DigiDrive™II

**Single Phase
Variable Frequency Drive**

USER INSTRUCTIONS

Welcome To Anacon System's DigiDrive II

The DigiDrive II is a speed controller for single phase motors.
It allows the motor's speed to be changed while consuming minimum electrical power. This manual provides information on connections, safety, specifications and troubleshooting. A separate manual exists for information concerning the optional Dash Drive configuration system.

Warnings

1. This product is an open frame design containing dangerous voltages. The User is responsible for ensuring that the DigiDrive is safely installed and wired for their particular application. When power is applied, the motor output terminals, and all the components on the PCBs, should always be regarded as high voltage, *even if the Status indicator is Off*.

2. Always remove power from the DigiDrive before making connections or adjusting jumper settings. After switching power off, wait until all 3 LEDs are completely extinguished before working on the drive or motor.

3. The control input signals (J2), are isolated from the line voltage. However, incorrect wiring can violate the isolation between control inputs signals (J2) and dangerous voltages on other parts of the circuit. The installer of this product should check wiring carefully and perform a test (Hipot) to insure that isolation exists between the control input signals and the AC line.

4. The DigiDrive is designed to operate in an ambient temperature of up to 40°C. The temperature of the heatsink depends on many factors including airflow, orientation and operating profile. The user should ensure that the heatsink temperature does not exceed 80°C worst case. In applications where the heatsink may be touched by the end-user, regulations may limit the maximum temperature to 70°C.

5. This drive is **not recognized for use as a motor protector**. The attached motor must have its own recognized over load protection device.

6. This drive is recognized for use in an environment of pollution class 2 and must be mounted in a suitable enclosure.

7. This product cannot be used in any equipment intended for life support.
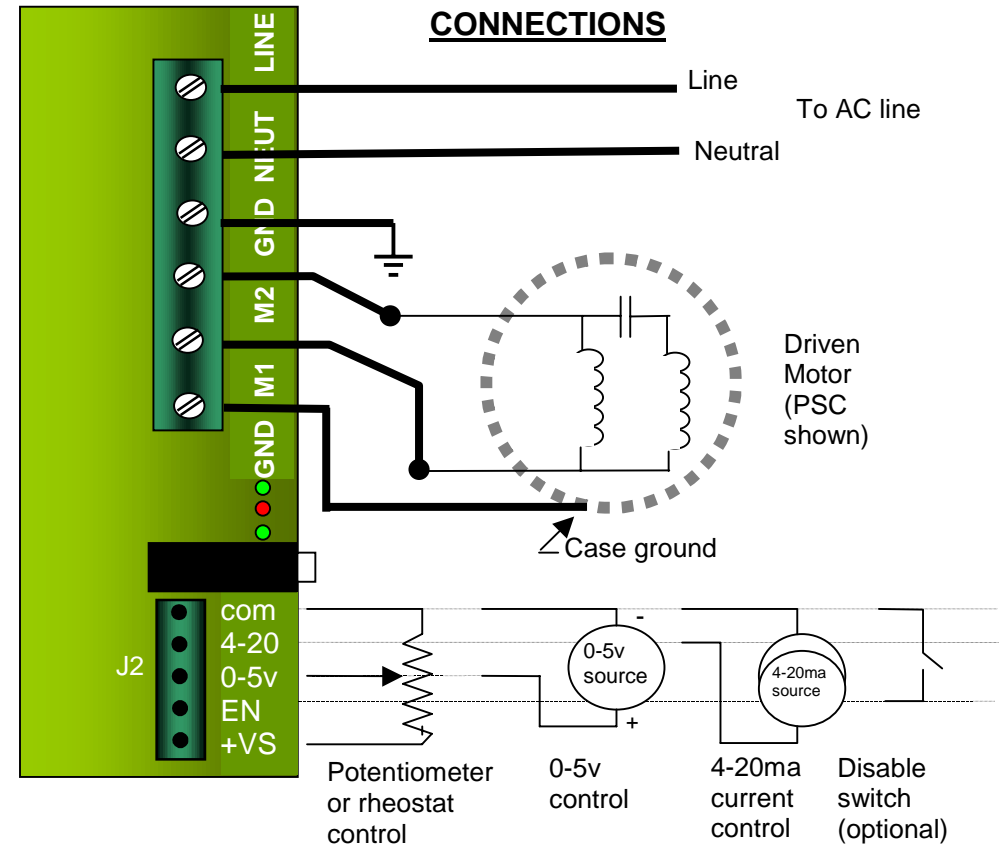
CONNECTIONS

