

AC DRIVE PARAMETERS



CHAPTER 4

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GS2 Parameter Summary

Motor Parameters			
GS2 Parameter	Description	Range	Default
P0.00	Motor Nameplate Voltage	115V/230V: 200/208/220/230/240 460V: 380/400/415/440/460/480 575V: 380 to 637	240 480 575
P0.01	Motor Nameplate Amps	Drive Rated Amps X .3 to 1.0	Drive Rated Amps x 1.0
P0.02	Motor Base Frequency	50/60/400	60
P0.03	Motor Base RPM	375 to 9999 RPM	1750
P0.04	Motor Maximum RPM	P0.03 to 9999 RPM	P0.03

Ramp Parameters			
P1.00	Stop Methods	00: Ramp to Stop 01: Coast to Stop	00
◆ P1.01	Acceleration Time 1	0.1 to 600.0 sec	10.0
◆ P1.02	Deceleration Time 1	0.1 to 600.0 sec	30.0
P1.03	Accel S-curve	0 to 7	00
P1.04	Decel S-curve	0 to 7	00
◆ P1.05	Acceleration Time 2	0.1 to 600.0 sec	10.0
◆ P1.06	Deceleration Time 2	0.1 to 600.0 sec	30.0
P1.07	Select method to use 2nd Accel/Decel	00: RMP2 from DI terminal 01: Transition Frequencies P1.08 & P1.09	00
P1.08	Accel 1 to Accel 2 frequency transition	0.0 to 400.0 Hz	0.0
P1.09	Decel 2 to Decel 1 frequency transition	0.0 to 400.0 Hz	0.0
P1.10	Skip Frequency 1	0.0 to 400.0 Hz	0.0
P1.11	Skip Frequency 2	0.0 to 400.0 Hz	0.0
P1.12	Skip Frequency 3	0.0 to 400.0 Hz	0.0
P1.17	Skip Frequency Band	0.0 to 20.0 Hz	0.0
P1.18	DC Injection Current Level	00 to 100 %	00
P1.20	DC Injection during Start-up	0.0 to 5.0 sec	0.0
P1.21	DC Injection during Stopping	0.0 to 25.0 sec	0.0
P1.22	Start-point for DC Injection	0.0 to 60.0 Hz	0.0

◆ Parameter can be set during RUN Mode.

Volts/Hertz Parameters			
GS2 Parameter	Description	Range	Default
P2.00	Volts/Hertz Settings	00: General Purpose 01: High Starting Torque 02: Fans and Pumps 03: Custom	00
◆ P2.01	Slip Compensation	0.0 to 10.0	0.0
◆ P2.02	Auto-torque Boost	00 to 10	00
P2.04	Mid-point Frequency	0.1 to 400 Hz	1.5
P2.05	Mid-point Voltage	115V/230V: 2.0 to 255V 460V: 2.0 to 510V 575V: 2.0 to 637V	10.0 20.0 24.0
P2.06	Min. Output Frequency	0.1 to 20.0 Hz	1.50
P2.07	Min. Output Voltage	115V/230V: 2.0 to 50.0V 460V: 2.0 to 100.0V 575V: 2.0 to 130.6V	10.0 20.0 24.0
P2.08	PWM Carrier Frequency	115V/230V/460V 01 to 15 kHz 575V 01 to 10 kHz	12 6

Digital Parameters			
P3.00	Source of Operation Command	00: Operation determined by digital keypad 01: Operation determined by external control terminals, keypad STOP is enabled 02: Operation determined by external control terminals, keypad STOP is disabled 03: Operation determined by RS-485 interface, keypad STOP is enabled 04: Operation determined by RS-485 interface, keypad STOP is disabled	00
P3.01	Multi-function Input Terminals (DI1 - DI2)	00: DI1 - FWD / STOP, DI2 - REV / STOP 01: DI1 - RUN / STOP, DI2 - REV / FWD 02: DI1 - RUN momentary (N.O.) DI2 - REV / FWD DI3 - STOP momentary (N.C.)	00

◆ Parameter can be set during RUN Mode.

Digital Parameters (cont.)			
GS2 Parameter	Description	Range	Default
P3.02	Multi-function Input (DI3)	00: External Fault (N.O.) 01: External Fault (N.C.) 02: External Reset 03: Multi-Speed/PID SP Bit 1 04: Multi-Speed/PID SP Bit 2	00
P3.03	Multi-function Input (DI4)	05: Multi-Speed/PID SP Bit 3 06: Reserved 07: Reserved 08: Reserved 09: Jog	03
P3.04	Multi-function Input (DI5)	10: External Base Block (N.O.) 11: External Base Block (N.C.) 12: Second Accel/Decel Time 13: Speed Hold 14: Increase Speed	04
P3.05	Multi-function Input (DI6)	15: Decrease Speed 16: Reset Speed to Zero 17: PID Disable (N.O.) 18: PID Disable (N.C.) 99: Input Disable	05
P3.11	Multi-Function Output Terminal 1	00: AC Drive Running 01: AC Drive Fault 02: At Speed 03: Zero Speed 04: Above Desired Frequency 05: Below Desired Frequency	00
P3.12	Multi-Function Output Terminal 2	06: At Maximum Speed 07: Over torque detected 08: Above Desired Current 09: Below Desired Current 10: PID Deviation Alarm	01
◆ P3.16	Desired Frequency	0.0 to 400.0 Hz	0.0
◆ P3.17	Desired Current	0.0 to <Drive Rated Amps>	0.0
◆ P3.18	PID Deviation Level	1.0 to 50.0 %	10.0
◆ P3.19	PID Deviation Time	0.1 to 300.0 sec	5.0

◆ Parameter can be set during RUN Mode.

Analog Parameters			
GS2 Parameter	Description	Range	Default
P4.00	Source of Frequency Command	00: Frequency determined by keypad potentiometer 01: Frequency determined by digital keypad up/down 02: Frequency determined by 0 to +10V input on AI terminal with jumpers 03: Frequency determined by 4 to 20mA input on AI terminal with jumpers 04: Frequency determined by 0 to 20mA input on AI terminal with jumpers 05: Frequency determined by RS-232C/RS-485 communication interface	00
P4.01	Analog Input Offset Polarity	00: No Offset 01: Positive Offset 02: Negative Offset	00
◆ P4.02	Analog Input Offset	0.0 to 100.0%	0.0
◆ P4.03	Analog Input Gain	0.0 to 300.0%	100.0
P4.04	Analog Input Reverse Motion Enable	00: Forward Motion Only 01: Reverse Motion Enable	00
P4.05	Loss of ACI Signal (4-20mA)	00: Decelerate to 0Hz 01: Stop immediately and display error code "EF" 02: Continue operation by the last frequency command	00
◆ P4.11	Analog Output Signal	00: frequency Hz 01: Current A 02: PV	00
◆ P4.12	Analog Output Gain	00 to 200%	100

Presets			
◆ P5.00	Jog	0.0 to 400.0 Hz	6.0
◆ P5.01	Multi-Speed 1	0.0 to 400.0 Hz	0.0
◆ P5.02	Multi-Speed 2	0.0 to 400.0 Hz	0.0
◆ P5.03	Multi-Speed 3	0.0 to 400.0 Hz	0.0
◆ P5.04	Multi-Speed 4	0.0 to 400.0 Hz	0.0
◆ P5.05	Multi-Speed 5	0.0 to 400.0 Hz	0.0
◆ P5.06	Multi-Speed 6	0.0 to 400.0 Hz	0.0
◆ P5.07	Multi-Speed 7	0.0 to 400.0 Hz	0.0

◆ Parameter can be set during RUN Mode.

Protection Parameters			
GS2 Parameter	Description	Range	Default
P6.00	Electronic Thermal Overload Relay	00: Constant Torque 01: Variable Torque 02: Inactive	00
P6.01	Auto Restart after Fault	00 to 10	00
P6.02	Momentary Power Loss	00: Stop operation after momentary power loss 01: Continue operation after momentary power loss, speed search from Speed Reference 02: Continue operation after momentary power loss, speed search from Minimum Speed	00
P6.03	Reverse Operation Inhibit	00: Enable Reverse Operation 01: Disable Reverse Operation	00
P6.04	Auto Voltage Regulation	00: AVR enabled 01: AVR disabled 02: AVR disabled during decel 03: AVR disabled during stop	00
P6.05	Over-Voltage Stall Prevention	00: Enable Over-voltage Stall Prevention 01: Disable Over-voltage Stall Prevention	00
P6.06	Auto Adjustable Accel/Decel	00: Linear Accel/Decel 01: Auto Accel, Linear Decel 02: Linear Accel, Auto Decel 03: Auto Accel/Decel 04: Auto Accel/Decel Stall Prevention (limited by P1.01, P1.02, P1.05, P1.06)	00
P6.07	Over-Torque Detection Mode	00: Disabled 01: Enabled during constant speed operation 02: Enabled during acceleration	00
P6.08	Over-Torque Detection Level	30 to 200%	150
P6.09	Over-Torque Detection Time	0.1 to 10.0	0.1
P6.10	Over-Current Stall Prevention during Acceleration	20 to 200%	150
P6.11	Over-Current Stall Prevention during Operation	20 to 200%	150
P6.12	Maximum Allowable Power Loss Time	0.3 to 5.0 sec	2.0
P6.13	Base-Block Time for Speed Search	0.3 to 5.0 sec	0.5
P6.14	Maximum Speed Search Current Level	30 to 200%	150
P6.15	Upper Bound of Output Frequency	0.1 to 400Hz	400
P6.16	Lower Bound of Output Frequency	0.0 to 400Hz	0.0
P6.30	Line Start Lockout	00: Enable Line Start Lockout 01: Disable Line Start Lockout	00

◆ Parameter can be set during RUN Mode.

Protection Parameters (cont.)			
GS2 Parameter	Description	Range	Default
P6.31	Present Fault Record	00: No Fault occurred 01: Over-current (oc) 02: Over-voltage (ov) 03: Overheat (oH)	00
P6.32	Second Most Recent Fault Record	04: Overload (oL) 05: Overload 1 (oL1) 06: Overload 2 (oL2)	00
P6.33	Third Most Recent Fault Record	07: External Fault (EF) 08: CPU failure 1 (CF1) 09: CPU failure 2 (CF2) 10: CPU failure 3 (CF3)	00
P6.34	Fourth Most Recent Fault Record	11: Hardware Protection Failure (HPF) 12: Over-current during accel (OCA) 13: Over-current during decel (OCd)	00
P6.35	Fifth Most Recent Fault Record	14: Over-current during steady state (OCn) 15: Ground fault or fuse failure (GFF) 16: Reserved	00
P6.36	Sixth Most Recent Fault Record	17: Input power 3-phase loss 18: External Base-Block (bb) 19: Auto Adjust accel/decel failure (cFA) 20: Software protection code (codE)	00

◆ Parameter can be set during RUN Mode.

PID Parameters			
GS2 Parameter	Description	Range	Default
P7.00	Input Terminal for PID Feedback	00: Inhibit PID operation 01: Forward-acting (heating loop) PID feedback, PV from AVI (0 to + 10V 02: Forward-acting (heating loop) PID feedback, PV from ACI (4 to 20mA) 03: Reverse-acting (cooling loop) PID feedback, PV from AVI (0 to +10V). 04: Reverse-acting (cooling loop) PID feedback, PV from ACI (4 to 20mA).	00
P7.01	PV 100% Value	0.0 to 999	100.0
P7.02	PID Setpoint Source	00: Keypad 01: Serial Communications	00
◆ P7.10	Keypad PID Setpoint	0.0 to 999	0.0
◆ P7.11	PID Multi-setpoint 1	0.0 to 999	0.0
◆ P7.12	PID Multi-setpoint 2	0.0 to 999	0.0
◆ P7.13	PID Multi-setpoint 3	0.0 to 999	0.0
◆ P7.14	PID Multi-setpoint 4	0.0 to 999	0.0
◆ P7.15	PID Multi-setpoint 5	0.0 to 999	0.0
◆ P7.16	PID Multi-setpoint 6	0.0 to 999	0.0
◆ P7.17	PID Multi-setpoint 7	0.0 to 999	0.0
◆ P7.20	Proportional Control	0.0 to 10.0	1.0
◆ P7.21	Integral Control	0.00 to 100.0 sec	1.00
◆ P7.22	Derivative Control	0.00 to 1.00 sec	0.00
P7.23	Upper Bound for Integral Control	00 to 100%	100
P7.24	Derivative Filter Time Constant	0.0 to 2.5 sec	0.0
P7.25	PID Output Frequency Limit	00 to 110%	100
P7.26	Feedback Signal Detection Time	0.0 to 3600 sec.	60
P7.27	PID Feedback Loss	00: Warn and AC Drive Stop 01: Warn and Continue Operation	00

Display Parameters			
◆ P8.00	User Defined Display Function	00: Output Frequency (Hz) 01: Motor Speed (RPM) 02: Output Freq. X P8.01 03: Output Current (A) 04: Motor Output Current (%) 05: Output Voltage (V) 06: DC Bus Voltage (V) 07: PID Setpoint 08: PID Feedback Signal (PV) 09: Frequency Setpoint	00
◆ P8.01	Frequency Scale Factor	0.01 to 160.0	1.0

◆ Parameter can be set during RUN Mode.

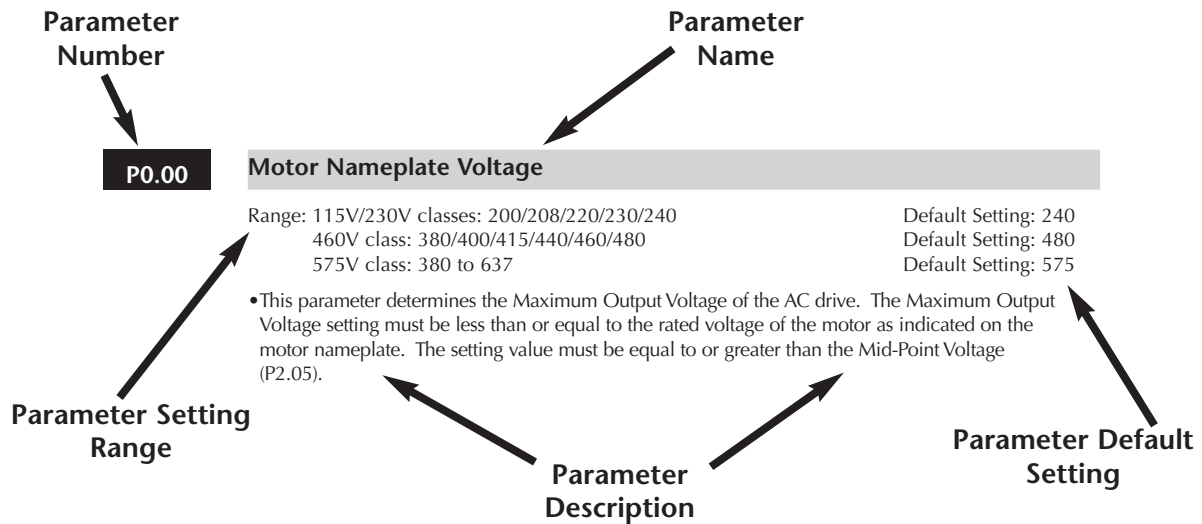
Communications Parameters			
GS2 Parameter	Description	Range	Default
P9.00	Communication Address	01 to 254	01
P9.01	Transmission Speed	00: 4800 baud 01: 9600 baud 02: 19200 baud 03: 38400 baud	01
P9.02	Communication Protocol	00: Modbus ASCII mode 7 data bits,no parity,2 stop bits 01: Modbus ASCII mode 7 data bits,even parity,1 stop bit 02: Modbus ASCII mode 7 data bits,odd parity,1 stop bit 03: Modbus RTU mode 8 data bits,no parity,2 stop bits 04: Modbus RTU mode 8 data bits,even parity,1 stop bit 05: Modbus RTU mode 8 data bits,odd parity,1 stop bit	00
P9.03	Transmission Fault Treatment	00: Display fault and continue operating 01: Display fault and RAMP to stop 02: Display fault and COAST to stop 03: No fault displayed and continue operating	00
P9.04	Time Out Detection	00: Disable 01: Enable	00
P9.05	Time Out Duration	0.1 to 60.0 seconds	0.5
◆ P9.07	Parameter Lock	00: All parameters can be set and read 01: All parameters are read-only	00
P9.08	Restore to Default	99: Restores all parameters to factory defaults	00
◆ P9.11	Block Transfer Parameter 1	P0.00 to P8.01, P9.99	P9.99
◆ P9.12	Block Transfer Parameter 2	P0.00 to P8.01, P9.99	P9.99
◆ P9.13	Block Transfer Parameter 3	P0.00 to P8.01, P9.99	P9.99
◆ P9.14	Block Transfer Parameter 4	P0.00 to P8.01, P9.99	P9.99
◆ P9.15	Block Transfer Parameter 5	P0.00 to P8.01, P9.99	P9.99
◆ P9.16	Block Transfer Parameter 6	P0.00 to P8.01, P9.99	P9.99
◆ P9.17	Block Transfer Parameter 7	P0.00 to P8.01, P9.99	P9.99
◆ P9.18	Block Transfer Parameter 8	P0.00 to P8.01, P9.99	P9.99
◆ P9.19	Block Transfer Parameter 9	P0.00 to P8.01, P9.99	P9.99
◆ P9.20	Block Transfer Parameter 10	P0.00 to P8.01, P9.99	P9.99
◆ P9.21	Block Transfer Parameter 11	P0.00 to P8.01, P9.99	P9.99
◆ P9.22	Block Transfer Parameter 12	P0.00 to P8.01, P9.99	P9.99

◆ Parameter can be set during RUN Mode.

