CHAPTER 3

KEYPAD OPERATION AND QUICKSTART

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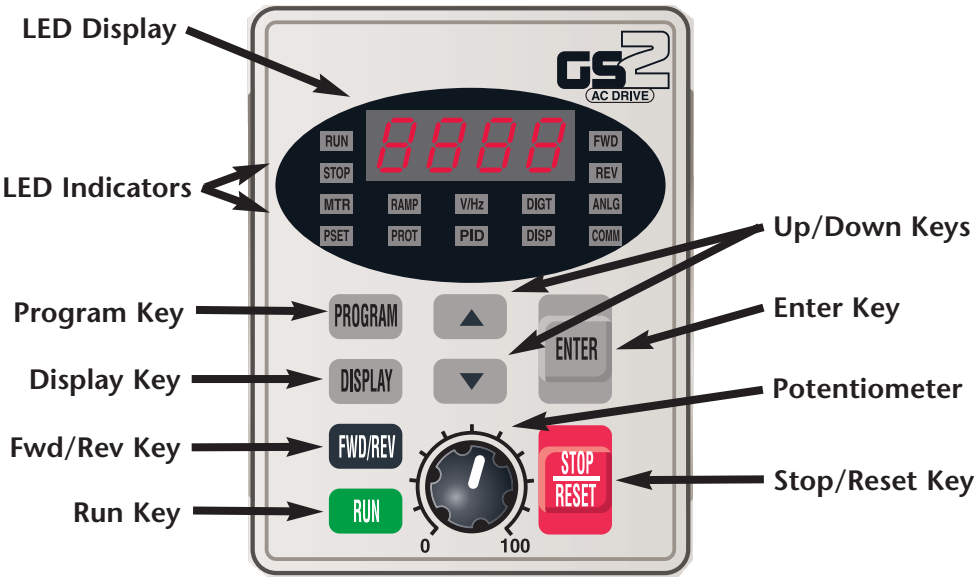
The GS2 Digital Keypad

The digital keypad includes a 4-digit LED display, 14 LED Indicators, 8 function keys, and a potentiometer. The diagram below shows all of the features of the digital keypad and an overview of their functions.



LED Display

The LED display shows the AC drive operation values and parameter settings.

LED Indicators

RUN — The RUN LED indicates the AC drive is in Run Mode. The RUN LED blinks when the drive is decelerating to stop.

STOP — The STOP LED indicates the AC drive is not in Run Mode. The STOP LED blinks when the drive is in Run Mode, but has zero speed reference.

FWD — The FWD LED indicates the AC drive is running the motor in the forward direction.

REV — The REV LED indicates the AC drive is running the motor in the reverse direction.

MTR — The MTR LED indicates the AC drive is in Program Mode and is displaying the Motor Parameters group (P 0.xx).

RAMP — The RAMP LED indicates the AC drive is in Program Mode and is displaying the Ramp Parameters group (P 1.xx).

V/Hz — The V/Hz LED indicates the AC drive is in Program Mode and displays the Volts/Hertz Parameters group (P 2.xx).

DIGT — The DIGT LED indicates the AC drive is in Program Mode and displays the Digital Parameters group (P 3.xx).

ANLG — The ANLG LED indicates the AC drive is in Program Mode and displays the Analog Parameters group (P 4.xx).

PSET The PSET LED indicates the AC drive is in Program Mode and displays the Preset Parameters group (P 5.xx).

PROT The PROT LED indicates the AC drive is in Program Mode and displays the Protection Parameters group (P 6.xx).

PID The PID LED indicates the AC drive is in Program Mode and displays the PID Parameters group (P 7.xx).

DISP The DISP LED indicates the AC drive is in Program Mode and displays the Display Parameters group (P 8.xx).

COMM The COMM LED indicates the AC drive is in Program Mode and displays the Communication Parameters group (P 9.xx).

Function Keys

PROGRAM Pressing the **PROGRAM** key repetitively cycles through the parameter groups. As you cycle through the parameter groups, an LED indicator lights to show you which parameter group is selected.

DISPLAY Pressing the **DISPLAY** key cycles through the operational values of the AC drive when the AC drive is not in Program Mode. When in Program Mode, the Display key will display the value of the selected parameter.

