

CHAPTER TWO

Installation

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 - Express Setup
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Checking Your Shipment

Inspect your shipment carefully. You should have received one or more of the following:

Gemini Drives

GV6K-L3n (“n” can be E or R)	GT6K-L5
GV6K-U3n	GT6K-L8
GV6K-U6n	
GV6K-U12n	
GV6K-H20n	
GV6K-H40n	

Ship Kit Items

The following ship with the drive:

Part	Part Number
Gem6K Quick Reference Guide	88-019930-01 (for GV6K); or 88-019931-01 (for GT6K)
Gem6K Hardware Installation Guide	88-019932-01
Gem6K Command Reference	88-019933-01
Gem6K Programmer's Guide	88-019934-01
Gemini Motor Reference Manual	88-017790-01
Motion Planner CD-ROM	95-017633-01

Options and Accessories

You may have ordered one or more of the following options or accessories.

Part	Part Number
EVM32-II or EVM32 Expansion I/O Module	EVM32-II or EVM32
GPDM Gemini Power Dissipation Module	GPDM
Drive Only (no accompanying manuals)	-NK

Cables: various cables, breakout modules, etc., are available. See *Appendix A Specifications* for cable and accessory information.

Cable clamps, EMC filters, ferrites, etc., are available. See *Appendix C Regulatory Compliance* for part numbers and more information.

Motors

You may have ordered a motor from one of the following families of Compumotor motors:

Servo Motors:
SM Series BE Series NeoMetric Series J Series M Series Linear Series

Step Motors:
O Series T Series E Series*

*E Series motors are similar to S and ZETA Series motors. If you use one of these motors, during configuration select the same size E Series motor from the configuration software's menu.

“Express Setup” Overview

This chapter gives instructions for performing an *express setup*. The purpose of the express setup is to verify that the drive, cables, and motor work properly as a system. It will also verify serial communications.

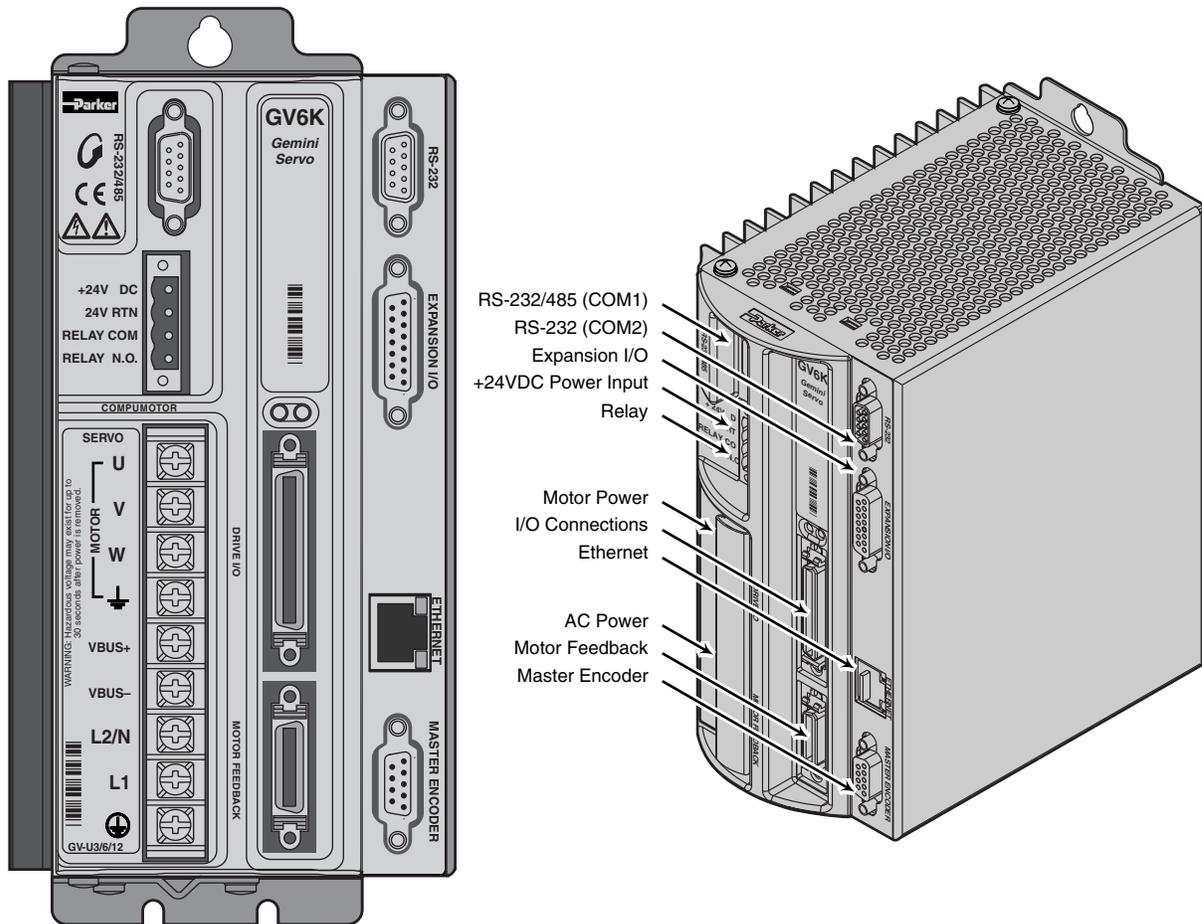
You will connect together only the components necessary to achieve basic motion—a drive, a motor (without a load connected), and cables. You will use a computer to communicate with the drive.

