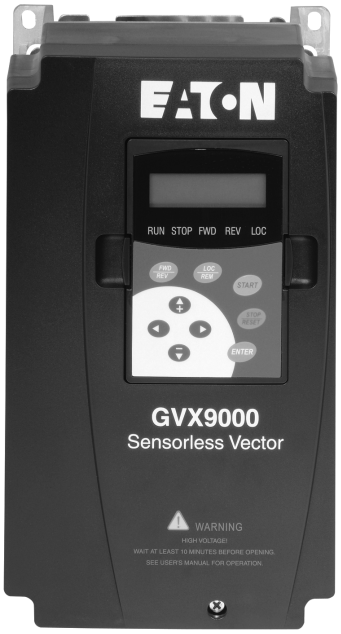
Quick Start Guide

For GVX9000 AF Drives

June 2006
New Information



5011646300
00GQ

Step 1 — Wiring

Hazardous High Voltage

HIGH VOLTAGE!

Motor control equipment and electronic controllers are connected to hazardous line voltages. When servicing drives and electronic controllers, there may be exposed components with housings or protrusions at or above line potential. Extreme care should be taken to protect against shock.

For the best results with the GVX9000 inverter, carefully read the manual and all of the warning labels attached to the inverter before installing and operating it, and follow the instructions exactly.

Wire Type: 75ºC Copper Only

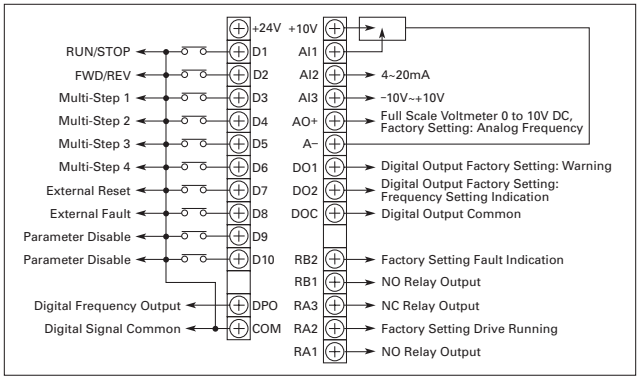
Catalog Number	Voltage Horsepower	Max. Current in Amps (Input/Output)	Wire Gauge in AWG (mm^2)	Torque Rating in kgf-cm [in-lb]
GVX001A1-2	240V, 1 hp	11.9 / 5	14 (2.1)	18 [15.6]
GVX002A1-2	240V, 2 hp	15.3 / 7	12 (3.3)	18 [15.6]
GVX003A1-2	240V, 3 hp	22.0 / 11	10 (5.3)	18 [15.6]
GVX005A1-2	240V, 5 hp	20.6 / 17	10 (5.3)	18 [15.6]
GVX007A1-2	240V, 7-1/2 hp	26 / 25	8 (8.4)	30 [26.0]
GVX010A1-2	240V, 10 hp	34 / 33	8 (8.4)	30 [26.0]
GVX015A1-2	240V, 15 hp	50 / 49	6 (13.3)	30 [26.0] Use Terminal
GVX020A1-2	240V, 20 hp	60 / 65	4 (21.2)	30 [26.0] Use Terminal
GVX025A1-2	240V, 25 hp	75 / 75	3 (26.7)	30 [26.0] Use Terminal
GVX030A1-2	240V, 30 hp	90 / 90	2 (33.6)	30 [26.0] Use Terminal
GVX040A1-2	240V, 40 hp	110 / 120	1/0 (53.5)	200 [173.6]
GVX050A1-2	240V, 50 hp	142 / 145	3/0 (85)	200 [173.6]
GVX001A1-4	480V, 1 hp	3.2 / 2.7	18 (0.8)	18 [15.6]
GVX002A1-4	480V, 2 hp	4.3 / 4.2	18 (0.8)	18 [15.6]
GVX003A1-4	480V, 3 hp	5.9 / 5.5	18 (0.8)	18 [15.6]
GVX005A1-4	480V, 5 hp	11.2 / 8.5	18 (0.8)	18 [15.6]
GVX007A1-4	480V, 7-1/2 hp	19 / 18	10 (5.3)	30 [26.0]
GVX010A1-4	480V, 10 hp	25 / 24	8 (8.4)	30 [26.0]
GVX015A1-4	480V, 15 hp	33 / 32	8 (8.4)	30 [26.0]
GVX020A1-4	480V, 20 hp	46 / 38	6 (13.3)	30 [26.0] Use Terminal
GVX025A1-4	480V, 25 hp	56 / 45	4 (21.2)	30 [26.0] Use Terminal
GVX030A1-4	480V, 30 hp	70 / 60	3 (26.7)	30 [26.0] Use Terminal
GVX040A1-4	480V, 40 hp	75 / 73	3 (26.7)	57 [49.5]
GVX050A1-4	480V, 50 hp	95 / 91	2 (33.6)	57 [49.5]
GVX060A1-4	480V, 60 hp	110 / 110	1/0 (53.5)	200 [173.6]
GVX075A1-4	480V, 75 hp	150 / 150	3/0 (85)	200 [173.6]
GVX100A1-4	480V, 100 hp	180 / 180	4/0 (107.2)	200 [173.6]

Basic Wiring Diagram

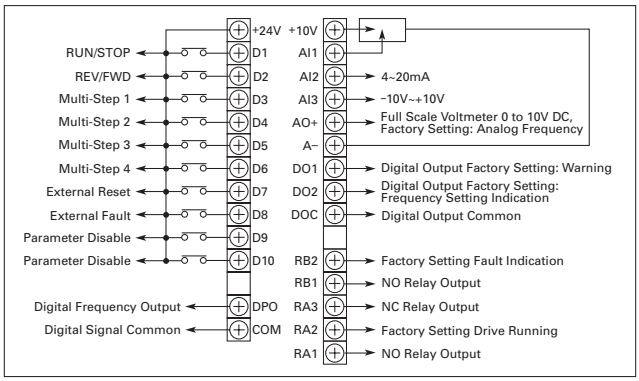
Users must connect wiring according to the following circuit diagram.