FWD/REV Pressing the **FWD/REV** key changes the direction in which the motor operates.

RUN Pressing the **RUN** key starts the AC drive operation. This key has no function if the AC drive is controlled by the external control terminals.

▲ ▼ Press the **UP/DOWN** arrow keys momentarily to change parameter settings. These keys may also be used to scroll through different operating values or parameters. Pressing the "Up" or "Down" key momentarily, changes the parameter settings in single-unit increments. To quickly run through the range of settings, press and hold the “Up” or "Down" key.

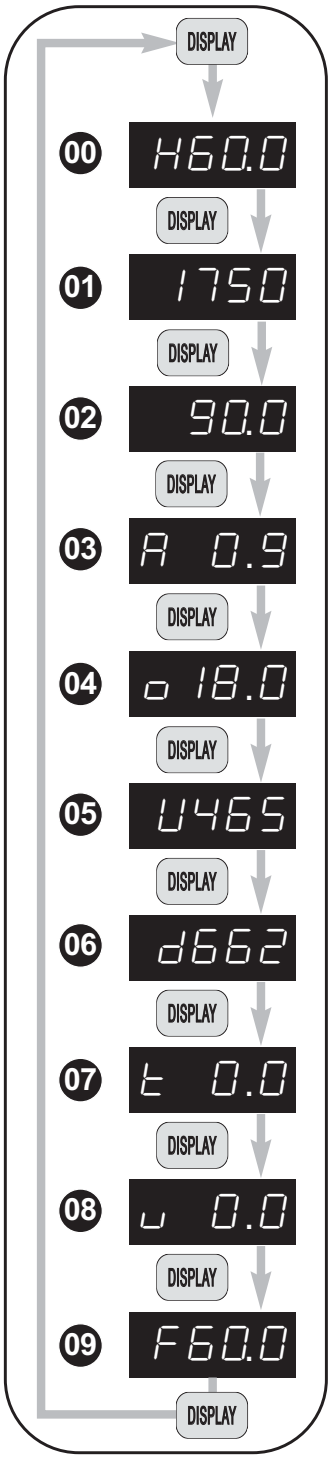
ENTER Press the **ENTER** key to view parameters and store parameter settings.

STOP RESET The **STOP/RESET** key is used to stop AC drive operation. If the AC drive has stopped due to a fault, clear the fault first, then press this key to reset the AC drive.

The **POTENTIOMETER** is for setting operation frequency.

Displaying the Status of the GS2 AC Drive

Press the display button on the keypad repeatedly to cycle through the status messages on the AC drive. The diagram below shows the order of the status messages as you cycle through them, and shows the definitions of the status messages. The status of the AC drive can be shown in RUN or STOP mode.



00 Actual Operating Frequency
Displays the actual operating frequency present at the T1, T2, and T3 terminals. *Example: 60.0Hz*

01 RPM
Displays the present *estimated* speed of the motor.
Example: 1750 rpm

02 Scaled Frequency
Displays the result of output frequency x P 8.01.
Example: 60Hz x 1.5 = 90.0

03 Amps
Displays the output current present at the T1, T2, and T3 terminals. *Example: 0.9A*

04 % Load
Displays the amount of load on the AC drive.
Example: (Output Current ÷ Drive Rated Current) x 100

05 Output Voltage
Displays the output voltage present at the T1, T2, and T3 terminals. *Example: 465V*

06 DC Bus Voltage
Displays the DC Bus Voltage. *Example: 662 VDC*

07 PID Setpoint
Displays the PID setpoint. *Note: It is possible to change the PID setpoint with the ▲ and ▼ keys when the PID setpoint value is displayed on the keypad. The PID function (P 7.00) must be enabled, and the PID Setpoint source (P 7.02) must be set to keypad (00).*