In the express setup, we will give procedures for the following steps:

1. Connecting the motor to the drive (with no load attached)
2. Connecting +24VDC power to the drive
3. Connecting AC power to the drive
4. Establishing communications and configuring the drive for autorun
5. Enabling the drive and observing the motor turn

Information you may need for final installation will be presented in *Chapter 3 Configuration*, in *Chapter 4 Special Features*, in *Appendix A Specifications*, and in the separate *Gemini Motor Reference Manual*.

The next drawing shows locations and names of the Gemini components that you will encounter during the installation procedure.



Component Locations

Illustrations in this Installation Guide

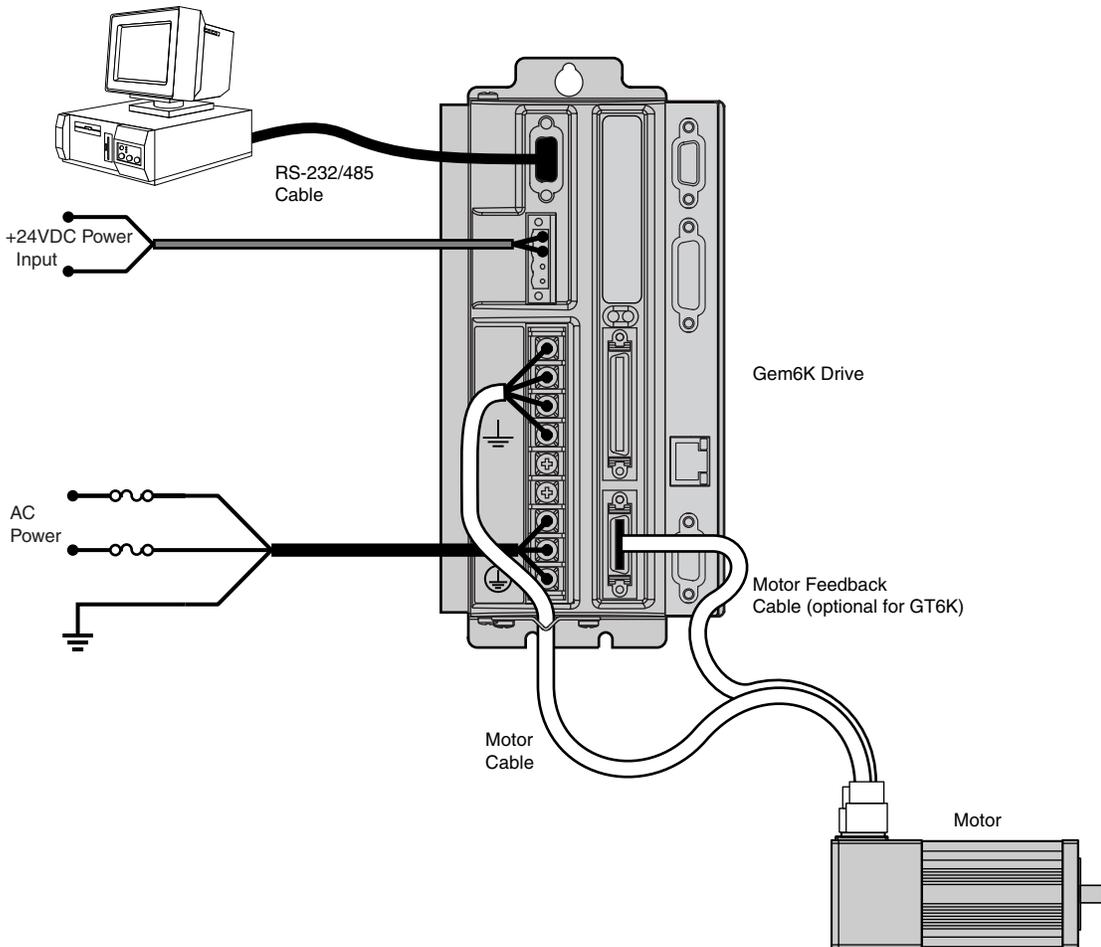
We will usually show the GV6K-U3n Drive in illustrations. Other Gem6K drives have similar features. In cases where we need to illustrate *differences* between drives, we will show relevant drawings for each drive.

