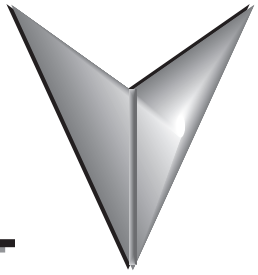
Digital and Analog I/O Parameter Maps



Appendix C

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Introduction

This section contains worksheets to help with designing and programming the physical inputs and outputs of the GS20(X) (digital, analog, and frequency interfaces). These worksheets provide the GS20(X) parameters and addresses associated with each input and output. For detailed parameter descriptions, please see Chapter 4 “AC Drive Parameters”. For more detailed wiring information, please see Chapter 2 “Installation and Wiring.

Digital and analog I/O parameter maps begin on the following page.

GS20(X) Digital Inputs								
GS20(X) Terminals	FWD/DI1	REV/DI2	DI3	DI4	DI5	DI6	DI7	Comments
PLC Address	X0	X1	X2	X3	X4	X5	X6	
Parameter	**P02.00** if ≠ 0, else: **P02.01**	**P02.02**	**(P02.00** if=**3 or 6)** else **P02.03**	**P02.04**	**P02.05**	**P02.06**	**P02.07**	See Digital Input Con-figurations Below
Default Setting	**P2.00**=1, **P02.01**=0	**P02.00**=1, **P02.02**=0	1	2	3	4	0	
Default Configuration	2 wire mode: FWD/STOP	2 wire mode: REV/STOP	Multi Spd 1	Multi Spd 2	Multi Spd 3	Multi Spd 4	No Function	
User Defined Selection / Value								
DI - N.C. / N.O. Select **P02.12 - Bit #**	0	1	2	3	4	5	6	0 = N.O. 1 = N.C.
Default Configuration	0 = Normally Open							
User Defined Selection / Value								
DI - Response Time	**P02.11**							0 to 30.000 seconds
Default Configuration	0.005 seconds							
User Defined Selection / Value								
DI - Active Status Monitor **P02.50 - Bit #**	0	1	2	3	4	5	6	Read Only!
DI - PLC Status Monitor **P02.52 - Bit #**	0	1	2	3	4	5	6	

** Note for PLC Address: When an external input is used in the PLC and the PLC is in Run or Stop mode, the PLC then controls that input and any Multi-Function Input setting assigned via P02.00~P02.07 is void. To read the status of an input into the PLC while maintaining the multifunction input setting use the RPR command on the DI Status Register (P02.50). The control of the IO can be given back to the drive by disabling the PLC either through the Keypad or Digital Inputs when they are assigned values 51 and 52.*

Digital Input Configurations – Parameters P02.01~P02.07			
0: No function 1: Multi-step speed command 1 2: Multi-step speed command 2 3: Multi-step speed command 3 4: Multi-step speed command 4 5: Reset 6: JOG [by external control or GS4-KPD (optional)] 7: Acceleration / deceleration speed inhibit 8: 1st and 2nd acceleration / deceleration time selection 9: 3rd and 4th acceleration / deceleration time selection 10: External Fault (EF) Input (P07.20)	11: Base Block (B.B.) input from external source 12: Output stop 13: Cancel the setting of autoacceleration / auto-deceleration time 15: Frequency command from AI1 16: Frequency command from AI2 18: Force to stop (P07.20) 19: Digital up command 20: Digital down command 21: PID function disabled 22: Clear the counter 23: Input the counter value (DI6) 24: FWD JOG command 25: REV JOG command 26: TQC / FOC mode selection 27: ASR1 / ASR2 selection	28: Emergency stop (EF1) 29: Signal confirmation for Y-connection 30: Signal confirmation for δ-connection 31: High torque bias (P11.30) 32: Middle torque bias (P11.31) 33: Low torque bias (P11.32) 38: Disable writing EEPROM function 39: Torque command direction 40: Force coasting to stop 41: HAND switch 42: AUTO switch 48: Mechanical gear ratio switch 49: Enable drive 50: Slave dEb action to execute 51: Selection for PLC mode bit 0 52: Selection for PLC mode bit 1	56: Local / Remote selection 58: Enable fire mode (with RUN command) 59: Enable fire mode (without RUN command) 70: Force auxiliary frequency return to 0 71: Disable PID function, force PID output return to 0 72: Disable PID function, retain the output value before disabled 73: Force PID integral gain return to 0, disable integral 74: Reverse PID feedback 81: Simple positioning zero point position signal input 82: OOB loading balance detection 83: Multi-motor (IM) selection bit 0 84: Multi-motor (IM) selection bit 1

