MagneTek

GPD 205
Technical Manual

QUICK REFERENCE – – GPD 205 CONSTANTS

CONSTANT	FACTORY SETTING	USER SETTING
n01	1	
n02	0	
n03	0	
n04	***For***	*(1)*
n05	0	
n06	1 *(2)*	
n07	2 *(2)*	
n08	4 *(2)*	
n09	1	
n10	0	
n11	6.0	
n12	0.0	
n13	0.0	
n14	0.0	
n15	0.0	
n16	0.0	
n17	0.0	
n18	0.0	
n19	6.0	
n20	10.0	
n21	10.0	
n22	10.0	
n23	10.0	
n24	60.0	
n25	230	
n26	60.0	
n27	1.5	
n28	12	
n29	1.5	
n30	12	
n31	*(3)*	
n32	0	
n33	0	

CONSTANT	FACTORY SETTING	USER SETTING
n34	170	
n35	160	
n36	0	
n37	4	
n38	1.0	
n39	1.00	
n40	0	
n41	100	
n42	0	
n43	0	
n44	0	
n45	1.00	
n46	50	
n47	0.0	
n48	0.0	
n49	0	
n50	0	
n51	160	
n52	0.1	
n53	0.0	
n54	0.0	
n55	40	
n56	0.0	
n57	0.0	
n58	0.0	
n59	1.0	
n60	0	
n61	0	
n62	2.0	
n68	*(4)*	
n69	*(4)*	

Constants n63 thru n67 are currently NOT USED.

(1) n04 switches between ***For*** and ***Rev***; user cannot enter a value.
(2) n06, n07 & n08 settings differ if 3-Wire Initialization has been performed.
(3) n31 factory setting depends on Drive rating; see page 17.
(4) n68 & n69 are DISPLAY ONLY constants, which are not user settable.

This list revised 06/01/00

MagneTek

WARNING

Do not touch circuit components until main input power has been turned OFF. Status indicator LEDs and Digital Operator display will be extinguished when the DC bus voltage is below 50 VDC. Wait at least one additional minute.

Do not connect or disconnect wires and connectors while the main input power is turned on.

CAUTION

The GPD 205 leaves the factory with constants initialized for 2-Wire control (when using external Run/Stop signals). Before using the initialization function of constant *n01* , know your control wiring configuration:

8 = Factory 2-Wire Control Initialization (Maintained RUN Contact)
9 = Factory 3-Wire Control Initialization (Momentary START/STOP Contact)

Entering either Initialization code resets all constants to factory settings, and automatically returns constant *n01* setting to " 1 ". If the GPD 205 is connected for 3-Wire control and this constant is set to " 8 " (2-Wire Control Initialization), the motor may run in reverse direction WITHOUT A RUN COMMAND APPLIED. Equipment damage or personal injury may result.

CAUTION

Constant *n25* must be set to proper motor voltage. Drive leaves factory with this constant set for " 230 " volts.

CAUTION

Always ground the GPD 205 using its ground terminal ($\perp$) (near the main circuit output terminals). See paragraph 1.4.1, "Grounding".

Never connect main circuit output terminals T1 (U), T2 (V) & T3 (W) to AC main circuit power supply.

CAUTION

Do not perform a withstand voltage test on any part of the GPD 205. Equipment uses semi-conductors and is vulnerable to high voltage.

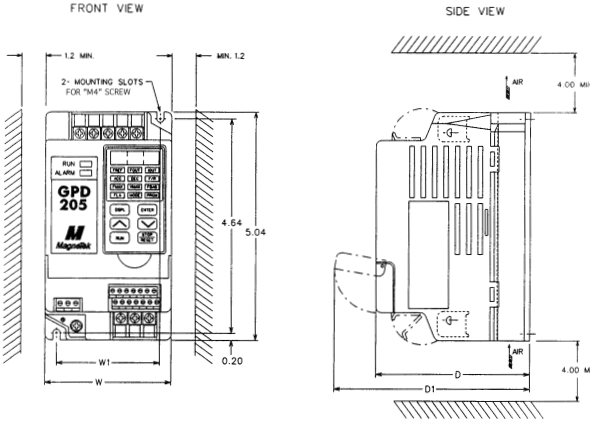
Do not remove the Digital Operator or change dipswitch SW1 unless the main input power is turned OFF. Never touch the printed control board (PCB) while the main input power is turned on.

IMPORTANT

All constants have been factory set. Do not change their settings unnecessarily.

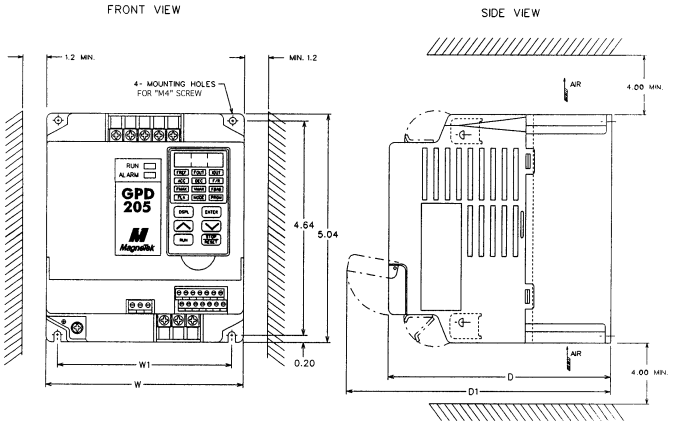
CONTENTS

Revision date 06/01/00



RATED INPUT	HORSE-POWER	DIMENSIONS in inches				WEIGHT Lbs.	HEAT LOSS (Watts)
		W	D	W1	D1		
115V 1ph	1/8	2.68	3.74	2.20	4.57	1.3	12.6
	1/4	2.68	4.25	2.20	5.08	1.3	20.3
230V 3ph	1/8	2.68	2.95	2.20	3.78	1.1	11.9
	1/4	2.68	3.46	2.20	4.29	1.3	18.8
	3/4	2.68	4.33	2.20	5.16	2.0	33.2
460V 3ph	1/2	4.25	3.62	3.78	4.45	2.2	25.5
	3/4	4.25	4.33	3.78	5.16	2.2	34.7

Figure 1-1 GPD 205 Dimensions



RATED INPUT	HORSE-POWER	DIMENSIONS in inches				WEIGHT Lbs.	HEAT LOSS (Watts)
		W	D	W1	D1		
115V 1ph	1/2	4.25	5.12	3.78	5.94	2.9	35.3
	1	4.25	6.10	3.78	6.93	3.3	55.3
230V 3ph	1	4.25	5.12	3.78	5.94	2.9	51.7
	2	4.25	6.10	3.78	6.93	3.3	71.6
460V 3ph	1 & 2	4.25	5.51	3.78	6.34	3.3	56.0
	3	5.12	6.69	4.65	7.52	4.4	78.5

Figure 1-2 GPD 205 Dimensions

Section 1. RECEIVING / INSTALLATION

1.1 GENERAL. The GPD 205 is a high performance, ultra-compact, pulse width modulated design which generates a sine-coded, adjustable voltage/frequency three phase output for complete speed control of any conventional squirrel cage induction motor. The GPD 205 can maintain a 150% current overload capability for 60 seconds. It will not induce any voltage line notching distortion back to the utility line and maintains a displacement power factor of not less than 0.98 throughout its speed range.

When properly installed, operated and maintained, the GPD 205 will provide a lifetime of service. It is mandatory that the person who operates, inspects, or maintains this equipment thoroughly read and understand this manual before proceeding.

1.2 RECEIVING. The GPD 205 is thoroughly tested at the factory. After unpacking, verify the part numbers with the purchase order (invoice). Any damages or shortages evident when the equipment is received must be reported immediately to the commercial carrier who transported the equipment. Assistance, if required, is available from your sales representative.

If the drive will be stored after receiving, keep it in its original packaging and store according to storage temperature specifications on page 62.2.

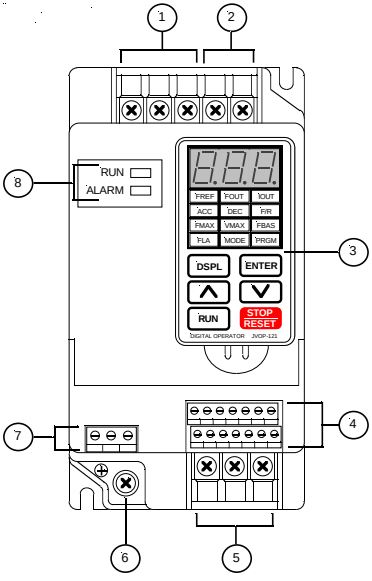
1.3 PHYSICAL INSTALLATION. Location of the GPD 205 (Figures 1-1 & 1-2) is important to achieve proper performance and normal operating life. The unit should be installed in an area where it will be protected from:

- Direct sunlight, rain or moisture.
- Corrosive gases or liquids.
- Vibration, airborne dust or metallic particles.

For effective cooling as well as proper maintenance, the GPD 205 must be installed vertically. There MUST be a MINIMUM 4.0 in. clearance above and below, and a MINIMUM 1.18 in. clearance on each side.

CAUTION

When mounting units in an enclosure, make sure air entering drive is below 113°F (45°C), by adding a fan or other cooling device if needed. See environmental specifications on page 62.2.



NOTE: Terminal covers open, and not shown in this illustration.

① Power circuit input terminals: L1 (R), L2 (S), L3 (T)
② Dynamic braking terminals: B1, B2
③ Digital Operator
④ Control circuit terminals: Top row - S2, S3, AM, AC, PA, PC
Bottom row - SF, SR, S1, SC, FS, FR, FC
⑤ Power circuit output terminals: T1 (U), T2 (V), T3 (W)
⑥ "Ground" terminal screw (⏚) for drive grounding and shield sheath.
⑦ Power circuit output terminals: MA, MB, MC
⑧ Status indicator LEDs: RUN, ALARM

Figure 1-3. Component Identification

1.4 CONFORMANCE TO EUROPEAN EMC DIRECTIVE. As of January 1, 1996, all CE marked products on the European Market had to meet the protection requirement of Electromagnetic Compatibility Directive (EMC) 89/366/EEC. In order for any Electrical system to meet the emission and immunity levels set forth by the European standards, the components that make up the system should individually meet the levels. To meet the required levels of conformance, MagneTek has outlined the methods for line filter application, cable shielding, and GPD 205 drive installation. The outline of the methods follows:

The line filter and the GPD 205 drive must be mounted on the same metal plate. The filter should be mounted as close to the drive as practical. The cable must be kept as short as possible and the metal plate should be securely grounded. The ground of the line filter and the drive must be bonded to the metal plate with as much bare-metal contact as possible.

For main circuit input cables, a screened cable is recommended within the panel, and is also suggested for external connections. The screen of the cable should be connected to a solid ground. For the motor cables, a screened cable (max. 20m) must be used and the screen of the motor cable should be connected to ground at both ends by a short connection, again using as much bare-metal contact as possible.

For more detailed information, refer to MagneTek document TD 4077, "Installation Guidelines For EMC Directive using MagneTek AC Drive Products."

The following chart and Figure 1-3A show the line filter list for the EMC standards and the installation/wiring of the GPD 205 drive and line filter.

Line Filters for GPD 205

Drive Model Number GPD205-	Line Filter			
	MagneTek Part Number	Rated Current (A)	Mass (kg)	Dimensions in mm H x W x D (1)
10P1	5P325-0056	3.0	0.61	66 x 67 x 117
10P2				
10P7	5P325-0057	10.0	0.61	66 x 67 x 117
1001				
A0P1	5P325-0030	7.0	1.1	255 x 126 x 50
A0P2				
A0P7				
A001				
A002				
B0P5	5P325-0030	7.0	1.1	255 x 126 x 50
B0P7				
B001				
B003				

(1) D is the distance the filter will extend outward from the surface of the metal plate.

Conversion Note: 1mm = .0394 in.

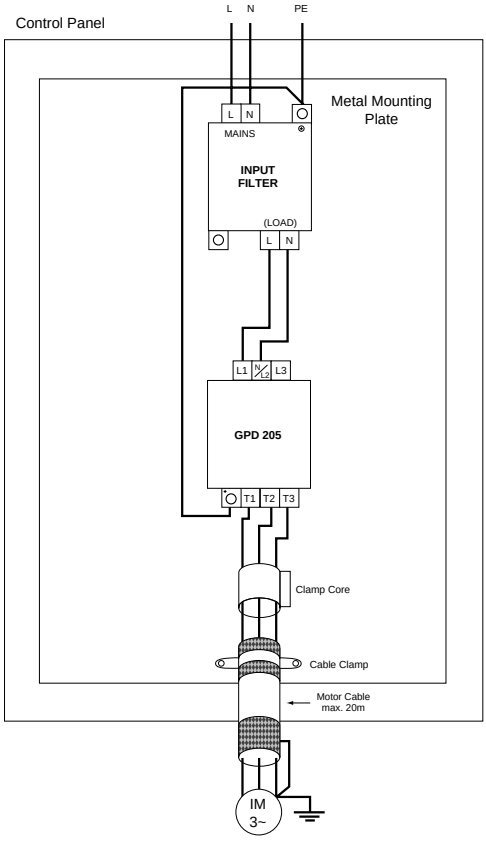


Figure 1-3A. Installation of Line Filter and GPD 205

1.5 ELECTRICAL INSTALLATION. The GPD 205 leaves the factory with all constants set for 2-Wire external reference control. Figure 1-5 must be used for all external connections.

To use the GPD 205 in a 3-Wire application, drive constants ***n01*** and ***n02*** must be reprogrammed, using the Digital Operator. Figure 1-6 must then be used for all external connections.

CAUTION

Use only UL listed or CSA certified closed loop (ring lug) connectors sized for the selected wire gauge. The connectors are to be installed using the correct crimp tool recommended by the connector manufacturer.

Wire and Terminal Screw Sizes for GPD 205

Circuit	Terminal Symbol	Screw	Max. Torque lb-ft	Wire	
				Size AWG	Type
Main Circuit	L1, L2, L3, B1, B2 T1, T2, T3, GND	M3.5	0.7	18 to 14	600V vinyl-sheathed wires or equivalent
Control Circuit	SF, SR, S1, S2, S3, SC FS, FR, FC AM, AC, PA, PC	M2	0.3	20 to 18	Shielded wire with Class 1 wiring
	MA, MB, MC	M3	0.6	20 to 16	

1.5.1 Grounding.

- The GPD 205 must be solidly grounded using main circuit ground (⏚) terminal (see Figure 1-3). Ground resistance should be 100 ohms or less. Select lead size suitable for size of terminal screw. Make lead length as short as possible.
- NEVER ground the GPD 205 in common with welding machines, motors, or other large-current electrical equipment.
- Where several GPD 205s are used, ground each directly or daisy-chain to the ground pole(s). DO NOT FORM A LOOP WITH THE GROUND LEADS. See Figure 1-4.