System Overview

In this express setup procedure, we will give instructions for a Compumotor system—Gem6K drive with Compumotor motor, and Compumotor cables.

If you use non-Compumotor equipment, try to follow along and perform the steps in the Express Setup procedure; consult *Appendix A Specifications* for additional information you may need.

The next drawing shows the components of a Compumotor system.



Compumotor System

Step 1 – Connecting the Motor

GV6K Servos – Motor Connections

Compumotor's motor cable with the GS or GB option has an MS connector on one end. The other end has three black wires with identifying white numbers (1, 2, or 3), and one green/yellow wire. (See the separate *Gemini Motor Reference Manual* for motor specifications, dimensions, speed/torque curves, and wiring diagrams for your particular motor.)

Connecting the Motor Cable

1. Connect the MS connector on the motor cable to the mating connector on the motor. (If you use a non-Compumotor motor, see *Appendix B* for information.)
2. Remove the clear plastic cover from the drive terminals. Connect the motor cable's green/yellow wire to the drive terminal with the \perp symbol. This connects the motor's protective conductor terminal to the drive's safety earth.
3. Connect your motor cable's phase wires 1, 2, and 3 to the drive's U, V, W terminals, respectively, as shown in the drawing below.



WARNING



The drive's barrier strip terminals are at hazardous voltages when power is applied to the drive, and up to 30 seconds after power is removed. Lower voltages may still be present for several minutes after power is removed. Reinstall the clear plastic terminal cover after you make connections.

4. Secure the cable to the drive by placing the exposed cable shield in the saddle clamp on the bottom of the drive (GV6K-H20n/H40n: R-Clamp on heatsink). Make the loop of cable between saddle clamp and drive terminals as short as possible.

Connecting the Motor Feedback Cable

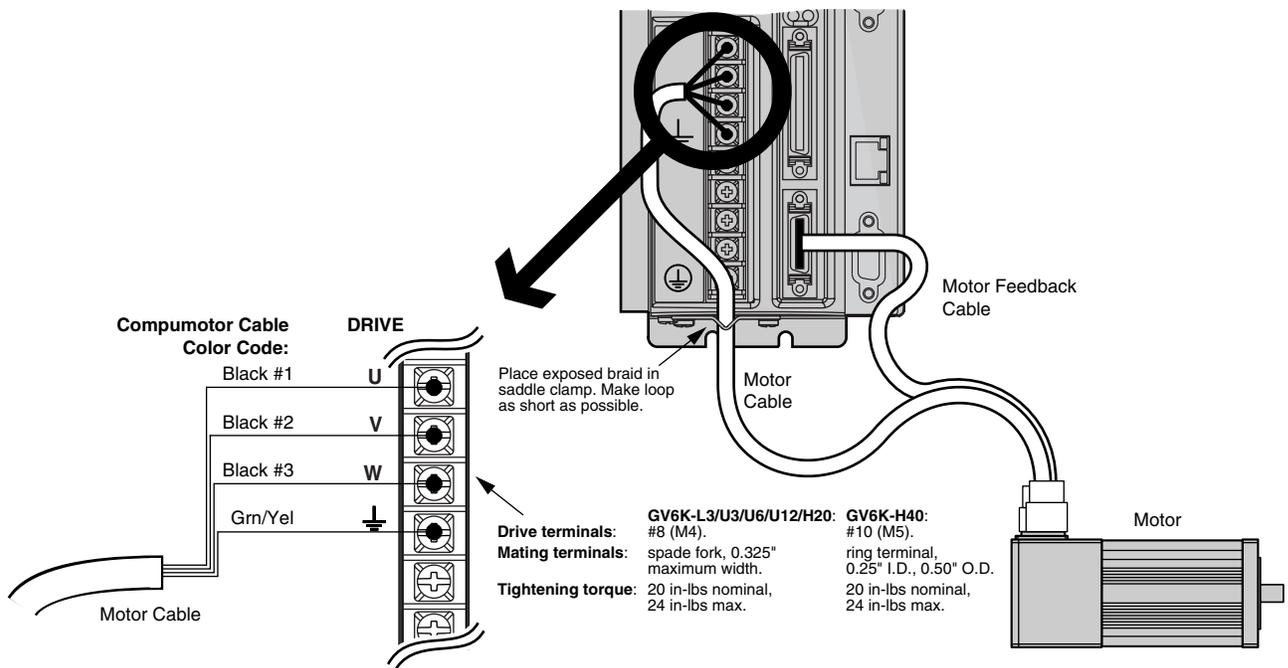
Compumotor's motor feedback cable with the GS or GB option has an MS connector on one end, and a 26 pin connector on the other end.

