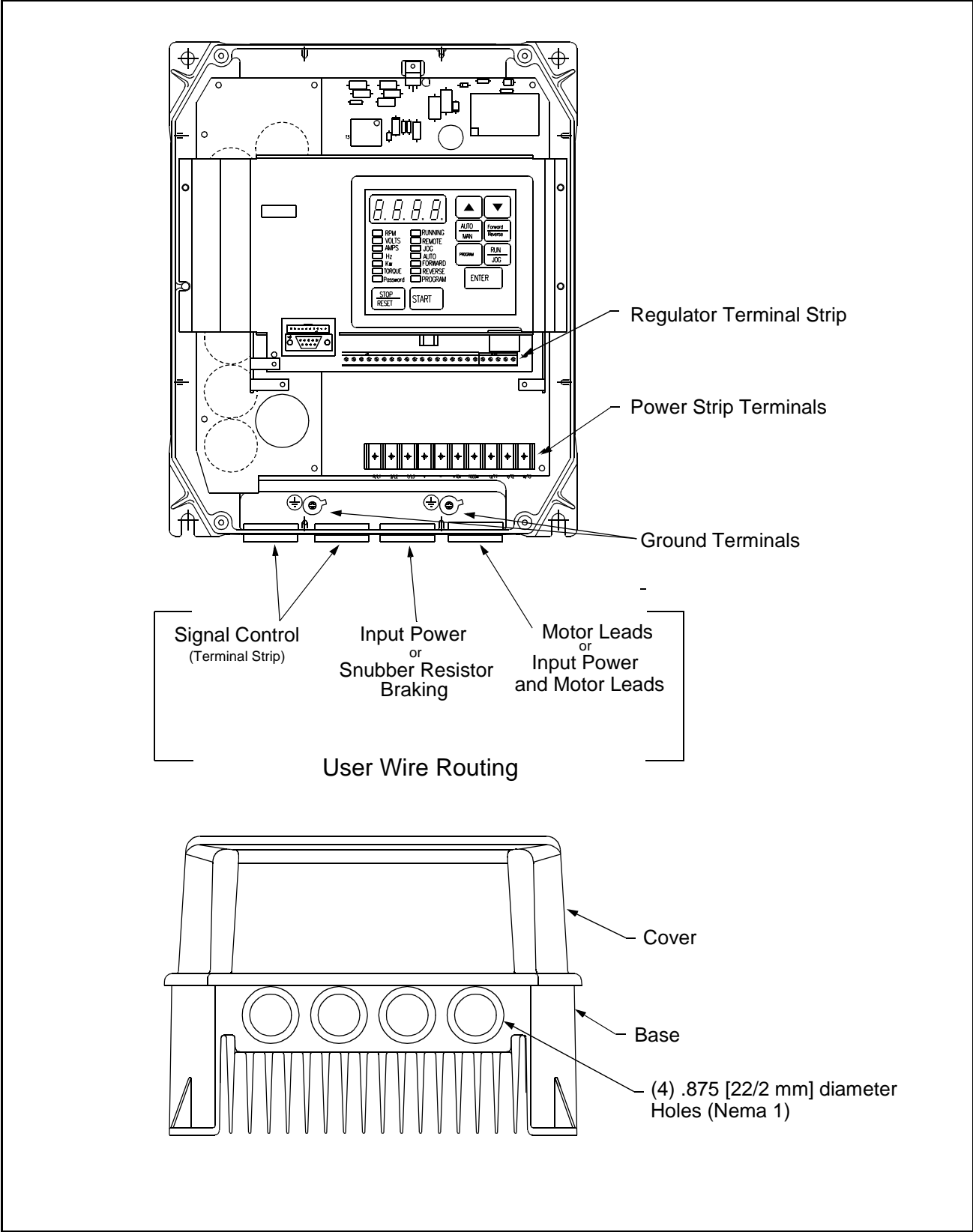


Figure 3.2 – Wire Routing Locations for 1 HP Drive

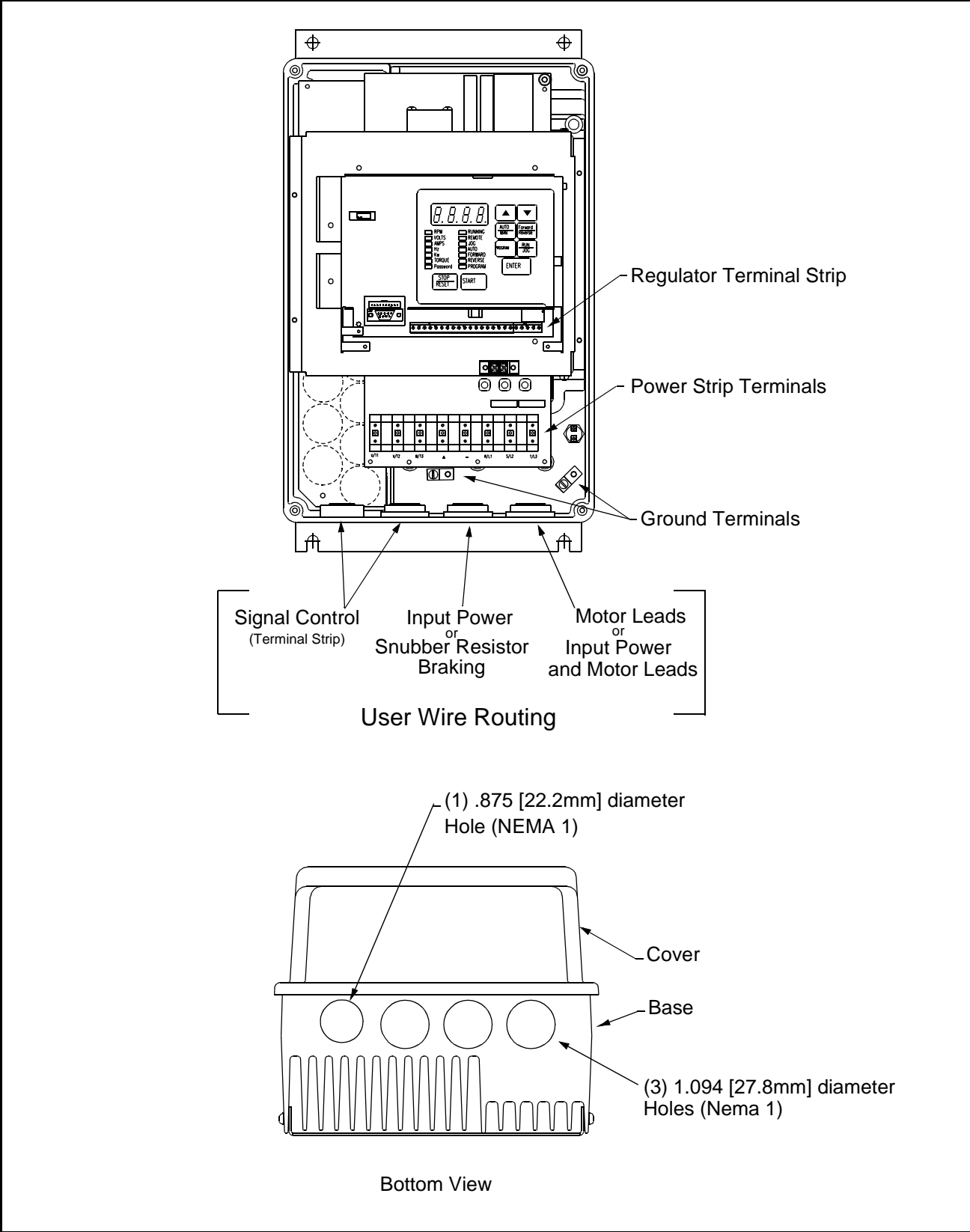


Figure 3.3 – Wire Routing Locations for 5 HP Drive

### 3.3 Grounding the Cabinet



**ATTENTION:** The user is responsible for conforming with all applicable local, national, and international codes. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

The Solar Turbine drive should be grounded in accordance with the instructions given for mounting a GV3000/SE drive in instruction manual D2-3360.

## Installing Power Wiring

This chapter describes how to connect 120 volt DC input power to a 1 HP or 5 HP GV3000/SE Solar Turbine drive. Guidelines for motor lead lengths are also provided. Please refer to instruction manual D2-3360 for complete information on wiring a GV3000/SE drive.

### 4.1 Installing Fuses for Branch Circuit Protection



**ATTENTION:** Most codes require that upstream branch protection be provided to protect input power wiring. Failure to observe this precaution could result in severe bodily injury or loss of life.

Install the required, user-supplied branch circuit protection fuses according to the applicable local, national, and international codes (e.g., NEC/CEC). The fuses must be installed in the line before the drive input terminals. See figure 4.1. Fuse value recommendations are provided in table 4.1.