GS20(X) Digital Outputs

GS20(X) Digital Outputs				
GS20(X) Terminals	R1-R1C-R1O	DO1-DOC	DO2-DOC	Comments
PLC Address	Y0	Y3	Y4	
Parameter	**P02.13**	**P02.16**	**P02.17**	See Digital Output Configurations Below
Default Setting	11	0	0	
Default Configuration	Malfunction Indication	No Function		
User Defined Selection / Value				
DO - N.C. / N.O. Select **P02.18 - Bit #**	0	3	4	0 = N.O. 1 = N.C.
Default Configuration	0	0	0	
User Defined Selection / Value				
DO - Active Status Monitor **P02.51 - Bit #**	0	3	4	Read Only!
DO - PLC Status Monitor **P03.53 - Bit #**	0	3	4	

** Note for PLC Address: When an external output is used in the PLC and the PLC is in Run or Stop mode, the PLC then controls that output and any Multi-Function Output setting assigned via P02.13, P02.16, and P02.17 is void. To read the status of an output from the PLC while maintaining the multifunction output setting, use the RPR command on the DO Status Register (P02.51). The ownership of the IO can be given back to the drive by disabling the PLC either through the Keypad or Digital Inputs when they are assigned values 51 and 52.*

Digital Output Configurations – Parameters P02.13, P02.16, and P02.17		
0: No function 1: Indication during RUN 2: Operation speed reached 3: Desired frequency reached 1 (P02.22) 4: Desired frequency reached 2 (P02.24) 5: Zero speed (Frequency command) 6: Zero speed including STOP (Frequency command) 7: Over-torque 1 (P06.06–06.08) 8: Over-torque 2 (P06.09–06.11) 9: Drive is ready 10: Low voltage warning (Lv) (P06.00) 11: Malfunction indication 13: Overheat warning (P06.15) 14: Software brake signal indicator (P07.00) 15: PID feedback error (P08.13, P08.14) 16: Slip error (oSL) 17: Count value reached, does not return to 0 (P02.20)	18: Count value reached, return to 0 (P02.19) 19: External interrupt B.B. input (Base Block) 20: Warning output 21: Over-voltage 22: Over-current stall prevention 23: Over-voltage stall prevention 24: Operation mode 25: Forward command 26: Reverse command 29: Output when frequency ≥ P02.34 30: Output when frequency < P02.34 31: Y-connection for the motor coil 32: δ-connection for the motor coil 33: Zero speed (actual output frequency) 34: Zero speed including STOP (actual output frequency) 35: Error output selection 1 (P06.23) 36: Error output selection 2 (P06.24)	37: Error output selection 3 (P06.25) 38: Error output selection 4 (P06.26) 40: Speed reached (including STOP) 42: Crane function 43: Motor speed detection 44: Low current output (use with P06.71–06.73) 45: UVW output electromagnetic valve switch 46: Master dEb output 51: Analog output control for RS-485 interface 52: Output control for communication cards 53: Fire mode indication 66: SO output logic A 67: Analog input level reached 68: SO output logic B 73: Over-torque 3 74: Over-torque 4 75: Forward RUN status 76: Reverse RUN status

GS20(X) Analog Common Parameters

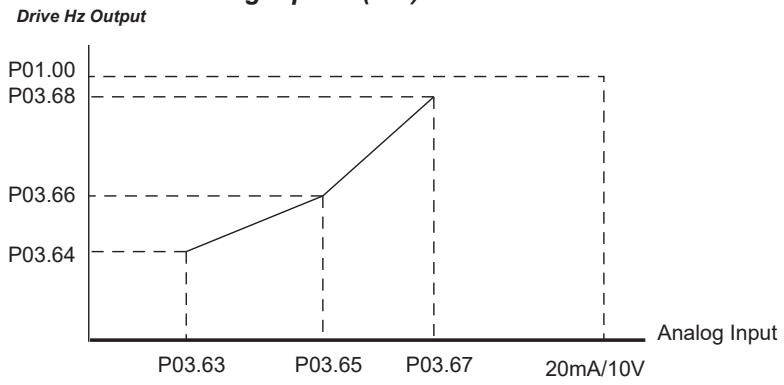
GS20(X) – AI1 and AI2 – Common Parameters				
Parameter		***Selection / Value***	***Default***	***User Selection***
P00.20	Master frequency command source (AUTO, REMOTE)	0: Digital keypad 1: RS-485 communication input 2: External analog input (Refer to P03.00) 3: External UP / DOWN terminal (digital input terminals) 4: Pulse input (DI7) without direction command 6: Not used 7: Digital keypad VR/potentiometer dial (GS20 only) 8: Communication card 9: PID controller	0	
P00.30	Master frequency command source (HAND, LOCAL)		0	