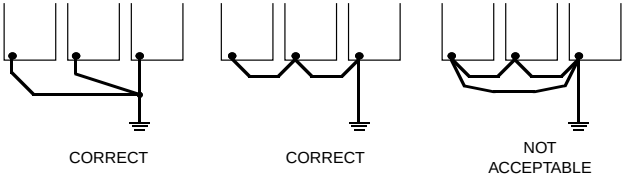


Figure 1-4. Grounding of Three GPD 205s

1.5.2 Main Circuit Input/Output. Observe the following while completing interconnections:

- Use only factory supplied installation instructions to install optional dynamic braking resistors. Failure to do so may cause equipment damage or personal injury.
- Use 600V vinyl-sheathed lead (75°C copper wires) or equivalent. Wire size should be determined by considering voltage drop of leads. Recommended size is 18-14 AWG (0.75-2 mm^2). Size of wire must be suitable for Class 1 circuits.
- Never connect AC main power to output terminals T1 (U), T2 (V) and T3 (W).
- Never allow wire leads to contact the GPD 205 enclosure. Short-circuit may result.
- Torque all main circuit M3.5 terminal screws to .70 lb-ft.
- Never connect power factor correction capacitors or noise filter to GPD 205 output.
- Motor lead length should NOT EXCEED 328 feet (100 meters), and motor wiring should be run in a separate conduit from the power wiring.

Main Circuit Terminal Functions and Voltages

TERMINAL	FUNCTION	VOLTAGE / SIGNAL LEVEL
L1 (R) L2 (S) L3 (T)	Main circuit input power supply	Three Phase, 230V Drive: 200 / 208 / 220 / 230V at 50/60Hz Three Phase, 460V Drive: 380 / 400 / 415 / 440 / 460V at 50/60Hz
L1 (R) L2 (S)	Main circuit input power supply	Single Phase, 115V Drive: 100 / 115V at 50/60Hz
T1 (U) T2 (V) T3 (W)	Main circuit output	0 - 200 / 208 / 220 / 230V 0 - 380 / 400 / 415 / 440 / 460
MA MB MC	Multi-Func. Relay output – NO contact Multi-Func. Relay output – NC contact Multi-Func. Relay output – common	250Vac, 1A or less (See Note 1) 30Vdc, 1A or less
B1 B2	For connection of braking resistor or braking resistor unit (option)	
⏚	Ground terminal (100 ohms or less)	– – – –

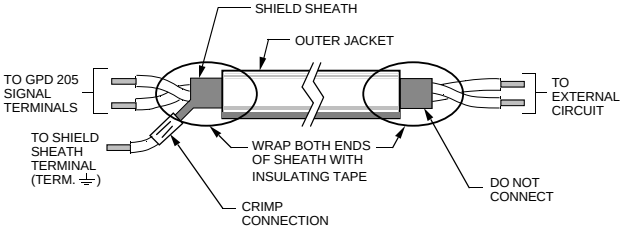
NOTES:

1. Any of 11 functions can be selected for multi-function relay output. See page 32.

1.5.3 Control Circuit. All basic control circuit (signal) connections are shown in the appropriate diagram:

— Figure 1-5 shows connections for external 2-Wire control.
— Figure 1-6 shows connections for external 3-Wire control.

- Use Class 1 twisted shielded or twisted-pair shielded wire, 20-16 AWG (0.5-1.25 mm^2), for control circuit leads. Wire size should be determined considering voltage drop in leads. Connect shield sheath AT THE GPD 205 END ONLY; the far end should be dressed neatly and left unconnected.



- Signal leads must be separated from main circuit leads L1 (R), L2 (S), L3 (T), T1 (U), T2 (V), T3 (W), MA, MB & MC leads, and any other power cables, to prevent erroneous operation caused by noise interference.
- Lead length should NOT EXCEED 164 feet (50 meters).

Control Circuit Terminal Functions

Type		Terminal	Terminal Name	Terminal Function	Signal Level
Input	Sequence (1)	SF	Forward Run/Stop	Forward run when closed, stop when open *(1)*	Photocoupler isolated input; 24VDC 8mA
		SR	Reverse Run/Stop	Reverse run when closed, stop when open *(1)*	
		S1	Multi-function contact input 1	Factory setting is "Fault Reset" *(1)*	
		S2	Multi-function contact input 2	Factory setting is "External Fault (NO contact) input" *(1)*	
		S3	Multi-function contact input 3	Factory setting is "Multi-step Speed Reference 1" *(1)*	
		SC	Sequence common	Common terminal for sequence inputs	
	Frequency Reference	FS	Frequency reference power supply	+15 VDC	
		FR	Frequency reference input	0 to 10 VDC (20 KΩ) or 4 to 20mA (250Ω)	
		FC	Frequency reference input common	0V	
Output		AM	Analog monitor output	Factory setting is "Output frequency" 0-3V = 0-100% *(2)*	0 to 10VDC 2mA or less
		AC	Analog monitor output common	0V	
		PA	Open collector output	Factory setting is "Fault" *(3)*	Photocoupler output; 48VDC 50mA or less
		PC	Open collector output common		

NOTES:

1 These inputs have factory settings based on 2-Wire reset. For 3-Wire reset definitions, see Figure 1-6.

2 Factory setting is for 0-3V = 0-100% frequency. Can be set for 0-10V = 0-100% output current; see page 46.

3 Multi-function open collector output is factory set for "Fault." For other settings, see page 32.

NOTES FOR FIGURE 1-5

■ - Indicates components not supplied.

◎ - Indicates main circuit terminal.

o - Indicates control circuit terminal.

( ) - Indicates alternate terminal marking, i.e. (R) and L1.

1. Insulated twisted shielded wire is required.
   2-conductor #18 GA. (Belden #8760 or equivalent)
   3-conductor #18 GA. (Belden #8770 or equivalent)
   Connect shield only at GPD 205 end (ground terminal ( ) ⏚). Stub and isolate other end.

2. +12V voltage output current capacity of control terminal FS is 20mA max.

3. The GPD 205 does not include overload 1OL; it is a separate item. It may not be required; see page 40. The contact from the separately supplied overload relay should be interlocked with the GPD 205 as shown. It should be the manual reset type to prevent automatic restart following a motor fault and subsequent contact reclosure after cool down. *For Canadian installations, overload 10L is to be provided in accordance with the Canadian Electrical Code, Part 1 and NEC.*

4. Customer to connect ground terminal ( ) to earth ground.

5. If Digital Operator is used, remote operators which duplicate functions of its command keys (see Figure 2-1) may not be required.

6. For installation of Braking Resistor or Braking Resistor Unit, refer to Appendix 3, “Dynamic Braking Option”.

7. If application does not allow reverse operation, constant ***n05***, Reverse Run Prohibit Selection, should be set to “ 1 ” (Reverse Run Disabled) and Reverse Run/Stop input can be eliminated.

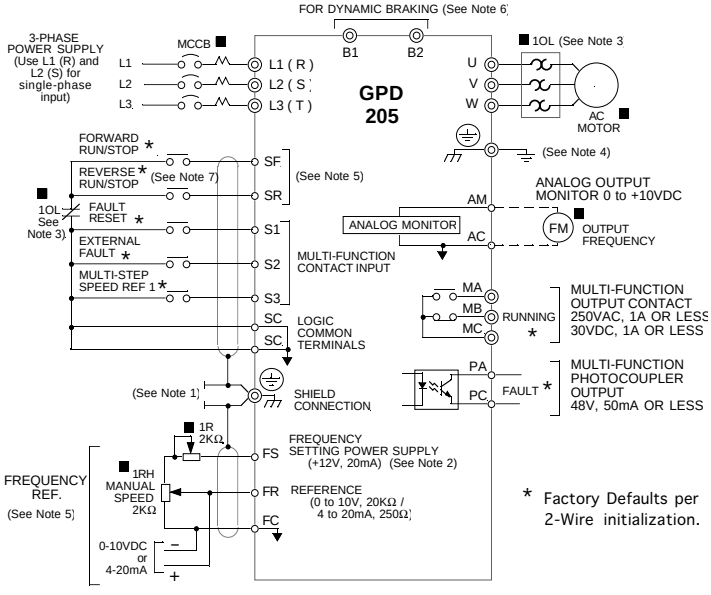


Figure 1-5. Standard Connections (2-Wire Control) (Constant n01 set to " 8 ")

NOTES FOR FIGURE 1-6

■ - Indicates components not supplied.

◎ - Indicates main circuit terminal.

○ - Indicates control circuit terminal.

( ) - Indicates alternate terminal marking, i.e. (R) and L1.

1. Insulated twisted shielded wire is required.
   2-conductor #18 GA. (Belden #8760 or equivalent)
   3-conductor #18 GA. (Belden #8770 or equivalent)
   Connect shield only at GPD 205 end (ground terminal ( ) ⏚ Stub and isolate other end.

2. +12V voltage output current capacity of control terminal FS is 20mA max.

3. The GPD 205 does not include overload 1OL; it is a separate item. It may not be required; see page 40. The contact from the separately supplied overload relay should be interlocked with the GPD 205 as shown. It should be the manual reset type to prevent automatic restart following a motor fault and subsequent contact reclosure after cool down. *For Canadian installations, overload 10L is to be provided in accordance with the Canadian Electrical Code, Part 1 and NEC.*

4. Customer to connect ground terminal ( ) to earth ground.

5. If Digital Operator is used, remote operators which duplicate functions of its command keys (see Figure 2-1) may not be required.

6. For installation of Braking Resistor or Braking Resistor Unit, refer to Appendix 3, “Dynamic Braking Option”.

7. If application does not allow reverse operation, constant ***n05***, Reverse Run Prohibit Selection, should be set to “ 1 ” (Reverse Run Disabled) and Fwd/Rev input can be eliminated.

CAUTION

Constant *n06* must be set to “ 00 ”, AND constant *n01* must be set to “ 9 ”. Resetting drive constant *n01* to “ 8 ” may cause the motor to run in reverse direction WITHOUT A RUN COMMAND, and possibly result in equipment damage or personal injury.

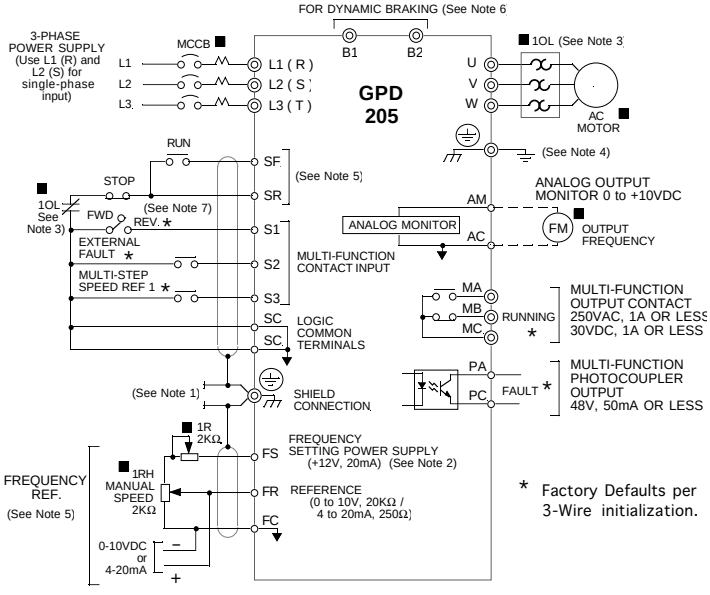


Figure 1-6. Standard Connections (3-Wire Control) (Constant n01 set to " 9 ")

1.5.4 Inspection. After wiring is complete, verify that:

All wiring is correctly installed.
Excess screws and wire clippings are removed from inside of unit.
Screws are securely tightened.
Exposed wire does not contact other wiring or terminals.

CAUTION

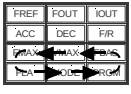
If a FWD or REV run command is given from the control circuit terminal when the operation method selection function (*n02*) is set to " 1 ", " 3 ", or " 5 ", the motor will start automatically as soon as power is applied to the main circuit.

Section 2. START-UP / OPERATION

2.1 TRIAL RUN. The drive will run after receiving a run command. There are two operation modes for the GPD 205:

1) Run command from the Digital Operator.
2) Run command from the control circuit terminal.

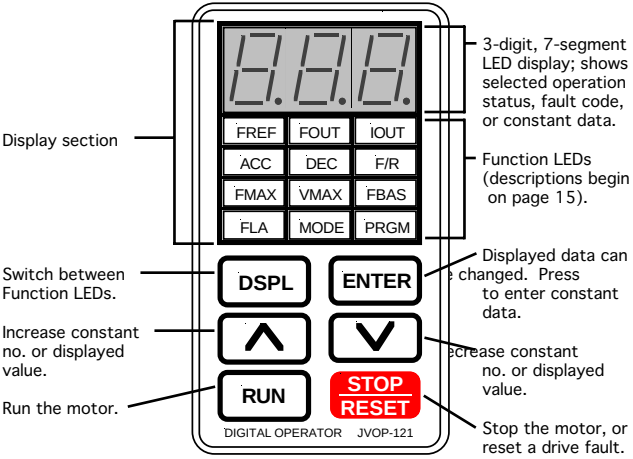
Prior to shipping, the drive is set up to receive a run command and frequency reference from the Digital Operator. See chart below for running the GPD 205 using the Digital Operator. For instructions on using the control circuit terminals, refer to **Constant *n02*** "Operation Mode Selection" on page 23.

Action	Operator Display	Function LEDs Display	Status Indicator LEDs
1) Turn ON input power to the GPD 205. Frequency reference (6.0 Hz) is displayed.	***6.0***	**FREF** lights.	RUN *blinking* ALARM *off* (operation ready)
2) Press the **RUN** key. Drive runs at 6.0 Hz. (The lower 6 Function LEDs turn on and off in a counterclockwise sequence when FWD RUN command is given)	***6.0***	 LED's indicate direction of motor shaft rotation.	RUN *on* ALARM *off* (normal operation)
3) Press the **STOP/RESET** key to stop motor rotation.	***6.0***	**FREF** remains lit.	RUN *blinking* ALARM *off*

Operation checkpoints:

- Motor rotates smoothly.
- Motor rotates in correct direction. (If motor does not rotate in the proper direction, stop the motor and remove power from the GPD 205. Switch motor connections T1 (U) and T2 (V) at the GPD 205 to change direction.
- Motor has no abnormal vibration or noise.
- Acceleration and deceleration are smooth.
- Unit is not overloaded.
- Status indicator LEDs and Digital Operator display are correct.