Control Terminal Wiring (Factory Settings)

Sink Mode



Source Mode



Terminal Symbols

Terminal Symbols	Terminal Name	Remarks
RA1 - RA3	Digital Output Relay 1 (FORM C)	Refer to 40.03, 40.04
RB1 - RB2	Digital Output Relay 2 (FORM A)	
D01 - DOC D02 - DOC	Digital Photocouple Outputs	Refer to 40.05, 40.06
RJ12 Port	Serial Communication port	RS-485 serial communication interface
+10V -A-	10V power supply	
AI1 -A-	Analog voltage input 1	0 – 10V input

Terminal Symbols (Continued)

Terminal Symbols	Terminal Name	Remarks
AI2 -A-	Analog voltage input 2	4 – 20 mA input
AI3 -A-	Analog voltage input 3	-10 to 10V input
A0+ -A-	Analog voltage output	0 to 10V output
D1 - COM to D10 - COM	Digital Inputs 1 – 10	Refer to 30.20 – 30.28
DPO - COM	Digital Pulse Output	Refer to 40.08
+24 - COM	24V Power Supply	Used for Source mode

Note: Use twisted-shielded, twisted-pair or shielded-lead wires for the control signal wiring. It is recommended to run all signal wiring in a separate steel conduit. The shield wire should only be connected at the drive. Do not connect shield wire on both ends.

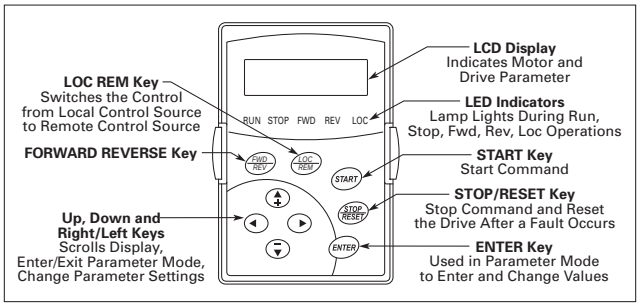
HIGH VOLTAGE!

Wiring work shall be carried out only by qualified personnel. Otherwise, there is a danger of electric shock or fire.

Step 2 — Keypad Operation

Digital Keypad Operation

The digital keypad includes the display panel and the keypad. The display panel provides the parameter display and shows the operation status of the AC drive. The keypad provides programming and control interface.



Keypad Operators

START	**START** This button operates as Start button for normal operation • Motor START from the panel; active control place has to be selected at "Panel"
ENTER	**ENTER** This button in the parameter edit mode is used to enter the programming mode and enter the parameter selection. • used for parameter edit confirmation, acceptance (confirmation) of the edited parameter value with exit from parameter edit mode

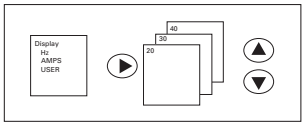
Keypad Operators (Continued)

STOP / RESET	**STOP / RESET** This button has two integrated operations. The button operates as Stop button for normal operation. In the parameter edit mode it is used to cancel previous action and back-up one step, and in fault mode it is used to reset the fault. **STOP** • motor STOP from the panel; active control place has to be selected at "Panel" **RESET** • used to reset an Active Fault on the drive and shown in the display
LOC / REM	This button switches the Control Location from the Local Source to the Remote Source.
FWD / REV	This button changes the direction of the motor connected to the GVX9000 drive.
◀	**LEFT Arrow** • navigation button, movement to left • in display mode, enter parameter group mode • in parameter edit mode, exits mode, backs up one step • cancels edited parameter (exit from a parameter edit mode)
▶	**RIGHT Arrow** • navigation button, movement to right • enter parameter group mode • enter parameter mode from group mode • Changes the cursor location when entering data into a parameter
▲ + / ▼ −	**UP and DOWN Arrows** • move either up or down the group list in order to select the desired group menu. • move either up or down the parameter list in order to select the desired parameter in the group. • increasing/decreasing of reference value on the keyboard (when selected).

Step 3 — Parameter Navigation

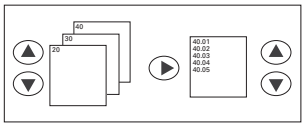
This page and Page 5 contain the descriptions of the GVX9000 parameters. Parameters are addressed and changed via the keypad for the GVX9000. For more information on keypad operation, see Keypad Operation located in Chapter 2 of the manual.

Viewing and Changing Parameter Settings



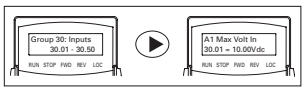
Page Groups

Parameters are grouped in a page arrangement. Each page will contain a list of the parameters associated with that group. Move into the page groups from the display menu by using the right arrow key.



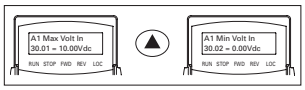
Parameter Groups

Select the desired parameter group by using the up and down keys. Once the parameter group is located, use the right arrow key to enter the group. Use the up and down keys to scroll the parameters on that page.



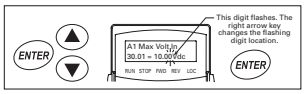
Parameter Setting

Once the parameter has been located, use the right arrow key to view the parameter setting.



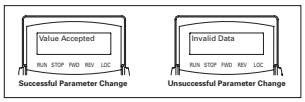
Scrolling Parameters

Once in the parameter setting, use the up and down keys to scroll through the parameters.



Programming Mode

Use the ENTER key to enter the programming mode. The displayed parameter will flash indicating the parameter can be changed.



Parameter Changes

Use the up and down keys to change the parameter setting. Press ENTER to enter the new parameter setting.

If the parameter change is successful, the keypad will display the Value Accepted message and return to the parameter number display. If the parameter change is unsuccessful the keypad will display an Invalid Data message, the parameter will not be changed, and the parameter number will again be displayed.

Note: Some parameters cannot be changed while the unit is the RUN/START mode.

To exit the programming mode, press the left arrow key to return to the display mode.