Control Signal Connection (J2) The signal inputs on J2 are isolated inputs and can receive control signals from other control devices or equipment so long as the COM signal does not exceed 30Vdc with respect to earth ground.

+VS : External Power Source: +5VDC output for a potentiometer. The external load on this supply should be 10Kohms or higher (500ua max.).
EN : Disable Control: External disable signal for the motor output. Connecting this input to the com terminal will cause the DigiDrive to turn off power to the motor.
0-5V : Speed Control: Sets the output frequency of the drive proportionate to the input voltage. If the voltage is below the enable threshold the drive output is disabled. A 0-10V control source can be used by adding an external 100k resistor in series. (The enable threshold will now be double).
4-20 : Speed Control:. Output frequency is proportional to current from 4 to 20mA. Below 4mA drive is Off
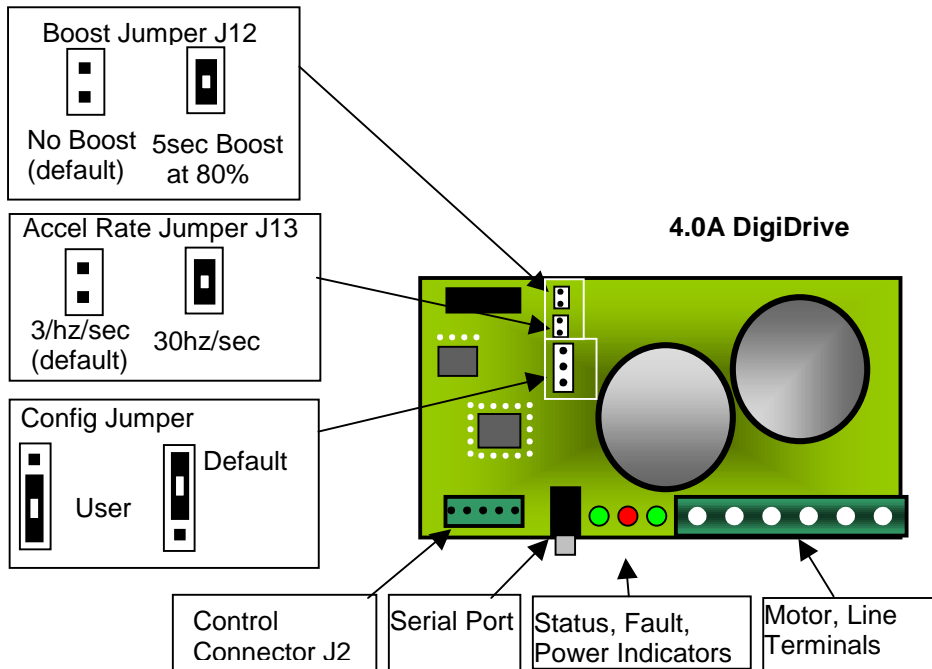**COM: Common:** Common signal for speed and disable signals.

Changing Parameters

The DigiDrive is shipped ready to run a fan load and be controlled from a potentiometer. It can be changed to operate different types of loads, have different acceleration times, use a different speed range, etc. These parameters can be changed using either the jumper method or the User method. There is a jumper on the circuit board, marked "config", which selects which method will be used.

Jumper Method. To use this method, the Config jumper should be set to the DEFAULT position. The DigiDrive has two other jumpers on its circuit board that can now be used to adjust Accel rate and Boost profile. For faster acceleration, insert jumper J13. For more starting torque, insert jumper J12.