GS20(X) Analog Input 1 Parameters

GS20(X) – AI1 Specific Parameters				
Parameter		***Selection / Value***	***Default***	***User Selection***
Terminals		***AI1 – ACM***	***N/A***	***N/A***
PLC Address		***D1028***	***N/A***	***N/A***
P03.00	Analog input selection (AI1)	1: Frequency command 2: Torque command (torque limit under speed mode) 3: Torque compensation command 4: PID target value 5: PID feedback signal 6: Thermistor (PTC) input value 7: Positive torque limit 8: Negative torque limit 9: Regenerative torque limit 10: Positive / negative torque limit 11: PT100 RTD input value 12: Auxiliary frequency input 13: PID compensation value	1	
P03.28	AI1 terminal input selection	0: 0–10 V (P03.63–P03.68 is valid) 3: -10–10 V (P03.63–P03.74 are valid)	0	
P03.03	Analog input bias (AI1)	-100.0% to +100.0%	0	
P03.07	Positive / negative bias mode (AI1)	0: No bias 1: Lower than or equal to bias 2: Greater than or equal to bias 3: The absolute value of the bias voltage while serving as the center 4: Bias serves as the center	0	
P03.11	Analog input gain (AI1)	-500.0% to +500.0%	100.0	
P03.15	Analog input filter (LPF) time (AI1)	0.00~20.00 sec	0.01	
P03.47	AI1%	-100 to 100%	0	
P03.50	Analog input curve calculation selection	0: Normal curve 1: Three-point curve of AI1 2: Three-point curve of AI2 3: Three-point curve of AI1 & AI2	0	
Parameters below are used to characterize the GS20(X) drive output frequency with three point curve parameters if using AI1 for speed reference (bias and gain parameters above are not used when P03.50 ≠ 0).				
P03.63	AI1 votage lowest point	0.00~10.00V	0	
P03.64	AI1 proportional lowest point	0.00~100.00%	0	
P03.65	AI1 voltage mid-point	0.00~10.00V	5	
P03.66	AI1 proportional mid-point	0.00~100.00%	50.00	

GS20(X) – AI1 Specific Parameters (continued)				
Parameter		**Selection / Value**	**Default**	**User Selection**
P03.67	AI1 voltage highest point	0.00~10.00V	10	
P03.68	AI1 proportional highest point	0.00~100.00%	100.00	
P03.69	Negative AI1 voltage highest point	-10.00–0.00 V (valid when P03.28 sets as -10–10 V)	0.00	
P03.70	Negative AI1 proportional highest point	-100.00–100.00% (valid when P03.28 sets as -10–10 V)	0.00	
P03.71	Negative AI1 voltage mid-point	-10.00–0.00 V (valid when P03.28 sets as -10–10 V)	-5.00	
P03.72	Negative AI1 proportional mid-point	-100.00–100.00% (valid when P03.28 sets as -10–10 V)	-50.00	
P03.73	Negative AI1 voltage lowest point	-10.00–0.00 V (valid when P03.28 sets as -10–10 V)	-10.00	
P03.74	Negative AI1 proportional lowest point	-100.00–100.00% (valid when P03.28 sets as -10–10 V)	-100.00	

Analog Input 1 (AI1) Three Point Curve



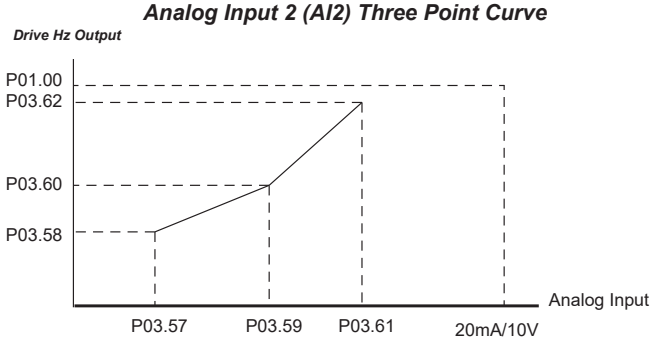
GS20(X) Analog Input 2 Parameters

GS20(X) – AI2 Specific Parameters				
Parameter		**Selection / Value**	**Default**	**User Selection**
Terminals		***AI2 – ACM***	***N/A***	***N/A***
PLC Address		***D1029***	***N/A***	***N/A***
P03.01	Analog input selection (AI2)	1: Frequency command 2: Torque command (torque limit under speed mode) 3: Torque compensation command 4: PID target value 5: PID feedback signal 6: Thermistor (PTC) input value 7: Positive torque limit 8: Negative torque limit 9: Regenerative torque limit 10: Positive / negative torque limit 11: PT100 RTD input value 12: Auxiliary frequency input 13: PID compensation value	0	