Step 4 — Parameter Groups & Default Values

Parameter Groups

The parameters are grouped according to the following descriptions:

GVX9000 Parameter Listings

20 — Easy Mode Settings

Modbus	Groups	Parameter Description	Range	Default	User Settings
	20.01	Easy Mode Selection	00 – 09	00	
			00 Factory Settings		
			01 Basic V/F Curve		
			02 PID Control		
			03 Preset Speeds		
			04 Local/Remote		
			05 Hand Off Auto (HOA)		
			06 Variable Torque (Pump/Fan)		
			07 Spindle Motor		
			08 Analog Speed Command		
			09 Closed Loop Vector Control		

30 — Inputs

Modbus	Groups	Parameter Description	Range	Default	User Settings
0100H	30.01	A1 Maximum Input Voltage (0 – 10V)	0.00 to 10.00V	10.00	
0101H	30.02	A1 Minimum Input Voltage (0 – 10V)	0.00 to 10.00V	0.00	
0102H	30.03	A1 Maximum Output Frequency	-400.0 to 400.0 Hz	60.00	
0103H	30.04	A1 Minimum Output Frequency	-400.0 to 400.0 Hz	0.0	
0104H	30.05	A1 Reverse Option	00 Negative input = 30.04	00	
			01 Negative input = Reverse direction		
			02 Negative input = Frequency command only, no Direction		
0105H	30.06	A2 Maximum Input Current (0 – 20 mA)	0.00 to 20.00 mA	20.00 mA	
0106H	30.07	A2 Minimum Input Current (0 – 20 mA)	0.00 to 20.00 mA	4.00 mA	
0107H	30.08	A2 Maximum Output Frequency	-400.0 to 400.0 Hz	60.00	
0108H	30.09	A2 Minimum Output Frequency	-400.0 to 400.0 Hz	0.0	
0109H	30.10	A2 Reverse Option	00 Negative input = 30.09	00	
			01 Negative input = Reverse direction		
			02 Negative input = Frequency command only, no Direction		
010AH	30.11	A3 Maximum Input Voltage (-10 – 10V)	-10.00 to 10.00V	10.00V	
010BH	30.12	A3 Minimum Input Voltage (-10 – 10V)	-10.00 to 10.00V	-10.00V	
010CH	30.13	A3 Maximum Output Frequency	-400.0 to 400.0 Hz	60.00	
010DH	30.14	A3 Minimum Output Frequency	-400.0 to 400.0 Hz	0.0	
010EH	30.15	A3 Reverse Option	00 Negative input = 30.14	01	
			01 Negative input = Reverse direction		
			02 Negative input = Frequency command only, no Direction		
010FH	30.16	A1 Response Time	0.00 to 10.00 sec.	0.05 sec.	
0110H	30.17	A2 Response Time	0.00 to 10.00 sec.	0.05 sec.	
0111H	30.18	A3 Response Time	0.00 to 10.00 sec.	0.05 sec.	
0112H	30.19	Analog Input Frequency Resolution	00 0.01 Hz	01	
			01 0.1 Hz		

30 — Inputs (Continued)

Modbus	Groups	Parameter Description	Range	Default	User Settings
0113H	30.20	Digital Input Terminals D1, D2	01 2-wire Operation Mode 1 D1: FWD / STOP D2: REV / STOP	02	
			02 2-wire Operation Mode 2 D1: RUN / STOP D2: REV / FWD		
			03 3-wire Operation Mode D1: RUN D2: REV / FWD D3: STOP		
0114H	30.21	Digital Input Terminal (D3)	00 Parameter Disable	05	
			01 External Fault (NO) EF		
			02 External Fault (NC) EF		
			03 External Reset (NO)		
			04 External Reset (NC)		
			05 Preset Speed Switch 1		
			06 Preset Speed Switch 2		
			07 Preset Speed Switch 3		
			08 Preset Speed Switch 4		
			09 Jog		
			10 2nd Acceleration/Deceleration time selection		
			11 3rd Acceleration/Deceleration time selection		
			12 Control Location Hand — HOA		
			13 Control Location Auto — HOA		
			14 Control Location Remote — Local/Remote (close for remote)		
			15 Increase Master Frequency		
			16 Decrease Master Frequency		
			17 Forward / Reverse		
			18 Parameter Lock		
			19 Acceleration / Deceleration Inhibit		
			20 Run Enable		
			21 PAUSE (NO)		
			22 PAUSE (NC)		
			23 PID Disable		
			24 Counter input		
			25 Counter reset		
			26 Auxiliary Motor 1 Output Failure		
			27 Auxiliary Motor 2 Output Failure		
			28 Auxiliary Motor 3 Output Failure		
			29 Output Shut Off (NO)		
			30 Output Shut Off (NC)		
			31 Auto/Linear Acceleration/ Deceleration		
			32 Proximity sensor input (index function)		
			33 Forced Stop (NO)		
			34 Forced Stop (NC)		
0115H	30.22	Digital Input Terminal (D4)	See Parameter 30.21	06	
0116H	30.23	Digital Input Terminal (D5)	See Parameter 30.21	07	
0117H	30.24	Digital Input Terminal (D6)	See Parameter 30.21	08	
0118H	30.25	Digital Input Terminal (D7)	See Parameter 30.21	03	

30 — Inputs (Continued)