1. Connect the MS connector on the motor cable to the mating connector on the motor.
2. Connect the 26 pin connector on the motor cable to the drive's MOTOR FEEDBACK connector.
3. Tighten the jack screws on the connector housing to secure the connector to the drive.

Secure the Motor

1. If your motor is not permanently mounted, clamp it securely in place during this Express Setup procedure.

The next drawing illustrates these connections.



Motor Wiring with GV6K – Typical

GT6K Steppers – Motor Connections

The GT6K drive is compatible with 4, 6, or 8 lead step motors designed for use with a bipolar drive.

Connecting the Motor

Make sure power is off before you connect the motor.

1. Wire your motor in series or parallel.

For wiring diagrams, color codes, dimensions and speed/torque curves for Compumotor motors, consult the separate *Gemini Motor Reference Manual*.

If you use a non-Compumotor motor, see *Appendix B Using Non-Compumotor Motors* for instructions on preparing your motor for connection to the GT6K.

2. Prepare four motor phase wires to connect to the GT6K drive, and identify them as A+, A-, B+, and B-.
3. Remove the clear plastic cover from the drive terminals. Connect the motor cable's earth wire to the drive terminal with the \perp symbol. This connects the motor's protective conductor terminal to the drive's safety earth.
4. Connect your motor cable's phase wires (A+, A-, B+, B-) to the drive's A+, A-, B+, and B- terminals, respectively, as shown in the drawing below.