Communications Parameters (continued)			
GS2 Parameter	Description	Range	Default
◆ P9.23	Block Transfer Parameter 13	P0.00 to P8.01	P9.99
◆ P9.24	Block Transfer Parameter 14	P0.00 to P8.01	P9.99
◆ P9.25	Block Transfer Parameter 15	P0.00 to P8.01	P9.99
◆ P9.26	Serial Comm Speed Reference	0.0 to 400.0 Hz	60.0
◆ P9.27	Serial Comm RUN Command	00: Stop 01: Run	00
◆ P9.28	Serial Comm Direction Command	00: Forward 01: Reverse	00
◆ P9.29	Serial Comm External Fault	00: No fault 01: External fault	00
◆ P9.30	Serial Comm Fault Reset	00: No action 01: Fault Reset	00
◆ P9.31	Serial Comm JOG Command	00: Stop 01: Jog	00
P9.39	Firmware Version	###	###
P9.41	GS Series Number	01: GS1 02: GS2 03: GS3	##
P9.42	Manufacturer Model Information	00: GS2-20P5 (230V 1ph/3ph 0.5hp) 01: GS2-21P0 (230V 1ph/3ph 1hp) 02: GS2-22P0 (230V 1ph/3ph 2hp) 03: GS2-23P0 (230V 1ph/3ph 3hp) 04: GS2-25P0 (230V 3ph 5hp) 05: GS2-27P5 (230V 3ph 7.5hp) 06: Reserved 07: GS2-41P0 (460V 3ph 1hp) 08: GS2-42P0 (460V 3ph 2hp) 09: GS2-43P0 (460V 3ph 3hp) 10: GS2-45P0 (460V 3ph 5hp) 11: GS2-47P5 (460V 3ph 7.5hp) 12: GS2-4010 (460V 3ph 10hp) 13: GS2-10P2 (115V 1ph 0.25hp) 14: GS2-10P5 (115V 1ph 0.5hp) 15: GS2-11P0 (115V 1ph 1hp) 16~20: Reserved 21: GS2-51P0 (575V 3ph 1hp) 22: GS2-52P0 (575V 3ph 2hp) 23: GS2-53P0 (575V 3ph 3hp) 24: GS2-55P0 (575V 3ph 5hp) 25: GS2-57P5 (575V 3ph 7.5hp) 26: GS2-5010 (575V 3ph 10hp)	##

◆ Parameter can be set during RUN Mode.

Detailed Parameter Listings



Note: If the ♦ symbol is found next to the parameter name, the parameter can be edited when the AC drive is in RUN Mode.

Motor Parameters

P0.00**Motor Nameplate Voltage**

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

Default Setting: 240
480
575

This parameter determines the Maximum Output Voltage of the AC drive. The Maximum Output Voltage setting must be less than or equal to the rated voltage of the motor as indicated on the motor nameplate. The setting value must be equal to or greater than the Mid-Point Voltage (P2.05).

P0.01**Motor Nameplate Amps**

Range: Drive Rated Amps x 0.3 to
Drive Rated Amps x 1.0

Default Setting: Drive Rating (A)

This parameter sets the output current to the motor, and is used by the drive to set the motor overload protection. Set this parameter value to the full load current listed on the motor nameplate. (Also refer to P6.00 to set overload curve type.)

P0.02 Motor Base Frequency

Range: 50/60/400

Default Setting 60

- This value should be set according to base frequency of the motor as indicated on the motor nameplate. Motor Base Frequency determines the volts per hertz ratio.

P0.03 Motor Base RPM

Range: 375 to 9999 RPM

Default Setting: 1750

- This value should be set according to rated Base RPM of the motor as indicated on the motor nameplate.

P0.04 Motor Maximum RPM

Range: P0.03 to 9999 RPM

Default Setting: P0.03

- This value should be set according to the desired maximum speed of the motor. This value should not exceed the motor's maximum rated speed.



WARNING: The Motor Maximum RPM parameter (P0.04) should never exceed the maximum speed rating for the motor you are using. If this information is not readily available, consult your motor manufacturer.

- This value cannot be set lower than Motor Base RPM (P0.03).

This parameter, along with P0.02 and P0.03, determines the Maximum Output Frequency of the AC Drive. The Maximum Output Frequency can be calculated as follows:

$$\text{Max. Output Frequency} = \left(\frac{\text{Motor Max. RPM (P0-04)}}{\text{Motor Base RPM (P0-03)}} \right) \times \text{Base Frequency (P0-02)}$$

- If an output limit based on Maximum Output Frequency is desired, use the following equation to determine the corresponding value for Motor Maximum RPM:

$$\text{Motor Maximum RPM} = \left(\frac{\text{Max. Output Frequency}}{\text{Motor Base Frequency (P 0.02)}} \right) \times \text{Motor Base RPM (P 0.03)}$$

Ramp Parameters

P1.00 Stop Methods

Range: 00 Ramp to Stop
01 Coast to stop

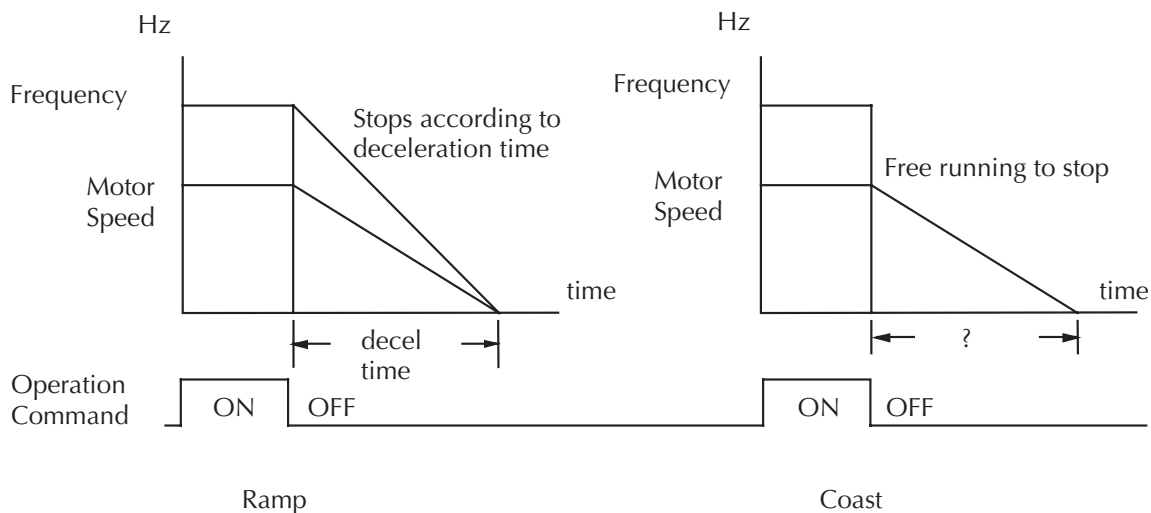
Default Setting: 00

This parameter determines how the motor is stopped when the AC drive receives a valid stop command.

- Ramp: The AC drive decelerates the motor to Minimum Output Frequency (P2.06) and then stops according to the deceleration time set in P1.02 or P1.06.
- Coast: The AC drive stops output instantly upon command, and the motor free runs until it comes to a complete stop.



Note: The drive application or system requirements will determine which stop method is needed.



P1.01 ◆ Acceleration Time 1

Range: 0.1 to 600 sec

Default Setting: 10 sec

This parameter is used to determine the time required for the AC drive to ramp from 0 to its Maximum Motor RPM (P0.04). The rate is linear unless S-Curve is "Enabled."

P1.02 ◆ Deceleration Time 1

Range: 0.1 to 600 sec

Default Setting: 30 sec

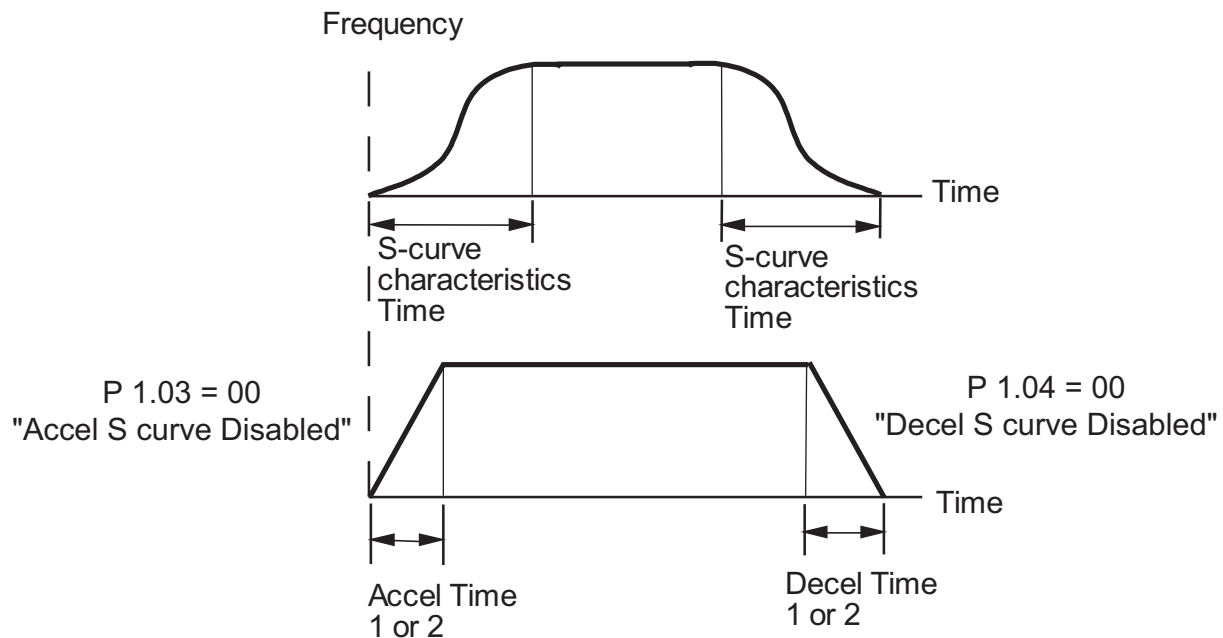
This parameter is used to determine the time required for the AC drive to decelerate from the Maximum Motor RPM (P0.04) down to 0Hz. The rate is linear unless S-Curve is "Enabled."

P1.03 Accel S-Curve

Range: 00 to 07

Default Setting: 00

This parameter is used whenever the motor and load need to be accelerated more smoothly. The Accel S-Curve may be set from 0 to 7 to select the desired acceleration S Curve.



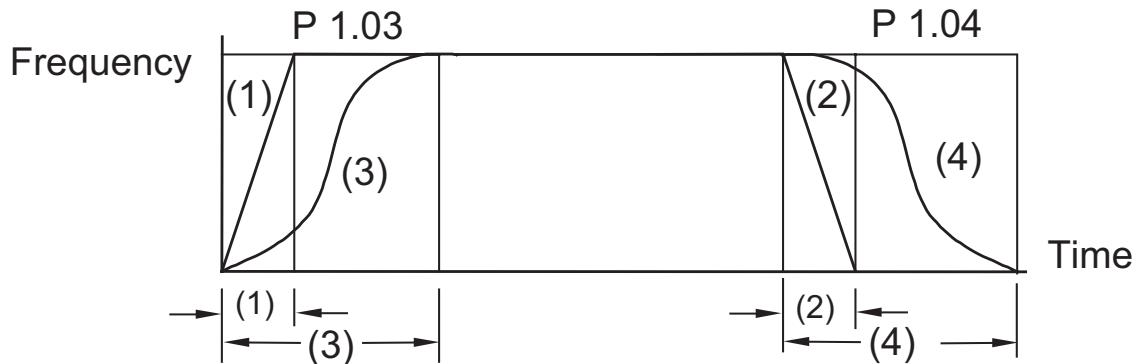
P1.04 Decel S-Curve

Range: 00 to 07

Default Setting: 00

This parameter is used whenever the motor and load need to be decelerated more smoothly. The Decel S-Curve may be set from 00 to 07 to select the desired deceleration S-Curve.

Note: From the diagram shown below, the original setting accel/decel time will be for reference when the function of the S-curve is enabled. The actual accel/decel time will be determined based on the S-curve selected (1 to 7).



S curve is disabled in (1), (2)
 P 1.03 sets S curve for (3)
 P 1.04 sets S curve for (4)

P1.05 ◆ Acceleration Time 2

Range: 0.1 to 600 sec

Default Setting: 10.0

- The Second Acceleration Time determines the time for the AC drive to accelerate from 0 RPM to Maximum Motor RPM (P0.04). Acceleration Time 2 (P1.05) can be selected using a multi-function input terminal or frequency transition (P1.07).

P1.06 ◆ Deceleration Time 2

Range: 0.1 to 600 sec

Default Setting: 30 sec

- The Second Deceleration Time determines the time for the AC drive to decelerate from Maximum Motor RPM (P0.04) to 0 RPM. Deceleration Time 2 (P1.06) can be selected using a multi-function input terminal or frequency transition (P1.07).