Modbus	Groups	Parameter Description	Range	Default	User Settings
0119H	30.26	Digital Input Terminal (D8)	See Parameter 30.21	01	
011AH	30.27	Digital Input Terminal (D9)	See Parameter 30.21	00	
011BH	30.28	Digital Input Terminal (D10)	See Parameter 30.21	00	
011CH	30.29	Final Count Value	00 to 65000	00	
011DH	30.30	Intermediate Count Value	00 to 65000	00	
011EH	30.31	Preset Speed 1	0.00 to 400.00 Hz	0.00 Hz	
011FH	30.32	Preset Speed 2	0.00 to 400.00 Hz	0.00 Hz	
0120H	30.33	Preset Speed 3	0.00 to 400.00 Hz	0.00 Hz	
0121H	30.34	Preset Speed 4	0.00 to 400.00 Hz	0.00 Hz	
0122H	30.35	Preset Speed 5	0.00 to 400.00 Hz	0.00 Hz	
0123H	30.36	Preset Speed 6	0.00 to 400.00 Hz	0.00 Hz	
0124H	30.37	Preset Speed 7	0.00 to 400.00 Hz	0.00 Hz	
0125H	30.38	Preset Speed 8	0.00 to 400.00 Hz	0.00 Hz	
0126H	30.39	Preset Speed 9	0.00 to 400.00 Hz	0.00 Hz	
0127H	30.40	Preset Speed 10	0.00 to 400.00 Hz	0.00 Hz	
0128H	30.41	Preset Speed 11	0.00 to 400.00 Hz	0.00 Hz	
0129H	30.42	Preset Speed 12	0.00 to 400.00 Hz	0.00 Hz	
012AH	30.43	Preset Speed 13	0.00 to 400.00 Hz	0.00 Hz	
012BH	30.44	Preset Speed 14	0.00 to 400.00 Hz	0.00 Hz	
012CH	30.45	Preset Speed 15	0.00 to 400.00 Hz	0.00 Hz	
012DH	30.46	Display Frequency (Hz) or Percent (%)	00 Frequency (Hz) 01 Percent (%) 02 User Definition (0.001 – max. unit) Unit set by 30.47	00	
012EH	30.47	User Definition for 30.46 Option 2	0.001 to 10.000	1.000	
012FH	30.48	Gear Ratio for Simple Index Function	4 to 1000	200	
0130H	30.49	Index Angle for Simple Index Function	0.0 to 360.0 Deg	180	
0131H	30.50	Deceleration Time for Simple Index Function	0.0 to 100.0	0.0	

40 — Outputs

Modbus	Groups	Parameter Description	Range	Default	User Settings
0200H	40.01	Analog Output Reference	00 Output Frequency (0 to Maximum Output Frequency) 01 Output Current (0 to 250% of the rated AC drive current) 02 Output Voltage (0 to 50.16) 03 Command Frequency (0 to 50.14) 04 Output Motor Speed (vector mode) 05 Load Power Factor (cos90° to 0°)	00	
0201H	40.02	Analog Output Gain	0 to 200%	100	
0202H	40.03	Digital Output Terminal Relay A (RA1, RA2, RA3)	00 to 33	02	
0203H	40.04	Digital Output Terminal Relay B (RB1, RB2)	00 to 33	03	
0204H	40.05	Digital Output Terminal DO1	00 to 33	04	
0205H	40.06	Digital Output Terminal DO2	00 Not Used 01 Ready 02 Inverter output is active 03 Inverter Fault	05	

40 — Outputs (Continued)

Modbus	Groups	Parameter Description	Range	Default	User Settings
0205H	40.06	Digital Output Terminal DO2	04 Warning (for detail, refer to the *GVX9000 AF Drives User Manual*, Chapter 7.)	05	
			05 At speed		
			06 Zero Speed ($F_{out} < F_{min}$ during Run)		
			07 Desired Frequency Attained 1 (40.07)		
			08 Below Frequency Attained 1 (40.07)		
			09 PID supervision		
			10 Over voltage supervision		
			11 Over heat supervision		
			12 Over current stall supervision		
			13 Over voltage stall supervision		
			14 Final Count value attained		
			15 Midpoint Count value attained		
			16 Reverse direction notification (command)		
			17 Under current detection		
			18 Over torque detection		
			19 Pause enabled		
			20 External control		
			21 Auxiliary Motor 1		
			22 Auxiliary Motor 2		
			23 Auxiliary Motor 3		
			24 F_{out} = 0.0 Hz (any state, STOP or RUN)		
			25 E-Stop		
			26 Above Frequency Attained 2 (40.09)		
			27 Soft Braking Signal		
			28 F_{out} = 0.0 Hz (during a RUN command)		
			29 $F_{out} > F_{min}$		
			30 PG Error		
			31 Low Voltage indication (User Defined)		
			32 Inverter RUN command state		
			33 Brake ON/ Brake OFF (40.10, 40.11)		
0206H	40.07	Frequency Attained 1	0.00 to 400.00 Hz	0.00	
0207H	40.08	Digital Output Multiplier	01 to 20	00	
0208H	40.09	Frequency Attained 2	0.00 to 400.00 Hz	0.00	
0209H	40.10	Brake Release Frequency (Brake OFF)	0.0 to 400.0 Hz	0.0	
020AH	40.11	Brake Engage Frequency (Brake ON)	0.0 to 400.0 Hz	0.0	
020BH	40.12	EF Displayed at Midpoint Count	00 Disabled	00	
			01 Display EF when midpoint count is reached		

50 — AC Drive Control

Modbus	Groups	Parameter Description	Range	Default	User Settings
0300H	50.01	Source of LOCAL/HAND Frequency	00 Master Frequency determined by digital keypad on the drive.	00	
			01 Master Frequency determined by 0 – 10V on terminal AI1.		
			02 Master Frequency determined by 4 – 20 mA on terminal AI2.		
			03 Master Frequency determined by -10 – 10V on terminal AI3.		

50 — AC Drive Control (Continued)

Modbus	Groups	Parameter Description	Range	Default	User Settings
0300H	50.01	Source of LOCAL/HAND Frequency	04 Master Frequency determined by RS-485 (Frequency retained) 05 Master Frequency determined by RS-485 (Frequency not retained)	00	
0301H	50.02	Source of REMOTE/ AUTO Frequency	00 Master Frequency determined by digital keypad on the drive. 01 Master Frequency determined by 0 – 10V on terminal AI1. 02 Master Frequency determined by 4 – 20 mA on terminal AI2. 03 Master Frequency determined by -10 – 10V on terminal AI3. 04 Master Frequency determined by RS-485 (Frequency retained) 05 Master Frequency determined by RS-485 (Frequency not retained)	01	
0302H	50.03	Source of LOCAL/HAND Operation Command	00 Operating commands determined by the Digital Keypad. 01 Operating commands determined by the External Control Terminals. Keypad STOP key is enabled. 02 Operating commands determined by the External Control Terminals. Keypad STOP key is not enabled.	00	
0302H	50.03	Source of LOCAL/HAND Operation Command	03 Operating commands determined by the RS-485 communication interface. Keypad STOP key is enabled. 04 Operating commands determined by the RS-485 communication interface. Keypad STOP key is not enabled.	00	
0303H	50.04	Source of REMOTE/ AUTO Operation Command	00 Operating commands determined by the Digital Keypad. 01 Operating commands determined by the External Control Terminals. Keypad STOP key is enabled. 02 Operating commands determined by the External Control Terminals. Keypad STOP key is not enabled. 03 Operating commands determined by the RS-485 communication interface. Keypad STOP key is enabled. 04 Operating commands determined by the RS-485 communication interface. Keypad STOP key is not enabled.	01	
0304H	50.05	Dual Frequency Input Mode	00 Disable 01 50.01 + 50.02 02 50.01 – 50.02 03 50.02 trims 50.01 (Reference)	00	
0305H	50.06	Trim Reference	0.00 to 100.00%	0.00	
0306H	50.07	Keypad Frequency Setting	50.00 to 400.00 Hz	60.00	
0307H	50.08	Stop Method	00 STOP = Ramp, EF = Coast 01 STOP = Coast, EF = Coast 02 STOP = Ramp, EF = Ramp 03 STOP = Coast, EF = Ramp	00	