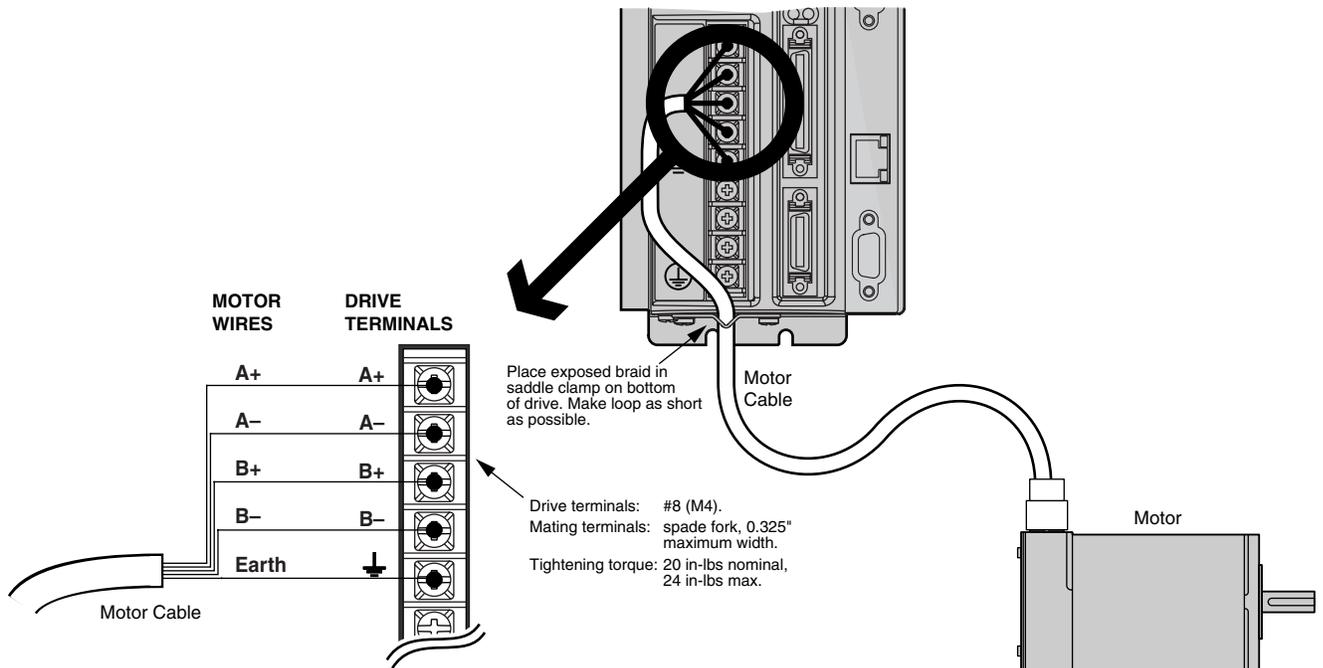
WARNING



The drive's barrier strip terminals are at hazardous voltages when power is applied to the drive, and up to 30 seconds after power is removed. Reinstall the clear plastic terminal cover after you make connections.

5. Secure the motor cable to the drive by placing the exposed cable shield in the saddle clamp on the bottom of the drive. Make the loop of cable between the saddle clamp and the drive terminals as short as possible.
6. Clamp the motor securely in place during this *Express Setup* procedure, if your motor is not permanently mounted.

The next drawing illustrates these connections.

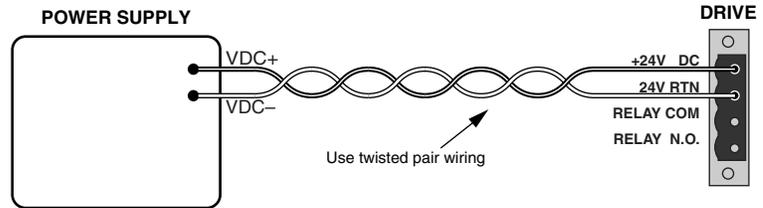


Motor Wiring with GT6K – Typical

Step 2 – Connecting +24VDC Power

You must connect an external +24VDC power source to the Gem6K, as the next drawing shows. Use the removable terminal connector that is supplied with the drive.

With +24VDC applied, the drive's internal control board will remain powered when the primary AC power source is disconnected, and will maintain several important functions, including communication diagnostics, position feedback, and other logic functions.



+24VDC Power Input

+24VDC Specifications:

Input voltage range:	19.2 – 28.8 VDC
Input current:	500 mA (maximum)
Functions available under +24VDC only:	position information (encoder or motor position counters in drive) communications diagnostics motor feedback program execution not involving motion (e.g., error programs, etc.)
Software status bit (see TASX command):	indicates “keep alive” is active: +24VDC power only (AC power is disconnected)



CAUTION



Do not exceed 28.8VDC input voltage

Step 3 – Connecting AC Power

Power Requirements

Acceptable ranges of AC input voltage are listed below for each drive :

Drive	AC Input Range
GT6K-L5/L8	95 – 132VAC
GV6K-L3n	95 – 132VAC
GV6K-U3n/U6n/U12n	95 – 264VAC
GV6K-H20n	165 – 264VAC [single phase (1Ø) or three phase power (3Ø)]
GV6K-H40n	165 – 264VAC [three phase power (3Ø) only]



WARNING



You must connect the drive's protective conductor terminal, marked with the \oplus symbol, to a reliable system safety earth. Make the connection directly, by means of a low impedance path less than or equal to 0.1 ohm (no fuses, etc.). Under normal operation, no current should flow through the safety earth connection.



WARNING



The drive's barrier strip terminals are at hazardous voltages when power is applied to the drive, and up to 30 seconds after power is removed. Lower voltages may still be present for several minutes after power is removed. Reinstall the clear plastic terminal cover after you make connections.