08 PID Feedback Signal (PV)
Displays the PID feed-back signal.

PID

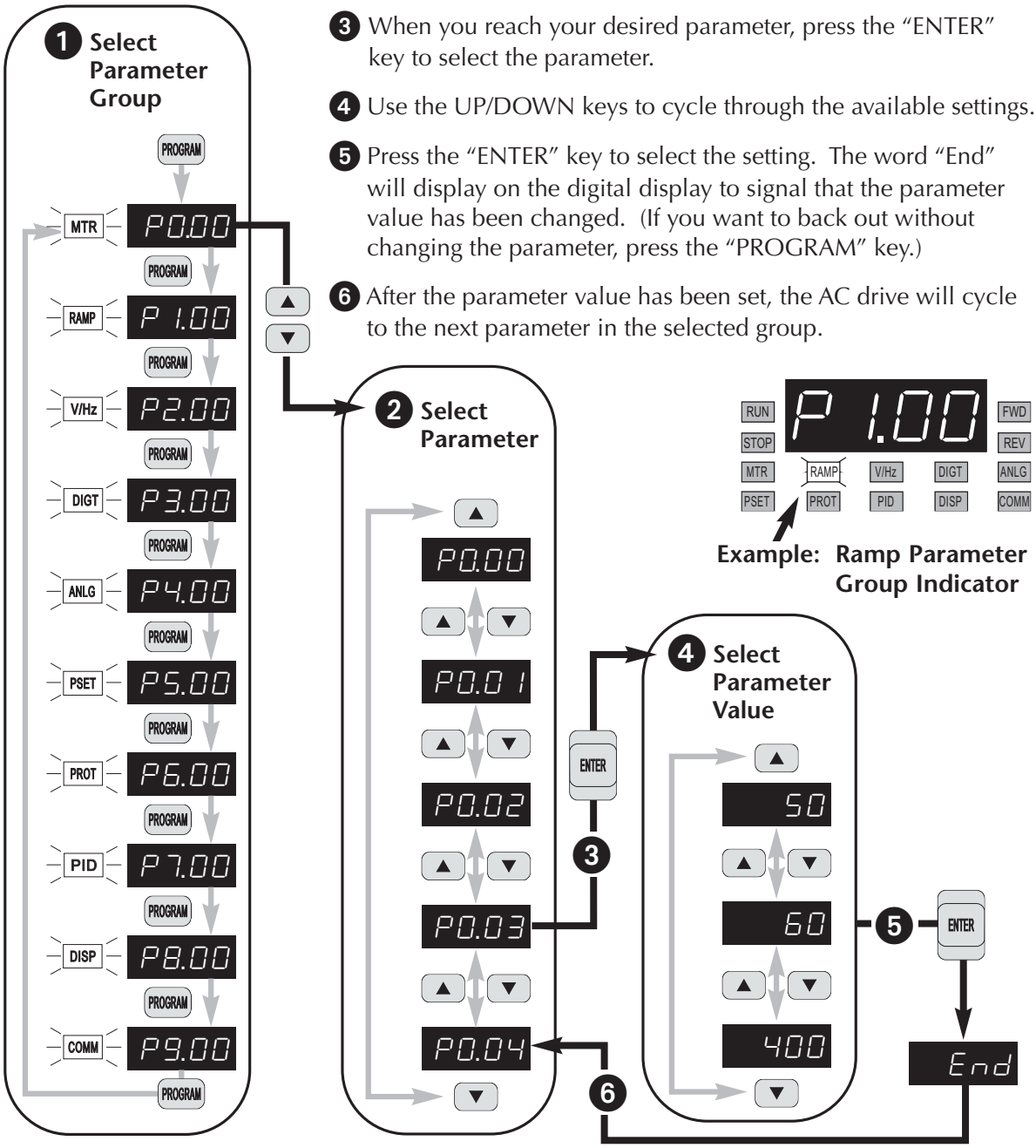
NOTE:
The PID LED will flash when the ***PID Setpoint*** *or* ***Process Variable*** *is displayed.*

09 Setpoint Frequency
Displays the frequency setting of the AC drive.
Example: 60.0 Hz

Programming the GS2 AC Drive

The GS2 AC Drive parameters are organized into 10 different groups according to their functions. The illustration below shows you how to navigate through the parameter groups and parameter settings. For a complete list of parameters, refer to CHAPTER 4.

1. Press the "Program" key repetitively to cycle through the parameter groups. As you cycle through the parameter groups, an LED indicator will light to show you which parameter group is selected.
2. Once you reach the desired parameter group, use the UP/DOWN keys to cycle through the available parameters in that group.
3. When you reach your desired parameter, press the "ENTER" key to select the parameter.
4. Use the UP/DOWN keys to cycle through the available settings.
5. Press the "ENTER" key to select the setting. The word "End" will display on the digital display to signal that the parameter value has been changed. (If you want to back out without changing the parameter, press the "PROGRAM" key.)
6. After the parameter value has been set, the AC drive will cycle to the next parameter in the selected group.