50 — AC Drive Control (Continued)

Modbus	Groups	Parameter Description	Range	Default	User Settings
0308H	50.09	HOA Stop Method	00 Ramp	01	
			01 Coast		
0309H	50.10	4 – 20 mA Input Signal Loss	00 Decel to 0 Hz	00	
			01 Stop immediately and display EF		
			02 Continue operation at last known frequency		
030AH	50.11	4 – 20 mA Input Loss Detection Time	0.1 to 120.00 sec.	0.1	
030BH	50.12	UP/DOWN Key Speed	00 Based on Accel/Decel time (RUN state only)	00	
			01 Constant Speed (based on 50.13)		
			02 Based on Accel/Decel time, frequency setpoint set to 0 Hz upon a STOP command. (RUN state only)		
030CH	50.13	Increment/Decrement Rate of Frequency	0.01 to 1.00 Hz/msec.	0.01	
030DH	50.14	Maximum Output Frequency	50 to 400.0 Hz	60.00	
030EH	50.15	Motor Nameplate Frequency	10.00 to 400.00 Hz	60.00	
030FH	50.16	Motor Nameplate Voltage	230V Series: 0.1 to 255.0V	230.0	
			460V Series: 0.1 to 510.0V	460.0	
			575V Series: 0.1 to 637.0V	575.0	
0310H	50.17	Mid-Point Output Frequency	0.00 to 400.00 Hz	1.50	
0311H	50.18	Mid-Point Output Voltage	230V Series: 0.1 to 255V	1.7	
			460V Series: 0.1 to 510V	3.4	
			575V Series: 0.1 to 637V	4.8	
0312H	50.19	Minimum Output Frequency	0.00 to 20.00 Hz	1.50	
0313H	50.20	Minimum Output Voltage	230V Series: 0.1 to 50V	1.7	
			460V Series: 0.1 to 100V	3.4	
			575V Series: 0.1 to 637V	4.8	
0314H	50.21	Control Mode	00 V/F	00	
			01 V/F Closed Loop		
			02 Sensorless Vector (SV)		
			03 Vector Closed Loop (CLV)		
0315H	50.22	CT/VT Mode	00 Constant Torque	00	
			01 Variable Torque		
0316H	50.23	Variable Torque Curve Selection	00 V/F curve determined by 50.15 – 50.20	00	
			01 1.5 Power curve		
			02 1.7 Power curve		
			03 Square curve		
			04 Cube curve		
0317H	50.24	Acceleration Time 1	0.01 to 600.00 seconds	Depends on drive hp	
0318H	50.25	Deceleration Time 1	0.01 to 600.00 seconds	Depends on drive hp	
0319H	50.26	Acceleration Time 2	0.01 to 600.00 seconds	Depends on drive hp	
031AH	50.27	Deceleration Time 2	0.01 to 600.00 seconds	Depends on drive hp	
031BH	50.28	Acceleration Time 3	0.01 to d 36000 sec.	Depends on drive hp	
031CH	50.29	Deceleration Time 3	0.01 to d 36000 sec.	Depends on drive hp	

50 — AC Drive Control (Continued)

Modbus	Groups	Parameter Description	Range	Default	User Settings
031DH	50.30	Acceleration Time 4	0.01 to d 36000 sec.	Depends on drive hp	
031EH	50.31	Deceleration Time 4	0.01 to d 36000 sec.	Depends on drive hp	
031FH	50.32	Accel/Decel Time Unit	0 1 sec. 1 0.1 sec. 2 0.01 sec.	1	
0320H	50.33	Automatic Acceleration/ Deceleration	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 50.24 to 50.31)	0	
0321H	50.34	Acceleration 1 to Acceleration 2 Transition Frequency	0.0 Disable Above min freq: Enable, 0.0 to 400.0 Hz	0.0	
0322H	50.35	Deceleration 1 to Deceleration 2 Transition Frequency	0.0 Disable Above min freq: Enable, 0.0 to 400.0 Hz	0.0	
0323H	50.36	Acceleration S-Curve	00 to 07	0	
0324H	50.37	Deceleration S-Curve	00 to 07	0	
0325H	50.38	Jog Accel Time	0.01 to d 3600.0 sec.	10.00	
0326H	50.39	Jog Decel Time	0.01 to d 3600.0 sec.	10.00	
0327H	50.40	Jog Frequency	0.1 to 400.00 Hz	6.00	
0328H	50.41	Reverse Operation	00 Enable Reverse Operation 01 Disable Reverse Operation 02 Disable Forward Operation	0	
0329H	50.42	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	0	
032AH	50.43	Speed Search Delay Time	0.1 to 10.0 sec.	0.5	
032BH	50.44	Speed Search Maximum Current	30 to 200%	150	
032CH	50.45	Speed Search Start Point	0 Start at last known freq command 1 Start at minimum speed	0	
032DH	50.46	Flying Start Mode	0 Disable 1 Enable	0	
032EH	50.47	Flying Start Point	0 From command frequency 1 From maximum freq	0	
032FH	50.48	Upper Frequency Limit (Safety)	0.01 to 400.00 Hz	400.00	
0330H	50.49	Lower Frequency Limit (Safety)	0.0 to 400.00 Hz	0	
0331H	50.50	Skip Frequency 1	0.0 to 400.00 Hz	0	
0332H	50.51	Skip Frequency 2	0.0 to 400.00 Hz	0	
0333H	50.52	Skip Frequency 3	0.0 to 400.00 Hz	0	
0334H	50.53	Skip Frequency 4	0.0 to 400.00 Hz	0	
0335H	50.54	Skip Frequency 1 Bandwidth	0.0 to 20.00 Hz	0	
0336H	50.55	Skip Frequency 2 Bandwidth	0.0 to 20.00 Hz	0	
0337H	50.56	Skip Frequency 3 Bandwidth	0.0 to 20.00 Hz	0	