2.2 DIGITAL OPERATOR DISPLAY. All functions of the GPD 205 are accessed using the Digital Operator. Below are descriptions of the display and keypad functions.



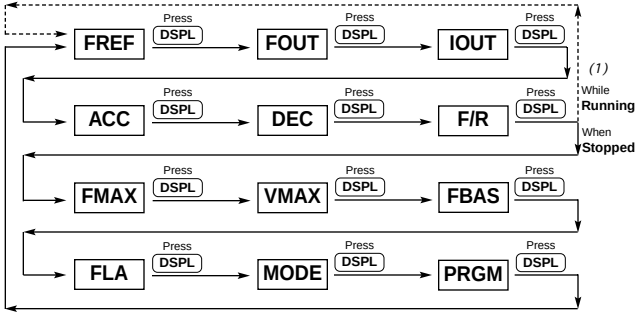
2.3 LED DESCRIPTION.

2.3.1 Description of Status Indicator LEDs. There are two indicator LEDs on the front of the GPD 205, to the right of the Digital Operator. The drive status is indicated by various combinations of ON, Blinking, and OFF conditions of these two LEDs:

	OPERATION READY (during stop)	NORMAL OPERATION
RUN	. . . . . Blinking	. . . . . ON
ALARM	. . . . . OFF	. . . . . OFF

For details of how the status indicator LEDs function during a drive fault, refer to "TROUBLESHOOTING", on page 56.

2.3.1 Description of Function LEDs. By pressing the **DSPL** key on the Digital Operator while the drive is stopped(1), the operator can step to each of the twelve Function LEDs and its associated display/setting function:



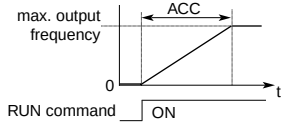
FREF — **Frequency Reference Setting** [constant ***n11***]
Sets the GPD 205 operation speed (Hz) (unless the drive has been programmed to run from external analog speed reference signal).

FOUT — **Output Frequency Monitor**
Displays the output frequency (Hz) that the GPD 205 is operating at. This is a **monitor only** function; the operator cannot change the displayed value.

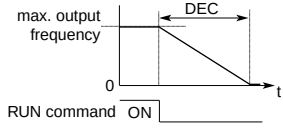
IOUT — **Output Current Monitor**
Displays the level of output current (Amps) that the GPD 205 is currently producing. This is a **monitor only** function; the operator cannot change the displayed value.

(1) While the drive is *running* , only the first 6 (GREEN) function LEDs can be selected by the **DSPL** key.

ACC — **Acceleration Time 1** [constant ***n20***]
Sets the time (seconds) it will take the drive to accelerate the motor from a stopped condition to maximum output frequency (i.e. sets the slope of the accel ramp).



DEC — **Deceleration Time 1** [constant ***n21***]
Sets the time (seconds) it will take the drive to decelerate the motor from maximum output frequency to a stopped condition (i.e. sets the slope of the decel ramp).



F/R — **FWD/REV Run Selection** [constant ***n04***]
Sets the rotation direction of the motor when a Run command is given by the Digital Operator. Display of ***For*** = forward run, ***rEu*** = reverse run. Constant ***n04*** toggles between these two presets; the user cannot enter a value.

FMAX — **Maximum Output Frequency** [constant ***n24***]
Sets the maximum output frequency (Hz) of the drive. (Part of V/f pattern set-up; see page 37.)

VMAX — **Maximum Voltage** [constant ***n25***]
Sets the maximum voltage (V) that can be output from the drive. (Part of V/f pattern set-up; see page 37.)

FBAS — **Maximum Voltage Output Frequency** [constant ***n26***]
Sets the frequency (Hz) at which the maximum output voltage level is reached (base frequency). (Part of V/f pattern set-up; see page 37.)

FLA — **Electronic Thermal Reference Current** [constant ***n31***]
Sets the electronic thermal reference current (Amps) used for detecting motor overload. This is normally set to the motor rated current value (nameplate full-load amps). When set to " 0.0 ", motor overload protection is disabled. The factory settings (i.e. reset defaults) are listed below.

INPUT VOLTS	HORSEPOWER [1]	GPD 333 CONTINUOUS OUTPUT CURRENT 100% RATED AMPS	MOTOR RATED CURRENT - AMPS (CONSTANT n31) FACTORY SETTING
115	1/8	0.8	0.6
	1/4	1.5	1.1
	3/4	3.0	1.9
	1	5.0	3.3
230	1/8	0.8	0.6
	1/4	1.5	1.1
	3/4	3.0	1.9
	1	5.0	3.3
	2	7.0	6.2
460	1/2	1.2	0.6
	3/4	1.8	1.0
	1 & 2	3.4	1.6
	3	4.8	3.1

[1] A standard 4-pole motor is used to determine applicable motor horsepower.

MODE — **Operation Mode Selection** [constant ***n02***]
Selects whether operation is performed from the Digital Operator or control circuit terminals. (See detailed description on page 23.)

PRGM — **Constant Programming**
Selects or reads constant data using constant numbers (*nXX*). Constant data is displayed by pressing the **ENTER** key, and can be changed by pressing the ^ or v keys. Any changes can be saved by again pressing the **ENTER** key. Pressing the **DSPL** key exits from Programming mode.

2.4 BASIC PROGRAMMING. By using the Function LEDs on the Digital Operator, simple programming of the GPD 205 is possible. Following are examples of two methods for setting the acceleration time (***n20***). The first example shows how to utilize the **ACC** Function LED, and the second example shows how to access constant ***n20*** through the **PRGM** Function LED.

Example 1: Using **ACC** LED	Display
• Press the **DSPL** key until the **ACC** led is illuminated.	***10.0***
• To set the acceleration time to 5 seconds, press the ˅ key until the Digital Operator display reads " 5.0 ".	***5.0***
• Press the **ENTER** key.	***5.0***

Example 2: Using **PRGM** LED

• Press **DSPL** key until the **PRGM** LED is illuminated.	***n01***
• Press the ˄key to access constant ***n20***.	***n20***
• Press the **ENTER** key. The current set value is displayed.	***10.0***
• To set the acceleration time to 15 seconds, press the ˄ key until the Digital Operator display reads " 15.0 ".	***15.0***
• Press the **ENTER** key.	***n20***
• Press the **DSPL** key until the **FREF** LED is illuminated.	***0.0***

Section 3. PROGRAMMING FEATURES

3.1 GENERAL. Paragraphs in this section provide descriptions of the GPD 205 features which are defined by programmed settings in memory (see Table 3-1). These feature descriptions, based on 2-Wire factory reset, appear in numerical order by constant number.

3.2 CONSTANT SETTING ERRORS. The display " ***Err*** " will appear on the Digital Operator for one second, then the previously set constant value is displayed, if any of the following conditions exists when the **ENTER** key is pressed while setting a new value for a constant:

1) The set values of input terminal function selections 1, 2 and 3 (***n06***, ***n07***, and ***n08***) are the same.

2) The following conditions are not satisfied when setting the V/f pattern:

   Max. output freq. (***n24***) ≥ Max. voltage output freq. (***n26***) ≥ Mid. output freq. (***n27***) ≥ Min. output freq. (***n29***)

   For details, refer to pages 37-39.

3) The following conditions are not satisfied when setting prohibited frequencies:

   Prohibited frequency 3 (***n58***) ≥ Prohibited frequency 2 (***n57***) ≥ Prohibited frequency 1 (***n56***)

4) Frequency reference lower limit (***n42***) > Frequency reference upper limit (***n41***).

5) Motor rated current (***n31***) > 120% of drive rated current.

Table 3-1. GPD 205 Constants

Constant	Name	Setting Range (and units)	Setting Increment	Factory Setting	Ref. Page
n01	Password / Initialization	0, 1, 8, 9	1	1	23
n02	Operation mode selection	0 - 5	1	0	23
n03	Stopping method selection	0, 1	1	0	26
n04	Forward / Reverse run selection	***For*** (forward), ***rEu*** (reverse)	——	***For***	16
n05	Reverse run prohibit selection	0, 1	1	0	26
n06	Multi-function input selection 1 (terminal S1)	0 - 14	1	1	27
n07	Multi-function input selection 2 (terminal S2)	1 - 14	1	2	
n08	Multi-function input selection 3 (terminal S3)	1 - 15	1	4	
n09	Multi-function output selection 1 (terminals MA & MB)	0 - 10	1	1	32
n10	Multi-function output selection 2 (terminal PA)	0 - 10	1	0	
n11	Frequency reference 1	0.0 - 400 (Hz)	0.1 (less than 100 Hz); 1 (100 Hz or more)	6.0	33
n12	Frequency reference 2			0.0	
n13	Frequency reference 3			0.0	
n14	Frequency reference 4			0.0	
n15	Frequency reference 5			0.0	
n16	Frequency reference 6			0.0	
n17	Frequency reference 7			0.0	
n18	Frequency reference 8			0.0	
n19	Jog frequency reference			6.0	35
n20	Acceleration time 1	0.0 - 999 (sec)	0.1 (less than 100 sec); 1 (100 sec or more)	10.0	36
n21	Deceleration time 1			10.0	
n22	Acceleration time 2			10.0	
n23	Deceleration time 2			10.0	

Table 3-1. GPD 205 Constants - Continued

Constant	Name	Setting Range (and units)	Setting Increment	Factory Setting	Ref. Page
n24	Maximum frequency (Fmax)	50.0 - 400 (Hz)	0.1 (< 100 Hz); 1 (≥ 100 Hz)	60.0	37
n25	Maximum voltage (Vmax)	1 - 255/510 (V) *	1	230/460 *	
n26	Maximum voltage frequency (Fa)	0.6 - 400 (Hz)	0.1 (< 100 Hz);	60.0	
n27	Frequency midpoint (Fb)	0.5 - 399 (Hz)	1 (≥ 100 Hz);	1.5	
n28	Voltage midpoint (Vc)	1 - 255/510 (V) *	1	12/24 *	
n29	Minimum frequency (Fmin)	0.5 - 10.0 (Hz)	0.1	1.5	
n30	Minimum voltage (Vmin)	1 - 50/100 (V) *	1	12/24 *	
n31	Motor rated current	0.0 - 25.5 (A)	0.1	*See Note 1*	40
n32	Electronic thermal motor protection	0 - 4	1	0	40
n33	Stall prevention during deceleration	0, 1	1	0	42
n34	Stall prevention level during acceleration	30 - 200 (%)	1	170	42
n35	Stall prevention level at set speed	30 - 200 (%)	1	160	43
n36	Momentary power loss function selection	0 - 2	1	0	43
n37	Carrier frequency	1 - 6 (x 2.5 kHz)	1	4	44
n38	Automatic torque boost gain	0.0 - 3.0	0.1	1.0	44
n39	Frequency command gain	0.10 - 2.00	0.01	1.00	45
n40	Frequency command bias	–99 - 99 (%)	1	0	
n41	Frequency command upper limit	0 - 110 (%)	1	100	45
n42	Frequency command lower limit	0 - 110 (%)	1	0	
n43	Control circuit terminal FR function	0, 1	1	0	46
n44	Analog monitor selection	0, 1	1	0	46
n45	Analog monitor gain	0.00 - 2.00	0.01	1.00	

* Where two values are given (xx/xx) in Setting Range and Factory Setting, the first is for 115V or 230V drives, and the second is for 460V drives.

Table 3-1. GPD 205 Constants - Continued

Constant	Name	Setting Range (and units)	Setting Increment	Factory Setting	Ref. Page
n46	DC injection braking current	0 - 100 (%)	1	50	47
n47	DC injection braking time at stop	0.0 - 5.0 (sec)	0.1	0.0	
n48	DC injection braking time at start	0.0 - 5.0 (sec)	0.1	0.0	
n49	S-curve accel/decel selection	0 - 3	1	0	48
n50	Overtorque detection	0 - 4	1	0	49
n51	Overtorque detection level	30 - 200 (%)	1	160	
n52	Overtorque detection time	0 - 9.9 (sec)	0.1	0.1	
n53	Frequency detection level	0.0 - 400 (Hz)	0.1 (< 100 Hz); 1 (≥ 100 Hz)	0.0	51
n54	Slip compensation gain	0.0 - 9.9 (%)	0.1	0.0	51
n55	Motor no-load current	0 - 99 (%)	1	40	52
n56	Prohibited frequency 1	0.0 - 400 (Hz)	0.1 (< 100 Hz); 1 (≥ 100 Hz)	0.0	52
n57	Prohibited frequency 2			0.0	
n58	Prohibited frequency 3			0.0	
n59	Prohibited frequency bandwidth	0.0 - 25.5 (Hz)	0.1	1.0	
n60	No. of auto-restart attempts	0 - 10	1	0.0	54
n61	Operator "Stop" key selection	0, 1	1	0	54
n62	Slip compensation delay timer	0.0 - 25.5 (sec)	0.1	2.0	54
n68	Fault record	Stores and displays most recent alarm (not user settable). Cleared by RESET command.			54.1
n69	PROM number	Displays last 3 digits of PROM number: NSP600300 (not user settable).			54.1

NOTES:

1. Initial value depends upon GPD 205 capacity. See page 17.
2. Constants ***n63*** thru ***n67*** are reserved for future use.

3.3 CONSTANT DESCRIPTIONS.

Constant *n01* **Password / Initialization** Factory Setting: 1

The following table describes data which can be set or read when ***n01*** is set.

Setting	Programmable Constants	Accessible Constants
0 (constant setting disabled)	*n01*	*n02* to *n69*
1	*n02* to *n60*	*n01* to *n69*
2 to 7	Not Used	
8	Initialize constants for 2-Wire sequence	
9	initialize constants for 3-Wire sequence	

NOTE: When either " 8 " or " 9 " is entered (initialization settings), the definitions of inputs at terminals SF and SR are changed. Constants ***n06***, ***n07***, and ***n08*** (Multi-function Input – Terminal S1, S2 & S3) settings are also changed, according to the requirements of the control configuration (see Figures 1-5 and 1-6). All other constants are returned to FACTORY SETTINGS; constant ***n01*** setting then returns to " 1 ".

Constant *n02* **Operation Mode Selection** Factory Setting: 0

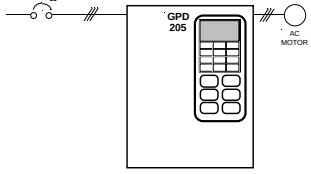
The setting of ***n02*** determines where the run command and speed reference will be accepted.

Setting	Run/Stop Command From:	Speed Reference From:
0	Digital Operator	Digital Operator
1	External terminal	Digital Operator
2	Digital Operator	External terminal (Voltage input)
3	External terminal	External terminal (Voltage input)
4	Digital Operator	External terminal (Current input)
5	External terminal	External terminal (Current input)

On the next two pages are illustrations of control input required by each ***n02*** setting.