GS2 Quickstart

The following examples will help you quickly set up your GS2 AC Drive for two common applications. The first example applies to an application that requires constant torque, and the second example requires variable torque.

Note: For a complete list and description of the parameters for the GS2 Series AC drives, refer to CHAPTER 4.

Example 1: Constant torque (e.g. conveyors, compressors, etc.)

In this example, the AC drive needs to operate a motor that is connected to a conveyor. In order to decide which parameters need modifications, we will make a list of the needs for the application.

Application Needs

- The AC drive must control a 460V, 1hp inverter duty motor. We will use a model GS2-41P0 drive for this application. An example of the motor nameplate is shown below.

INVERTER DUTY MOTOR							
HP	1	Volts	460	PHASE	3	TYPE	P
RPM	1725	AMPS	2.6	HZ	60	SF	1.15
DESIGN	B			AMB	40°C	INSUL CLASS	F
DUTY	CONT			ENCL	TEFC	CODE	K

- The maximum speed for the motor is 2000 rpm.
- The motor should accelerate to maximum speed in 5 seconds.
- The motor should decelerate from maximum speed in 5 seconds.
- The motor will require a high torque when starting.
- The operation of the motor (start, stop, etc.) will be controlled by remote control terminals. All keys on the GS2 keypad should be disabled.
- The frequency of the AC drive will be determined by remote potentiometer that has a 0 to +10V signal.
- The display of the AC drive should default to the motor speed (rpm) when running.

Parameter Setup

In order to meet the needs of this application, the drive parameters should be set as follows:

P 0.00 Motor Nameplate Voltage Setting: 460

Range: 115V&230V class: 200/208/220/230/240 Default Setting: 240
460V class: 380/400/415/440/460/480 480
575V class: 380 to 637 575

This parameter setting is determined by the motor nameplate.

P 0.01 Motor Nameplate Amps Setting: 2.6

Range: Drive Rated Amps x .3 to Drive Rated Amps x 1.0 Default Setting: Drive Rating (A)

This parameter setting is determined by the motor nameplate..

P 0.02 Motor Base Frequency Setting: 60

Range: 50/60/400 Default Setting 60

This parameter setting is determined by the motor nameplate.

P 0.03 Motor Base RPM Setting: 1725

Range: 375 to 9999 rpm Default Setting: 1750

This parameter setting is determined by the motor nameplate.

P 0.04 Motor Maximum RPM Setting: 2000

Range: P 0.03 to 9999 rpm Default Setting: P 0.03

This parameter setting is determined by the needs of the application.

WARNING: The Motor Maximum RPM parameter (P 0.04) should never exceed the maximum rpm rating for the motor you are using. If this information is not readily available, consult your motor manufacturer.

P 1.00 Stop Methods — Setting: 00

Range: 00 Ramp to Stop
01 Coast to stop

Default Setting: 00

The Ramp to Stop setting causes the drive to stop the motor under power according to the Deceleration Time set in P 1.02. If the AC drive was set for Coast to Stop, the AC drive would ignore the Deceleration Time setting.

WARNING: If the Stop Method for the GS2 AC drive is set for Coast to Stop, the AC drive will ignore any setting you have for Deceleration Time (P 1.02).

P 1.01 Acceleration Time — Setting: 5.0

Range: 0.1 to 600 sec

Default Setting: 10 sec

The motor should accelerate from 0 rpm to base rpm (P 0.03) in 5 seconds.

P 1.02 Deceleration Time — Setting: 5.0

Range: 0.1 to 600 sec

Default Setting: 30 sec

The motor should decelerate from 2000 rpm (maximum speed) to 0 rpm in 5 seconds.

P 2.00 Volts/Hertz Settings — Setting: 01

Settings: 00 - General Purpose
01 - High Starting Torque
02 - Fans and Pumps
03 - Custom

Default Setting: 0.0

The GS2 Series AC drive has some predefined torque settings that meet the needs of most applications. A custom setting is available if needed. In this example, the application requires a high starting torque.