P1.07 Select method for 2nd Accel/Decel

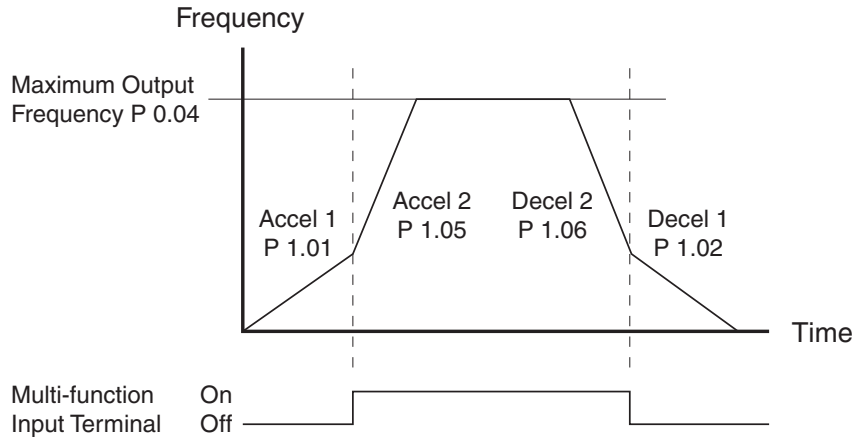
Range: 00: Second Accel/Decel from DI terminal

Default Setting: 00

01: Frequency Transition
P1.08 & P1.09

- The second set of acceleration and deceleration times P1.05 and P1.06 can be selected either with a multi-function input terminal programmed to Second Accel/Decel, or by the values of the transition frequencies P1.08 and P1.09

Second Accel/Decel Times selected with Multi-Function Input Terminal

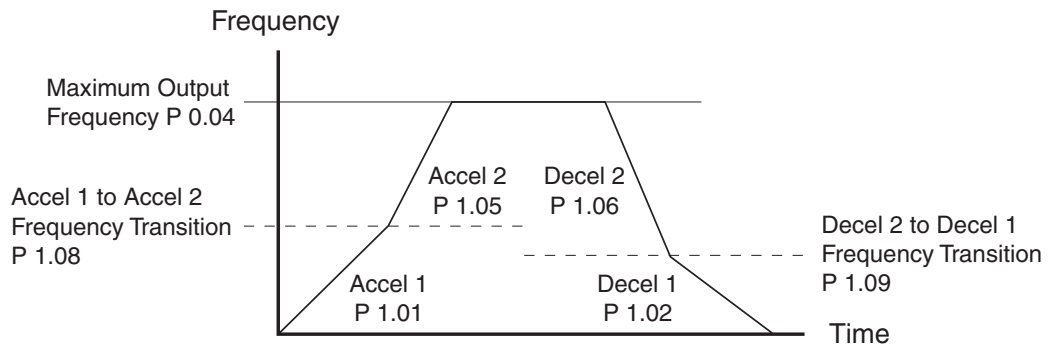


P1.08 Accel 1 to Accel 2 Frequency Transition

Range: 0.0 to 400.0 Hz

Default Setting: 0.0

Second Accel/Decel Times selected with Frequency Transition



P1.09 Decel 1 to Decel 2 Frequency Transition

Range: 0.0 to 400.0 Hz

Default Setting: 0.0

P1.10 Skip Frequency 1

Range: 0.0 to 400.0 Hz

Default Setting: 0.0

P1.11 Skip Frequency 2

Range: 0.0 to 400.0 Hz

Default Setting: 0.0

P1.12 Skip Frequency 3

Range: 0.0 to 400.0 Hz

Default Setting: 0.0

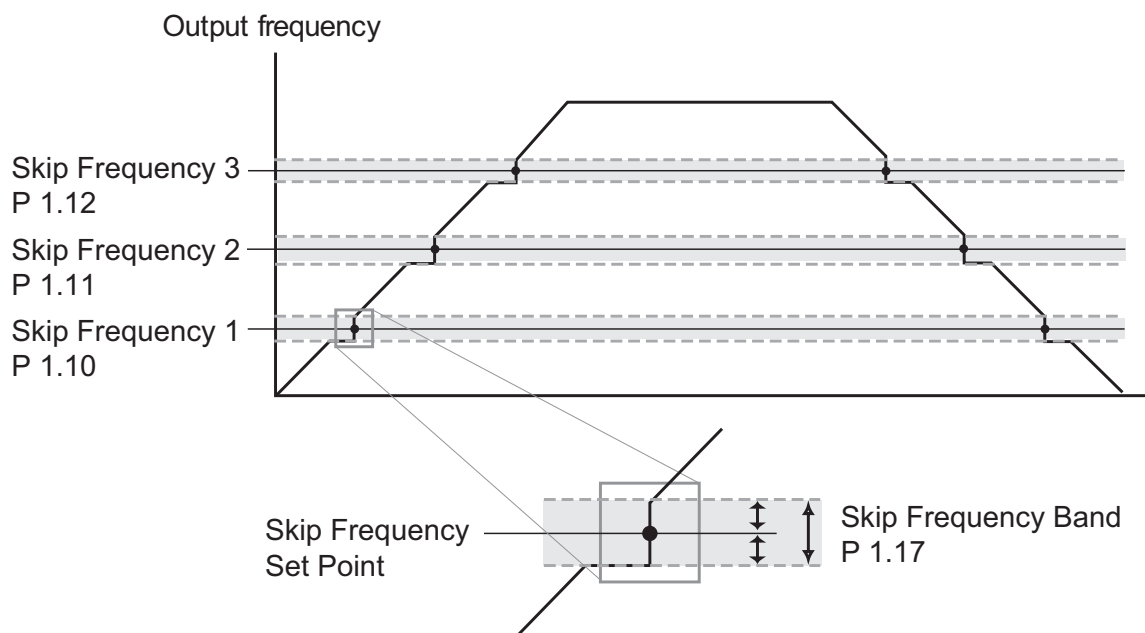
- P1.10, P1.11, and P1.12 determine the location of the frequency bands that will be skipped during AC drive operation.

P1.17 Skip Frequency Band

Range: 0.0 to 20.0 Hz

Default Setting: 0.0

This parameter determines the frequency band for a given Skip Frequency (P1.10, P1.11, or P1.12). Half of the Skip Frequency Band is above the Skip Frequency and the other half is below. Programming this parameter to 0.0 disables all skip frequencies.



P1.18 DC Injection Current Level

Range: 00 to 100%

Default Setting: 00

This parameter determines the amount of DC Braking Current applied to the motor during start-up and stopping. When setting DC Braking Current, please note that 100% is equal to the rated current of the drive. It is recommended to start with a low DC Braking Current Level and then increase until proper holding torque has been attained.

P1.20 DC Injection during Start-up

Range: 0.0 to 5.0 sec

Default Setting: 0.0

This parameter determines the duration of time that the DC Braking Current will be applied to the motor during the AC drive start-up. DC Braking will be applied for the time set in this parameter until the Minimum Frequency is reached during acceleration.

P1.21 DC Injection during Stopping

Range: 0.0 to 25.0 sec

Default Setting: 0.0

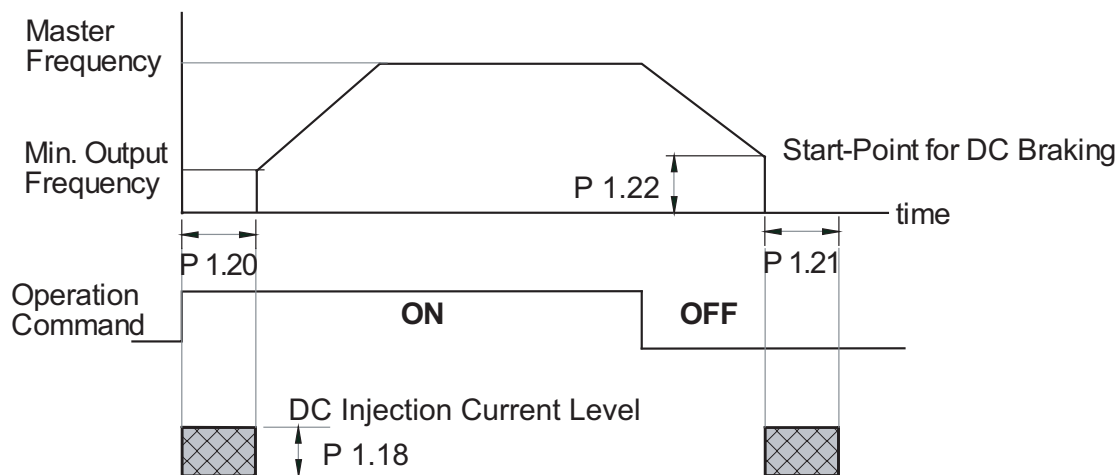
This parameter determines the duration of time that the DC braking voltage will be applied to the motor during stopping. If stopping with DC Braking is desired, then P1.00 must be set to Ramp to Stop (00).

P1.22 Start-point for DC Injection

Range: 0.0 to 60.0 Hz

Default Setting: 0.0

This parameter determines the frequency when DC Braking will begin during deceleration.



Volts/Hertz Parameters

P2.00

Volts/Hertz Settings

Settings: 00 - General Purpose (constant torque)

Default Setting: 0.0

01 - High Starting Torque

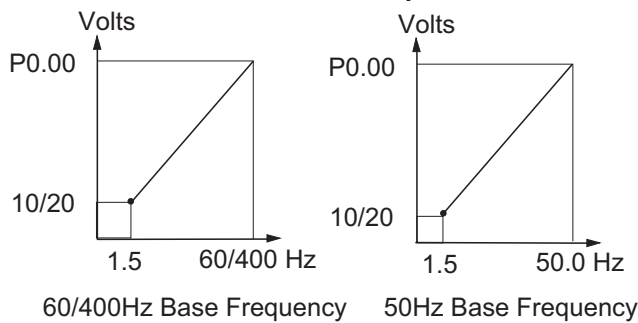
02 - Fans and Pumps (variable torque)

03 - Custom

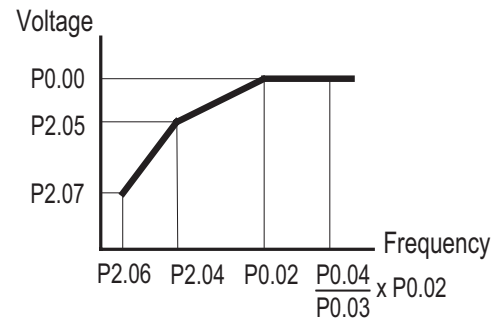


Note: P2.04 through P2.07 are only used when the Volts/Hertz parameter (P2.00) is set to 03.

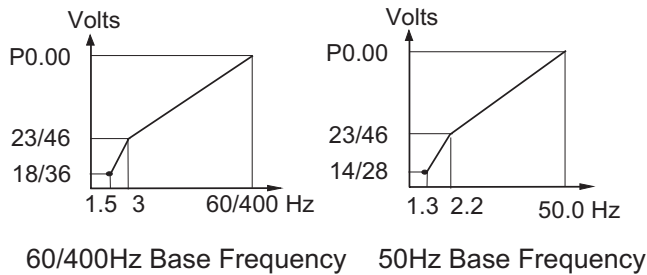
00: General Purpose



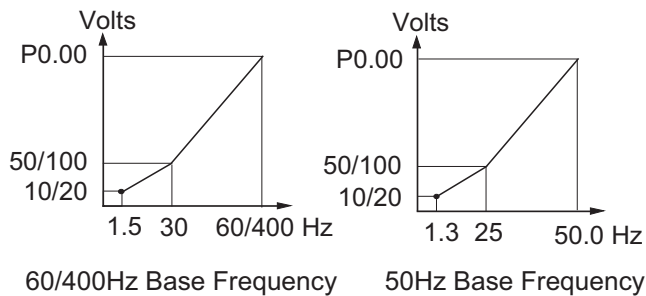
03: Custom



01: High Starting Torque



02: Fans and Pumps



P2.01

◆ Slip Compensation

Range: 0.0 to 10.0

Default Setting: 0.0

When controlling an asynchronous induction motor, load on the AC drive will increase causing an increase in slip. This parameter may be used to compensate the nominal slip within a range of 0 to 10. When the output current of the AC drive is greater than the Motor Nameplate Amps (P0.01), the AC drive will adjust its output frequency according to this parameter.

P2.02

◆ Auto-torque Boost

Range: 00 to 10

Default Setting: 00

This parameter functions similarly to the P2.00-01 High Starting Torque V/Hz setting, except that this parameter uses less current than does P2.00-01. P2.00-01 boosts starting torque by increasing current at every start beyond what is required to move the load. P2.02 Auto-torque Boost increases the current only as required to move the load. The proper setting for P2.02 is determined by trial and error.



P2.04 through P2.07 are used only when the Volts/Hertz parameter (P2.00) is set to 03.

P2.04

Mid-point Frequency

Range: 0.1 to 400 Hz

Default Setting: 1.5

This parameter sets the Mid-Point Frequency of V/F curve. With this setting, the V/F ratio between Minimum Frequency and Mid-Point frequency can be determined.

This parameter must be greater than or equal to the Minimum Output Frequency (P2.06) and less than or equal to the Maximum Voltage Frequency (P0.02). This parameter is used only when the Volts/Hertz parameter (P2.00) is set to 03.

P2.05

Mid-point Voltage

Range: 115V/230V: 2.0 to 255V

Default Setting: 10.0

460V: 2.0 to 510V

20.0

575V: 2.0 to 637V

24.0

This parameter sets the Mid-Point Voltage of any V/F curve. With this setting, the V/F ratio between Minimum Frequency and Mid-Point Frequency can be determined.

This parameter must be greater than or equal to the Minimum Output Voltage (P2.07) and less than or equal to the Maximum Output Voltage (P0.00). This parameter is used only when the Volts/Hertz parameter (P2.00) is set to 03.

P2.06 Minimum Output Frequency

Range: 0.1 to 20.0 Hz

Default Setting: 1.5

This parameter sets the Minimum Output Frequency of the AC drive.

This parameter must be less than or equal to the Mid-Point Frequency (P2.04).

This parameter is used only when the Volts/Hertz parameter (P2.00) is set to 03.

P2.07 Minimum Output Voltage

Range: 115V/230V: 2.0 to 50.0V

Default Setting: 10.0

460V: 2.0 to 100.0V

20.0

575V: 2.0 to 130.6V

24.0

This parameter sets the Minimum Output Voltage of the AC drive.

This parameter must be equal to or less than Mid-Point Voltage (P2.05). This parameter is used only when the Volts/Hertz parameter (P2.00) is set to 03.

P2.08 PWM Carrier Frequency

Range: 115V/230V/460V: 01 to 15 kHz

Default Setting: 12

575V: 01 to 10 kHz

6

This parameter sets the carrier frequency of PWM (Pulse-Width Modulated) output.

- In the table below, we see that the carrier frequency of PWM output has a significant influence on the electromagnetic noise, leakage current, heat dissipation of the AC drive and the acoustic noise to the motor:

Carrier Frequency	Acoustic Noise	Electromagnetic Noise, Leakage Current	Heat Dissipation
1kHz	significant	minimal	minimal
15 kHz	minimal	moderate	moderate

Digital Parameters

P3.00 Source of Operation Command

Default Setting: 00

Settings	00	Operation Determined by Digital Keypad
	01	Operation determined by external control terminals. Keypad STOP is enabled.
	02	Operation determined by external control terminals. Keypad STOP is disabled.
	03	Operation determined by communication interface. Keypad STOP is enabled.
	04	Operation determined by communication interface. Keypad STOP is disabled.

- This parameter sets the input source for the AC drive operation commands.
- Refer to P3.01 to P3.05 for more details.

P3.01 Multi-function Input Terminals (DI-DI2)

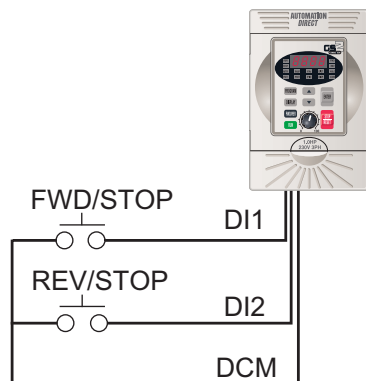
Default Setting: 00

Settings	00	DI1 - FWD/STOP DI2 - REV/STOP
	01	DI1 - RUN/STOP DI2 - REV/FWD
	02	DI1 - RUN (N.O. latching input) DI2 - REV/FWD DI3 - STOP (N.C. latching input)

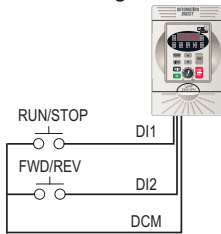


Note: Multi-function Input Terminals DI1 and DI2 do not have separate parameter designations. DI1 and DI2 must be used in conjunction with each other to operate two and three wire control.