Table 4.1 – Recommended Input Line Fuse Ratings

Drive HP Rating	Input Voltage (+/- 10%)	Fuse Rating <sup>1</sup>
1 HP	120 VDC	25A
5 HP	120 VDC	70A

1. Recommended fuse type: UL Class J, 600V, time delay, or equivalent.

### 4.2 Installing a Required External/Separate Input Disconnect

An input disconnect must be installed in the line before the drive input terminals in accordance with local, national, and international codes (e.g., NEC/CEC). The disconnect should be sized according to the in-rush current as well as any additional loads the disconnect might supply. The trip rating for the inrush current (10-12 times full load current) should be coordinated with that of the input isolation transformer, if used. Refer to instruction manual D2-3360 for additional information.

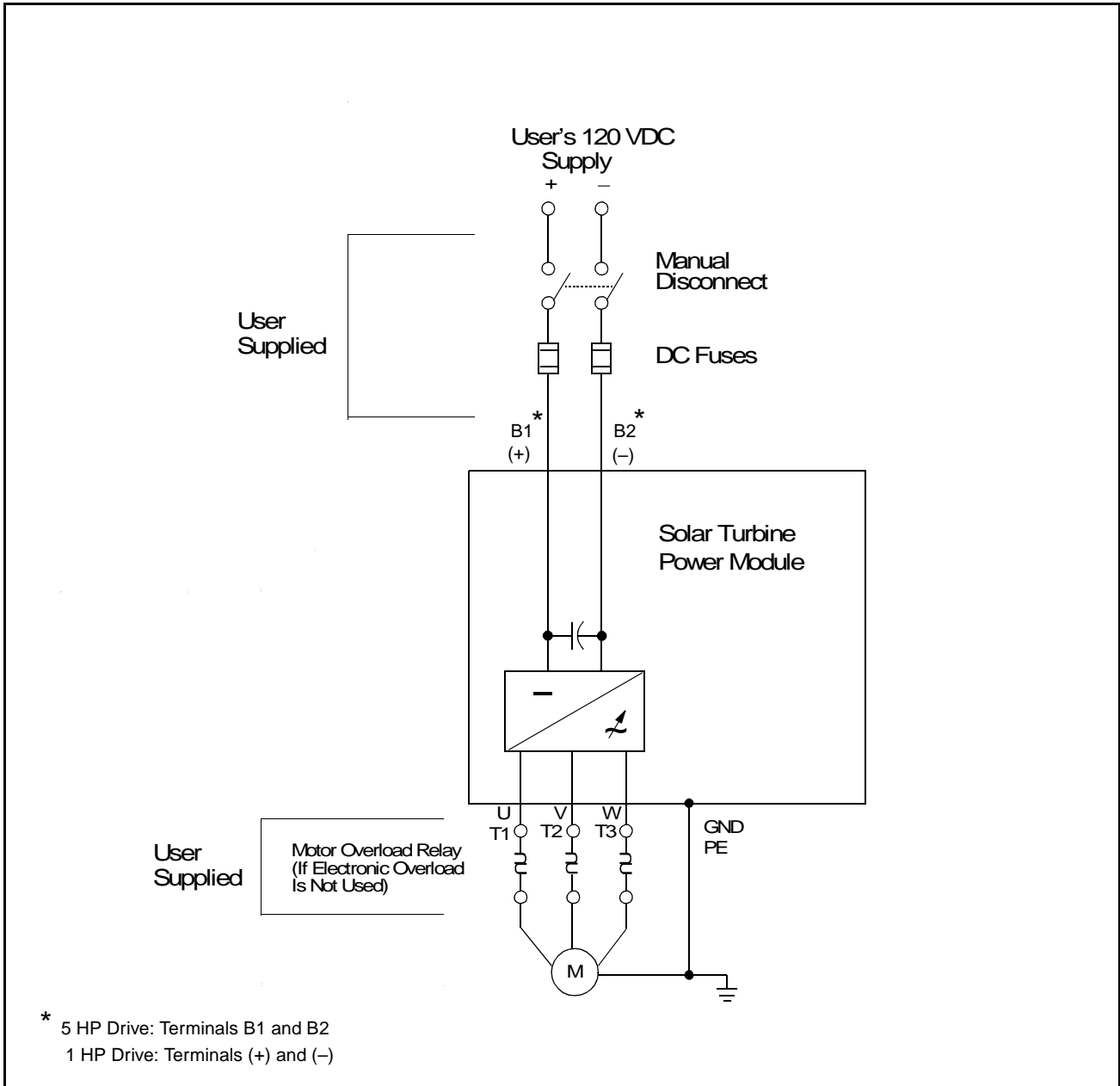


Figure 4.1 – Typical Electrical Connections

## 4.3 Installing Power Wiring from the DC Power Supply to the Drive's Internal DC Bus Terminals



**ATTENTION:** Do not route signal and control wiring in the same conduit with power wiring. This can cause interference with drive operation. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

**ATTENTION:** If the GV3000/SE drive is connected to an external DC bus, the user is responsible for DC bus short-circuit protection. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

Use the following steps to connect DC input power to the drive:

Step 1. Wire the DC input power leads by routing them according to drive type. Refer to figures 3.2 and 3.3. Table 4.2 contains the recommended power wiring sizes.