P 3.00 Source of Operation Command Setting: 02

Default Setting: 00

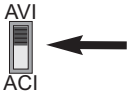
Settings
- 00 Operation Determined by Digital Keypad
- 01 Operation determined by external control terminals. Keypad STOP is enabled.
- 02 Operation determined by external control terminals. Keypad STOP is disabled.
- 03 Operation determined by RS-232/RS-485 interface. Keypad STOP is enabled.
- 04 Operation determined by RS-232/RS-485 interface. Keypad STOP is disabled.

The AC drive operation will be determined by external control terminals and the keypad stop will be disabled.

P 4.00 Source of Frequency Command Setting: 02

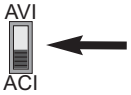
Default: 00

Settings:
- 00 Frequency determined by keypad potentiometer
- 01 Frequency determined by digital keypad up/down
- 02 Frequency determined by 0 to +10V input on AI terminal. Switch, SW1 must be set to AVI.



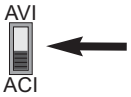
Switch SW1 must be set to AVI in order to use a 0 to +10V input

- 03 Frequency determined by 4 to 20mA input on AI terminal. Switch SW1 must be set to ACI.



Switch SW1 must be set to ACI in order to use a 4 to 20mA input

- 04 Frequency determined by 0 to 20mA input on AI terminal. Switch SW1 must be set to ACI.



Switch SW1 must be set to ACI in order to use a 0 to 20mA input

- 05 Frequency determined by RS-232/RS-485 communication interface *(RS-232 or RS-485 communication selected by switches SW2 and SW3. Refer to CHAPTER 5 for details.)*

The frequency of the AC drive will be determined by an external potentiometer with a 0 to +10V signal.

P 6.00 Electronic Thermal Overload Relay — Setting: 00

Default Setting: 00

Settings: 00 - Constant Torque (inverter/vector duty motor)
01 - Variable Torque (fan-cooled standard motor)
02 - Inactive

This function setting 00 is the standard overload protection curve used to protect inverter/vector duty motors.

P 8.00 User Defined Display Function — Setting: 01

Default Setting: 00

Settings:		
	00	Output Frequency (Hz)
	01	Motor Speed (rpm)
	02	Output Frequency x P 8.01
	03	Output Current (A)
	04	Motor Output Current (%)
	05	Output Voltage(V)
	06	DC Bus Voltage (V)
	07	PID Setpoint
	08	PID Feedback (PV)
	09	Frequency Setpoint

The AC drive display will default to motor speed (rpm) when running.

Example 2: Variable torque (e.g. fans, centrifugal pumps, etc.)

In this example, the AC drive needs to operate a motor that is connected to a centrifugal pump. As in Example 1, we will make a list of the needs for the application in order to decide which parameters need modifications.

Application Needs

- The AC drive must control a 208V, 3hp fan-cooled standard duty motor. The AC drive model we will be using for this application is a GS2-23P0. An example of the motor nameplate is shown below.

STANDARD DUTY MOTOR							
HP	3	Volts	208	PHASE	3	TYPE	P
RPM	3525	AMPS	9.2	HZ	60	SF	1.15
DESIGN	B	AMB	40°C			INSUL CLASS	F
DUTY	CONT	ENCL	TEFC			CODE	K

- The maximum speed for the motor is 3600 rpm.
- The motor should accelerate to maximum speed in 20 seconds.
- The motor should coast to stop when operation is terminated.
- The motor will be turning a centrifugal pump.
- The operation of the motor (start, stop, etc.) will be controlled by the GS2 digital keypad.
- The frequency of the AC drive will be determined by the GS2 keypad potentiometer.
- The display of the AC drive should default to output current (A) when running.

Parameter Setup

In order to meet the needs of this application, the parameters should be set as follows:

P 0.00 **Motor Nameplate Voltage** **Setting: 208**

Range: 115V&230V class: 200/208/220/230/240 Default Setting: 240
460V class: 380/400/415/440/460/480 480
575V class: 380 to 637 575

This parameter setting is determined by the motor nameplate.

P 0.01 **Motor Nameplate Amps** **Setting: 9.2**

Range: Drive Rated Amps x .3 to Drive Rated Amps x 1.0 Default Setting: Drive Rating (A)

This parameter setting is determined by the motor nameplate.