P3.01: Setting 00

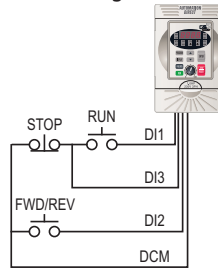


DI1	DI2	Result
OFF	OFF	STOP
ON	OFF	FWD
OFF	ON	REV
ON	ON	STOP

P3.01: Setting 01

DI1- RUN/STOP select
 "Open" : Stop
 "Close" : Run

DI2- FWD/REV select
 "Open" : FWD
 "Close" : REV

P3.01: Setting 02

DI1- RUN command
 Latching input (N.O.)
 Runs when closed

DI2- FWD/REV select
 "Open" : FWD
 "Close" : REV

DI3- STOP command
 Latching input (N.C.)
 Stops when open

P3.02	Multi-Function Input (DI3)	Default Setting: 00
P3.03	Multi-Function Input (DI4)	Default Setting: 03
P3.04	Multi-function Input (DI5)	Default Setting: 04
P3.05	Multi-function Input (DI6)	Default Setting: 05

Settings for P3.02 to P3.05:

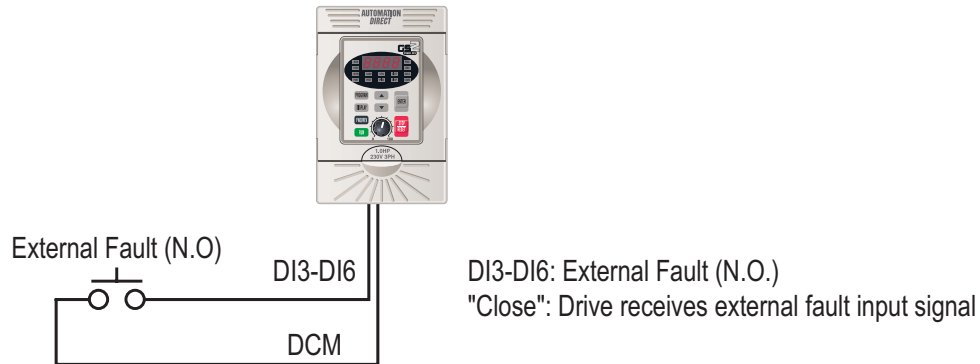
- 00 *External Fault (N.O.)
- 01 *External Fault (N.C.)
- 02 External Reset
- 03 Multi-Speed/PID SP Bit 1
- 04 Multi-Speed/PID SP Bit 2
- 05 Multi-Speed/PID SP Bit 3
- 06 Reserved
- 07 Reserved
- 08 Reserved
- 09 Jog
- 10 External Base Block (N.O.)
- 11 External Base Block (N.C.)
- 12 Second Accel/Decel Time
- 13 Speed Hold
- 14 Increase Speed (P4.00 must be set to 01)
- 15 Decrease Speed (P4.00 must be set to 01)
- 16 Reset Speed to Zero (P4.00 must be set to 01)
- 17 PID Disable (N.O.)
- 18 PID Disable (N.C.)
- 99 Input Disable

* Use either 00 or 01, but not both. Use interposing relays if more contacts are needed.

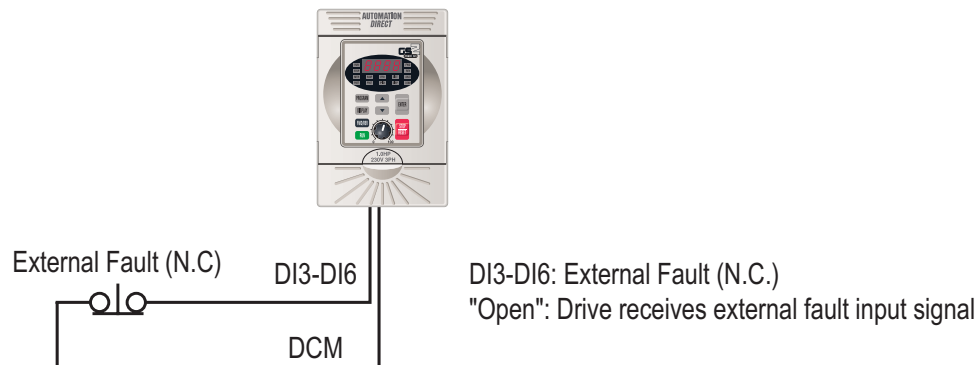
Setting Explanations for parameters P3.02 - P3.05

Setting 00: External Fault (N.O.)

When an External Fault input signal is received, the AC drive output will turn off, the drive will display “EF” on the LED Display, and the motor will Coast to Stop. To resume normal operation, the external fault must be cleared, and the drive must be reset.

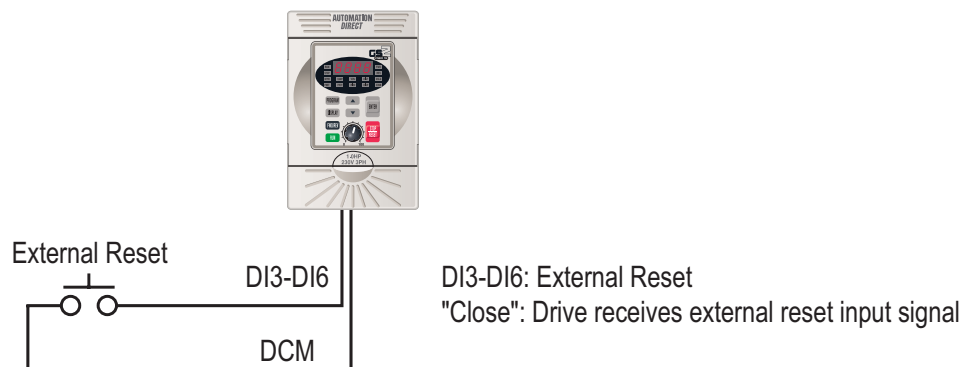


Setting 01: External Fault (N.C.)



Setting 02: External Reset

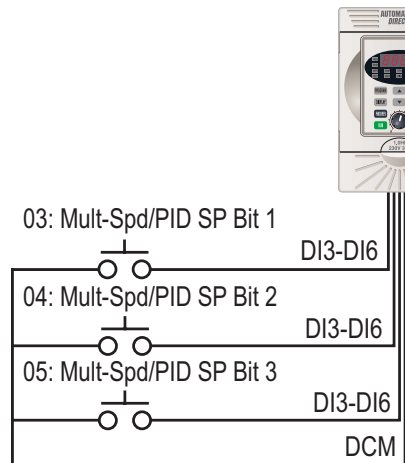
An External Reset has the same function as the Reset key on the digital keypad. Use an External Reset to reset the drive after a fault.



Settings 03, 04, and 05: Multi-Speed/PID SP Bits 1, 2, and 3

If PID operation is inhibited ($P7.00 = 00$), the three Multi-Speed/PID SP Bits are used to select the multi-speed settings defined by P5.01 to P5.07.

If PID operation is enabled ($P7.00 \neq 00$), the three Multi-Speed/PID SP Bits are used to select the PID multi-setpoint settings defined by P7.11 to P7.17.



Multi-Spd/PID SP			Speed Selection	PID SP Selection
Bit 3	Bit 2	Bit 1		
OFF	OFF	OFF	P4.00	P7.02
OFF	OFF	ON	P5.01: Spd 1	P7.11: SP 1
OFF	ON	OFF	P5.02: Spd 2	P7.12: SP 2
OFF	ON	ON	P5.03: Spd 3	P7.13: SP 3
ON	OFF	OFF	P5.04: Spd 4	P7.14: SP 4
ON	OFF	ON	P5.05: Spd 5	P7.15: SP 5
ON	ON	OFF	P5.06: Spd 6	P7.16: SP 6
ON	ON	ON	P5.07: Spd 7	P7.17: SP 7



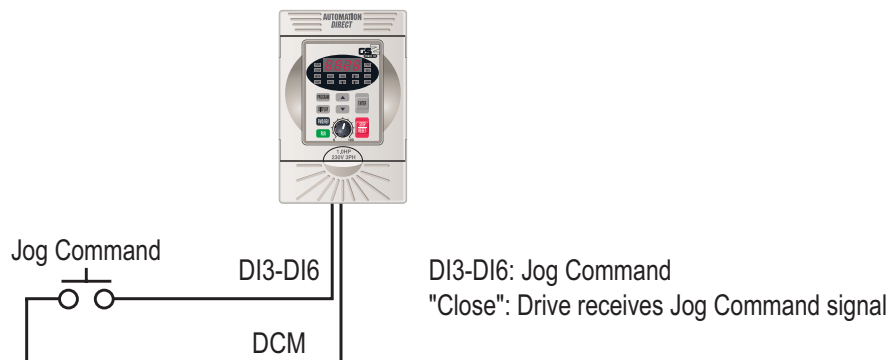
Note: In order to use the Multi-Speed settings, parameters 5.01 to 5.07 must be set. In order to use the Multi-PID SP settings, parameters 7.11 to 7.17 must be set.



Note: When all multi-speed inputs are off, the AC drive reverts back to the Source of Frequency Command (P4.00), or the PID Setpoint Source (P7.02).

Setting 09: Jog Command

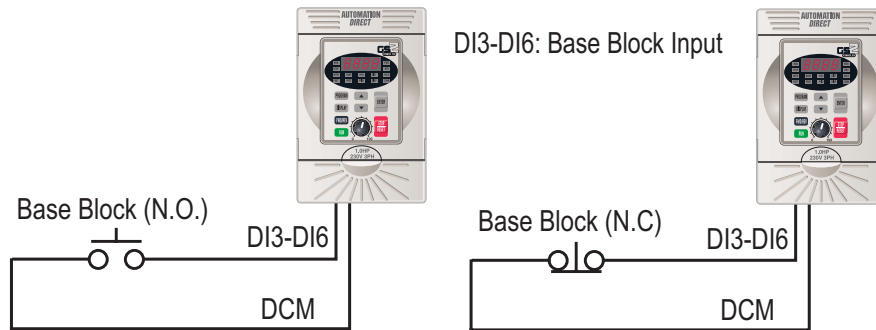
This setting configures a Multi-function Input Terminal to give the Jog Command when activated. P5.00 sets the Jog Speed.



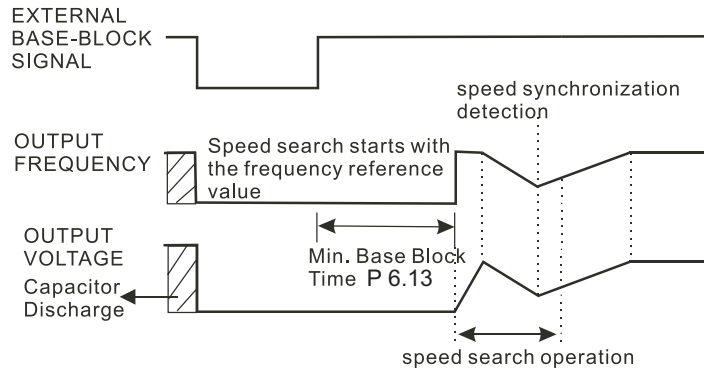
Note: The motor must be stopped to initiate this command. The Jog Command cannot be used simultaneously with an active FWD/STOP, REV/STOP, or RUN/STOP command. The Jog Command can be used with an active REV/FWD command.

Settings 10 and 11: External Base Block (N.O.) and External Base Block (N.C.)

Value 10 is for a normally open (N.O) input and value 11 is for a normally closed (N.C.) input.

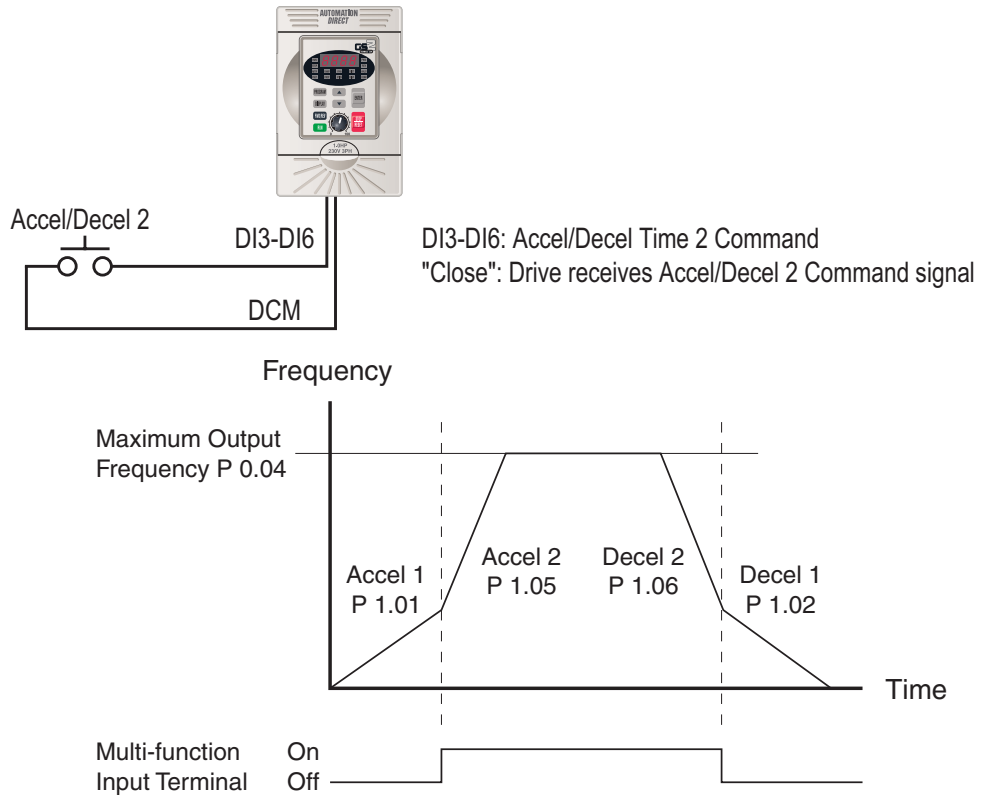


When an External Base Block is activated, the LED display shows **bb**, the AC drive stops all output, and the motor will free run. When the External Base Block is deactivated, the AC drive will start the speed search function and synchronize with the motor speed. The AC drive will then accelerate to the Master Frequency.



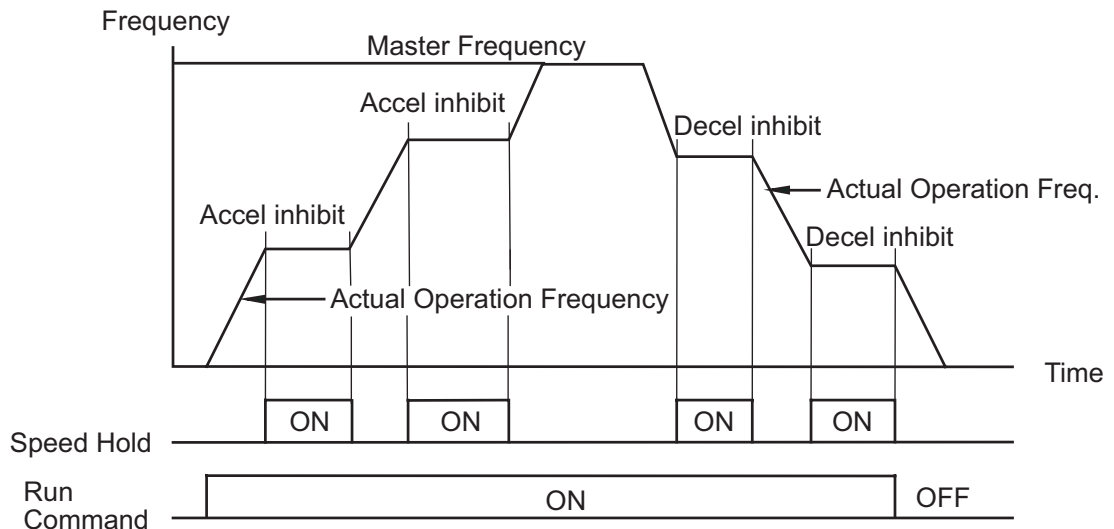
Setting 12: Second Accel/Decel Time

Multi-function Input Terminals DI3-DI6 can be set to select between Accel/Decel times 1 and 2. Parameters P1.01 and P1.02 set Accel 1 and Decel 1 times. Parameters P1.05 and P1.06 set Accel 2 and Decel 2 times.