50 — AC Drive Control (Continued)

Modbus	Groups	Parameter Description	Range	Default	User Settings
0338H	50.57	Skip Frequency 4 Bandwidth	0.0 to 20.00 Hz	0	
0339H	50.58	PID Setpoint Source	00 Disable	0	
			01 Keypad (store in 50.66)		
			02 AI1 (external 0 – 10V)		
			03 AI2 (external 4 – 20 mA)		
			04 AI3 (external -10 – 10V)		
			05 PID set point (50.66)		
033AH	50.59	PID Feedback Source and Type	00 Positive AI1 (0 – 10V)	0	
			01 Negative AI1 (0 – 10V)		
			02 Positive AI2 (4 – 20 mA)		
			03 Negative AI2 (4 – 20 mA)		
			04 Positive AI3 (-10 – 10V)		
033BH	50.60	PID P Gain Adjustment	0.0 to 10.0	1.0	
033CH	50.61	PID I Gain Adjustment	0.00 to 100.0 sec.	1.00	
033DH	50.62	PID D Gain Adjustment	0.00 to 1.0 sec.	0.00	
033EH	50.63	PID Upper Limit for Integral Control	00 to 100%	100	
033FH	50.64	PID Output Delay Filter Time	0.0 to 2.5 sec.	0.0	
0340H	50.65	PID Output Freq Limit	0 to 110%	100	
0341H	50.66	PID Fixed Set Point	0.0 to 400.0 Hz (100.0%)	0	
0342H	50.67	PID Feedback Deviation Level	0 to 100%	100	
0343H	50.68	PID Feedback Deviation Detection Time	0.00 to 3600.0 sec.	1.0	
0344H	50.69	PID Treatment of the Feedback Deviation Error	00 Warning and Inverter Stop	01	
			01 Warning and Continue Operation		
0345H	50.70	Sleep Frequency	0.0 Disabled	0.00	
			0.00 to 400 Hz Enabled		
0346H	50.71	Wake Frequency	0.00 to 400.00 Hz	0.00	
0347H	50.72	Sleep Time Delay	0.0 to 600 sec.	0	
0348H	50.73	Frequency Point to Start Motor 2	0.00 to 400.00 Hz	0.00	
0349H	50.74	Frequency Point to Stop Motor 2	0.00 to 400.00 Hz	0.00	
034AH	50.75	Delay Time Before Starting Motor 2	0.0 to 3600.0 sec.	0.0	
034BH	50.76	Delay Time Before Stopping Motor 2	0.0 to 3600.0 sec.	0.0	

60 — Motor Control

Modbus	Groups	Parameter Description	Range	Default	User Settings
0400H	60.01	Motor Rated Current	Real Current (10 to 120%)	FLA	
0401H	60.02	Motor No-Load Current	Real Current (01 to 99%)	0.4*FLA	
0402H	60.03	Dynamic Tune with Unloaded Motor	00 Disable	00	
			01 DC test (static test)		
			02 DC test and no load test		
0403H	60.04	Stator Resistance (Calculated Via Auto Tune or Entered Manually)	00 to 65535 Ohms	0	
0404H	60.05	DC Brake Current Level	00 to 100%	0	
0405H	60.06	DC Brake Time Upon a Start	0.0 to 60.0 sec.	0	
0406H	60.07	DC Brake Time Upon a Stop	0.0 to 60.0 sec.	0	
0407H	60.08	DC Brake Frequency Point	0.00 to 60.00 Hz	0	
0408H	60.09	Torque Compensation	00 to 10	0	

60 — Motor Control (Continued)

Modbus	Groups	Parameter Description	Range	Default	User Settings
0409H	60.10	Slip Compensation	0.00 to 10.00	0	
040AH	60.11	PWM Carrier Frequency	1 to 15 KHz	9	
040BH	60.12	Motor Poles	2 to 10	4	
040CH	60.13	Motor Rated Slip	0.00 to 20.00 Hz	3.00	
040DH	60.14	Slip Compensation Limit	0 to 250%	200	
040EH	60.15	Time Constant for Torque Compensation	0.01 ~ 10.00 sec.	0.05	
040FH	60.16	Time Constant for Slip Compensation	0.01 ~ 10.00 sec.	0.10	
0410H	60.17	Hunting Coefficient	0 ~ 1000	0	
0411H	60.18	CLV — Encoder Pulses	00 – 40000 (2 poles: 00 – 20000)	600	
0412H	60.19	CLV — Encoder Mode	00 PG disable	0	
			01 Single-phase		
			02 Forward / Counterclockwise rotation		
			03 Reverse / Clockwise rotation		
0413H	60.20	CLV — P Gain	0.0 ~ 10.0	1.0	
0414H	60.21	CLV — I Gain	0.0 ~ 100.00	1.00	
0415H	60.22	CLV — Frequency Limit	0.0 ~ 100.00 Hz	10.00	
0416H	60.23	CLV — Encoder Detection Update Time	0.01 ~ 1.00 sec.	0.10	
0417H	60.24	CLV — Encoder Fault Treatment	00 Warning and Keep operating	00	
			01 Warning and Ramp to stop		
			02 Warning and Coast to stop		
0418H	60.25	CLV — Encoder Feedback Fault Detection Time	0.01 ~ 10.00 sec.	1.00	
0419H	60.26	CLV — Encoder Feedback Filter	00 Disable	00	
			0.002 ~ 1.00		
041AH	60.27	CLV — Encoder Slip Range (Deviation Range)	0.0 ~ 50.0%	10.0	
041BH	60.28	CLV — Encoder Stall Level (Over Speed)	0 ~ 115%	110	
041CH	60.29	SV Zero Speed Mode	0 Standby	0	
			1 Zero Speed Control		
041DH	60.30	SV Zero Speed DC Voltage Level	0.0 to 30.0%	0	