User Method. With this method, a personal computer or other serial controller can be used to change parameters. To use this method the Config jumper must be set to USER. Many more parameters are available with this method. An optional configuration kit (P/No DD-CFG) connects the DigiDrive to a PC/serial controller through a serial data link. Anacon's DashDrive™ Windows™ Software provides several screens to change parameters, such as, acceleration, V-F profiles, etc. Once configured, DashDrive stores the parameters in the DigiDrive's non-volatile memory and the programmer is no longer required. A separate manual is available for the DashDrive program. If the Config jumper is in the DEFAULT position, the drive will accept and use parameter changes from the PC/serial controller but will revert back to the jumper setting when the power is turned off.

Boost Jumper J12

No Boost (default)   5sec Boost at 80%

Accel Rate Jumper J13

3/hz/sec (default)   30hz/sec

Config Jumper

User   Default

4.0A DigiDrive

Control Connector J2 | Serial Port | Status, Fault, Power Indicators | Motor, Line Terminals

Description of Components

Power Drive Block: "L" shaped board containing power transistors. Attached to heatsink with three screws. Has no user adjustable components or terminals.

Control Board: Contains all user terminals. 6.5 amp units contain 3 large round capacitors. 4.0 amp units contain 2 large round capacitors.

Power Indicator: Green LED mounted on control board adjacent to Motor terminals. Marked "PWR". Lighted whenever sufficient line voltage is available for operation. Blinking or off state indicates input voltage is insufficient

Fault Indicator: Red LED mounted on control board. Marked "FLT" Flashes fast and dim to indicate system OK. Flashes bright and slow to indicate drive has turned itself off. See Fault Codes section of this manual.

Status Indicator: Green LED mounted on control board adjacent to Serial port. Marked "STAT". Lit whenever power is being sent to the motor.

Serial Port: Jack mounted on control board which accepts mini stereo plug. Used in conjunction with optional Configuration Kit.. Cannot be directly connected to any other equipment. (Is not RS 232 standard.)

Control Connector J2: Green, mounted on control board, 5 terminal. Used to connect potentiometer or other control equipment such as a PLC. **Tighten to .95-1.3 in-lbs**

Motor / Line Terminals: Blue, mounted on control board, 6 terminal. For connection driven motor and input line. **Tighten to 4.3-4.6 in-lbs** **CAUTION:** *these terminals are at dangerous voltage*.

Using the DigiDrive

Step 1 – Read Instructions and Warnings

Before connecting power to the DigiDrive, read all warnings listed at the beginning of these instructions. If you have questions, contact Anacon Systems or your distributor for assistance.

Step 2 – Mounting

The correct mounting orientation for the DigiDrive is on a vertical surface with the length of the fins running vertically. Observe all warnings listed in these instructions.

Step –3 Connection

Refer to the Connection drawing. Wire the control first, then the motor. Connect the line last.

The command (0-5v or 4-20ma) input can be driven by either a local potentiometer, remote potentiometer, an external voltage source or a 4-20mA current source. Refer to the connection drawing for wiring information. If 4-20mA is being used, the 0-5v input will become inactive automatically as soon as a current greater 2ma is input.

Step 4 – Testing

After checking wiring, power the drive and test operation over the full speed range.

If a potentiometer is being used, advance the knob slowly. The Status LED will light indicating that the drive has started. The motor load should start to rotate. If the Red Fault (FLT) Indicator lights, check the fault code before removing power.

The practical motor speed range will depend on the motor and the application. The Default profile should work in most simple applications. Some applications may require more advanced configuration using a PC to customize V-F curves, ramp rates etc.

Step 5 – Application Configuration

If the motor stops running, does not run properly, or if the Fault indicator starts to flash slowly, It may be necessary to change the parameters that the DigiDrive uses to control the motor speed and voltage.

After removing power and waiting for all Indicators to turn off, the parameter settings can be changed. The **Changing Parameters** section of this manual shows possible parameter changes using jumper settings or by using a PC.