Table 4.2 – Recommended Power Wire Sizes

Type of Wiring	Terminals	Size of Wire (Maximum)
Output Power	U/T1, V/T2, W/T3	12 AWG, 3 mm <sup>2</sup> (1 HP) 6 AWG, 13 mm <sup>2</sup> (5 HP)
DC Input Power	+, -	
Ground		

Step 2. Connect the DC input power leads to terminals + and – (1 HP drive) or B1 and B2 (5 HP drive) on the power terminal strip (see figure 4.2).



**ATTENTION:** On the 5 HP Solar Turbine drive, the positive DC input must be connected to the (+) terminal. The negative DC input must be connected to the (–) terminal. These terminals cannot be interchanged. Failure to observe this precaution could result in damage to, or destruction of, the equipment.



**ATTENTION:** On the 5 HP Solar Turbine drive, the positive DC input must be connected to the (+) terminal. The negative DC input must be connected to the (-) terminal. These terminals cannot be interchanged. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

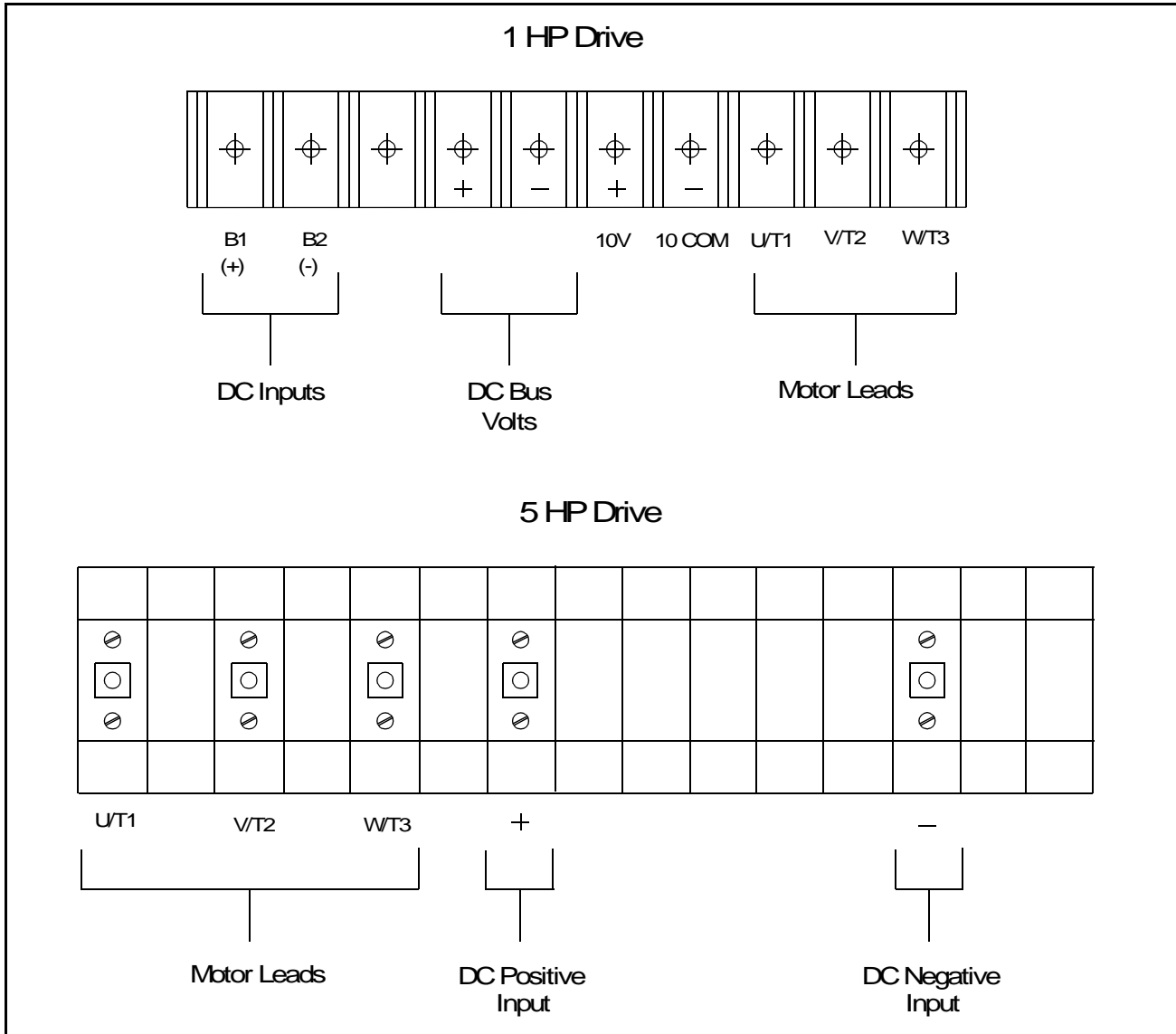


Figure 4.2 – DC Input Terminals

Step 3. Tighten the DC input power terminals to the proper torque, as listed in table 4.3.

Table 4.3 – Terminal Tightening Torques

Drive	Terminals	Maximum Tightening Torque
1 HP	All	1.08 Newton-meters (9.5 in-lbs)
5 HP	All	13.5 Newton-meters (10 ft-lbs)



## 4.4 Recommended Motor Lead Lengths

The following motor lead lengths are recommended to reduce line disturbances and noise.

Table 4.4 – Recommended Motor Lead Lengths

Drive Power Rating	Maximum Lead Length in Feet		
	Carrier Frequency		
	2 kHz	4 kHz	8 kHz
1 HP	500	500	500
5 HP	800	500	500

Refer to instruction manual D2-3360 for detailed instructions on installing output power wiring.



## Troubleshooting the Drive

The GV3000/SE Solar Turbine drive displays alarm and fault codes to signal a problem detected during self tuning or drive operation. These codes are described in instruction manual D2-3359. This chapter provides general troubleshooting safety guidelines and replacement part information that is unique to a 1 HP or 5 HP GV3000/SE Solar Turbine drive. Refer to D2-3359 and to D2-3360 for detailed instructions about troubleshooting a GV3000/SE drive and obtaining standard replacement parts.