70 — Protective Functions

Modbus	Groups	Parameter Description	Range	Default	User Settings
0500H	70.01	Over-voltage Stall Prevention	230V Series: 330 ~ 410V	390	
			460V Series: 660 ~ 820V	780	
			575V Series: 825 ~ 1025V	950	
0501H	70.02	Over Current Stall Prevention during Acceleration	20 to 200%	170	
0502H	70.03	Over Current Stall Prevention during Operation	20 to 200%	170	
0503H	70.04	Over-Torque Detection Mode	00 Disabled	00	
			01 Enabled during constant speed operation, drive halted after fault		
			02 Enabled during constant speed operation, operation continues after fault		
			03 Enabled during operation, drive halted after fault		
			04 Enabled during operation, operation continues after fault		
0504H	70.05	Over-Torque Detection Level	10 to 200%	150%	

70 — Protective Functions (Continued)

Modbus	Groups	Parameter Description	Range	Default	User Settings
0505H	70.06	Over-Torque Detection Time	0.1 to 10.0 sec.	0.1	
0506H	70.07	Electronic Thermal Overload Relay	00 Constant Torque	01	
			01 Variable Torque		
			02 Inactive		
0507H	70.08	Electronic Thermal Characteristic	30 to 300 sec.	60	
0508H	70.09	Auto Voltage Regulation (AVR)	00 AVR enabled	00	
			01 AVR disabled		
			02 AVR disabled during decel		
			03 AVR disabled during stop		
0509H	70.10	Auto Energy-Saving Operation	00 Disable	00	
			01 Enable		
050AH	70.11	Under Current Detection Value	0.0 Disable	0.0	
			0.1 To No Load Amps		
050BH	70.12	Under Current Detection Mode	00 Output fault (and coast stop)	01	
			01 Output fault & ramp to Stop		
			02 Coast stop and restart after delay 70.14 setting time		
050CH	70.13	Under Current Detection Time	0.0 to 20.0 sec.	1.0	
050DH	70.14	Under Current Detection Restart Time	1 to 3600 sec.	60	
050EH	70.15	Low Voltage Detection Level	240V Series: 240 – 300V DC	0	
			480V Series: 480 – 600V DC	0	
			575V Series: 520 – 780V DC	0	
050FH	70.16	Low Voltage Detection Time	0 to 3600.0 sec.	0.5	
0510H	70.17	Cooling Fan Mode	0 Always on	0	
			1 Fan is off one minute after stop command		
			2 Fan on with run, fan off with stop		
			3 Fan on when temp limit reached		
0511H	70.18	Line Start Lock Out	00 Start lockout disabled; keep previous status when operation command source changed	00	
			01 Start lockout enabled; keep previous status when operation command source changed		
			02 Start lockout disabled; change according to the new operation command source		
			03 Start lockout enabled; change according to the new operation command source		
0512H	70.19	Brake Chopper ON Voltage	230V Series: 370 – 430V DC	380	
			460V Series: 740 – 860V DC	760	
			575V Series: 660 – 1070V DC	950	
0513H	70.20	Auto Restart After Fault	00 to 10	00	
0514H	70.21	Reset Time for Auto Restart after Fault	0 to 60000 sec.	600	
0515H	70.22	OV Fault of Stop Auto Reset	00 Disabled	00	
			01 Enable		

80 — Keypad / Display

Modbus	Groups	Parameter Description	Range	Default	User Settings
0600H	80.01	Software Version	#.##	#.##	
0601H	80.02	AC Drive Rated Current Display	##.#	##.#	

80 — Keypad / Display (Continued)

Modbus	Groups	Parameter Description	Range	Default	User Settings
0602H	80.03	Manufacturer Model Information	For detail, refer to the *GVX9000 AF Drives User Manual*, Appendix B.	0	
0603H	80.04	Fault Record 1	00 – 26	0	
0604H	80.05	Fault Record 2	00 – 26	0	
0605H	80.06	Fault Record 3	00 – 26	0	
0606H	80.07	Fault Record 4	00 No fault occurred	0	
			01 Over Current		
			02 Over Voltage		
			03 Overheat		
			04 Overload		
			05 Overload 1		
			06 Over Torque		
			07 External Fault		
			08 CPU failure 1		
			09 CPU failure 2		
			10 CPU failure 3		
			11 Hardware Protection Failure		
			12 Over-current during accel		
			13 Over-current during decel		
			14 Over-current during steady state		
			15 Ground fault or fuse failure		
			16 Reserved		
			17 3-phase Input Power Loss		
			18 Reserved		
			19 Auto Adjust accel/decel failure		
			20 Software protection code		
			21 IGBT Short circuit		
			22 Loss of 4 – 20 mA		
			23 Under Current Detected		
			24 Encoder Fault		
			25 Feedback Deviation Err		
			26 Count Attained		
0607H	80.08	Power Up Display Selection (Also Order of Appearance When Scrolling through Display Modes)	00 Command Frequency	00	
			01 Output Frequency		
			02 Output Current		
			03 User Defined		
			04 Output Voltage		
			05 Unit Temperature		
			06 Forward/Reverse Direction		
0608H	80.09	User Defined Multiplier	0.01 to 160.00	1	
0609H	80.10	External Terminal Scanning Time	01 to 20	1	
060AH	80.11	Parameter Lock and Configuration	00 All parameters can be set and read	00	
			01 All parameters are read only		
			10 Reset all parameters to the factory defaults		
060BH	80.12	Run Time — Timer Day	0 to 65535	0	
060CH	80.13	Run Time — Timer Minutes	0 to 65535	0	
060DH	80.14	Power On Time — Timer Day	0 to 65535	0	
060EH	80.15	Power On Time — Timer Minutes	0 to 65535	0	
060FH	80.16	Display Scroll	00 Disable	00	
			01 Scroll every 5 seconds after 1 minute delay		
			02 Scroll every 15 seconds after 1 minute delay		