Fuse Information

Gem6K drives have no internal fuses. For safety, you must provide a fuse in each of the AC input lines. Recommended fuse types and sizes are:

Drive Type	Fuse Style	Rating	Fuse Type
GT6K-L5/L8 (120VAC)	125VAC Time Delay	10 amp	Type RK5 or better
GV6K-L3n (120VAC)	125VAC Time Delay	10 amp	Type RK5 or better
GV6K-U3n/6n/12n (120VAC)	125VAC Time Delay	30 amp	Type RK5 or better
GV6K-U3n/6n/12n (240VAC)	250VAC Time Delay	30 amp	Type RK5 or better
GV6K-H20n (208/240VAC, 1Ø/3Ø)	250VAC Time Delay	30 amp	Type RK5 or better
GV6K-H40n (208/240VAC, 3Ø)	250VAC Time Delay	60 amp	Type RK5 or better

The next table lists part numbers for suitable fuses, from several manufacturers:

Amps	Bussmann	Gould	Littelfuse	Grainger
10	FRN-R-10	TR10R	FLNR10	1A693
30	FRN-R-30	TR30R	FLNR30	1A698
60	FRN-R-60	TR60R	FLNR060	1A700

AC Power Connections

GT6K-L5/L8 and GV6K-L3n: Connecting AC Power



CAUTION

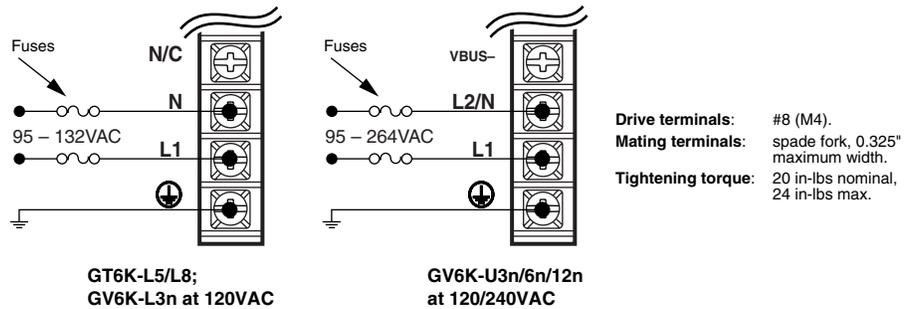


Do not operate GV6K-L3n above 132VAC, or the drive will be permanently damaged.

120VAC Operations:

1. Connect power system's safety earth to drive's protective conductor terminal, marked with the \oplus symbol. Do not fuse the protective conductor terminal.
2. Connect 120VAC, 50/60 Hz, single phase power line to drive's L1 and N terminals.
3. **Reinstall the clear plastic terminal cover after you make connections.**

Connections are illustrated in the next drawing.



Power Connections – GT6K and GV6K-L3/U3/U6/U12

GV6K-U3n/6n/12n: Connecting AC Power

Connections are illustrated in the drawing above.

208/240VAC Operations:

1. Connect power system's safety earth to drive's protective conductor terminal, marked with the \oplus symbol. Do not fuse the protective conductor terminal.
2. Connect 208/240VAC, 50/60 Hz, single phase power to drive's L1 and L2/N terminals.
3. **Reinstall the clear plastic terminal cover after you make connections.**

120VAC Operations:

1. Connect power system's safety earth to drive's protective conductor terminal, marked with the \oplus symbol. Do not fuse the protective conductor terminal.
2. Connect 120VAC, 50/60 Hz, single phase power line to drive's L1 terminal.
3. Connect neutral to drive's L2/N terminal.
4. **Reinstall the clear plastic terminal cover after you make connections.**

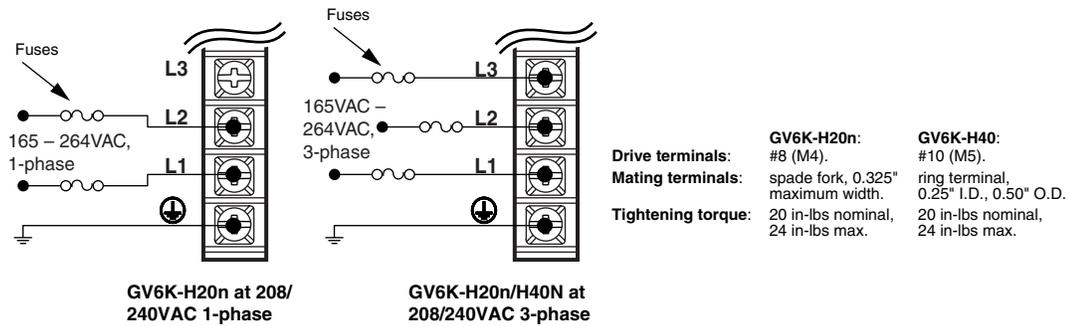
GV6K-H20n: Connecting Single Phase AC Power

Single Phase 208/240VAC Operations:

1. Connect power system's safety earth to drive's protective conductor terminal, marked with the \oplus symbol. Do not fuse the protective conductor terminal.
2. Connect 208/240VAC, 1 \emptyset , 50/60 Hz power to drive's L1 and L2 terminals.
3. **Reinstall the clear plastic terminal cover after you make connections.**

NOTE: Default current settings are for three phase operation. For single phase, you must modify the current settings in *Step 4 – Configuring the Drive* on the next page.