Step 6 – Troubleshooting

Verify the line, motor, and control are wired per the Connection drawing.

Verify the correct line voltage is available at the Line terminals.

If the PWR indicator is on, the Fault indicator is not flashing slowly and:

The status indicator is on, but the motor is not turning. In this case either the motor is not connected, is not wired properly, or, is working but is simply not developing enough torque to turn the load. Check the motor wiring. Try increasing the commanded frequency or turning on the boost parameter.

The status indicator is not on. In this case the drive is not being commanded to run. Either the 0-5v input is below the enable threshold or the EN input is below 4.5v. If an external controller is being (used such as a PLC) disconnect it from the DigiDrive. Connect a 10k ohm potentiometer to J2 and retest. This should determine if the problem is in the DigiDrive or in the external controller.

If the PWR indicator is on and the Fault indicator is flashing slowly, refer to the Fault Code section to determine the type of fault. The troubleshooting section will provide solutions to try for each type of fault.

Specifications:

Input Voltage
- SO16xxxx   115Vac $\pm$ 10%
- SO17xxxx   230Vac $\pm$ 10%

Input Frequency
- 50 or 60 Hz

Output Current   Continuous   Peak
- SOxx1xxxx   4.0Arms   6.0Arms
- SOxx2xxxx   6.5Arms   8.0Arms

Output Frequency
- 120Hz maximum   5Hz minimum

Ambient Temperature
- 40C (104F)

Protection
- Over Output Current
- Over Input Voltage
- Under Input voltage
- Over Temperature

Default Configuration

This configuration is always used when the Config jumper is set to DEFAULT.

Fmin	15Hz
Fmax	110% of rated (ie. 55 or 65Hz)
V-F Profile	Strong Fan Curve
Current Trip	10 amps
Boost Time / Freq	J12 In 5s @ 80%
	J12 Out None
Ramp Rate	J13 In 30Hz/sec
	J13 Out 3Hz/sec
Speed Input	0-5V or 4-20ma
Enable Threshold	0.49V on , 0.25V off

The default configuration uses either the speed control input or the Disable signal (EN) to switch the motor output on and off (Read warning #3). If the speed control input voltage is less than the enable threshold the output will be off. If the Disable input is connected to COM, the output will also be off. When no connection is made to the EN input, the 0-5v input or 4-20ma input will determine the enable state.

Fault Codes

The red fault indicator will normally flash dimly at a very high rate indicating good communication between the Power Drive Block and control board. If a fault is detected, the fault indicator will flash much brighter and more slowly. The fault code will be indicated by a series of flashes followed by a pause. Count the flashes to determine the fault number. After correcting the problem, the fault can be cleared by disabling and re-enabling the drive using the disable input, the potentiometer, or by cycling power to the drive.

Fault Code	Fault
1	Current Trip Fault
2	Current Trip Fault
3	Current Limit Fault
4	Over Temperature
5	Supply Voltage Too High
6	Supply Voltage Too Low
7	Internal Communications Fault

Applicable Motors

The DigiDrive is best suited for Permanent Split Capacitor motors (often called PSC or capacitor run) and shaded pole type single phase motors.

Split phase or capacitor start motors, having a centrifugal switch, can be used however they are not recommended. These motors draw large starting current that can cause the drive to trip. Running these types below the toggle speed of the centrifugal switch will also cause the Aux winding to overheat.

Applicable Part Numbers

This manual applies to the following DigiDrive models:

Part Number	Line Voltage	Amps Out	HP	Motor Freq
SO161003A	115	4.0	1/3	60Hz
SO171005A	230	4.0	½	60Hz
SO171005B	230	4.0	½	50Hz
SO162005A	115	6.5	½	60Hz
SO172007A	230	6.5	¾	60Hz
SO172007B	230	6.5	¾	50Hz

Trouble Shooting

Fault code 1, 2 or 3   Current Trip or Current Limit
Problem: The motor's current requirements exceed drive's capabilities. Some motors have very high starting currents, which may not be measurable with a standard ammeter.
Solutions: Check that the drive's motor outputs are not shorted and that the motor is wired correctly. Reduce the ramp rate using J13. Experiment with the Boost setting. Use a drive with a higher rating. Change the motor to one with lower amp draw or lower starting current (such as a PSC motor). If using a PC and Configuration Kit, raise the current limit to its max value.