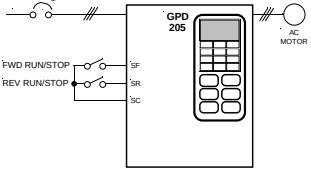
- **Digital Operator Reference Input:**

Setting 0 :



- RUN/STOP command and frequency reference are from the Digital Operator. Use the **F/R** LED to alternate between FWD and REV run.

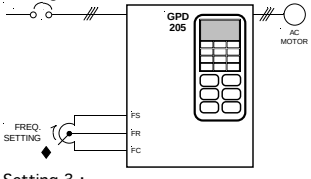
Setting 1 :



- Use Digital Operator to set the frequency reference.
- Use switches connected to the control circuit terminals to alternate between FWD RUN/STOP and REV RUN/STOP.

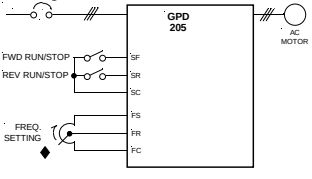
- **Voltage Reference Input:**

Setting 2 :



- Use Digital Operator to give RUN/STOP command. Use the **F/R** LED to alternate between FWD and REV run.
- Set frequency with analog voltage signal [0-100% (max. frequency)/0-10V] at the control circuit terminal FR.

Setting 3 :



- Use switches connected to the control circuit terminals to alternate between FWD RUN/STOP and REV RUN/STOP.
- Set frequency with analog voltage signal [0-100% (max. frequency)/0-10V] at the control circuit terminal FR.

♦ When using a frequency setting potentiometer, reference will be at 100% of max. frequency at a rotation of 83% CW. For 100% reference at a rotation of 100%, set constant ***n39*** (Frequency command gain) to approximately " 0.83 ".

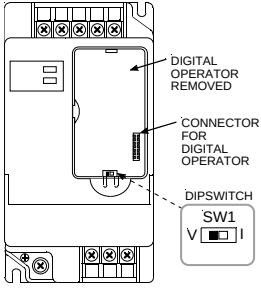
- **Current Reference Input:**

CAUTION

Do not remove the Digital Operator to access the dipswitch unless the input power to the drive has been turned OFF.

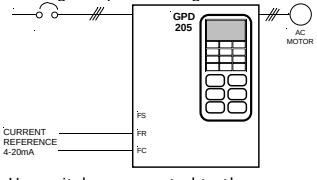
When setting frequency by current reference (4-20mA) from the control circuit terminal FR, move dipswitch SW1 on the printed circuit board to the " I " position. SW1 is accessed by removing the Digital Operator.

After switching SW1, set the MODE Function LED to " 4 " or " 5 ".



Setting 4 :

- Use Digital Operator to give

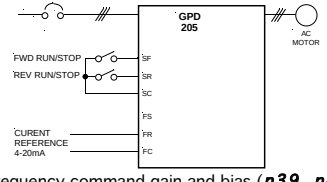


RUN/STOP command. Use the **F/R** LED to alternate between FWD and REV run.

- Set frequency with analog current signal (0-100% of max. frequency = 4-20mA) at control circuit terminal FR.

Setting 5 :

- Use switches connected to the



control circuit terminals to alternate between FWD RUN/STOP and REV RUN/STOP.

- Set frequency with analog current signal (0-100% of max. frequency = 4-20mA) at control circuit terminal FR.

Frequency command gain and bias (***n39*** , ***n40***) can be set even when current reference input is selected. For details, refer to page 45.

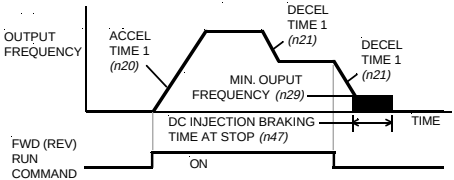
Constant *n03* **Stopping Method** Factory Setting: 1

This constant allows the user to select the stopping method when a stop command is issued.

Setting	Description
0	Deceleration to a stop
1	Coast to stop

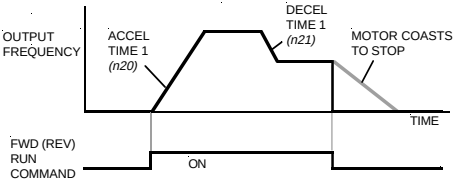
- **Deceleration (ramp) to a stop**

Example when accel/decel time 1 is selected.



- **Coast to stop**

Example when accel/decel time 1 is selected.



Constant *n05* **Reverse Run Prohibit Selection** Factory Setting: 0

A "Reverse run disabled" setting prohibits the drive from accepting a reverse run command from either the control circuit terminals or the Digital Operator.

Setting	Function
0	Reverse run enabled
1	Reverse run disabled

Constant	Multi-function Input Selection	Terminal	Factory Settings 2-Wire	3-Wire	
n06	**1**	**S1**		1	0
n07	**2**	**S2**		2	2
n08	**3**	**S3**		4	4

Inputs to these three terminals are defined by these constants. When a terminal is closed to sequence common (terminal SC), the selected function is enabled.
To disable the function, the input must be opened.

IMPORTANT

- No two of the above constants can have the same setting value entered.
- Constants ***n06*** and ***n07*** cannot be set to " 15 ".
- When constant ***n08*** is set to " 15 " (Up/Down), terminal S2 becomes the UP command input and terminal S3 becomes the DOWN command input, regardless of the previous setting in constant ***n07***.

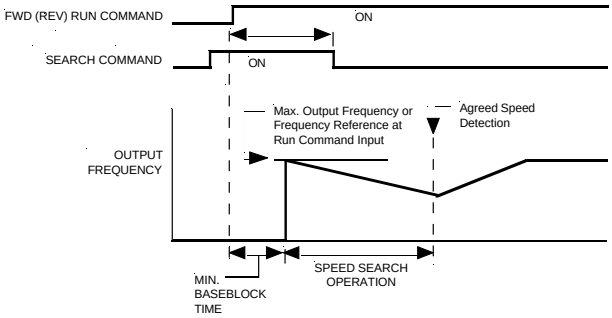
Setting	Function	Notes
0	Fwd/Rev Select Command; Open = Fwd; Closed = Rev (for **3-Wire** control)	Can only be entered in ***n06***
1	Fault Reset	
2	External Fault (NO contact input)	Drive stops, Digital Operator displays " ***EF_*** " (1, 2, or 3 as third digit), corresponding to input at S1, S2, or S3
3	External Fault (NC contact input)	
4	Multi-step Speed Ref 1	See page 34
5	Multi-step Speed Ref 2	
6	Multi-step Speed Ref 3	
7	Jog	Changes frequency reference to value set in ***n19***. See page 35
8	Accel/Decel Time Change	See page 36
9	External Baseblock (NO contact input)	Motor coasts to stop while contact is closed (open). Digital Operator displays " ***bb*** "
10	External Baseblock (NC contact input)	
11	Speed Search from max frequency	See page 28
12	Speed Search from set frequency	
13	Accel/Decel Hold	See page 28
14	Local/Remote	See page 29
15	Up/Down Function	See page 30

- **Speed Search (setting: " 11 " or " 12 ")**

This function allows the restart of a coasting motor without the necessity to first stop the motor rotation. It is useful during drive bypass operation, when switching between the motor receiving power directly from the line and from the drive.

The FWD (REV) run command must be input at the same time as the search command, or within 0.5 sec. after the search command. If the run command is input before the search command, the search command is disabled.

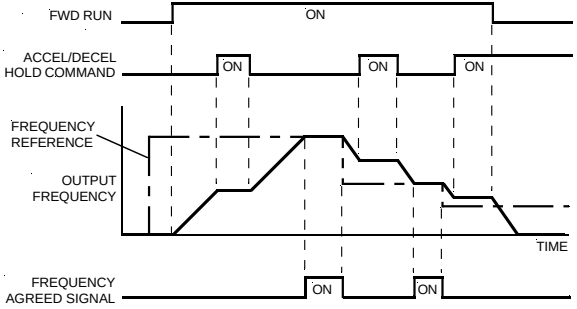
Time chart at Search Command input:



- **Accel/Decel Hold (setting: " 13 ")**

To temporarily hold acceleration or deceleration, input an Accel/Decel Hold Command. The output frequency is maintained during acceleration or deceleration while the Accel/Decel Hold Command is input. The stop command releases the accel/decel hold and operation ramps to a stop.

Time chart for Accel/Decel Hold Command input:



NOTE: When the FWD (REV) run command is input along with the Accel/Decel Hold Command, the motor does not operate (holds at zero speed). However, when the frequency reference lower limit (***n42***) is set greater than or equal to the minimum output frequency (***n29***), the motor operates at the frequency reference lower limit.

- **Local/Remote selection (setting: " 14 ")**

Selects whether an operation reference is received from the Digital Operator or the control circuit terminal.

Local/Remote selection is possible only when the drive is stopped.

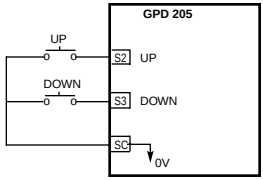
Open : Run according to the setting of Operation Mode Selection (***n02***).
Closed : Run by frequency reference and run command from the Digital Operator.

Example: Set ***n02*** to " 3 " or " 5 ".

Open : Run by frequency reference from control circuit terminal FR and Run command from control circuit terminals SR and SF.
Closed : Run by frequency reference and Run command from the Digital Operator.

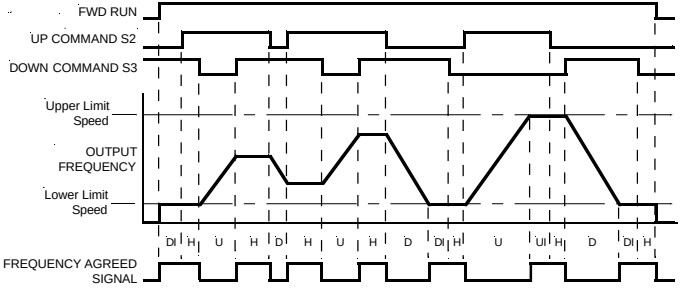
- **Up/Down Command (setting: *n08* = " 15 ")**

With the FWD (or REV) Run command entered, accel/decel is enabled by inputting the UP or DOWN signals to control circuit terminals S2 and S3 without changing the frequency reference, so that operation can be performed at the desired speed.



Input Signal		Function
UP (S2)	DOWN (S3)	
Open	Open	HOLD
Closed	Open	UP (Frequency command approaches frequency command upper limit)
Open	Closed	DOWN (Frequency command approaches minimum output frequency or frequency command lower limit, whichever is larger)
Closed	Closed	HOLD

Time Chart at Up/Down Command Input:



U : Up (accelerating) status
D : Down (decelerating) status
H : Hold (constant speed) status
Ul : Up status, with clamping at upper limit speed
Dl : Down status, with clamping at lower limit speed

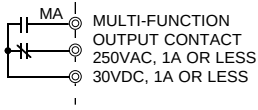
Notes:

1) When Up/Down command is selected, the upper limit speed is set regardless of frequency reference.
   Upper limit speed = (maximum output frequency x frequency reference upper limit)/100
   (***n24***) (***n41***)
2) The lower limit value is either the minimum output frequency (***n29***) or the frequency reference lower limit (***n42***), whichever is greater.
3) When FWD (REV) Run command is input, operation starts at the lower limit speed without an Up/Down command.
4) If the Jog command is input while the drive is running by the Up/Down command, the Jog command has priority.

Constant *n09* **Multi-function Output Selection 1 (Terminals MA & MB)** Factory Setting: 1

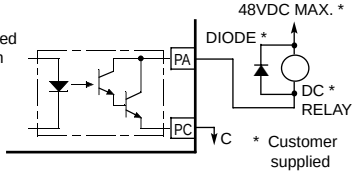
Constant *n10* **Multi-function Output Selection 2 (Terminal PA)** Factory Setting: 0

This relay can be programmed to change state upon any of the conditions listed below. Relay contacts are Form-C.



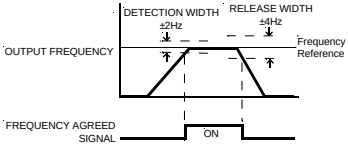
The open collector output will switch low (with respect to terminal PC, common) when the selected condition is met.

Recommended Configuration for DC Relay

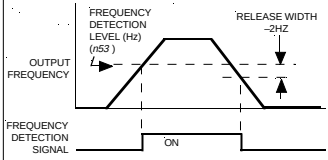


Setting	Function — Activated During:
0	Fault output
1	Run
2	Speed agree (at set frequency) (see next page)
3	Zero speed (< Fmin)
4	Frequency detection (output frequency ≥ constant ***n53*** setting) (see next page)
5	Frequency detection (output frequency ≤ constant ***n53*** setting)
6	Overtorque detection
7	Baseblock
8	Undervoltage (UV)
9	Speed search
10	Local operating mode (selected by Local/Remote input to multi-function input terminal – see setting " 14 " on page 27)

- **Speed at Set Frequency (setting: *n09* or *n10* = " 2 ")**



- **Frequency Detection (setting: *n09* or *n10* = " 4 ")**



Constant *n11* **Frequency Reference 1**
Constant *n12* **Frequency Reference 2**

Constant *n13* **Frequency Reference 3**
Constant *n14* **Frequency Reference 4**

Constant *n15* **Frequency Reference 5**
Constant *n16* **Frequency Reference 6**

Constant *n17* **Frequency Reference 7**
Constant *n18* **Frequency Reference 8**

Range (each): 0.0 - 400 (Hz)

Factory Setting: ***n11*** - 6.0; all others - 0.0

In order to use multi-step speed presets, constants ***n06***, ***n07***, & ***n08*** must be programmed accordingly for 2-Wire or 3-Wire control. (Constant ***n02*** must be set to " 1 ".)

To use the maximum of 8 preset speeds (in 2-Wire control only), constant ***n06*** must be set to " 4 " (Multi-step Speed Ref 1), constant ***n07*** must be set to " 5 " (Multi-step Speed Ref 2), and constant ***n08*** must be set to " 6 " (Multi-step Speed Ref 3).

(Description continued on next page)

Multi-step (8 speed presets) in 2-Wire Control

Constant and Name	External Terminal		
	S3	S2	S1
n11 Frequency Ref 1	0	0	0
n12 Frequency Ref 2	0	0	1
n13 Frequency Ref 3	0	1	0
n14 Frequency Ref 4	0	1	1
n15 Frequency Ref 5	1	0	0
n16 Frequency Ref 6	1	0	1
n17 Frequency Ref 7	1	1	0
n18 Frequency Ref 8	1	1	1

1 = Closed (ref terminal SC)
0 = Open (ref terminal SC)

For 3-Wire control, constant ***n06*** must be set to " 0 " (FWD/REV). Therefore, a maximum of 4 preset speeds can be used, if constant ***n07*** is set to " 4 " (Multi-step Speed Ref 1) and constant ***n08*** is set to " 5 " (Multi-step Speed Ref 2).