Connections are illustrated in the next drawing.



Power Connections – GV6K-H20n/H40n

GV6K-H20n/H40n: Connecting Three Phase AC Power

Connections are illustrated in the drawing above.

Three Phase 208/240VAC Operations:

1. Connect power system's safety earth to drive's protective conductor terminal, marked with the \oplus symbol. Do not fuse the protective conductor terminal.
2. Connect 208/240VAC, 3 \emptyset , 50/60 Hz power to drive's L1, L2 and L3 terminals.
3. **Reinstall the clear plastic terminal cover after you make connections.**

Applying Power

1. Verify that the load is not connected to the motor, and that the motor is clamped securely in place.
2. Verify that a cable is not attached to the DRIVE I/O connector.
3. Apply power to the drive (both +24VDC and AC). After the power-up sequence, the LEDs should display the following state:

Left LED	Right LED	Indicated State:
red	off	Drive ready, not enabled

Proceed to *Step 4 – Configuring the Drive*.

Step 4 – Configuring the Drive

Gem6K drives have no DIP switches or potentiometers for configuration. You will use *Motion Planner*, a software program, to communicate with the drive, configure drive settings, and load your application program.

Configuration Software

Motion Planner is located on the Motion Planner CD-ROM. This program is also available on the Compumotor web site at <http://www.compumotor.com>. Motion Planner runs on a personal computer (PC).

Information about installing and using Motion Planner can be found in the *Gem6K Programmer's Guide*.

Establishing Communications

We assume you have a Gem6K drive, and at least one serial port on your PC.



WARNING



This procedure causes the motor shaft to move. Do not connect a load to the shaft.

1. Verify that a load is not connected to the motor, and that the motor is clamped securely in place.
2. Verify that a cable is not attached to the DRIVE I/O connector.
3. Using a null modem cable, connect the drive's RS-232/485 connector to the serial port on your PC. (A null modem cable is available from Compumotor. See *Appendix A Specifications* for more information.) It is not necessary to turn off power before you plug in an RS-232 cable; however, connect RS-485 cables *before* applying power.

Proceed to *Configuring the Drive*. For more instructions on establishing communications, refer to the *Communications* section of *Chapter 4 – Special Features*.

Configuring the Drive

Use the following procedure to configure your drive.

1. Install and launch Motion Planner.
2. When the product selection dialog appears, select a Gem6K drive (GV6K or GT6K) and select the COM port to which the drive is connected.
3. To verify communications with the drive, click the "Terminal" tab on the bottom of the screen to enter terminal mode. Issue the following command to the drive:
TREV (transfers the drive's revision level)
Revision level information for your drive should appear on the screen.
To solve communication problems: see *RS-232/485 Communications* in *Chapter 4 – Special Features*.
NOTE: If this is not the first time the drive has been configured, issue an RFS command (Return to Factory Settings), before performing the following procedures. Click the "Editor" tab on the bottom of the screen to return to the Editor window.
4. In the Editor window, click on the Gemini button at the top of the window to launch the setup wizard.

5. Select “Express Setup”, and select “Initialize wizard with factory defaults”. Click the “Next” button to proceed with the wizard.
6. Fill in the wizard dialogs as prompted, including choosing a motor series, frame size, and part number. At the end of the wizard, click the “finish” button; this creates the setup code and places it in the Editor window. (For GV6K-H20 using single phase power, see the *Note* at the end of this procedure.)
7. Select File/Save to save the setup code to a file (*.prg) on your hard drive.
8. Select Communications/Download to download the setup code (contents of the Editor window) to the Gem6K drive. When the download is complete, choose to “DRESET” the drive.

Drive setup is complete. All of the setup parameters (command values) are stored in the Gem6K’s battery-backed RAM and are automatically recalled when you cycle power or reset the drive.