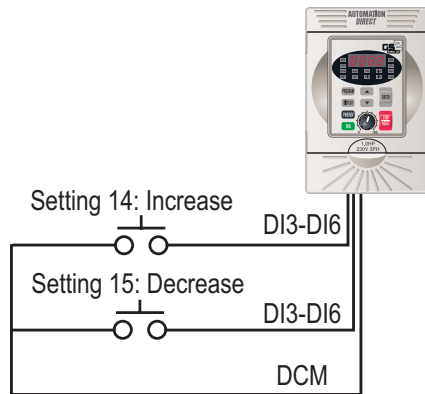
Setting 13: Speed Hold

When the Speed Hold command is received, the drive acceleration or deceleration is stopped and the drive maintains a constant speed.



Settings 14 and 15: Increase and Decrease Speed (Electronic Motor Operated Potentiometer)

Settings 14 and 15 allow the Multi-function terminals to be used to increase or decrease speed. As long as the DI terminal is activated, the speed reference will continuously increase or decrease according to the acceleration and deceleration ramp settings.

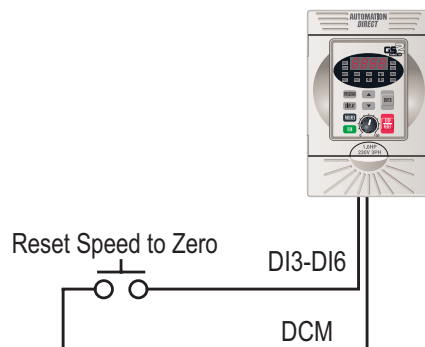


DI3-DI6: Increase or Decrease Frequency
"Close": Drive receives Increase or Decrease Frequency Input



Note: In order to use these settings, P4.00 must be set to 01.

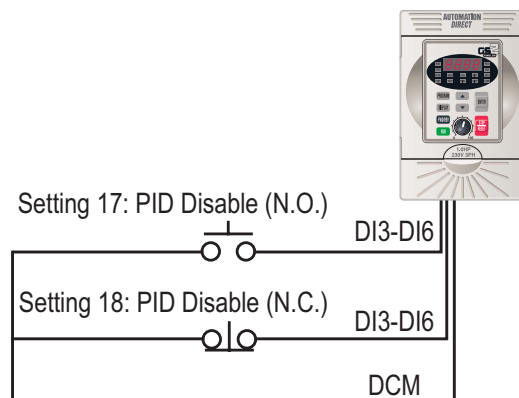
Setting 16: Reset Speed to Zero



DI3-DI6: Reset Speed to Zero
"Close": Drive receives Reset Speed to Zero signal

Settings 17 and 18: PID Disable (N.O) and (N.C.)

Settings 17 and 18 set the Multi-function terminals to disable PID operation.



DI3-DI6: PID Disable (N.O.) or (N.C.)

Setting 99: Multi-Function Input Disable

Setting a Multi-Function Input to 99 will disable that input. The purpose of this function is to provide isolation for unused Multi-Function Input Terminals. Any unused terminals should be programmed to 99 to make sure they have no effect on drive operation.



*Note: Any **unused terminals** should be programmed to **99** to make sure they have no effect on drive operation.*

P3.11 Multi-function Output Terminal 1

Default Setting: 00

P3.12 Multi-function Output Terminal 2

Default Setting: 01

Settings for P3.11 to P3.12:

Settings:	00	AC Drive Running
	01	AC Drive Fault
	02	At Speed
	03	Zero Speed
	04	Above Desired Frequency (P3.16)
	05	Below Desired Frequency (P3.16)
	06	At Maximum Speed (P0.02)
	07	Over Torque Detected
	08	Above Desired Current (P3.17)
	09	Below Desired Current (P3.17)
	10	PID Deviation Alarm (P3.18 and P3.19)

Setting Function Explanations:

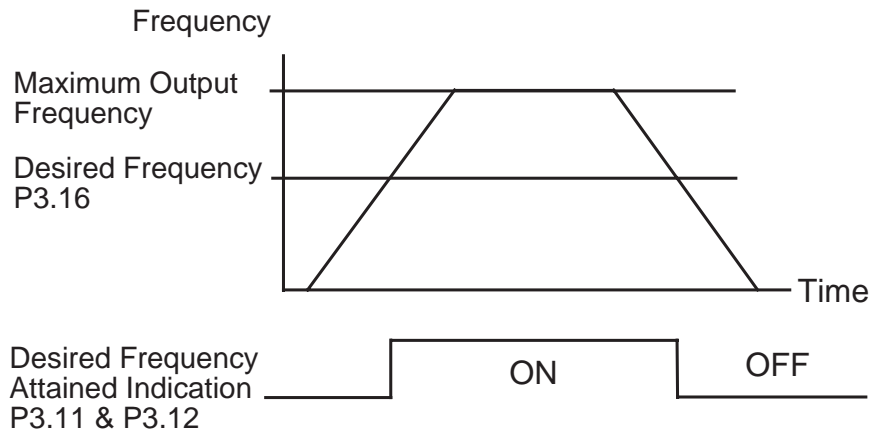
- 00: AC Drive Running—The terminal will be activated when there is an output from the drive.
- 01: AC Drive Fault—The terminal will be activated when one of the faults listed under parameters P6.31 through P6.36 occurs.
- 02: At Speed—The terminal will be activated when the AC drive attains the Command Frequency (P4.00 or P5.01~P5.07).
- 03: Zero Speed—The output will be activated when Command Frequency (P4.00 or P5.01~P5.07) is lower than the Minimum Output Frequency (P2.06).
- 04: Above Desired Frequency—The output will be activated when the AC drive is above the Desired Frequency (P3.16).
- 05: Below Desired Frequency—The output will be activated when the AC drive is below the Desired Frequency (P3.16).
- 06: At Maximum Speed—The output will be activated when the AC drive reaches Motor Maximum RPM (P0.04).
- 07: Over Torque Detected—The output will be activated when the AC drive reaches the Over-torque Detection Level (P6.08), and exceeds this level for a time greater than the Over-torque Detection Time (P6.09).
- 08: Above Desired Current—The output will be activated when the AC drive is above the Desired Current (P3.17).
- 09: Below Desired Current—The output will be activated when the AC drive is below the Desired Current (P3.17).
- 10: PID Deviation Alarm—The output will be activated when the AC drive exceeds the PID Deviation Level (P3.18) for longer than the PID Deviation Time (P3.19).

P3.16 ◆ **Desired Frequency**

Range: 0.0 to 400.0 Hz

Default Setting: 0.0

- If a Multi-function output terminal is set to function as Desired Frequency Attained (P3.11 or P3.12 = 04 or 05), then the output will be activated when the programmed frequency is attained.

**P3.17** ◆ **Desired Current**

Range: 0.0 to <Drive Rated Amps>

Default Setting: 0.0

P3.18 ◆ **PID Deviation Level**

Range: 1.0 to 50.0%

Default Setting: 10.0

P3.19 ◆ **PID Deviation Time**

Range: 0.1 to 300.0 sec

Default Setting: 5.0

Analog Parameters

P4.00

Source of Frequency Command

Default: 00

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



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

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



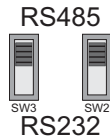
Switch SW1 must be set to ACI in order to use a 4 to 20mA input

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



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

- 05 Frequency determined by RS-232/RS-485 communication interface. Switches SW2 and SW3 must be set to RS-232 or RS-485.



RS-232 / RS-485 communication is determined by switches SW2 & SW3

P4.01

Analog Input Offset Polarity

Range: 00 Offset disabled

Default Setting: 00

- 01 Positive Offset
- 02 Negative Offset

- This parameter sets the potentiometer Bias Frequency to be positive or negative.
- The Analog Input Offset calculation will also define the Offset Polarity. See the note after P4.02.

P4.02 ◆ Analog Input Offset

Range: 0.0 to 100%

Default Setting: 0.0

This parameter can be set during the operation

- This parameter provides a frequency offset for an analog input.
- Use the equation below to determine the Analog Input Offset. For this equation, you will need to know the necessary Minimum Frequency References and Maximum Output Frequency needed for your application.

$$\text{Analog Offset \%} = \left(\frac{\text{Min. Frequency Reference}}{\text{Max. Frequency Reference}} \right) \times 100$$



Note: The result of the Analog Input Offset calculation will also define the Analog Input Offset Polarity (P4.01). A positive answer means you should have a positive offset. A negative answer means you should have a negative offset.

P4.03 ◆ Analog Input Gain

Range: 0.0 to 300.0%

Default Setting: 100.0

This parameter can be set during the operation

- This parameter sets the ratio of analog input vs frequency output.
- Use the equation below to calculate the Analog Input Gain. For this equation, you will need to know the minimum and maximum set-point frequencies needed for your application.

$$\text{Analog Gain \%} = \left(\frac{\text{Max. Frequency Reference} - \text{Min. Frequency Reference}}{\text{Maximum Output Frequency}} \right) \times 100$$

P4.04 Analog Input Reverse Motion Enable

Range: 00 Forward Motion Only

Default Setting: 00

01 Reverse Motion Enable

- P4.01 to P4.04 are used when the source of frequency command is the analog signal (0 to +10 VDC, 0 to 20 mADC, or 4 to 20 mADC). Refer to the following examples:

Analog Input Examples

Use the equations below when calculating the values for the Maximum Output Frequency, Analog Input Offset, Analog Input Gain, and the Mid-point Frequency.

$$\text{A) Max. Output Frequency} = \left(\frac{\text{Motor Max. RPM (P0-04)}}{\text{Motor Base RPM (P0-03)}} \right) \times \text{Base Frequency (P0-02)}$$



Note: The Maximum Output Frequency is not a parameter setting, but is needed in order to calculate the Analog Gain. The default Maximum Output Frequency for the GS2 drive is 60Hz. If parameters P0.02, P0.03, or P0.04 are changed, then the Maximum Output Frequency will change.

$$\text{B) Analog Offset \%} = \left(\frac{\text{Min. Frequency Reference}}{\text{Max. Frequency Reference}} \right) \times 100$$

$$\text{C) Analog Gain \%} = \left(\frac{\text{Max. Frequency Reference} - \text{Min. Frequency Reference}}{\text{Maximum Output Frequency}} \right) \times 100$$

$$\text{D) Mid-point Freq.} = \left(\frac{\text{Max. Freq. Reference} - \text{Min. Freq. Reference}}{2} \right) + \text{Min. Freq. Reference}$$



Note: The Mid-point Frequency calculation shows the frequency reference of the drive when the potentiometer or other analog device is at its mid-point.

Example 1: Standard Operation

This example illustrates the default operation of the drive. The example is given to further illustrate the use of the analog calculations. The full range of the analog input signal corresponds to the full forward frequency range of the AC drive.

- Minimum Frequency Reference = 0Hz
- Maximum Frequency Reference = 60Hz

Calculations

$$A) \text{ Max. Output Frequency} = \left(\frac{1750 \text{ RPM}}{1750 \text{ RPM}} \right) \times 60\text{Hz} = 60\text{Hz}$$

$$B) \text{ Analog Offset \%} = \left(\frac{0\text{Hz}}{60\text{Hz}} \right) \times 100 = 0\%$$

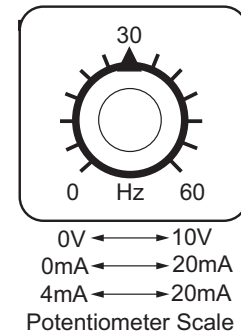
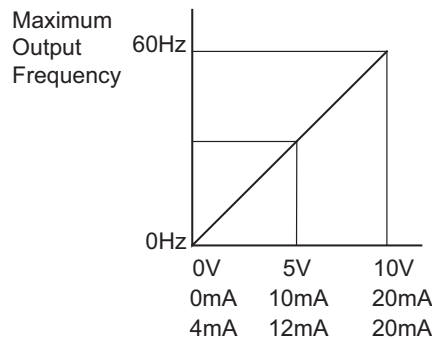
$$C) \text{ Analog Gain \%} = \left(\frac{60\text{Hz} - 0\text{Hz}}{60\text{Hz}} \right) \times 100 = 100\%$$

$$D) \text{ Mid-point Frequency} = \left(\frac{60\text{Hz} - 0\text{Hz}}{2} \right) + 0\text{Hz} = 30\text{Hz}$$

Parameter Settings

- P4.01: 01 – Positive Input Offset Polarity
P4.02: 00 – 0% Analog Input Offset
P4.03: 100 – 100% Analog Input Gain
P4.04: 00 – Forward Motion Only

Results



Example 2: Positive Offset

In this example, the Analog Input will have a positive offset while still using the full scale of the potentiometer. When the potentiometer is at its lowest value (0V, 0mA, or 4mA), the set-point frequency will be at 10Hz. When the potentiometer is at its maximum value (10V or 20mA), the set-point frequency will be at 60Hz.

- Minimum Frequency Reference = 10Hz
- Maximum Frequency Reference = 60Hz

Calculations

$$A) \text{ Max. Output Frequency} = \left(\frac{1750 \text{ RPM}}{1750 \text{ RPM}} \right) \times 60\text{Hz} = 60\text{Hz}$$

$$B) \text{ Analog Offset \%} = \left(\frac{10\text{Hz}}{60\text{Hz}} \right) \times 100 = 16.7\%$$

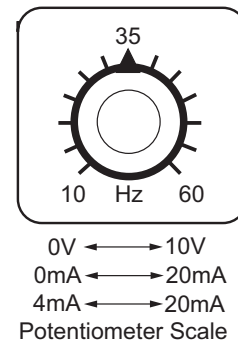
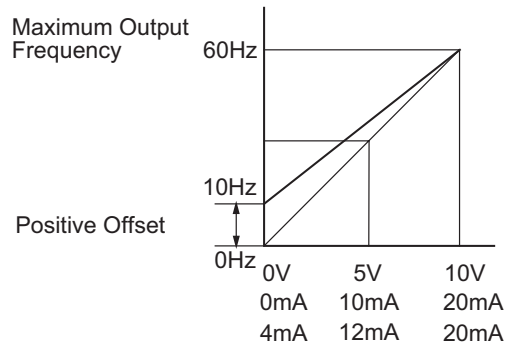
$$C) \text{ Analog Gain \%} = \left(\frac{60\text{Hz} - 10\text{Hz}}{60\text{Hz}} \right) \times 100 = 83.3\%$$

$$D) \text{ Mid-point Frequency} = \left(\frac{60\text{Hz} - 10\text{Hz}}{2} \right) + 10\text{Hz} = 35\text{Hz}$$

Parameter Settings

P4.01: 01 – Positive Input Offset Polarity
P4.02: 16.7 – 16.7% Analog Input Offset
P4.03: 83.3 – 83.3% Analog Input Gain
P4.04: 00 – Forward Motion Only

Results



Example 3: Forward and Reverse Operation

In this example, the potentiometer is programmed to run a motor full-speed in both forward and reverse direction. The frequency reference will be 0Hz when the potentiometer is positioned at mid-point of its scale. Parameter P4.04 must be set to enable reverse motion.



Note: When calculating the values for the Analog Input using reverse motion, the reverse frequency reference should be shown using a negative (-) number. Pay special attention to signs (+/-) for values representing reverse motion.

- Minimum Frequency Reference = -60Hz (reverse)
- Maximum Frequency Reference = 60Hz

Calculations

$$A) \text{ Max. Output Frequency} = \left(\frac{1750 \text{ RPM}}{1750 \text{ RPM}} \right) \times 60\text{Hz} = 60\text{Hz}$$

$$B) \text{ Analog Offset \%} = \left(\frac{-60\text{Hz}}{60\text{Hz}} \right) \times 100 = -100\%$$



Note: The negative (-) value for the Analog Offset % shows that a negative offset is needed for P4.01.