P 0.02 Motor Base Frequency — Setting: 60

Range: 50/60/400 Default Setting 60

This parameter setting is determined by the motor nameplate.

P 0.03 Motor Base RPM — Setting: 3525

Range: 375 to 9999 rpm Default Setting: 1750

This parameter setting is determined by the motor nameplate.

P 0.04 Motor Maximum RPM — Setting: 3600

Range: P 0.03 to 9999 rpm Default Setting: P 0.03

This parameter setting is determined by the needs of the application.

WARNING: The Motor Maximum RPM parameter (P 0.04) should never exceed the maximum rpm rating for the motor you are using. If this information is not readily available, consult your motor manufacturer.

P 1.00 Stop Methods — Setting: 01

Range: 00 Ramp to Stop Default Setting: 00
01 Coast to stop

The application requires that this parameter be set to Coast to Stop.

WARNING: If the Stop Method for the GS2 AC drive is set for Coast to Stop, the AC drive will ignore any setting you have for Deceleration Time (P 1.02).

P 1.01 Acceleration Time — Setting: 20.0

Range: 0.1 to 600 sec Default Setting: 10 sec

The motor should accelerate from 0 rpm to Base rpm (P 0.03) in 20 seconds.

P 2.00 Volts/Hertz Settings — Setting: 02

Range: 00 - General Purpose Default Setting: 0.0
01 - High Starting Torque
02 - Fans and Pumps
03 - Custom

The GS2 Series AC drive has predefined torque settings that meet the needs of most applications. A custom setting is also available, if needed. In this example, the motor will be running a centrifugal pump.

P 3.00 Source of Operation Command Setting: 00

Default Setting: 00

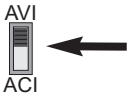
Settings
- 00 Operation Determined by Digital Keypad
- 01 Operation determined by external control terminals. Keypad STOP is enabled.
- 02 Operation determined by external control terminals. Keypad STOP is disabled.
- 03 Operation determined by RS-232/RS-485 interface. Keypad STOP is enabled.
- 04 Operation determined by RS-232/RS-485 interface. Keypad STOP is disabled.

The AC drive operation will be determined by the Digital Keypad.

P 4.00 Source of Frequency Command Setting: 00

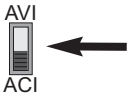
Default: 00

Settings:
- 00 Frequency determined by keypad potentiometer
- 01 Frequency determined by digital keypad up/down
- 02 Frequency determined by 0 to +10V input on AI terminal. Switch, SW1 must be set to AVI.



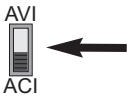
Switch SW1 must be set to AVI in order to use a 0 to +10V input

- 03 Frequency determined by 4 to 20mA input on AI terminal. Switch SW1 must be set to ACI.



Switch SW1 must be set to ACI in order to use a 4 to 20mA input

- 04 Frequency determined by 0 to 20mA input on AI terminal. Switch SW1 must be set to ACI.



Switch SW1 must be set to ACI in order to use a 0 to 20mA input

- 05 Frequency determined by RS-232/RS-485 communication interface *(RS-232 or RS-485 communication selected by switches SW2 and SW3. Refer to CHAPTER 5 for details.)*

The frequency of the AC drive will be determined by keypad potentiometer.

P 6.00 Electronic Thermal Overload Relay Setting: 01

Default Setting: 00

Settings: 00 - Constant Torque (inverter/vector duty motor)
01 - Variable Torque (fan-cooled standard motor)
02 - Inactive

This function setting 01 is used to derate the AC drive output current overload protection to protect a fan-cooled standard motor running at low speeds.

P 8.00 User Defined Display Function Setting: 03

Default Setting: 00

Settings:

	00	Output Frequency (Hz)
	01	Motor Speed (rpm)
	02	Output Frequency x P 8.01
	03	Output Current (A)
	04	Motor Output Current (%)
	05	Output Voltage(V)
	06	DC Bus Voltage (V)
	07	PID Setpoint
	08	PID Feedback (PV)
	09	Frequency Setpoint

The AC drive display will default to indicate Output Current (A) when running.

Note: For a complete list and description of the parameters for the GS2 Series AC drives, refer to CHAPTER 4.