NOTE: Any values set into constants ***n15*** - ***n18*** cannot be used for multi-step speed operation when the drive is programmed and wired for 3-Wire control.

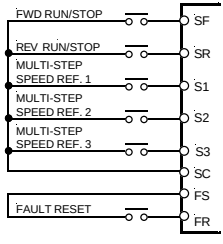
Multi-step (4 speed presets) in 3-Wire Control

Constant and Name	External Terminal	
	S3	S2
n11 Frequency Ref 1	0	0
n12 Frequency Ref 2	0	1
n13 Frequency Ref 3	1	0
n14 Frequency Ref 4	1	1

1 = Closed (ref terminal SC)
0 = Open (ref terminal SC)

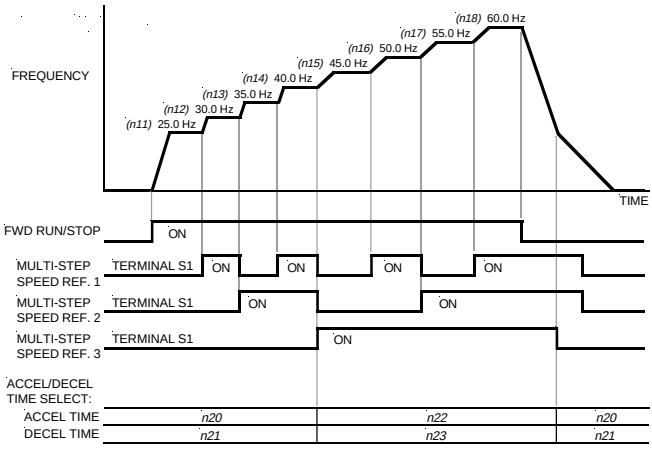
Example: 8-step Speed Selection in 2-Wire Control

n02 = 1 (Operation mode selection)
n11 = 25.0 (Hz)
n12 = 30.0 (Hz)
n13 = 35.0 (Hz)
n14 = 40.0 (Hz)
n15 = 45.0 (Hz)
n16 = 50.0 (Hz)
n17 = 55.0 (Hz)
n18 = 60.0 (Hz)
n06 = 4 (Multi-function contact input terminal)
n07 = 5 (Multi-function contact input terminal)
n08 = 6 (Multi-function contact input terminal)
n43 = 1 (Terminal FR function selection)



Note: When ***n02*** is set to " 2 ", " 3 ", " 4 " or " 5 ", frequency reference 1 (***n11***) becomes disabled. To output a reference from control circuit terminal FR, set ***n43*** to " 0 " (see page 46).

Time chart for Multi-step Speed operation:



Multi-step speed reference 3 is used together with the accel/decel time selection. When multi-step speed reference 3 is turned OFF, accel/decel time 1 (***n20*** , ***n21***) is selected. When it is turned ON, accel/decel time 2 (***n22*** , ***n23***) is selected.

Constant ***n19*** **Jog Frequency Reference** Factory Setting: 6.0
Range: 0.0 - 400 (Hz)

This constant determines the speed at which the drive will run the motor when the momentary Jog input (see setting " 7 " for multi-function input terminals, on page 27) is applied to the drive. Usually set to a low output frequency level, this setting is used for jogging the driven machine, an operation primarily used during set-up.

Constant Accel Time 1 ***n20***

Constant Decel Time 1 ***n21***

Range (each): 0.0 - 999 (seconds)

Factory Setting (each): 10.0

These two constants set the normal accel and decel times required for the GPD 205 output to ramp from Fmin to Fmax or from Fmax to Fmin, respectively. For settings of less than 100 seconds, the value can be set in increments of 0.1 second. For settings of 100 seconds or more, the increment is 1 second.

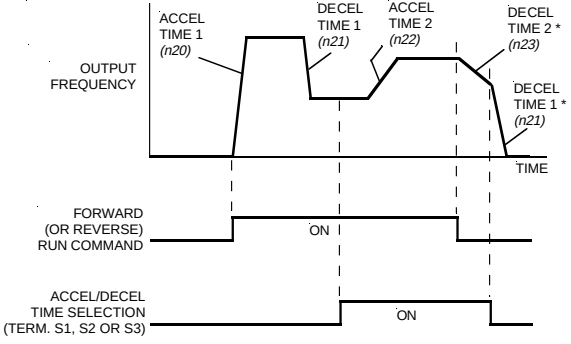
Constant Accel Time 2 ***n22***

Constant Decel Time 3 ***n23***

Range (each): 0.0 - 999 (seconds)

Factory Setting (each): 10.0

If a multi-function input terminal (S1, S2, or S3) is programmed for Accel/Decel Time Select (see setting " 8 " on page 27), the GPD 205 uses the settings in *these* two constants as its accel and decel times when that input is closed. Setting increments are the same as for ***n20*** & ***n21*** .



* When "Ramp to stop" is selected (***n03*** = " 0 ").

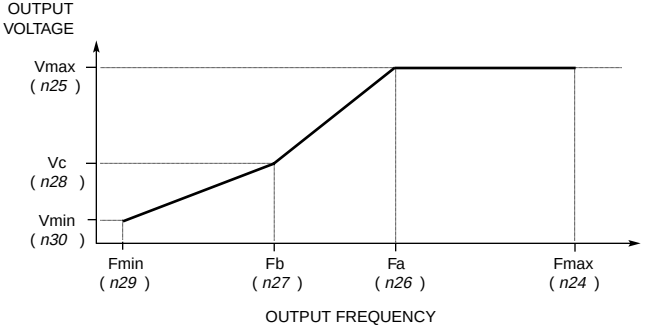
NOTE: When multi-step speed operation is used (see pages 33-35), a closed Multi-step Speed Ref 3 signal input will also select these accel/decel settings.

Constants
n24
thru
n30

These constants define the V/f pattern, and are related to each other as shown in the following table and illustration.

Constant	Name	Setting Range (and units)	Factory Setting
n24	Maximum Frequency (Fmax)	50.0 - 400 (Hz)	60.0
n25	Maximum Voltage (Vmax)	1 - 255/510 (V) *	230/460 *
n26	Maximum Voltage Frequency (Fa)	0.6 - 400 (Hz)	60.0
n27	Frequency Midpoint (Fb)	0.5 - 399 (Hz)	1.5
n28	Voltage Midpoint (Vc)	1 - 255/510 (V) *	12/24 *
n29	Minimum Frequency (Fmin)	0.5 - 10.0 (Hz)	1.5
n30	Minimum Voltage (Vmin)	1 - 50/100 (V) *	12/24 *

* Where two values appear, the first is for 115V and 230V drives, and the second for 460V drives.



To establish a V/f pattern with a straight line from Fmin to Fa, set Fb = Fmin and Vc = Vmin.

IMPORTANT

When entering a setting for one of these constants, an " ***Err*** " fault will occur if any part of the following relationship is NOT TRUE:

Fmax (***n24***) ≥ Fa (***n26***) ≥ Fb (***n27***) ≥ Fmin (***n29***)

The Digital Operator will flash " ***Err*** ", then the display will blink the previous setting of the constant.

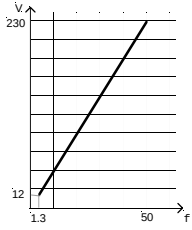
- **Examples of V/f Pattern Setting**

Set the V/f pattern according to the applications described below. When running at a frequency exceeding 50/60 Hz, change the maximum output frequency (***n24***).

NOTE: Be sure to set the maximum output frequency according to the motor characteristics.

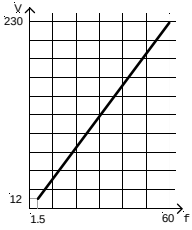
1) General-purpose applications

50 Hz



Constant	Setting
n24	50.0
n25	230.0
n26	50.0
n27	1.3
n28	12.0
n29	1.3
n30	12.0

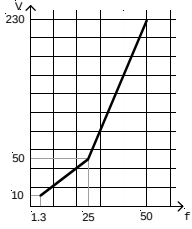
60 Hz [Factory Settings]



Constant	Setting
n24	60.0
n25	230.0
n26	60.0
n27	1.5
n28	12.0
n29	1.5
n30	12.0

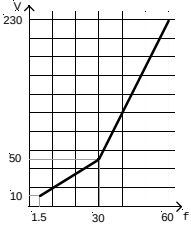
2) Fans/pumps

50 Hz



Constant	Setting
n24	50.0
n25	230.0
n26	50.0
n27	25.0
n28	50.0
n29	1.3
n30	10.0

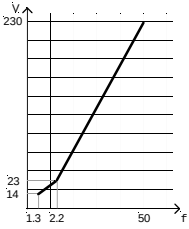
60 Hz



Constant	Setting
n24	60.0
n25	230.0
n26	60.0
n27	30.0
n28	50.0
n29	1.5
n30	10.0

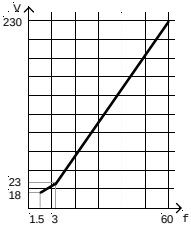
3) Applications requiring high starting torque

50 Hz



Constant	Setting
n24	50.0
n25	230.0
n26	50.0
n27	2.2
n28	23.0
n29	1.3
n30	14.0

60 Hz



Constant	Setting
n24	60.0
n25	230.0
n26	60.0
n27	3.0
n28	23.0
n29	1.5
n30	18.0

Increasing the voltage of the V/f pattern increases motor torque, but an excessive increase may cause motor overexcitation, overheating or excessive vibration.

NOTE: Voltages shown are for 230V motors; for other motor voltages, multiply all voltage (V) values by (Vmtr/230). i.e., for a 460V motor, multiply by 460/230 = 2.

Constant *n31* **Motor Rated Current** Range: 0.0 - 25.5 (Amps)
Factory setting: see pg. 17

This constant should be set to the actual rated current value shown on the motor nameplate. Make sure that the motor rated current is **less than or equal to** the drive rated current shown in Appendix 1.

NOTE: Setting ***n31*** to " 0.0 " disables the motor overload protection function, regardless of the setting of ***n32*** .

Constant *n32* **Electronic Thermal Motor Protection** Factory Setting: 0

Setting	Electronic Thermal Characteristics
0	General-purpose motor, standard rating (8 min.)
1	General-purpose motor, short-term rating (5 min.)
2	Blower-cooled motor, standard rating (8 min.)
3	Blower-cooled motor, short-term rating (5 min.)
4	Electronic thermal overload protection disabled

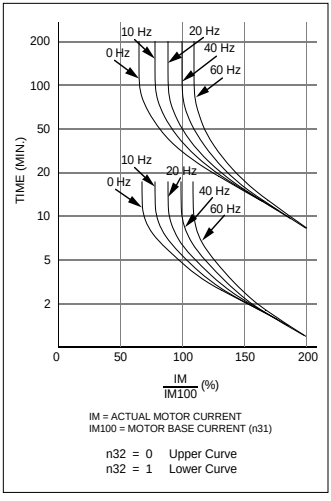
The GPD 205 protects against motor overload with a UL-recognized, built-in electronic thermal overload relay.

The electronic thermal overload function monitors motor temperature, based on drive output current and time, to protect the motor from overheating. When the electronic thermal overload trips, an " ***oL1*** " error occurs, shutting OFF the drive output and preventing excessive overheating in the motor. When operating with one drive connected to only one motor, an external thermal relay is not needed. When operating several motors with one drive, install a thermal overload relay on each motor.

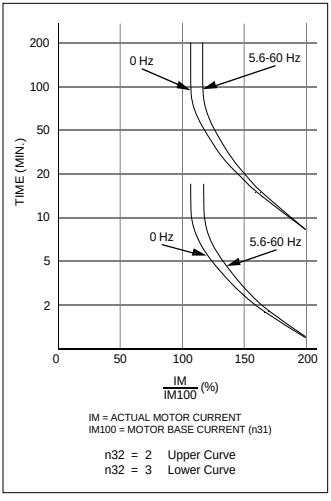
- **General-purpose and blower-cooled motors**

Induction motors are classified as general-purpose or blower-cooled motors, based on their cooling capabilities; the motor overload detection function operates differently, as shown, for each of these two motor types.

Electronic Thermal Motor Protection



Electronic Thermal Motor Protection Characteristics For General-Purpose Motor

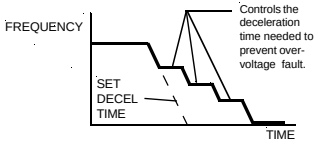


Electronic Thermal Motor Protection Characteristics For Blower-Cooled Motor

Constant *n33* Stall Prevention During Deceleration Factory Setting: 0

Setting	Function
0	Stall prevention during deceleration enabled
1	Stall prevention during deceleration disabled (braking resistor connected)

Stall prevention during deceleration automatically adjusts the deceleration rate while monitoring the DC bus voltage to prevent overvoltage during deceleration. This constant must be set to " 1 " when connecting dynamic braking (DB) resistor(s).

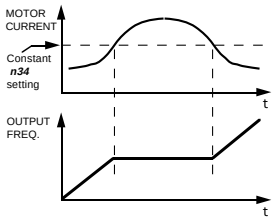


When the motor load is large or decel time is short, actual decel time may be longer than the set value because of the stall prevention function.

Constant *n34* Stall Prevention Level During Acceleration Range: 30 - 200 (%) Factory Setting: 170

This constant determines the actual stall prevention level during an acceleration condition. Set in percent of GPD 205 output current level during an acceleration condition. Set in percent of GPD 205 rated output current (see Appendix 1).

A setting of " 200 " disables stall prevention during acceleration. During acceleration, if the output current exceeds the value in ***n34*** , acceleration stops and frequency is maintained. When the output current goes below the value set in ***n34*** , acceleration resumes.



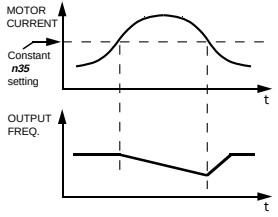
In the constant horsepower region [actual output frequency ≥ max. voltage frequency (***n26***)], the stall prevention level during acceleration is changed by the following formula:

$$\text{Stall prevention level during accel (constant horsepower)} = \text{Stall prevention level during accel} \times \frac{\text{Max. voltage frequency}}{\text{Actual output frequency}}$$

Constant *n35* **Stall Prevention Level At Set Speed** Range: 30 - 200 (%) Factory Setting: 160

This constant determines the actual GPD 205 output current level while operating at set speed (frequency). Set in percent of GPD 205 rated output current (see Appendix 1).