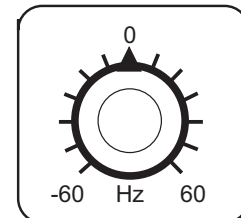
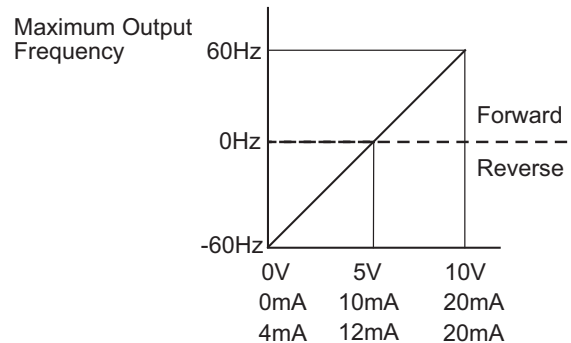
$$C) \text{ Analog Gain \%} = \left(\frac{60\text{Hz} - (-60\text{Hz})}{60\text{Hz}} \right) \times 100 = 200\%$$

$$D) \text{ Mid-point Frequency} = \left(\frac{60\text{Hz} - (-60\text{Hz})}{2} \right) + (-60\text{Hz}) = 0\text{Hz}$$

Parameter Settings

P4.01: 02 – Negative Input Offset Polarity
 P4.02: 100 – 100% Analog Input Offset
 P4.03: 200 – 200% Analog Input Gain
 P4.04: 01 – Reverse Motion Enable

Results



0V ←→ 10V
 0mA ←→ 20mA
 4mA ←→ 20mA
 Potentiometer Scale

Example 4: Forward Run/Reverse Jog

This example shows an application in which the drive runs full-speed forward and jogs in reverse. The full scale of the potentiometer will be used.



Note: When calculating the values for the Analog Input using reverse motion, the reverse frequency reference should be shown using a negative (-) number. Pay special attention to signs (+/-) for values representing reverse motion.

- Minimum Frequency Reference = -15Hz (reverse)
- Maximum Frequency Reference = 60Hz

Calculations

$$\text{A) Max. Output Frequency} = \left(\frac{1750 \text{ RPM}}{1750 \text{ RPM}} \right) \times 60\text{Hz} = 60\text{Hz}$$

$$\text{B) Analog Offset \%} = \left(\frac{-15\text{Hz}}{60\text{Hz}} \right) \times 100 = -25\%$$



Note: The negative (-) value for the Analog Offset % shows that a negative offset is needed for P4.01.

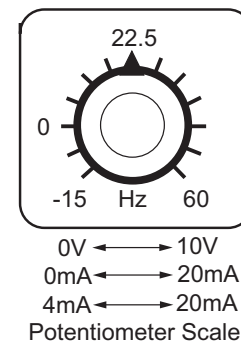
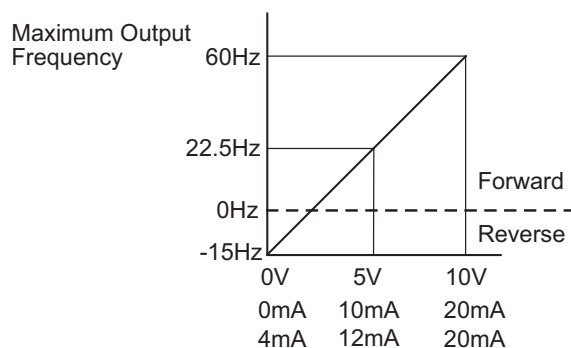
$$\text{C) Analog Gain \%} = \left(\frac{60\text{Hz} - (-15\text{Hz})}{60\text{Hz}} \right) \times 100 = 125\%$$

$$\text{D) Mid-point Frequency} = \left(\frac{60\text{Hz} - (-15\text{Hz})}{2} \right) + (-15\text{Hz}) = 22.5\text{Hz}$$

Parameter Settings

- P4.01: 02 – Negative Input Offset Polarity
- P4.02: 25 – 25% Analog Input Offset
- P4.03: 125 – 125% Analog Input Gain
- P4.04: 01 – Reverse Motion Enable

Results



Example 5: Reduced Analog Gain and Increased Maximum Output Frequency

This example illustrates two separate features:

- 1) limiting the Maximum Frequency Reference by reducing the Analog Input Gain
- 2) increasing the Maximum Output Frequency to run the motor faster than the Motor Base RPM

When the Analog Input is at its maximum value (10V or 20mA), the set-point frequency will be 50Hz. However, the Jog and Multi-speed settings can set the output as high as 70Hz.

- Minimum Frequency Reference = 0Hz
- Maximum Frequency Reference = 50 Hz
- Motor Maximum RPM = 2042 rpm



WARNING: The Motor Maximum RPM parameter (P0.04) should never exceed the maximum speed rating for the motor you are using. If this information is not readily available, consult your motor manufacturer.

Calculations

$$A) \text{ Max. Output Frequency} = \left(\frac{2042 \text{ RPM}}{1750 \text{ RPM}} \right) \times 60\text{Hz} = 70\text{Hz}$$

$$B) \text{ Analog Offset \%} = \left(\frac{0\text{Hz}}{50\text{Hz}} \right) \times 100 = 0\%$$

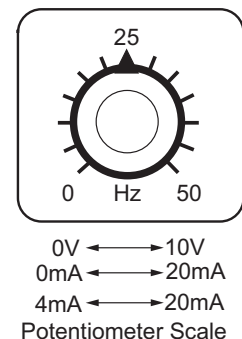
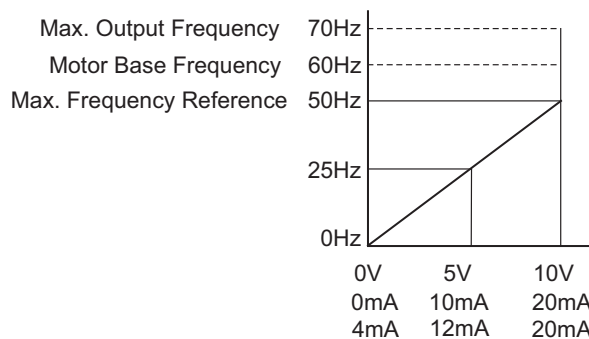
$$C) \text{ Analog Gain \%} = \left(\frac{50\text{Hz} - (0\text{Hz})}{70\text{Hz}} \right) \times 100 = 71.4\%$$

$$D) \text{ Mid-point Frequency} = \left(\frac{50\text{Hz} - (0\text{Hz})}{2} \right) + (0\text{Hz}) = 25\text{Hz}$$

Parameter Settings

P0.04: 2042 – Motor Maximum RPM
 P4.01: 00 – Offset disabled
 P4.02: 00 – 0% Analog Input Offset
 P4.03: 71.4 – 71.4% Analog Input Gain
 P4.04: 00 – Forward Motion Only

Results



P4.05 Loss of ACI Signal (4-20mA)

Settings: 00 - Decelerate to 0Hz

Default Setting: 00

01 - Stop immediately and display "EF".

02 - Continue operation by the last frequency command

This parameter determines the operation of the drive when the ACI frequency command is lost.

P4.11 Analog Output Signal

Range: 00 - Frequency Hz

Default Setting: 00

01 - Current A

02 - PV

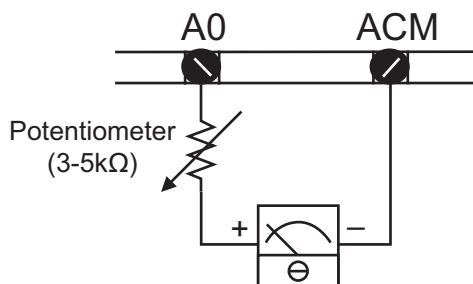
This parameter selects either Output Frequency or current to be displayed using the 0 to 10V A0 output.

P4.12 Analog Output Gain

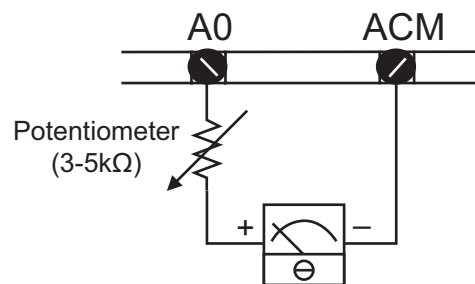
Range: 00 to 200%

Default Setting: 100

This parameter sets the voltage range of the analog output signal, on output terminal A0.



Analog Frequency Meter



Analog Current Meter

- The analog output voltage is directly proportional to the output frequency of the AC drive. With the factory setting of 100%, the Maximum Output Frequency of the AC drive corresponds to +10VDC analog voltage output. (The actual voltage is about +10VDC, and can be adjusted by P4.12)
- The analog output voltage is directly proportional to the output current of the AC drive. With the factory setting of 100%, the 2.5 times rated current of the AC drive corresponds to +10 VDC analog voltage output. (The actual voltage is about +10 VDC, and can be adjusted by P4.12).

Note: Any type of voltmeter can be used. If the meter reads full scale at a voltage less than 10 volts, then P4.12 should be set by the following formula:

$$\text{P4.12} = (\text{meter full scale voltage} \div 10) \times 100\%$$

For Example: When using the meter with full scale of 5 Volts, adjust P4.12 to 50%.

Preset Parameters

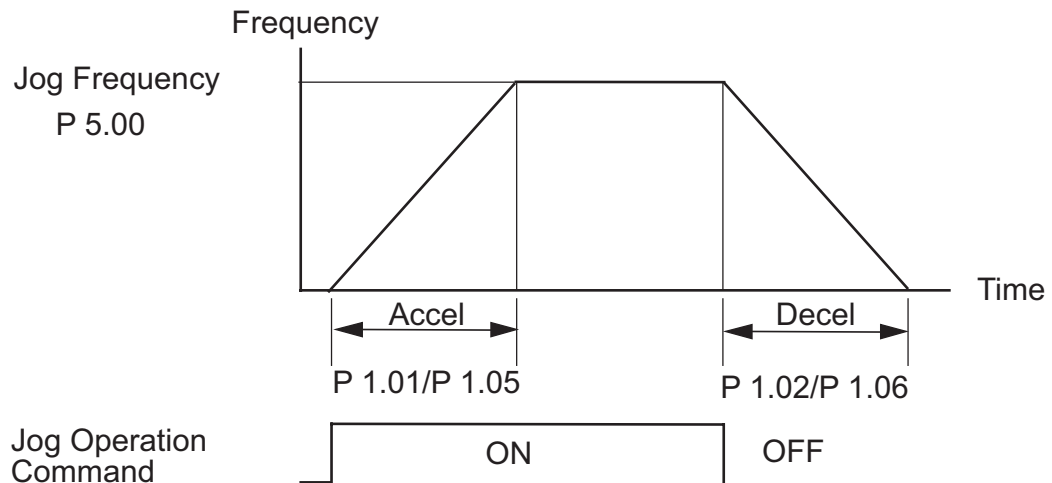
P5.00

◆ Jog

Range: 0.0 to 400.0 Hz

Default Setting: 6.0

The Jog Command is selected by a Multi-Function Input Terminal (P3.02 to P3.05) set to the Jog Function (09).



P5.01 ◆ Multi-Speed 1

P5.02 ◆ Multi-Speed 2

P5.03 ◆ Multi-Speed 3

P5.04 ◆ Multi-Speed 4

P5.05 ◆ Multi-Speed 5

P5.06 ◆ Multi-Speed 6

P5.07 ◆ Multi-Speed 7

Range for P5.01 - P5.07: 0.0 to 400.0 Hz

Default Setting: 0.0

- The Multi-Function Input Terminals (refer to P3.01 to P3.05) are used to select one of the AC drive Multi-Step speeds. The speeds (frequencies) are determined by P5.01 to P5.07 shown above.

Multi-Speed Bits			Speed Selection
Bit 3	Bit 2	Bit 1	
OFF	OFF	OFF	P4.00: Source of Frequency
OFF	OFF	ON	P5.01: Multi-Speed 1
OFF	ON	OFF	P5.02: Multi-Speed 2
OFF	ON	ON	P5.03: Multi-Speed 3
ON	OFF	OFF	P5.04: Multi-Speed 4
ON	OFF	ON	P5.05: Multi-Speed 5
ON	ON	OFF	P5.06: Multi-Speed 6
ON	ON	ON	P5.07: Multi-Speed 7



Note: When all multi-speed inputs are off, the AC drive reverts back to the Command Frequency (P4.00).

Protection Parameters

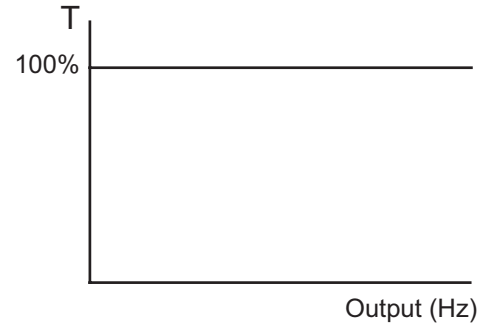
P6.00 Electronic Thermal Overload Relay

Default Setting: 00

Settings:

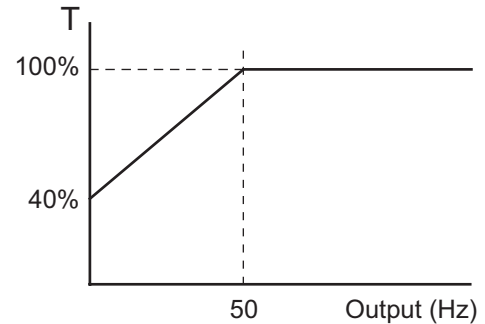
00 Constant Torque (inverter/vector duty motors)

Use this setting when using the drives with motors designed specifically for AC drive outputs and for running at low speeds with high currents. Motor currents will be 100% throughout the speed range, and can be up to 150% for one minute.



01 Variable Torque (fan cooled standard motors)

Use this setting when using the drives with motors which are NOT designed specifically for AC drive outputs. Motors with shaft mounted fans offer poor cooling at low speeds, therefore the output can be derated at lower output frequencies. This derated current is for protecting the motor at lower speeds.



The output current is derated as follows:

- $I_{\text{output}} (\%) = [f_{\text{output}} (\text{Hz}) \times 1.2 \%/\text{Hz}] + 40\%$

Example:

If the rated motor current is 10A, and the output frequency is 25Hz, the derating will be 70%, and the overload will be 10.5A (150%) for one minute.

- $I_{\text{output}} (\%) = [(25\text{Hz}) (1.2 \%/\text{Hz})] + 40\% = 70\%$
- $10\text{A} \times 70\% = 7\text{A}$
- $7\text{A} \times 150\% = 10.5\text{A}$

02 Inactive

P6.01 Auto Restart After Fault

Range: 00 to 10

Default Setting: 00

- After fault occurs (allowable faults: over-current OC, over-voltage OV), the AC drive can be reset/restarted automatically up to 10 times. Setting this parameter to 0 will disable the reset/restart operation after any fault has occurred. When enabled, the AC drive will restart with speed search, which starts at the previous Frequency. To set the fault recovery time after a fault, please see (P6.13) base-block time for speed search.

P6.02 Momentary Power Loss

Default Setting: 00

Settings:	00	Stop operation after momentary power loss.
	01	Continue operation after momentary power loss, speed search from Speed Reference.
	02	Continue operation after momentary power loss, speed search from Minimum Speed.



Note: Also refer to P6.30, Line Start Lockout.

Note: This parameter (P6.02) will work only if the Source of Operation (P3.00) is set to something other than 00 (Operation determined by digital keypad).

P6.03 Reverse Operation Inhibit

Default Setting: 00

Settings:	00	Enable Reverse Operation
	01	Disable Reverse Operation

This parameter determines whether the AC Motor Drive can operate in the reverse direction.

P6.04**Auto Voltage Regulation**

Default Setting: 00

Settings:	00	AVR enabled
	01	AVR disabled
	02	AVR disabled during decel
	03	AVR disabled during Stop

- AVR function automatically regulates the AC drive output voltage to the Maximum Output Voltage (P0.00). For instance, if P0.00 is set at 200 VAC and the input voltage is at 200V to 264 VAC, then the Maximum Output Voltage will automatically be regulated to 200 VAC.
- Without AVR function, the Maximum Output Voltage may vary between 180V to 264 VAC, due to the input voltage varying between 180V to 264 VAC.
- Selecting program value 2 enables the AVR function and also disables the AVR function during deceleration. This offers a quicker deceleration.