80 — Keypad / Display (Continued)

Modbus	Groups	Parameter Description	Range	Default	User Settings
0610H	80.17	Content of Multifunction Display	00 Display output current	00	
			01 Display counter value		
			02 Display DC-BUS voltage		
			03 Display output voltage		
			04 Output power factor angle		
			05 Display output power (kW)		
			06 Display actual motor speed (rpm)		
			07 Display the estimative value of the ratio of torque		
			08 Display PG numbers/10 ms		
			09 Display analog feedback signal value (%)		
			10 Display AI1 (%)		
			11 Display AI2 (%)		
			12 Display AI3 (%)		
			13 Unit Temperature		
0611H	80.18	Password Input	1 ~ 65535	0	
0612H	80.19	Password Decode	0 ~ 65535	0	

90 — Communication

For Communication parameters see the *GVX9000 AF Drives User Manual* CD, Appendix B.

Step 5 — Troubleshooting Information

The AC drive has a comprehensive fault diagnostic system that includes several different alarms and fault messages. Once a fault is detected, the corresponding protective functions will be activated. The following faults are displayed as shown on the AC drive digital keypad display. The three most recent faults can be read on the digital keypad display by viewing 80.04 through 80.06.

Note: Faults can be cleared by resetting at the keypad or with the Input Terminal.

Common Problems and Solutions

Fault Name	Fault Descriptions	Corrective Actions
Over Current	The AC drive detects an abnormal increase in current.	1. Check that the motor horsepower corresponds to the AC drive output power. 2. Check the wiring connections between the AC drive and motor for possible short circuits. 3. Increase the acceleration time (50.24, 50.26, 50.28, 50.30). 4. Check for possible excessive loading conditions at the motor. 5. If there are any abnormal conditions when operating the AC drive after a short circuit is removed, it should be sent back to manufacturer.
Over Voltage	The AC drive detects that the DC bus voltage has exceeded its maximum allowable value.	1. Check that the input voltage falls within the rated AC drive input voltage. 2. Check for possible voltage transients. 3. Bus over-voltage may also be caused by motor regeneration. Either increase the deceleration time or add an optional braking resistor. 4. Check whether the required braking power is within the specified limits.

Common Problems and Solutions (Continued)

Fault Name	Fault Descriptions	Corrective Actions
Over Heat	The AC drive temperature sensor detects excessive heat.	1. Make sure that the ambient temperature falls within the specified temperature range. 2. Make sure that the ventilation holes are not obstructed. 3. Remove any foreign objects from the heatsink and check for possible dirty heatsink fins. 4. Provide enough spacing for adequate ventilation.
Low Voltage	The AC drive detects that the DC bus voltage has fallen below its minimum value.	Check that the input voltage falls within the rated AC drive's input voltage.
Over Load	The AC drive detects excessive drive output current. Note: The AC drive can withstand up to 150% of the rated current for a maximum of 60 seconds.	1. Check if the motor is overloaded. 2. Reduce the torque compensation setting in 60.09. 3. Replace the AC drive with one that has a higher output capacity (next hp size).
Over Load 1	Internal electronic overload trip	1. Check for possible motor overload. 2. Check electronic thermal overload setting. 3. Increase motor capacity. 4. Reduce the current level so that the drive output current does not exceed the value set by the Motor Rated Current (60.01).
Over Torque	Motor overload. Check the parameter settings (70.04 through 70.06)	1. Reduce the motor load. 2. Adjust the over-torque detection setting to an appropriate setting.
Over Current During Accel	Over-current during acceleration: 1. Short-circuit at motor output. 2. Torque boost too high. 3. Acceleration time too short. 4. AC drive output capacity is too small.	1. Check for possible poor insulation at the output line. 2. Decrease the torque boost setting in 60.09. 3. Increase the acceleration time. 4. Replace the AC drive with one that has a higher output capacity (next hp size).
Over Current During Decel	Over-current during deceleration: 1. Short-circuit at motor output. 2. Deceleration time too short. 3. AC drive output capacity is too small.	1. Check for possible poor insulation at the output line. 2. Increase the deceleration time. 3. Replace the AC drive with one that has a higher output capacity (next hp size).

Common Problems and Solutions (Continued)

Fault Name	Fault Descriptions	Corrective Actions
Over Current During Steady State	Over-current during steady state operation: 1. Short-circuit at motor output. 2. Sudden increase in motor loading. 3. AC drive output capacity is too small.	1. Check for possible poor insulation at the output line. 2. Check for possible motor stall. 3. Replace the AC drive with one that has a higher output capacity (next hp size).
CPU Failure 1	Internal memory cannot be programmed.	1. Switch off power supply. 2. Check whether the input voltage falls within the rated AC drive input voltage. Switch the AC drive back on.
CPU Failure 2	Internal memory cannot be read.	1. Check the connections between the main control board and the power board. 2. Reset the drive to factory defaults.
Hardware Protection Failure	Hardware protection failure	Return the drive to the factory.
Software Protection Code	Software protection failure	Return the drive to the factory.
CPU Failure 3	Drive's internal circuitry is abnormal.	1. Switch off power supply. 2. Check whether the input voltage falls within the rated AC drive input voltage. Switch on the AC drive.
External Fault	The external terminal DI1-COM goes from OFF to ON.	When external terminal DI1-COM is closed, the drive's output will be turned off and will display EF.
Auto Accel/ Decel Failure	Auto acceleration/ deceleration failure	Don't use the auto acceleration/ deceleration function.
Ground Fault or Fuse Failure	Ground fault: The AC drive output is abnormal. When the output terminal is grounded (short circuit current is 50% more than the AC drive rated current), the AC drive power module may be damaged. The short circuit protection is provided for AC drive protection, not user protection.	Ground fault: 1. Check whether the IGBT power module is damaged. 2. Check for possible poor insulation on the output wires or on the motor.
Pause	External Pause. AC drive output is turned off.	1. When the external input terminal (pause) is active, the AC drive output will be turned off. 2. Disable this (pause) and the AC drive will begin to work again.