A setting of " 200 " disables stall prevention at set speed. During running at set speed, if the output current exceeds the value set in ***n35*** , the drive will begin to decelerate. When the output current goes below the value set in ***n35*** , acceleration begins, up to the set frequency.



Constant *n36* **Momentary Power Loss Function Selection** Factory Setting: 0

This constant determines how the momentary power loss ride-thru function of the GPD 205 will operate.

Setting	Function
0	Operation during momentary power loss disabled
1	Operation during momentary power loss enabled — 0.5 sec. power loss ride-thru (" ***Uu*** " displayed during power loss)
2	Operation during momentary power loss enabled — indefinite power loss ride-thru, provided control power is maintained (" ***Uu*** " displayed during power loss; no fault signal is output at control circuit terminals MA & MB or PA)

Constant *n37* Carrier Frequency

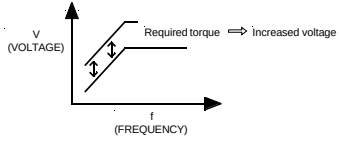
Range: 1 - 6 (x 2.5 kHz)
Factory Setting: 4

The user can select a lower carrier frequency, depending on allowable operating noise levels for the application. Adjusts in increments of 2.5 kHz (set value x 2.5 kHz = carrier frequency).

Setting	Carrier Frequency (kHz):
1	2.5
2	5.0
3	7.5
4	10.0
5	12.5
6	15.0

Constant *n38* Automatic Torque Boost Gain

Range: 0.0 - 3.0
Factory Setting: 1.70



Sets the torque compensation, in increments of 0.1. When the motor has the same capacity as that of the GPD 205, the gain is 1.0. When a smaller motor is used, the gain should be set to 1.5 (typical). When the wiring distance between the drive and the motor is long, or when the motor generates vibration, change the automatic torque boost gain, and set the V/f pattern (***n24*** to ***n30***). Except for the most demanding of high torque applications, the factory setting of this constant will be adequate. The factory setting in programmed to match the performance characteristics of typical AC motors,

Motor torque can be adjusted either by changing the V/f pattern or by using full-range automatic torque boost. For details on setting the V/f pattern, see pages 37-39. Full-range automatic torque boost adjusts the voltage of the V/f pattern according to the required torque, which changes with load conditions. The GPD 205 automatically adjusts the voltage during constant-speed operation as well as during acceleration.

The required torque is calculated by the drive.

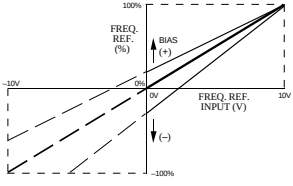
Output voltage $\propto$ Automatic torque boost gain x Required torque

Constant *n39* **Frequency Command Gain** Range: 0.1 - 2.00
Factory Setting: 1.00

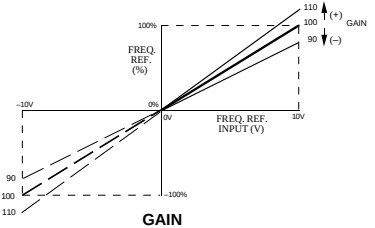
Sets the external Frequency Reference gain, in increments of 0.01.

Constant *n40* **Frequency Command Bias** Range: –99 - 99 (%)
Factory Setting: 0

Sets the external Frequency Reference bias, in increments of 1% (setting of ***n24*** [Maximum Output Frequency] = 100%).



BIAS



GAIN

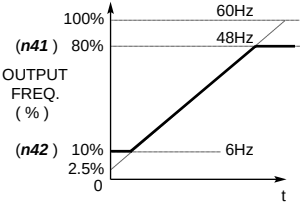
Constant *n41* **Frequency Command Upper Limit** Range: 0 - 100 (%)
Factory Setting: 100

Sets the External Speed Frequency Reference gain, in increments of 0.01.

Constant *n42* **Frequency Command Lower Limit** Range: 0 - 100 (%)
Factory Setting: 0

These two constants set the range for the frequency command signal. Each is set as a percentage of maximum frequency (Fmax) as established by constant ***n24*** (see page 37). All references are affected by the upper and lower limits.

Example:
Constant *n24* = 60 (Hz) (100%)
Constant *n41* = 80 (%) = 48 Hz
Constant *n42* = 10 (%) = 6 Hz



Constant *n43* **Control Circuit Terminal FR Function** Range: 0, 1
Factory Setting: 0

This constant sets the function of control circuit terminal FR.

Setting	Function
0	External frequency reference signal input (0-10 VDC or 4-20mA) ref terminal FC
1	External fault reset signal input (when shorted to terminal FS, drive performs fault reset)

Constant *n44* **Analog Monitor Selection** Factory Setting: 0

This constant establishes which output parameter will be applied to the Analog Monitor Output at terminals AM & AC. The Analog Monitor output is a 0-3 VDC signal, proportional to the output parameter selected.

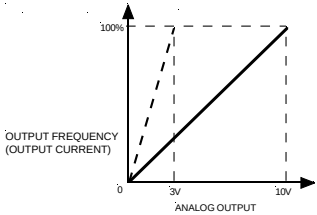
Setting	Function
0	Output frequency
1	Output current

Constant *n45* **Analog Monitor Gain** Range: 0.0 - 2.00
Factory Setting: 1.00

This constant calibrates the output signal for the external metering circuit.

At the factory setting, an analog voltage of approximately 10V is output when the output frequency (or output current) is 100%. Use the following formula to calculate the proper value of ***n45*** :

$$n45 \text{ setting} = \frac{\text{Desired output voltage at 100\% of Fmax}}{10V}$$



Example:
For 3V output at 100%,
set ***n45*** to " 0.30 "

Constant *n46* **DC Injection Braking Current** Range: 0 - 100 (%) Factory Setting: 50

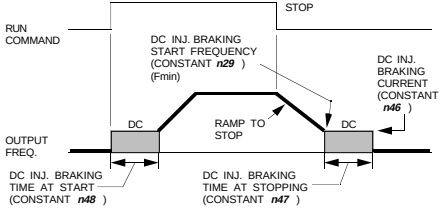
Limits the DC current level (drive rated current = 100%) that the GPD 205 produces during DC injection braking. Time and current level must be set to provide adequate stopping without excessive motor heating.

Constant *n47* **DC Injection Braking Time At Stop** Range: 0.0 - 5.0 (seconds) Factory Setting: 0.0

Sets the time, in increments of 0.1 second, during which DC injection braking current is applied after ramp to stop. This time starts when output frequency reaches Fmin (constant ***n29***). If set to zero, then operation is coast to stop after Fmin. This function is disabled if coast to stop is enabled in constant ***n03*** .

Constant *n48* **DC Injection Braking Time At Start** Range: 0.0 - 5.0 (seconds) Factory Setting: 0.0

Sets the time, in increments of 0.1 second, during which DC injection braking current is applied at starting (by inputting a Forward or Reverse run command). When set to zero, acceleration begins immediately with the minimum output frequency.



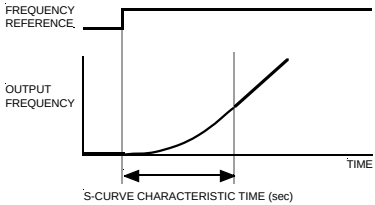
Constant *n49* **S-Curve Accel/Decel Selection** Factory Setting: 0

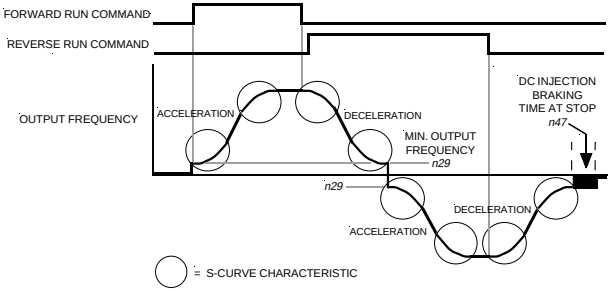
An S-curve pattern is used to reduce shock and provide smooth transitions during machine acceleration and deceleration.

Setting	Description
0	S-Curve not provided
1	S-Curve for 0.2 seconds
2	S-Curve for 0.5 seconds
3	S-Curve for 1.0 seconds

NOTE: S-curve characteristic time is the time from current frequency to the regular rate determined by the set accel/decel time.

The following figure shows FWD/REV run switching and acceleration & deceleration to a stop with S-curve active.





Constant n50 Overtorque Detection Factory Setting: 0

This constant determines whether the overtorque detection function of the GPD 205 is enabled, under what conditions it will detect for overtorque, and what operation it will perform after detecting an overtorque.

Setting	Overtorque Detection	Detection Condition	Operation After Detection
0	Disabled	——	——
1	Enabled	Only at set frequency	Continues
2	Enabled	Only at set frequency	Coast to stop
3	Enabled	At all times except during stopping or DC injection braking	Continues
4	Enabled	At all times except during stopping or DC injection braking	Coast to stop

- For overtorque detection during accel or decel, set to " 3 " or " 4 ".
- For continuous operation after overtorque detection, set to " 1 " or " 3 ". During detection, the Digital Operator displays and " ***oL3*** " alarm (blinking).
- To stop the drive at an overtorque detection fault, set to " 2 " or " 4 ". At detection, the Digital Operator displays an " ***oL3*** " fault.
- To output an overtorque detection signal, set output terminal function selection (***n09*** or ***n10***) to " 6 ".

Overtorque detection compares GPD 205 actual output current with the overtorque detection level. When the output current is equal to or greater than the detection level, an overtorque condition exists. This will be indicated as on " ***oL3*** " fault or warning on the Digital Operator, or an equivalent indication on the Status Indicator LEDs. (The detection level is a percent of GPD 205 rated output current; see Appendix 1.)

Constant n51 Overtorque Detection Level Range: 30 - 200 (%) Factory Setting: 160

This is the reference point for determining that an overtorque condition exists. Set as a percent of GPD 205 rated current (see Appendix 1).

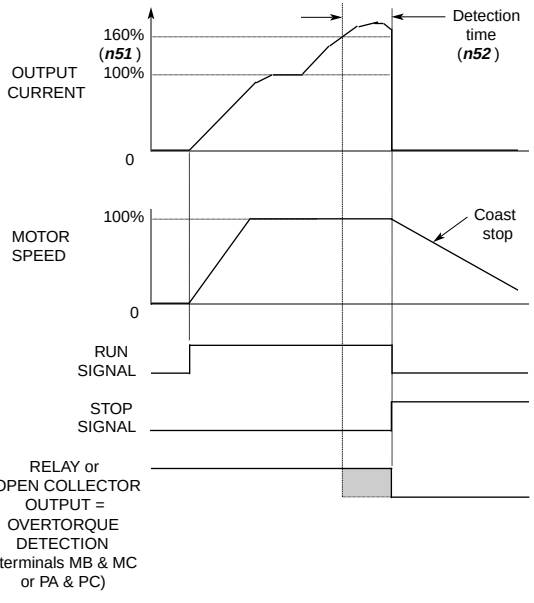
Constant n52 Overtorque Detection Time Range: 0.1 - 9.9 (seconds) Factory Setting: 0.1

Determines how long an overtorque condition must exist before another event will occur, i.e. coast stop, multi-function output change of state, or ***oL3*** warning or fault display.

(See Overtorque Detection Timing Diagram on next page.)

Example:

Constant ***n09*** or ***n10*** = 6 (see page 31)
Constant ***n50*** = 2 (Overtorque enabled, only at set frequency, coast to stop)
Constant ***n51*** = 160 (%)
Constant ***n52*** = 1.0 (second)



Overtorque Detection Timing Diagram

Constant n53 Frequency Detection Level Range: 0.0 - 400 (Hz)
Factory Setting: 0.0

Establishes the frequency level used as a reference when programming a multi-function output terminal or contact to change state at Frequency Detection (see page 32).

Constant n54 Slip Compensation Gain Range: 0.0 - 9.9 (%)
Factory Setting: 0.0

As load increases, the motor slip value increases and motor speed decreases. The slip compensation function maintains motor speed even if load varies. When drive output current is equal to motor rated current (***n31***), the slip compensation frequency is added to the output frequency.

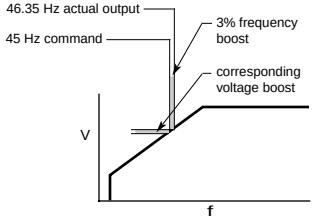
This constant sets the slip compensation gain, in increments of 0.1%. When the gain is " 1.0 ", the output frequency is increased by 1% of the ***n26*** (Maximum voltage frequency) setting at rated current. A setting of " 0.0 " results in no slip compensation.

The slip compensation value is calculated as follows:

$$n54 = \frac{\text{Motor synchronous RPM} - \text{Motor nameplate RPM}}{\text{Motor synchronous RPM}} \times 100\%$$

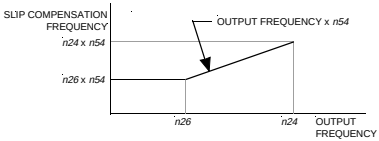
Example:

Desired frequency is 45 Hz
Motor slip = 3% at full load
(***n54*** = ***3.0***)
Actual output frequency at full load = 46.35 Hz



NOTES:

1) Slip compensation is disabled during the following conditions:
   - When motor rated current (***n31***) is set to " 0.0 " Amps;
   - When Fout < Fmin (***n29***);
   - During regeneration.
2) In the constant horsepower region [Fout ≥ Fmax. (***n26***), the slip compensation frequency is increased automatically as shown at right.



Constant *n55* **Motor No-load Current** Range: 0 - 99 (%)
Factory Setting: 40

This constant is used in the calculation of the actual compensation frequency by modifying the slip compensation value as follows:

$$\text{Compensation Frequency} = \frac{n54}{100} \times n26 \times \frac{Io - n55}{n31 - n55}$$

Where:

Io = actual output current
n31 = motor FLA
n26 = Max. voltage frequency (Fa)
n54 = Slip compensation gain (see page 51)

Constant *n56* **Prohibited Frequency 1** Range: 0.0 - 400 (Hz)
Factory Setting: 0.0

Constant *n57* **Prohibited Frequency 2** Range: 0.0 - 400 (Hz)
Factory Setting: 0.0

Constant *n58* **Prohibited Frequency 3** Range: 0.0 - 400 (Hz)
Factory Setting: 0.0

Each of these constants allows setting of one of three prohibited frequency points, in increments of 0.1 Hz (below 100 Hz) or 1 Hz (100 Hz or greater), for eliminating problems with resonant vibration of the motor/machine. This feature does not actually eliminate the selected frequency values, but will accelerate and decelerate the motor through the prohibited bandwidth.