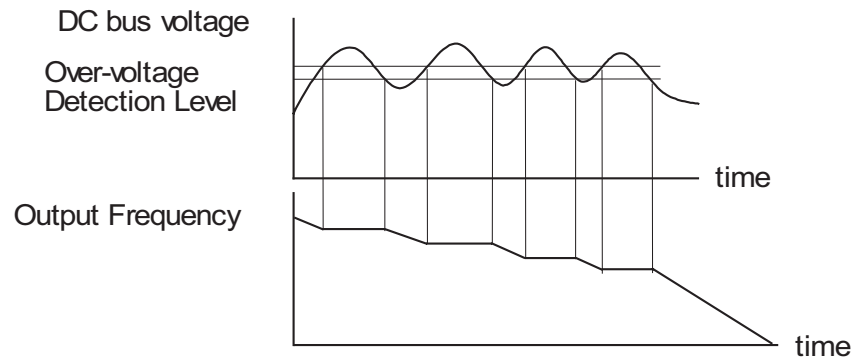
P6.05**Over-Voltage Stall Prevention**

Range: 00 Enable Over-voltage Stall Prevention

Default Setting: 00

01 Disable Over-voltage Stall Prevention

- During deceleration, the AC drive DC bus voltage may exceed its Maximum Allowable Value due to motor regeneration. When this function is enabled, the AC drive will stop decelerating, and maintain a constant output frequency. The drive will resume deceleration when the voltage drops below the factory-preset value.



Note: With moderate inertial loads, over-voltage during deceleration will not occur. For applications with high inertia loads, the AC drive will automatically extend the deceleration time. If deceleration time is critical for the application, a dynamic braking resistor should be used. Set this parameter to 01 (disable) when using a dynamic braking resistor.

P6.06 Auto Adjustable Accel/Decel

Default Setting: 00

Settings:	00	Linear Accel/Decel
	01	Auto Accel, Linear Decel
	02	Linear Accel, Auto Decel
	03	Auto Accel/Decel
	04	Auto Accel/Decel Stall Prevention

If the auto accel/decel is selected, the AC drive will accel/decel in the fastest and smoothest means possible by automatically adjusting the time of accel/decel.

This parameter provides five modes to choose:

- 00 Linear Acceleration and deceleration (operation by P1.01, P1.02 or P1.05, P1.06 acceleration/deceleration time).
- 01 Automatic acceleration, linear deceleration (Operation by automatic acceleration time, P1.02 or P1.06 deceleration time).
- 02 Linear acceleration and automatic deceleration (Operation by automatic acceleration time, P1.01 or P1.05 acceleration time).
- 03 Automatic acceleration, deceleration (Operation by AC drive auto adjustable control).
- 04 Auto acceleration, deceleration. The auto accel/decel will not be quicker than the settings for acceleration (P1.01 or P1.05) or deceleration (P1.02 or P1.06). The operation is specific to preventing a stall.

P6.07 Over-Torque Detection Mode

Default Setting: 00

Settings:	00	Disabled
	01	Enabled during constant speed operation
	02	Enabled during acceleration

P6.08 Over-Torque Detection Level

Range: 30 to 200%

Default Setting: 150

- A setting of 100% is proportional to the Rated Output Current of the drive.
- This parameter sets the Over-Torque Detection level in 1% increments. (The AC drive rated current is equal to 100%.)

P6.09 Over-Torque Detection Time

Range: 0.1 to 10.0

Default Setting: 0.1

This parameter sets the Over-Torque Detection Time in units of 0.1 seconds.

P6.10 Over-Current Stall Prevention During Acceleration

Range: 20 to 200%

Default Setting: 150

A setting of 100% is equal to the Rated Output Current of the drive.

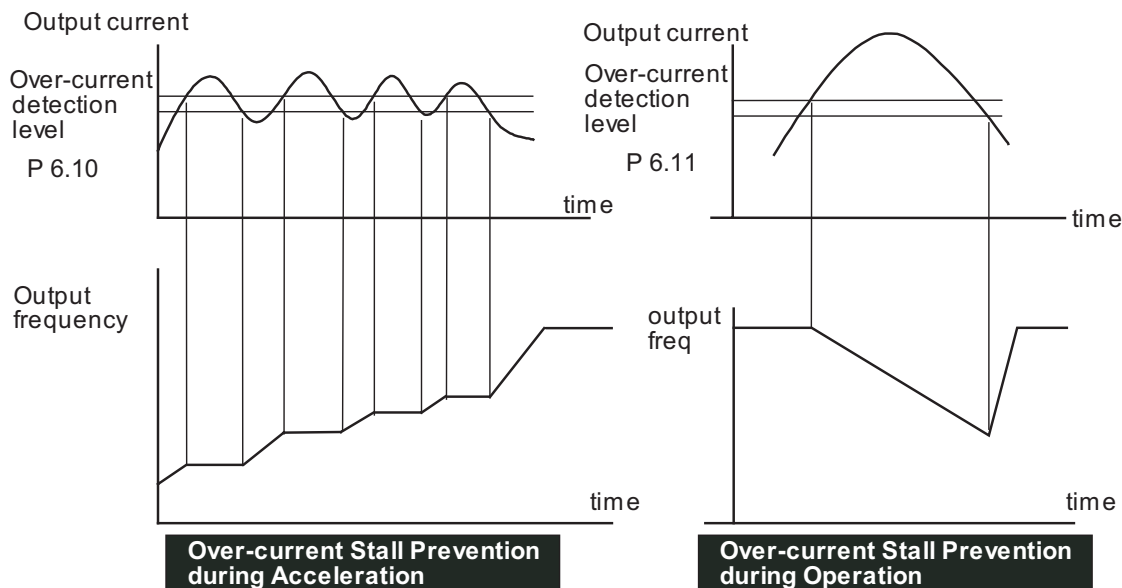
- Under certain conditions, the AC drive output current may increase abruptly, and exceed the value specified by P6.10. This is commonly caused by rapid acceleration or excessive load on the motor. When this function is enabled, the AC drive will stop accelerating and maintain a constant output frequency. The AC drive will only resume acceleration when the current drops below the maximum value.

P6.11 Over-Current Stall Prevention During Operation

Range: 20 to 200%

Default Setting: 150

- During steady-state operation with motor load rapidly increasing, the AC drive output current may exceed the limit specified in P6.11. When this occurs, the output frequency will decrease to maintain a constant motor speed. The drive will accelerate to the steady-state output frequency only when the output current drops below the level specified by P6.11.



P6.12 Maximum Allowable Power Loss Time

Range: 0.3 to 5.0 sec

Default Setting: 2.0

- During a power loss, if the power loss time is less than the time defined by this parameter, the AC drive will resume operation. If the Maximum Allowable Power Loss Time is exceeded, the AC drive output is turned off.

P6.13 Base-Block Time for Speed Search

Range: 0.3 to 5.0 sec

Default Setting: 0.5

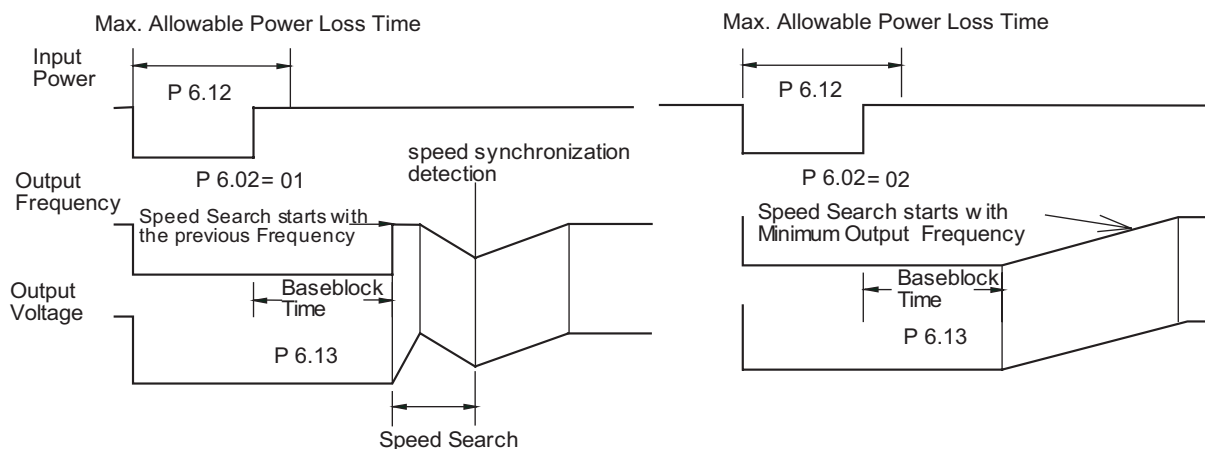
- When a momentary power loss is detected, the AC drive turns off for a specified time interval determined by P6.13 before resuming operation. This time interval is called Base-Block. This parameter should be set to a value where the residual output voltage due to regeneration is nearly zero, before the drive resumes operation.
- This parameter also determines the searching time when performing external Base-Block and Fault Reset (P6.01)

P6.14 Maximum Speed Search Current Level

Range: 30 to 200%

Default Setting: 150

- Following a power failure, the AC drive will start its speed search operation only if the output current is greater than the value determined by P6.14. When the output current is less than that of P6.14, the AC drive output frequency is at a "speed synchronization point". The drive will start to accelerate or decelerate back to the operating frequency at which it was running prior to the power failure.



P6.15 Upper Bound of Output Frequency

Range: 0.1 to 400 Hz

Default Setting: 400

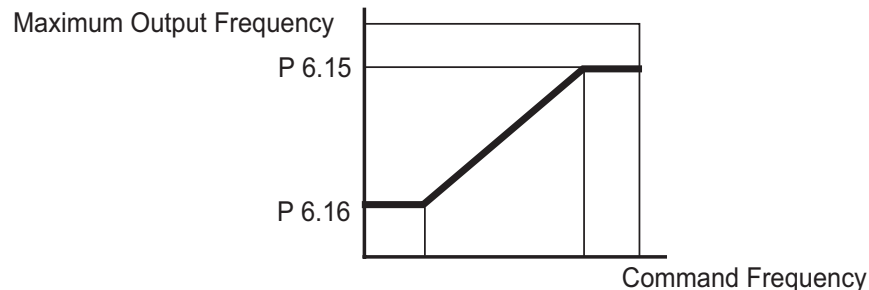
- The Upper/Lower Bound of Output Frequency is to prevent operation error and machine damage.
- This parameter must be equal to or greater than the Lower Bound of Output Frequency (P6.16).
- If the Upper Bound of Output Frequency is 50 Hz and the Maximum Output Frequency is 60 Hz, then any Command Frequency above 50 Hz will generate a 50 Hz output from the drive.
- The Output Frequency is also limited by the Motor Maximum RPM (P0.04).

P6.16 Lower Bound of Output Frequency

Range: 0.0 to 400 Hz

Default Setting: 0.0

- The Upper/Lower Bound of Output Frequency is to prevent operation error and machine damage.
- This parameter must be equal to or less than the Upper Bound of Output Frequency (P6.15).
- If the Lower Bound of Output Frequency is 10 Hz, and the Minimum Output Frequency (P2.06) is set at 1.0 Hz, then any Command Frequency between 1-10 Hz will generate a 10 Hz output from the drive.
- The Upper/Lower Bound of Output Frequency is to prevent operation error and machine damage.

**P6.30 Line Start Lockout**

Default Setting: 00

Settings:	00	Enable Line Start Lockout
	01	Disable Line Start Lockout

When this parameter is enabled, the AC Motor Drive will not start when powered up with a RUN command already applied. The drive must see the RUN command change from STOP to RUN before it will start.

When this parameter is disabled, the AC Motor Drive will start when powered up with a RUN command already applied.

P6.31	Present Fault Record
P6.32	Second Most Recent Fault Record
P6.33	Third Most Recent Fault Record
P6.34	Fourth Most Recent Fault Record
P6.35	Fifth Most Recent Fault Record
P6.36	Sixth Most Recent Fault Record

Default Setting: 00

Settings for P6.31 - P6.36:

00	No Fault occurred
01	Over-current (oc)
02	Over-voltage (ov)
03	Overheat (oH)
04	Overload (oL)
05	Overload 1 (oL1)
06	Overload 2 (oL2)
07	External Fault (EF)
08	CPU failure 1 (CF1)
09	CPU failure 2 (CF2)
10	CPU failure 3 (CF3)
11	Hardware Protection Failure (HPF)
12	Over-current during accel (OCA)
13	Over-current during decel (OCd)
14	Over-current during steady state (OCn)
15	Ground fault or fuse failure (GFF)
16	Reserved
17	Input Power 3 phase loss
18	External Base Block (bb)
19	Auto Adjust Accel/decel failure (cFA)
20	Software protection code (co)

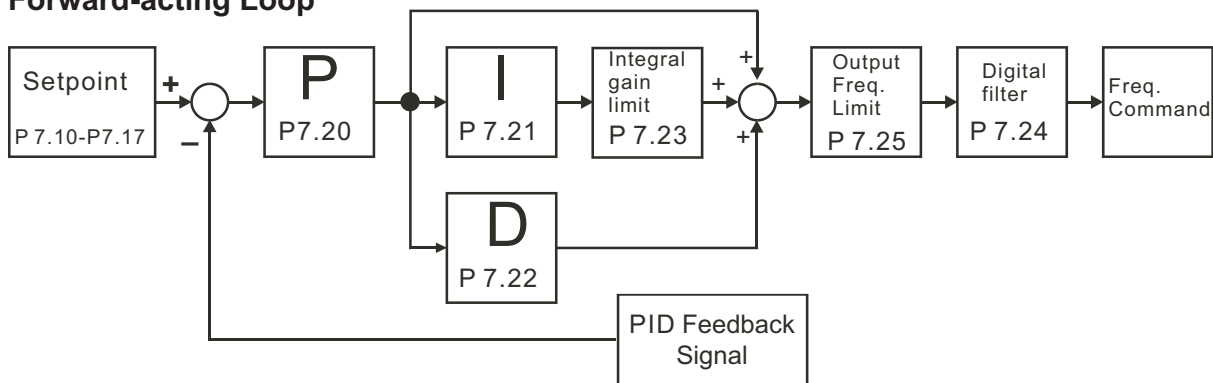
PID Parameters

P7.00 Input Terminal for PID Feedback

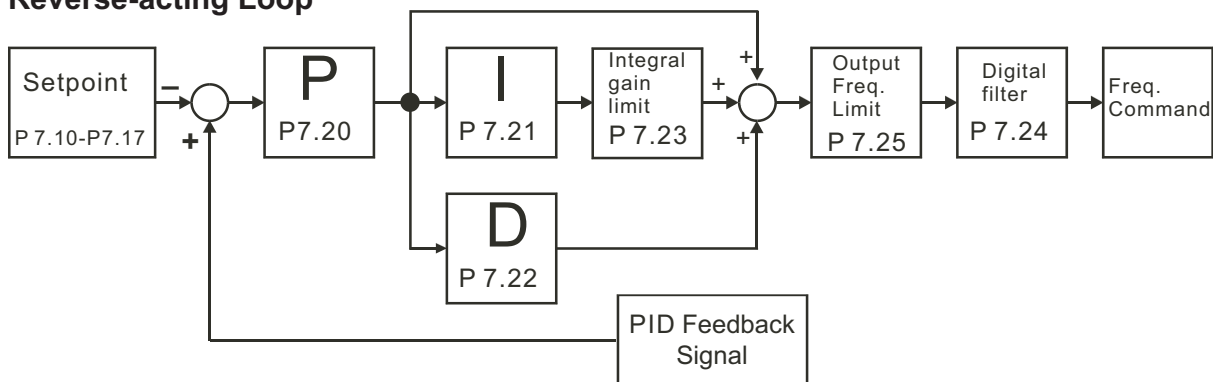
Default Setting: 00

- Settings:
- 00 Inhibit PID operation.
 - 01 Forward-acting (heating loop) PID feedback, PV from AVI (0 to +10V)
 - 02 Forward-acting (heating loop) PID feedback, PV from ACI (4 to 20mA)
 - 03 Reverse-acting (cooling loop) PID feedback, PV from AVI (0 to +10V)
 - 04 Reverse-acting (cooling loop) PID feedback, PV from ACI (4 to 20mA)

Forward-acting Loop



Reverse-acting Loop



Note: Reverse-acting PID loops are available only for GS2 AC drives with firmware version 1.04 or higher.