Fault code 4   Over Temperature
Problem: Insufficient airflow around heatsink combined with extended use at high output currents.
Solutions: Correct mounting orientation.   Add forced air-cooling or relocate drive. If these fail, a larger capacity drive may be needed.

Fault code 5 or 6   Supply Voltage Too High/Low
Problem: The AC Line voltage is outside the limits required to run the motor.
Solution: Check that the drive is connected to the correct AC line voltage. Check the AC line voltage at the drive terminals. Check or set the limits using a PC and the Configuration Kit.

Fault code 7   Internal Communications Fault
Problem: Errors are occurring in communications between the two modules within the DigiDrive. This can be caused by loose wires on the Power Drive Block or by excessive electrical noise in the system.
Solutions: Tighten the terminal block on the Power Drive Block (the vertical board). Check that external wiring is correct. Try rerouting external wiring to reduce noise pickup. Replace external control signal with potentiometer to see if this was a source of noise.

Power Indicator Does Not Light
Problem: The drive is not powered.
Solution: Check supply voltage to the DigiDrive. If this is OK, the internal fuse may be blown. Return to Anacon for service.

Status Indicator Won't Light / Drive Won't Run
Problem: The drive is being held in the Disabled state by a control signal or a fault condition.
Solution: If no fault is being indicated, check the speed and enable signals. For the drive to run, EN must be above 4.5V and 0-5v must be above .35v. Try replacing control signal with the potentiometer supplied with the drive. If the Fault indicator is flashing slowly, refer to the fault codes section in this manual.

Drive Operates Erratically
Problem: Can be due to an unstable speed signal or incorrect parameters in the configuration memory.
Solutions: Set the Config jumper to the Default position. Check that the speed and enable signals are stable and free of noise.

Motor Does Not Run Smoothly
Problem: The voltage to the motor at a given frequency may be incorrect. This is determined by the Voltage-Frequency curve (V-F curve). Alternatively, the drive may be running the motor outside its speed (Hz) range.
Solution: The V-F curve and Max/Min Frequency limits can be modified using the DigiDrive Configuration Kit.
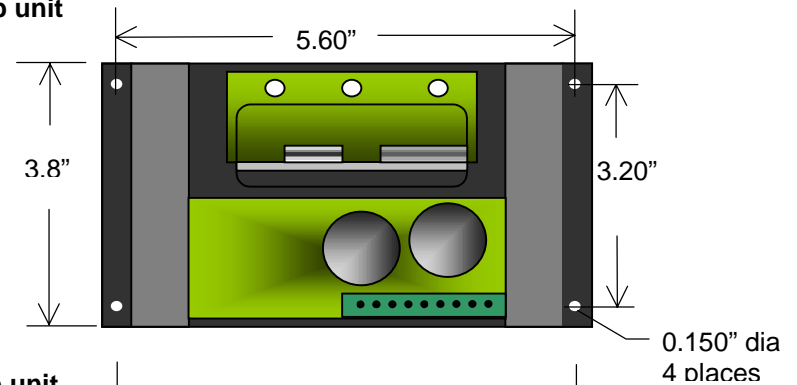
Motor Has Trouble Starting
Problem: At low frequencies and voltages, the motor may not develop enough starting torque.
Solutions: Enable the 80% boost using J12. A more complex start profile can be programmed using the Configuration Kit.

Mechanical Dimensions

4.0amp unit

5.60"

3.8"

3.20"

0.150" dia
4 places

6.5amp unit

5.60"

5.0"

4.40"

0.150" dia
4 places

2.7"

6.00"

Tolerances:
.x $\pm$.05"
.xx $\pm$.005"
.xxx $\pm$.001"