Constant *n59* **Prohibited Frequency Bandwidth** Range: 0.0 - 25.5 (Hz)
Factory Setting: 1.0

Determines the width of the deadband, in increments of 0.1 Hz, around each of the prohibited frequency points. The factory setting of " 1.0 " establishes a deadband of ±1.0 Hz.

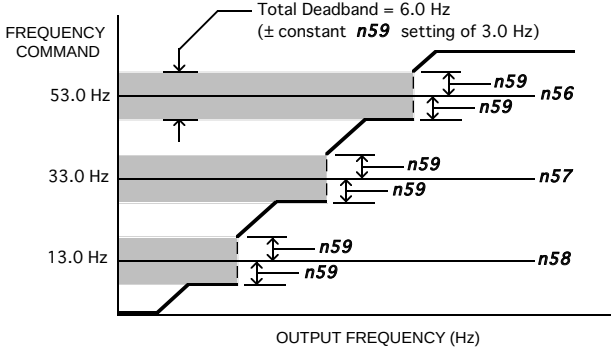
- **Setting Prohibited Frequencies**

Example: Vibration encountered between 10.0 and 16.0 Hz, again between 30.0 and 36.0 Hz, and again between 50.0 and 56.0 Hz.

Solution:

- Set constant ***n58*** to " 13.0 ", constant ***n57*** to " 33.0 ", and constant ***n56*** to " 53.0 ". Each is the center of one of the problem frequency bands.
- Set constant ***n59*** to " 3.0 ". This will cause the GPD 205 to reject all frequency command values between 10.0 and 16.0 HZ, between 30.0 and 36.0 Hz, and between 50.0 and 56.0 Hz.

A frequency command in any deadband will be converted to the bottom value of the deadband, e.g. a command of 33.0 Hz would result in a run frequency of 30.0 Hz.



Note that if ***n56*** ≥ ***n57*** ≥ ***58*** is not satisfied, the drive displays " ***Err*** " for 1 second, and will reset the data of the selected constant to its original setting.

Constant ***n60*** **No. of Auto-restart Attempts** Range: 0 - 10 Factory Setting: 0

The GPD 205 can be programmed for auto-restart to automatically reset a fault which occurs during operation. Auto-restart operation will use the number of restart attempts set in this constant, up to the maximum of ten. When set to " 0 ", no auto-restart will be attempted.

- Only the following faults can be automatically reset:

  oC : Overcurrent
  ou : Overvoltage (OV)

- The number of restart attempts available will be reset to the constant n60 setting when:

  1. 10 minutes have elapsed without a fault occurring.
  2. An external Fault Reset push button is pressed (or the **RESET** key of the Digital Operator is pressed).
  3. The input power to the GPD 205 is turned OFF long enough for the drive to re-initialize itself when power is turned back ON.

Constant ***n61*** **Operator "Stop" Key Selection** Range: 0, 1 Factory Setting: 0

This function is used to enable/disable the "Stop" key on the digital keypad. When set to " 0 ", the key is enabled and the drive can be stopped by pressing the "Stop" key. When set to " 1 ", the key is disabled and the end user will not be able to stop the operation of the drive by pressing the "Stop" key.

Constant ***n62*** **Slip Compensation Delay Timer** Range: 0.0 - 25.5 (sec) Factory Setting: 2.0

This function is used as a stabilization factor when the application has varying loads.

Constant Fault Record Range: N/A
n68 Factory Setting: N/A

This is a display-only function which cannot be programmed by the user. When this constant is selected and the **ENTER** key is pressed, the fault code for the most recent fault is displayed.

Only the following types of faults can be stored in the fault record: ***oC*** (overcurrent), ***ou*** (overvoltage), ***oH*** (cooling fin overheat), ***oL1*** (motor overload), ***oL2*** (drive overload), ***oL3*** (overtorque detection), ***EF1*** , ***EF2*** , ***EF3*** (external fault), or ***F05*** (A/D converter fault).

To clear the fault record, press the **RESET** key while viewing the fault record.

NOTE: The fault record is cleared automatically when an initialization setting is entered into constant ***n01*** .

Constant PROM Number Range: N/A
n69 Factory Setting: N/A

This is display-only function which cannot be programmed by the user. When this constant is selected and the **ENTER** key is pressed, the code number (3 digits) of the PROM that is installed on the Control PC board is displayed.

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Section 4. MAINTENANCE / TROUBLESHOOTING

4.1 MAINTENANCE. Periodically inspect the drive, as described in the following table, to prevent accidents and ensure high performance and reliability.

WARNING

To prevent electrical shock, disconnect all power before servicing the drive. Wait at least one minute after the power supply is disconnected and all LEDs are extinguished.

Location	Check For	Solution
Terminals, unit mounting bolts, etc.	Loose or misaligned connection hardware	Properly seat and securely tighten all connection hardware
Heatsink	Built-up dust, dirt and debris	Blow with dry, compressed air; 39.2×10^4 to 58.8×10^4 Pa, 57 to 85 psi (4 to 6 kg/cm^2) pressure
Printed circuit board	Accumulation of conductive material or oil mist	If dust or oil cannot be removed, replace the drive
Power elements, smoothing capacitor	Abnormal odor or discoloration	Replace the drive

4.2 TROUBLESHOOTING. The GPD 205's Fault circuit monitors operating parameters and initiates drive shutdown (Fault contacts change state) when allowable limits are exceeded, or provides an Alarm indication (drive contin-ues to operate) when conditions exist which *may lead to* a Fault shutdown.

The Status Indicator LEDs on the front of the GPD 205 and the 3-digit display on the Digital Operator provide a coded display related to the Fault or Alarm condition which has occurred; find the same indication or display in one of the following tables, and take the appropriate corrective action based on the description given.

WARNING

Oscilloscope chassis may be at voltages potentially hazardous to life if not properly grounded. If oscilloscope is used to measure high voltage waveforms, use only a dual channel oscilloscope in the differential mode with X100 probes. Always connect oscilloscope chassis to earth ground.

WARNING

Voltages dangerous to life exist when equipment is open and energized. Do not work alone.

CAUTION

To prevent equipment damage always remove incoming three-phase power before test equipment is connected or removed.

4.3 ALARM DISPLAYS.

Digital Operator Display	Status LEDs		Description	Possible Causes / Corrective Actions
	RUN (green)	ALARM (red)		
EF Blinks	Blinks	Blinks	Simultaneous input of FWD and REV commands – when both commands are closed for 0.5 sec. or longer, drive stops according to ***n03*** . (If either input is removed, motor operation will resume.)	Check inputs at terminals SF and SR.
bb Blinks			External Base Block signal is applied. (Motor operation will resume when Base Block input is removed.)	
SI¯P (STP) Blinks			Operator stop function – when **STOP** key is pressed while the Run command is from control input terminal SF or SR.	
oL3 Blinks	ON	Blinks	Overtorque detection – motor current exceeds the set value for longer than detection time. Operation continues.	Check the driven machine and remove the overload condition, or increase the value in ***n51*** to the machine's allowable value.
SEr Blinks			Sequence error – LOCAL/REMOTE command is changed during running.	Check multi-function contact inputs S1, S2 and S3.
Uu Blinks	Blinks	Blinks	Main circuit under voltage – DC bus voltage drops below 210V for a 230V drive, or below 420V for a 460V drive, when the drive is not running.	Check the voltage, verify that main circuit power supply wiring is connected, and terminal screws are securely tightened.
ou Blinks			Main circuit overvoltage – DC bus voltage exceeds 410V for a 230V drive, or exceeds 820V for a 460V drive, when drive is not running.	Check the main circuit power supply voltage.
oH Blinks			Heatsink overheat – intake air temperature rises when the drive is not running.	Check the intake air temperature.

4.4 FAULT DISPLAYS.

Digital Operator Display	Status LEDs		Description	Possible Causes / Corrective Actions
	RUN (green)	ALARM (red)		
oC	OFF	ON *	Overcurrent – drive output current momentarily exceeded 250% of rated current.	• Short circuit at drive output • Excessive load inertia • Accel/decel time (***n20*** to ***n23***) too short • Special motor use • Starting a coasting motor • Motor with larger capacity than drive • Magnetic contactor at drive output is ON/OFF
ou			Main circuit overvoltage – DC voltage exceeded 410V for a 230V rated drive, or exceeded 820V for a 460V rated drive.	Check main circuit power supply voltage. If fault occured during decel, may be due to excessive regenerative energy from the motor – increase decel time (***n21*** or ***n23***) or connect a braking resistor.
Uu1			Main circuit under voltage – DC voltage dropped below 210V for a 230V drive, or below 420V for a 460V rated drive.	Input power supply voltage is reduced, phases are opened or momentary power loss occurs. Check the voltage, verify that main circuit power supply wiring is connected and terminal screws are securely tightened.
Uu2			IGBT module control power supply fault.	Turn the power supply off, then on again. If the fault remains, replace the drive.

* When faulted, drive output shuts off and motor coasts to a stop.

4.4 FAULT DISPLAYS. (Continued)

Digital Operator Display	Status LEDs		Description	Possible Causes / Corrective Actions
	RUN (green)	ALARM (red)		
oH	OFF	ON *	Heatsink overheat.	Check the size of the load, the V/f setting (***n24*** to ***n30***), accel setting (***n20*** or ***n22***), the intake air temperature (must not exceed 113°F/45°C), or the cooling fan.
oL1			Motor overload – motor electronic thermal overload detected.	Check the size of the load, electronic thermal motor protection setting (***n32***), or the V/f setting (***n24*** to ***n30***). Set motor rated current value (***n31***) according to motor nameplate value.
oL2			Drive overload – drive electronic thermal overload detected.	Check the size of the load, or the V/f setting (***n24*** to ***n30***). Re-check the drive capacity.
oL3			Overtorque detection – drive motor current exceeds the set value for longer than detection time.	Check the driven machine and remove the overload condition, or increase the value in ***n51*** to the machine's allowable value.
EF1 ***EF2*** ***EF3***			External faults – drive receives an external fault input from control circuit terminal.	Check multi-function input terminals S1, S2 and S3.
F00			CPF-00 – initial memory fault is detected.	Turn the power supply off, then on again. If the fault remains, replace the drive.
F01			CPF-01 – ROM fault is detected.	

* When faulted, drive output shuts off and motor coasts to a stop.

4.4 FAULT DISPLAYS. (Continued)

Digital Operator Display	Status LEDs		Description	Possible Causes / Corrective Actions
	RUN (green)	ALARM (red)		
F04	OFF	ON *	CPF-04 – constant fault is detected.	Record all constant data and reinitialize the constants. Turn the power supply off, then on again. If the fault remains, replace the drive.
F05			CPF-05 – AD converter fault is detected.	Turn the power supply off, the on again. If the fault remains, replace the drive.
F06			CPF-06 – a prohibited option is detected.	Turn the power supply off, remove the option, then turn it on again.
– – –	OFF	OFF	• Control power supply fault • Hardware fault	Check the power supply wiring. Replace the drive.

* When faulted, drive output shuts off and motor coasts to a stop.

Appendix 1. SPECIFICATIONS

SECTION A. MODEL NO. RELATED SPECIFICATIONS						
	115 VAC Model GPD205-	**10P1**	**10P2**	**10P7**	**1001**	
Output characteristics	Max. applicable motor output HP (kW) *(1)*	1/8 (0.1)	1/4 (0.2)	3/4 (0.4)	1 (0.75)	
	Drive capacity (kVA)	0.3	0.6	1.1	1.9	
	Rated output current (A)	0.8	1.5	3.0	5.0	
	Max. output voltage (V)	200 to 230V (proportional to input voltage)				
	Max. output frequency (Hz)	400Hz (programmable)				
Power supply	Rated input voltage and frequency	single-phase: 100 to 115V, 50/60Hz				
	Allowable voltage fluctuation	-15% to +10%				
	Allowable frequency fluctuation	±5%				
	230 VAC Model GPD205-	**A0P1**	**A0P2**	**A0P7**	**A001**	**A002**
Output characteristics	Max. applicable motor output HP (kW) *(1)*	1/8 (0.1)	1/4 (0.2)	3/4 (0.4)	1 (0.75)	2 (1.5)
	Drive capacity (kVA)	0.3	0.6	1.1	1.9	2.6
	Rated output current (A)	0.8	1.5	3.0	5.0	7.0
	Max. output voltage (V)	200 to 230V (proportional to input voltage)				
	Max. output frequency (Hz)	400Hz (programmable)				
Power supply	Rated input voltage and frequency	3-phase: 200 to 230V, 50/60Hz				
	Allowable voltage fluctuation	-15% to +10%				
	Allowable frequency fluctuation	±5%				
	460 VAC Model GPD205-	**B0P5**	**B0P7**	**B001**	**B003**	
Output characteristics	Max. applicable motor output HP (KW) *(1)*	1/2 (0.4)	3/4 (0.5)	2 (1.5)	3 (2.2)	
	Drive capacity (kVA)	0.9	1.4	2.6	3.7	
	Rated output current (A)	1.2	1.8	3.4	4.8	
	Max. output voltage (V)	3 phase, 380 to 460V (proportional to input voltage)				
	Max. output frequency (Hz)	400Hz (programmable)				
Power supply	Rated input voltage and frequency	3-phase: 380 to 460V, 50/60Hz				
	Allowable voltage fluctuation	–15% to +10%				
	Allowable frequency fluctuation	±5%				

(Continued on next page)

See notes at end of table.