9. Click the “Terminal” tab on the bottom of the screen to enter terminal mode.
10. Issue a DMODE13 command. This configures the drive for autorun mode, in which the motor runs open loop in the clockwise direction at 1 rps. (The motor will not begin turning, though, because you have not yet enabled the drive.)

NOTE: GV6K-H20 – default current values are for three phase operation. If you use single phase power with the GV6K-H20, you must manually modify the current values as follows:

- Set continuous current (DMTIC) to 11.3 amps rms or less
- Set peak current (DMTIP) to 28.3 amps rms or less

Depending upon which motor you selected, your settings may already be lower than these limits.

Proceed to *Step 5 – Verifying Correct System Installation*.

Step 5 – Verifying Correct System Installation

Commanding Motion in Autorun Mode

In this procedure you will enable the drive; the motor will then rotate in autorun mode. This will verify correct system wiring and drive configuration.

1. Connect a jumper wire between Pin 1 and Pin 2 on the 50 pin DRIVE I/O connector. (For connector diagrams, cable color codes, and breakout module information see *Appendix A Specifications*.)
2. Issue the following command to the drive:
DRIVE1 (enables the drive)
3. Verify that the drive is enabled. (Left LED is illuminated green; right LED flashes yellow/green during autorun.)
4. Verify that the motor is rotating clockwise at approximately one revolution per second, as viewed from the shaft end of the motor. (The motor is turning because earlier you configured the drive for autorun.)

Proceed to *Commanding Motion Under Program Control*.

Commanding Motion Under Program Control

In this procedure you will use the Gem6K command language to make the motor turn. This will verify that your system is installed correctly.

1. Issue the following commands to change the drive mode:
DRIVEØ (disables the drive and stops motion)
DMODE12 (changes mode from autorun to controller/drive mode)
DRIVE1 (enables the drive)
2. Issue the following commands to the drive to make the motor turn:
LHØ (disables limits)
MAØ (enables incremental positioning mode; disables absolute mode)
MCØ (enables incremental positioning mode; disables continuous mode)
A10 (sets acceleration to 10)
V1 (sets velocity to 1)
If you are using a GV6K, issue D4000. If you are using a GT6K, issue D25000:
D4000 (GV6K: sets distance to 1 rev (if ERES = 4000))
or
D25000 (GT6K: sets distance to 1 rev (if DRES = 25000))
GO (initiates motion)
3. Verify that the motor rotates one revolution and then stops.

This completes the *Express Setup* procedure.

What's Next?

This chapter has given you information and instructions for performing an *Express Setup*. The following list explains the steps you should take to complete your installation, and indicates where to find additional information for each of those steps.

1. **Mount the drive.** For information on drive dimensions, environmental specifications, airflow and cooling, etc., see *Appendix A Specifications*.
2. **Mount the motor.** For information on motor dimensions, motor cables, encoders, speed/torque curves, etc., see the separate *Gemini Motor Reference Manual*.
3. **Make System Connections.** Information about Compumotor cables is in *Appendix A Specifications*. For information on cabling practices to reduce electrical noise, see *Appendix C Regulatory Compliance: UL and CE*.

Connect any of the drive's optional features you may wish to use (see *Appendix A Specifications* for more information):

- Reset Input
- VINref – Voltage Input Reference
- Digital Inputs (and CNTRL-P)
- Digital Outputs
- Analog Monitor
- Encoder Output (GV6K only)
- Step & Direction Output (GT6K only)

Connect any of the drive's special features you may wish to use (see *Chapter 4 Special Features* for more information):

- Relay, and how to control a Motor Brake
- Aligning the Resolver (GV6K only)
- RS-232 Daisy Chain
- RS-485 Multi-Drop
- Ethernet
- Expansion I/O – EVM32-II and SIM modules
- Multiple Drive Installations
- Connecting drive power buses together (GV6K only)
- Regeneration and the GPDM Power Dissipation Module (GV6K only)

4. **Connect the Load.**
5. **Configure Your Drive.** After completing your hardware installation in Steps 1 – 5 above, proceed to *Chapter 3 Configuration* for information about additional drive configuration options, including:
 - **Advanced Features Configuration** (GT6K only) – Configure settings for Active Damping, Electronic Viscosity, ABS Damping, and encoderless stall detect.
 - **Motor Matching** (GT6K only) – Match your drive to your particular motor.
6. **Tune Your System** (GV6K only) – Tune your system according to the instructions found at the end of *Chapter 3 Configuration*.