GS20(X) – AI2 Specific Parameters (continued)				
Parameter		***Selection / Value***	***Default***	***User Selection***
P03.29	AI2 terminal input selection	0: 4–20 mA 1: 0–10 V 2: 0–20 mA	0	
P03.04	Analog input bias (AI2)	-100.0% to +100.0%	0	
P03.08	Positive/negative bias mode (AI2)	0: No bias 1: Lower than or equal to bias 2: Greater than or equal to bias 3: The absolute value of the bias voltage while serving as the center 4: Bias serves as the center	0	
P03.12	Analog input gain (AI2)	-500.0% to +500.0%	100.0	
P03.16	Analog input filter (LPF) time (AI2)	0.00~20.00 sec	0.01	
P03.48	AI2%	-100 to 100%	0	
P03.50	Analog input curve calculation selection	0: Normal curve 1: Three-point curve of AI1 2: Three-point curve of AI2 3: Three-point curve of AI1 & AI2	0	
Parameters below are used to characterize the GS20(X) drive output frequency with three point curve parameters if using AI2 for speed reference (bias and gain parameters above are not used when P03.50 ≠ 0).				
P03.57	AI2 lowest point	P03.29=0: 0.00~10.00V P03.29=1: 4.00~20.00mA P03.29=2: 0.00~20.00mA	P03.29=0: 0.00V P03.29=1: 4.00mA P03.29=2: 0.00mA	
P03.58	AI2 proportional lowest point	0.00~100.00%	0	
P03.59	AI2 voltage mid-point	P03.29=0: 0.00~10.00V P03.29=1: 4.00~20.00mA P03.29=2: 0.00~20.00mA	P03.29=0: 5.00V P03.29=1: 12.00mA P03.29=2: 10.00mA	
P03.60	AI2 proportional mid-point	0.00~100.00%	50.00	
P03.61	AI2 voltage highest point	P03.29=0: 0.00~10.00V P03.29=1: 4.00~20.00mA P03.29=2: 0.00~20.00mA	P03.29=0: 10.00V P03.29=1: 20.00mA P03.29=2: 20.00mA	
P03.62	AI2 proportional highest point	0.00~100.00%	100.00	

P03.19 (Loss of AI2) determines the drive behavior if the 4~20mA signal is lost.

Analog Input 2 (AI2) Three Point Curve



GS20(X) Analog Output 1 Parameters

GS20(X) – AO1 Specific Parameters				
Parameter		***Selection / Value***	***Default***	***User Selection***
Terminals		***AO1 – ACM***	***N/A***	***N/A***
PLC Address		***D1040***	***N/A***	***N/A***
P03.20	Multi-function output (A01)	0: Output frequency (Hz) 1: Frequency command (Hz) 2: Motor speed (Hz) 3: Output current (rms) 4: Output voltage 5: DC bus voltage 6: Power factor 7: Power 8: Output torque 9: AI1 10: AI2 12: Iq current command 13: Iq feedback value 14: Id current command 15: Id feedback value 16: Vq-axis voltage command 17: Vd-axis voltage command 18: Torque command 19: PG2 (DI7) frequency command 21: RS-485 analog output 22: Communication card analog output 23: Constant voltage output	0	
P03.21	Analog output gain (A01)	0.0~500.0%	100.0	
P03.22	Analog output in REV direction (A01)	0: Absolute Value 1: 0V When Negative 2: Offset 5V = 0 Value	0	
P03.27	A01 output bias	-100.00–100.00%	0.00	
P03.31	A01 output selection	0: 0–10 V output 1: 0–20 mA output 2: 4–20 mA output	0	
P03.32	A01 DC output setting level	0.00~100.00%	0.00	
P03.35	A01 output filter time	0.00–20.00 sec.	0.01	

GS20(X) Frequency Output Parameters

GS20(X) – Frequency Output Specific Parameters				
Parameter		***Selection / Value***	***Default***	***User Selection***
Terminals		***DO – DCM***	***N/A***	***N/A***
PLC Address		***N/A***	***N/A***	***N/A***
P02.21	Digital output gain (DO) (Pulse per second output = actual output frequency x P3.38)	1~55 (1 = no scaling)	1	