SECTION B. ALL GPD 205s		
Control characteristics	Control method	Sine wave PWM w/ full-range automatic torque boost
	Frequency control range	0.5 to 400Hz
	Frequency accuracy (temperature change)	Digital command: ±0.01% (14 to 122°F, –10 to +50°C)
		Analog command: ±1% (77°F ± 18°F, 25°C ± 10°C)
	Frequency setting resolution	Digital Operator reference: 0.1Hz (< 100Hz), 1Hz (100Hz or more)
		Analog reference: 0.06Hz/60Hz (1/1000)
	Output frequency resolution	0.1Hz
	Overload capacity	150% of rated output current for 1 minute
	Frequency reference signal	0 to +10VDC (20kΩ), 4 to 20mA (250Ω) selectable
	Accel/decel time	0.1 to 999 sec (accel/decel times are set independently)
	Braking torque	Short-term average deceleration torque: *(2)* 0.13HP, 0.25HP (0.1kW, 0.2kW): 150% 0.5HP, 1HP (0.4kW, 0.75kW): 100% 2HP (1.5kW): 50% or more Continuous regenerative torque: approximately 20% (150% w/ optional braking resistor, braking transistor built-in)
	V/f characteristics	Custom V/f pattern
Protective functions	Motor overload protection	Electronic thermal overload relay
	Instantaneous overcurrent	Motor coasts to stop at approx. 250% of drive current
	Overload	Motor coasts to stop after 1 min. at 150% of drive rated current
	Overvoltage	Motor coasts to stop if DC bus voltage exceeds 410V (230V drive) or 820V (430V drive)
	Undervoltage	Motor coasts to stop when DC bus voltage is below 210V (230V drive) or 420V (460V drive)
	Momentary power loss	The following operations are selectable: • Not provided (stops if power loss is 15 ms or longer) • Automatic restart at recovery from 0.5 sec. power loss • Automatic restart
	Heatsink overheat	Protected by electronic circuit

SECTION B. ALL GPD 205s – Continued			
Protective functions (continued)	Stall prevention level		Independently programmable during accel and constant-speed running. Selectable during decel.
	Ground fault		Protected by electronic circuit (overcurrent level)
	Power charge indication		RUN LED stays on or Digital Operator display stays ON (230V only) "CHARGE" LED remains lit until bus voltage drops below 50V (460V only)
Other functions	Input signals	Run/stop input	2-Wire or 3-Wire
		Multi-function input	Three of the following input signals are selectable: • Forward/reverse run (3-Wire control); • Fault reset; • External fault (N.O/N.C. contact input); • Multi-step speed operation (8 presets max.); • Jog command; • Alternate accel/decel time selection; • External baseblock (N.O./N.C. contact input; • Accel/decel hold command; • LOCAL/ REMOTE selection; • UP/DOWN command
	Output signals	Multi-function output	Two of the following output signals are selectable (1 Form-C contact output; 1 photo-coupler output): • Fault; • Running at frequency; • Zero speed; • Frequency detection (output frequency ≤ or ≥ set value); • During overtorque detection; • During undervoltage detection; • During speed search; • Operation mode
		Analog monitor	0 to +10VDC output, programmable for output frequency or output current
	Standard functions		Full-range automatic torque boost, auto restart, upper/lower frequency limit, DC injection braking current/time at start/stop, frequency reference gain/bias, prohibited frequencies, analog meter calibrating gain, S-curve accel/decel, slip compensation
	Display	Status indicator LEDs	RUN and ALARM LEDs provided as standard
		Digital Operator	Monitors frequency reference, output frequency, output current, FWD/REF selection
	Terminals		Screw terminals for both main circuit and control circuit
	Wiring distance between drive and motor		328 ft (100 m) or less *(3)*

(Continued on next page)

See notes at end of table.

SECTION B. ALL GPD 205s – Continued		
Enclosure		Protected chassis (IP 20)
Cooling method		Self-cooling
Environmental conditions	Ambient temperature	14 to 122°F (–10 to 50°C)
	Humidity	95% RH or less (non-condensing)
	Storage temperature *(4)*	–4 to 140°F (–20 to 60°C)
	Location	Indoor (free from corrosive gases or dust)
	Elevation	3,280 feet (1,000 m) or less
	Vibration	Up to 1G, at less than 20 Hz; up to 0.2G, at 20 to 50Hz

Notes:

(1) Based on a standard 4-pole motor for max. applicable motor output.

(2) Shows deceleration torque for an uncoupled motor decelerating from 60 Hz in 0.1 seconds.

(3) Contact your MagneTek representative for wiring distances greater than 328 ft (100 m).

(4) Temperature during shipping (for short periods of time).

Appendix 2. PERIPHERAL DEVICES

The following peripheral devices may be required to be mounted between the AC main circuit power supply and the GPD 205 input terminals L1 (R), L2 (S) and L3 (T).

- **Molded-case circuit breaker (MCCB)**

115 V Model GPD205-	10P1	10P2	10P7	1001
Capacity (kVA)	0.3	0.6	1.1	1.9
Rated output current (A)	0.8	1.5	3	5
Rated input current (A)	3.2	6.0	12.0	20.0
MCCB rating	10A	10A	10A	15A

230 V Model GPD205-	A0P1	A0P2	A0P7	A001	A002
Capacity (kVA)	0.3	0.6	1.1	1.9	2.6
Rated output current (A)	0.8	1.5	3	5	7
Rated input current (A)	0.9	1.7	3.3	5.5	7.7
MCCB rating	5A	5A	5A	10A	10A

460 V Model GPD205-	B0P7	B0P7	B001	B003
Capacity (kVA)	0.9	1.4	2.6	3.7
Rated output current (A)	1.2	1.8	3.4	4.8
Rated input current (A)	1.9	2.6	4.5	7.0
MCCB rating	5A	5A	10A	10A

- **Magnetic contactor**

Mount a surge protector on the coil. When using a magnetic contactor to start and stop the drive, do not exceed one start per hour.

IMPORTANT: See **CAUTION** on next page.

- **Ground fault interrupter**

Select a ground fault interrupter not affected by high frequencies. To prevent malfunctions, the current should be 200mA or more and the operating time 0.1 second or more.

- **AC reactor**

Install an AC reactor to connect to a power supply transformer of large capacity (600 kVA or more) or to improve the power factor on the power supply side.

- **Noise filter**

Use a noise filter exclusively for the drive if radio noise generated from the drive causes other control devices to malfunction.

CAUTION

Never connect a general LC/RC noise filter to the drive output circuit.

Do not connect a phase-advancing capacitor to the input/output sides or a surge suppressor to the output side of the drive.

When a magentic contactor is installed between the drive and the motor, do not turn it on or off during operation.

For more details on peripheral devices, refer to the GPD Price Book, or contact your MagneTek representative.

Appendix 3. DYNAMIC BRAKING OPTION

GENERAL. Dynamic braking (DB) enables the motor to be brought to a smooth and rapid stop. This is achieved by dissipating the regenerative energy of the AC motor across the resistive components of the Dynamic Braking option. For further details on dynamic braking, see the option instruction sheet shipped with the dynamic braking components.

The GPD 205 has an integral braking resistor. However, to make use of the Dynamic Braking function requires addition of either a Braking Resistor (for 3% duty cycle) or Braking Resistor Unit (for 10% duty cycle). See table below. In either case, interface to external control circuitry is necessary to ensure that dynamic brake resistor overheating is communicated to the drive as a fault condition.

GPD 205 Drive		MagneTek DB Components			
		Braking Resistor (3% Duty)		Braking Resistor Unit (10% Duty)	
Voltage	HP	Part No.	Qty Reqd	Part No.	Qty Reqd
115V, 230V	1/8	50185430	1	5P41-0825	1
	1/4	50185430	1	5P41-0825	1
	3/4	50185431	1	5P41-0825	1
	1	50185432	1	5P41-0827	1
	2 (1)	50185433	1	5P41-0827	1
460V	1/2	50185530	1	5P41-0835	1
	3/4	50185530	1	5P41-0835	1
	1 & 2	50185530	1	5P41-0835	1
	3	50185531	1	5P41-0836	1

(1) 230V units only.

INSTALLATION. This option must be installed by a TECHNICALLY QUALIFIED INDIVIDUAL who is familiar with this type of equipment and the hazards involved.

WARNING

HAZARDOUS VOLTAGE CAN CAUSE SEVERE INJURY OR DEATH.

LOCK ALL POWER SOURCES FEEDING THE DRIVE IN "OFF" POSITION.

CAUTION

Failure to follow these installation steps may cause equipment damage or personnel injury.

Preliminary Procedures

1. Disconnect all electrical power to the drive.

2. Open the GPD 205's terminal covers.

3. Verify that voltage has been disconnected by using a voltmeter to check for voltage at the incoming power terminals, L1 (R), L2 (S) and L3 (T).

Braking Resistor (3% Duty Cycle) Installation

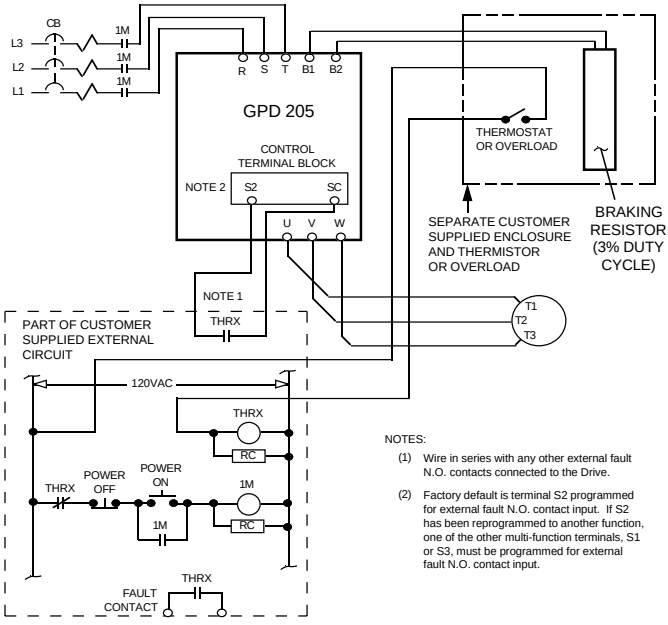
Note: The 3% duty cycle Braking Resistor is supplied with 6-inch leads.

1. Mount the Braking Resistor, along with an overload or thermostat, in a suitable metal enclosure.

2. At the GPD 205, cut the protective tab covering terminals B1 and B2. Connect the leads from the Braking Resistor to drive terminals, and make connections to external control circuit, as shown in Figure A3-1.

3. Close the GPD 205's terminal covers.

4. Proceed to "Adjustments" on page 68.



NOTES:

(1) Wire in series with any other external fault N.O. contacts connected to the Drive.

(2) Factory default is terminal S2 programmed for external fault N.O. contact input. If S2 has been reprogrammed to another function, one of the other multi-function terminals, S1 or S3, must be programmed for external fault N.O. contact input.

Figure A3-1. Typical Wiring of Braking Resistor (for 3% Duty Cycle) to Drive

Braking Resistor (10% Duty Cycle) Installation

IMPORTANT

Since the Braking Resistor Unit generates heat during the dynamic braking opeartion, install it in a location away from other equipment which emits heat.

1. Mount the Braking Resistor Unit on a vertical surface, maintaining minimum 1.18 inch (30 mm) clearance on each side and 5.91 inch (150 mm) clearance top and bottom.

2. At the GPD 205, cut the protective tab covering terminals B1 and B2. Open the Braking Resistor Unit terminal box to access its terminal block. Connect the Braking Resistor Unit to the drive and external control circuit according to the following table and Figure A3-2.

Terminals	B, P	1, 2 *
Lead Size (AWG)	12 - 10	18 - 14 *
Lead Type	600V ethylene propylene rubber insulated, or equivalent	
Terminal Screw	M4	

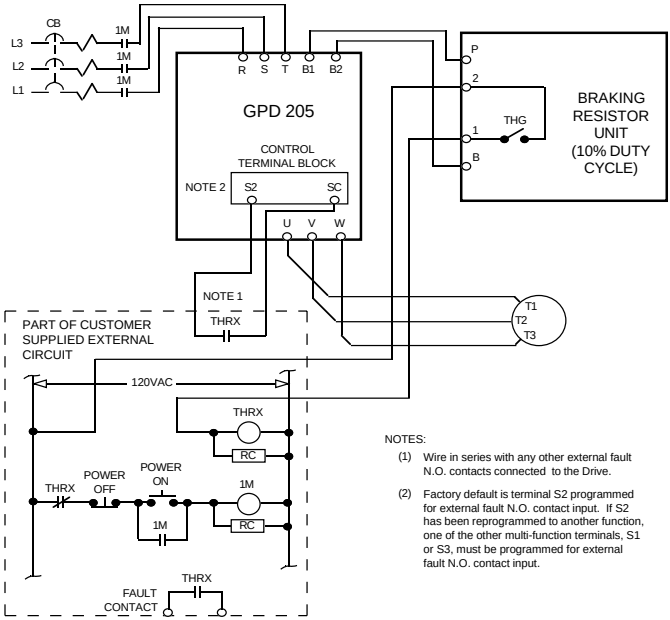
* Power leads for the Braking Resistor Unit generate high levels of electrical noise; therefore, signal leads must be grouped separately.

3. Close and secure the cover of the Braking Resistor Unit terminal box. Close the GPD 205's terminal covers.

4. Proceed to "Adjustments" below.

Adjustments

Program constant ***n33*** to " 1 "; this disables stall prevention during deceleration.



NOTES:

(1) Wire in series with any other external fault N.O. contacts connected to the Drive.

(2) Factory default is terminal S2 programmed for external fault N.O. contact input. If S2 has been reprogrammed to another function, one of the other multi-function terminals, S1 or S3, must be programmed for external fault N.O. contact input.

Figure A3-2. Typical Wiring of Braking Resistor Unit (for 10% Duty Cycle) to Drive

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Appendix 4. GPD 205 SPARE PARTS

MagneTek does not offer spare parts for the GPD 205. Because of the compact size of the drive and the inherent difficulty of properly installing replacement parts, MagneTek recomends changing out the complete drive unit if troubleshooting determines that it is defective.

A MagneTek authorized repair shop may be able to attempt repair of a defective drive, but this would necessitate longer down-time.

When changing out a drive unit, make sure that any of the following separately priced options are transfered to the replacement unit, unless they are already present on the replacement unit.

- Attached to control terminals:
  - Auxiliary Potentiometer Card

- Attached to heat sink:
  - Din Rail Mount

NOTE: If the defective GPD 205 has Modbus RTU interface (a factory installed option), the replacement GPD 205 must also have the interface factory installed.

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INDEX (Continued)

If you would prefer a larger (8-1/2 in. x 11 in.) version of this manual, please complete and submit the following:

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PHONE: _____ FAX: _____

Manual #: **TM 4502**

TO: MagneTek Drives & Systems
Attn: Marketing Communications
16555 W. Ryerson Road
New Berlin, WI 53151

FAX #: (262) 782-3418

GPD 205

***MagneTek Technical Support** is available to provide telephone assistance for **installation, programming, & troubleshooting** of MagneTek Drives. All support is available during normal business hours. Emergency breakdown support is available on a 24 hour / 7 day basis.*

***Review the Technical Manual provided with each MagneTek Product.** This manual provides valuable information for proper installation & programming of MagneTek AC Drives. Most answers can be found in the Simplified Startup Procedures bound in the front of most manuals. Troubleshooting information can also be found within the manual. If you cannot find what you need, call for technical support.*

Help us help you. When you call, please have the following information available.

- *Have Technical Manual at hand. The Support Associate will refer to it.*
- *Drive model and all nameplate data.*
- *Motor type, brand, and all nameplate data.*

For Troubleshooting, additional information may be required.

- *Power distribution information (type – delta, wye; power factor correction; other major switching devices used; voltage fluctuations)*
- *Installation Wiring (separation of power & control wire; wire type/class used; distance between drive and motor, grounding.*
- *Use of any devices between the Drive & motor (output chokes, etc.).*

Please phone us at 1-800-541-0939 for technical support.

Additional technical information is available at www.drives.com

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