### 5.1 Verifying that DC Bus Capacitors are Discharged



**ATTENTION:** DC bus capacitors retain hazardous voltages after input power has been disconnected. After disconnecting input power, wait five (5) minutes for the DC bus capacitors to discharge and then check the voltage with a voltmeter to ensure the DC bus capacitors are discharged before touching any internal components. Failure to observe this precaution could result in severe bodily injury or loss of life.

- Step 1. Place the input disconnect in the Off position and lock out drive power. Wait five minutes.
- Step 2. Remove the drive's cover.
- Step 3. Verify that there is no voltage at the drive's input power terminals (refer to figure 4.2). This ensures that the DC bus capacitors are discharged.
- Step 4. Once the drive has been serviced, reattach the drive's cover.
- Step 5. Reapply input power.

### 5.2 Replacement Parts

Table 5.1 lists the replacement parts that are available from Reliance Electric. See figures 2.2 and 2.3 for component locations.

Table 5.1 – Solar Turbine Drive Replacement Parts

Description <sup>1</sup>	Drive HP	Part Number	Quantity
NEMA 1 Fan Assembly	1	615161-V	1
	5		2
NEMA 1 Cover	1	805538-1S	1
	5	805547-1S	1
Membrane Switch Keypad/Bracket	1	805548-1R	1
	5		1
Regulator Printed Circuit Board	1	O-56975-200	1
	5		1
Capacitor Printed Circuit Board	1	179210	1
Current Feedback Printed Circuit Board	1	O-56935-100	1
Power Printed Circuit Board	1	179211	1
	5	O-56973	1
IGBT Module	5	602909-813AW	3
Signal Printed Circuit Board	5	O-56974	1
Gate Driver Board <sup>2</sup>	5	O-56960	1
Internal Fan Assembly	1	615159-1R	1
	5	615159-1S	1

<sup>1</sup> Components are identified in figure 2.3.

<sup>2</sup> Replace the Gate Driver board when the IGBT modules are replaced.

## Solar Turbine Drive Parameters

For Solar Turbine drives the following parameters have different default values than standard GV3000/SE drives:

<b>Parameter</b>	<b>Solar Turbine Default Setting</b>
P.048	V/Hz
H.000	90
H.017	3
H.021	85

Please refer to Instruction Manual D2-3359 for detailed descriptions of drive parameters.



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