Note: When using PID operation, the Source of Frequency parameter (P4.00) must be set to 00 or 01. If PID operation is disabled, the AC drive will operate using the Source of Frequency specified by P4.00.

P7.01 PV 100% Value

Range: 0.0 to 999

Default Setting: 100.0

This parameter should be set to the value corresponding to the 100% value of the process variable (PV). The setting for P7.01 cannot be less than any setting for P7.10 to P7.17.



Note: The setting for PV 100% value (P7.01) cannot be set less than any value set for P7.10 to P7.17. If you are unable to reduce P7.01 to the desired value, check parameters P7.10 to P7.17 and reduce these values accordingly.

P7.02 PID Setpoint Source

Settings: 00 - Keypad

01 - Serial Communications

Default Setting: 00

P7.10 ◆ Keypad PID Setpoint

Range: 0.0 to 999

Default Setting: 0.0



Note: The settings for P7.10 to P7.17 cannot exceed the setting for P7.01.

P7.11 ◆ PID Multi-setpoint 1

Range: 0.0 to 999

Default Setting: 0.0

- The Multi-Function Input Terminals DI3 to DI6 are used to select one of the PID Multi-Setpoints. (For further explanation, refer to settings 03, 04, and 05 for P3.02 to P3.05.) The setpoints are determined by P7.11 to P7.17.

P7.12 ◆ PID Multi-setpoint 2

Range: 0.0 to 999

Default Setting: 0.0

- Refer to P7.11 for explanation.

P7.13 ◆ PID Multi-setpoint 3

Range: 0.0 to 999

Default Setting: 0.0

- Refer to P7.11 for explanation.

P7.14 ◆ PID Multi-setpoint 4

Range: 0.0 to 999

Default Setting: 0.0

- Refer to P7.11 for explanation.

P7.15 ◆ PID Multi-setpoint 5

Range: 0.0 to 999

Default Setting: 0.0

- Refer to P7.11 for explanation.

P7.16 ◆ PID Multi-setpoint 6

Range: 0.0 to 999

Default Setting: 0.0

•Refer to P7.11 for explanation.

P7.17 ◆ PID Multi-setpoint 7

Range: 0.0 to 999

Default Setting: 0.0

•Refer to P7.11 for explanation.

P7.20 ◆ Proportional Control (P)

Range: 0.0 to 10.0

Default Setting: 1.0

The first parameter of PID control is Proportional Control (P). For a given process, if the Proportional Value is set too low, the control action will be too sluggish. If the Proportional value is set too high, the control action will be unstable (erratic).

Set the Integral Control (I) and Derivative Control (D) to zero (0). Begin tuning the process with a low Proportional Value, and increase the Proportional value until the system goes unstable (erratic). When instability is reached, reduce the Proportional Value slightly until the system becomes stable (smaller values reduce system Gain). Stability can be tested by moving between two wide-spread setpoint values.

With 10% deviation and $P=1$, then $P \times 10\% = \text{Control Output}$. For example, if the speed of a motor is dragged down 10% due to a load increase, a corrective speed signal increase of 10% is generated. In a perfect world, this increase in speed command should bring the motor speed back to normal.

P7.21 ◆ Integral Control (I)

Range: 0.00 to 100.0 sec (0.00 disable)

Default Setting: 1.00

Using only the Proportional Control, the corrective action may not increase fast enough or the setpoint may never be reached because of system losses. The Integral Control is used to generate additional corrective action.

When tuning, begin with a large Integral value and reduce the value until the system goes unstable (erratic). When instability is reached, increase the Integral value slightly until the system becomes stable and the desired setpoint value is reached.

P7.22 ◆ Derivative Control (D)

Range: 0.00 to 1.00 sec

Default Setting: 0.00

If the control output is too sluggish after the Proportional Control (P) and Integral Control (I) values are set, Derivative Control (D) may be required. Begin with a high Derivative value and reduce the value to the point of system instability. Then increase the Derivative value until the control output regains stability. Stability can be tested by moving between two wide-spread setpoint values.

P7.23 Upper Bound for Integral Control

Range: 00 to 100%

Default Setting: 100

- This parameter defines an upper boundary or limit for the integral gain (I) and therefore limits the Master Frequency. Use the formula below to calculate the Integral upper limit.

$$\text{Max. Output Frequency} = \left(\frac{\text{Motor Max. RPM (P0-04)}}{\text{Motor Base RPM (P0-03)}} \right) \times \text{Base Frequency (P0-02)}$$

- The formula is: Integral upper limit = (Maximum Output Frequency) X P7.23. This parameter can limit the Maximum Output Frequency

P7.24 Derivative Filter Time Constant

Range: 0.0 to 2.5 sec

Default Setting: 0.0

- To avoid amplification of measured noise in the controller output, a derivative digital filter is inserted. This filter helps smooth oscillations. Larger values for P7.24 provide more smoothing.

P7.25 PID Output Frequency Limit

Range: 00 to 110%

Default Setting: 100

- This parameter defines the percentage of output frequency limit during the PID control. The formula is Output Frequency Limit = (Maximum Output Frequency) X P7.25. This parameter will limit the Maximum Output Frequency.

$$\text{Max. Output Frequency} = \left(\frac{\text{Motor Max. RPM (P0-04)}}{\text{Motor Base RPM (P0-03)}} \right) \times \text{Base Frequency (P0-02)}$$

P7.26 Feedback Signal Loss Detection Time

Range: 0.0 to 3600 sec

Default Setting: 60

- This parameter defines how long the PID Feedback signal is lost before an error is generated. Setting this parameter to 0.0 disables the PID Feedback loss timer. When the feedback signal is lost, PID Feedback loss timer starts timing. When the timer value is greater than the setting value of P. 7.26, the PID Feedback Loss parameter (P7.27) is activated. Furthermore, the Keypad will display "FbE" means the feedback abnormality detected. When the signal is corrected, the warning message "FbE" will automatically be cleared.

P7.27 PID Feedback Loss Operation

Range: 00 - Warn and AC Drive Stop
01 - Warn and Continue Operation

Default Setting: 00

- This parameter sets the operation of the drive when there is a loss of the PID feedback signal.
- This parameter only functions with 4-20ma for feedback loss operation.

Display Parameters

P8.00 ◆ User Defined Display Function

Default Setting: 00

Settings:	00	Output Frequency (Hz)
	01	Motor Speed (RPM)
	02	Output Frequency x P8.01
	03	Output Current (A)
	04	Motor Output Current (%)
	05	Output Voltage(V)
	06	DC Bus Voltage (V)
	07	PID Setpoint
	08	PID Feedback (PV)
	09	Frequency Setpoint

P8.01 ◆ Frequency Scale Factor

Range: 0.01 to 160.0

Default Setting: 1.0

This parameter can be used to multiply the display unit by a scaling factor so that the display will represent some other user desired unit. For example, the user may want to scale the drive display to represent ft/min for a motor that is driving a conveyor.

The coefficient K determines the multiplying factor for the user-defined unit.

- The display value is calculated as follows:

$$\text{Display value} = \text{output frequency} \times K$$

- The display window is only capable of showing four digits, but P8.01 can be used to create larger numbers. The display window uses decimal points to signify numbers up to five digits as explained below:

DISPLAY NUMBER REPRESENTED

9999	The absence of a decimal point indicates a four digit integer.
999.9	A single decimal point between the middle and the right-most numbers is a true decimal point; it separates ones and tenths as in "300.5 (three hundred and one-half).
9999.	A single decimal point after the right-most number is not a true decimal point; instead it indicates that a zero follows the right-most numbers. For example, the number 12340 would be displayed as "1234.".

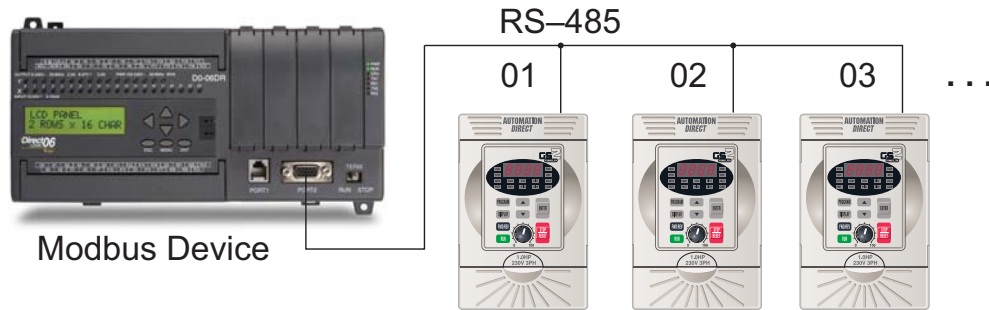
Communication Parameters

P9.00 Communication Address

Range: 01 to 254

Default Setting: 01

- If the AC drive is controlled by serial communication, the communication address must be set via this parameter.



P9.01 Transmission Speed

Range: 00 to 03

Default Setting: 01

Setting	00: 4800 baud data transmission speed
	01: 9600 baud data transmission speed
	02: 19200 baud data transmission speed
	03: 38400 baud data transmission speed

- Users can set parameters and control the operation of the AC drive via the RS-485 serial interface of a personal computer. This parameter is used to set the transmission speed between the computer and AC drive.

P9.02 Communication Protocol

Default Setting: 00

Settings:	00	MODBUS ASCII mode. <7 data bits, no parity, 2 stop bits>
	01	MODBUS ASCII mode <7 data bits, even parity, 1 stop bit>
	02	MODBUS ASCII mode <7 data bits, odd parity, 1 stop bit>
	03	MODBUS RTU mode <8 data bits, no parity, 2 stop bits>
	04	MODBUS RTU mode <8 data bits, even parity, 1 stop bit>
	05	MODBUS RTU mode <8 data bits, odd parity, 1 stop bit>

P9.03 Transmission Fault Treatment

Default Setting: 00

- Settings:
- 00 - Display fault and continue operating
 - 01 - Display fault and RAMP to stop
 - 02 - Display fault and COAST to stop
 - 03 - No fault displayed and continue operating

P9.04 Time Out Detection

Range: 00 - Disable
01 - Enable

Default Setting: 00

- This parameter is used for ASCII mode. When this parameter is set to 01, it indicates that the over-time detection is enabled and the time slot between each character cannot exceed 500 ms.

P9.05 Time Out Duration

Range: 0.1 to 60.0 seconds

Default Setting: 0.5

P9.07 ◆ Parameter Lock

Default Setting: 00

- Settings:
- 00 All parameters can be set and read
 - 01 All parameters are read only

P9.08 Restore to Default

Settings: 0 or 99

Default Setting: 00

- Setting 99 restores all parameters to factory defaults. ••

P9.11 **◆ Block Transfer Parameter 1**

Range: P0.00 to P8.01, P9.99

Default Setting: P9.99

The sequential block transfer parameters (P9.11 through P9.25) allow you to "group" various miscellaneous non-sequential parameters, so that only one PLC programming write instruction is required to update those parameters, instead of three separate write instructions.

- Example:

Writing directly to three non-sequential parameters P1.00, P1.02, and P1.04 requires three separate write instructions from the PLC. However, those drive parameters can be updated with only one PLC write instruction to the sequential transfer blocks P9.11 through P9.13; if P9.11 is set to P1.00, P9.12 is set to P1.02, and P9.13 is set to P1.04.

P9.12 **◆ Block Transfer Parameter 2**

Range: P0.00 to P8.01, P9.99

Default Setting: P9.99

P9.13 **◆ Block Transfer Parameter 3**

Range: P0.00 to P8.01, P9.99

Default Setting: P9.99

P9.14 **◆ Block Transfer Parameter 4**

Range: P0.00 to P8.01, P9.99

Default Setting: P9.99

P9.15 **◆ Block Transfer Parameter 5**

Range: P0.00 to P8.01, P9.99

Default Setting: P9.99

P9.16 **◆ Block Transfer Parameter 6**

Range: P0.00 to P8.01, P9.99

Default Setting: P9.99

P9.17 **◆ Block Transfer Parameter 7**

Range: P0.00 to P8.01, P9.99

Default Setting: P9.99

P9.18 **◆ Block Transfer Parameter 8**


Range: P0.00 to P8.01, P9.99

Default Setting: P9.99

P9.19 **◆ Block Transfer Parameter 9**

Range: P0.00 to P8.01, P9.99

Default Setting: P9.99

P9.20	◆ Block Transfer Parameter 10	
	Range: P0.00 to P8.01, P9.99	Default Setting: P9.99
P9.21	◆ Block Transfer Parameter 11	
	Range: P0.00 to P8.01, P9.99	Default Setting: P9.99
P9.22	◆ Block Transfer Parameter 12	
	Range: P0.00 to P8.01, P9.99	Default Setting: P9.99
P9.23	◆ Block Transfer Parameter 13	
	Range: P0.00 to P8.01, P9.99	Default Setting: P9.99
P9.24	◆ Block Transfer Parameter 14	
	Range: P0.00 to P8.01, P9.99	Default Setting: P9.99
P9.25	◆ Block Transfer Parameter 15	
	Range: P0.00 to P8.01, P9.99	Default Setting: P9.99
P9.26	◆ Serial Comm Speed Reference	
	Range: 0.0 to 400.0 Hz	Default Setting: 60.0
	<ul style="list-style-type: none"> • This parameter is used to set the Frequency Command when the AC drive is controlled by communication interface. 	
	<i>Note: In order for this parameter to function, the Source of Frequency Command (P4.00) must be set to 05.</i>	
P9.27	◆ Serial Comm RUN Command	
	Range: 00 - Stop 01 - Run	Default Setting: 00
P9.28	◆ Serial Comm Direction Command	
	Range: 00 - Forward 01 - Reverse	Default Setting: 00

P9.29 ◆ Serial Comm External Fault

Range: 00 - No action
01 - External fault

Default Setting: 00

P9.30 ◆ Serial Comm Fault Reset

Range: 00 - No action
01 - Fault Reset

Default Setting: 00

P9.31 ◆ Serial Comm JOG Command

Range: 00 - Stop
01 - Jog

Default Setting: 00

P9.39 Firmware Version

Range: #.##

Default Setting: #.##

P9.41 GS Series Number

Default Setting: ##

Settings:	01	GS1
	02	GS2
	03	GS3
	04	GS4

P9.42**Manufacturer Model Information**

Default Setting: ##

Settings:	00	GS2-20P5 (230V 1 ph/3ph 0.5hp)
	01	GS2-21P0 (230V 1 ph/3ph 1hp)
	02	GS2-22P0 (230V 1ph/3ph 2hp)
	03	GS2-23P0 (230V 1ph/3ph 3hp)
	04	GS2-25P0 (230V 3ph 5hp)
	05	GS2-27P5 (230V 3ph 7.5hp)
	06	Reserved
	07	GS2-41P0 (460V 3ph 1hp)
	08	GS2-42P0 (460V 3ph 2hp)
	09	GS2-43P0 (460V 3ph 3hp)
	10	GS2-45P0 (460V 3ph 5hp)
	11	GS2-47P0 (460V 3ph 7.5 hp)
	12	GS2-4010 (460V 3ph 10hp)
	13	GS2-10P2 (115V 1ph 0.25hp)
	14	GS2-10P5 (115V 1ph 0.5hp)
	15	GS2-11P0 (115V 1ph 1hp)
	16	Reserved
	17	Reserved
	18	Reserved
	19	Reserved
	20	Reserved
	21	GS2-51P0 (575V 3ph 1hp)
	22	GS2-52P0 (575V 3ph 2hp)
	23	GS2-53P0 (575V 3ph 3hp)
	24	GS2-55P0 (575V 3ph 5hp)
	25	GS2-57P5 (575V 3ph 7.5hp)
	26	GS2-5010 (575V 3ph 10hp)