*DURA*PULSE GS30 AC Drive Quick-Start Guide

5014152001-202410

GS30 AC Drives Installation Instructions

Sensorless Vector Control Variable Frequency Micro-drive

- *Please read this instruction sheet thoroughly before installation and retain for later reference.*
- *To ensure the safety of operators and equipment, only qualified personnel familiar with AC drives should install, wire, program, and operate the GS30 drive. Always read this instruction sheet thoroughly before using the GS30 drive, especially the WARNING, DANGER and CAUTION notes. If you have any questions, please contact AutomationDirect.*

PLEASE READ PRIOR TO INSTALLATION FOR SAFETY

DANGER

- *The ground terminal of the GS30 drive must be grounded correctly. The grounding method must comply with the laws of the country where the GS30 drive is to be installed.*
- *After power has been turned off, the capacitors in the GS30 drive may retain a charge for several minutes. To prevent personal injury, visually verify that the "CHARGE" LED has turned off. Then measure to confirm that the DC bus voltage level between terminals (+1) and (-) is less than 25VDC before touching any terminals. (Capacitor discharge will take at least 5 minutes for most GS30 models)*
- *The CMOS ICs on the internal circuit boards of the GS30 drive are sensitive to static electricity. Please DO NOT touch the circuit boards with your bare hands before taking anti-static measures. Never disassemble the internal components or circuits.*
- *If wiring changes must be made, turn off power to the GS30 drive before making those changes. Allow the internal DC bus capacitors in the GS30 drive sufficient time to discharge prior to making changes in power or control wiring. Failure to do so may result in short circuit and fire. To ensure personal safety, allow DC bus voltage to discharge to a safe level before making wiring changes to the GS30 drive.*
- *DO NOT install the GS30 drive in locations subject to high temperature, direct sunlight, or flammable materials.*

WARNING

- *Never apply power to the output terminals U/T1, V/T2, W/T3 of the GS30 drive. If a fault occurs during operation of the GS30 drive, refer to the fault code descriptions and corrective actions to reset the fault before attempting to operate the GS30 drive.*
- *DO NOT use Hi-pot test for internal components. The semi-conductors in the GS30 drive are easily damaged by high voltage.*

CAUTION

- *Long motor lead lengths may result in reflective wave due to impedance mismatch between the motor cable and the motor. Reflective wave may damage the insulation of the motor. To avoid the possibility of reflective wave damage, use an inverter-rated motor with an insulation rating of 1600 volts. A load reactor or output filter installed between the GS30 drive and motor will help to mitigate reflective wave.*
- *Nominal supply voltage to the GS30 drive should be less than or equal to 240/480 volts AC depending on GS30 model.*
- *Nominal supply current capacity should be less than or equal to 100kA for Frame A–F models. For Frames G, H, and I, ratings vary from 5kA to 10kA – please see drive spec sheets.*
- *The GS30 drive must be installed in a clean, well-ventilated and dry location, free from corrosive gases or liquids.*
- *The GS30 drive must be stored within an ambient temperature range from –40°C to +85°C, and relative humidity range of 0% to 90% without condensation.*
- *Do not apply AC power to the GS30 drive with the front cover removed. Following a fault of the GS30 drive, wait 5 seconds before pressing the RESET key.*
- *To improve power factor, install a line reactor ahead of the GS30 drive. Do not install power correction capacitors in the main AC supply circuit to the GS30 drive to prevent drive faults due to over-current.*

Minimum Wiring

- *For 3-phase models, AC input power to R/L1, S/L2, and T/L3. For 1-phase models AC input power to R/L and S/L2. (For applicability of 1-phase input power, please refer to Chapter 1 of the DURApulse GS30 AC Drives User Manual at AutomationDirect.com.)*
- *Ground from the power supply*
- *Drive power to the motor (U, V, W on T1, T2, T3) (For use with 3-phase motors only!)*
- *Ground to the motor*
- *STO1 and STO2 (both must be wired through appropriate N.C. safety-rated contacts to DCM or the factory-installed jumpers must be left in place)*

With this minimal wiring, the drive can be operated via the keypad to test the motor and drive installation. See the "Parameter Set Up" (page 4) section to configure the drive for keypad operation.

Recommended Safety Wiring

We strongly recommend that customers use the STO safety feature.

The Safe Torque Off (STO) function turns off the power supplied to the motor through the hardware, so that the motor cannot produce torque. This method of removing power from the motor is considered an emergency stop, also known as "coast to stop."

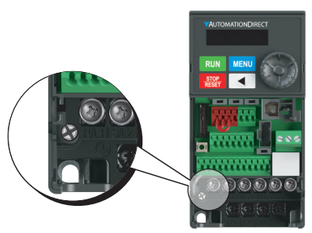
To use this feature, disconnect the appropriate factory-installed jumpers and wire a safety relay or safety PLC as shown. The E-Stop pushbutton should be wired through a Safety Relay or PLC to meet Category 3 safety requirements. See User Manual Appendix E for wiring the GS30 with STO.

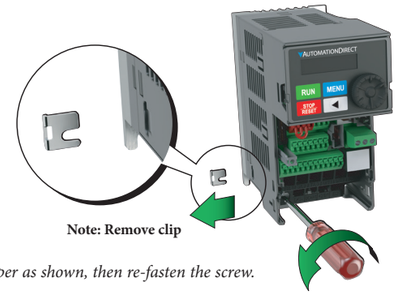
Wiring Diagrams

RFI Jumper Removal

If the power distribution system supplying the GS30 AC drive is a floating (IT) or an asymmetric ground system, the RFI jumper must be removed. Removing the RFI jumper uncouples the internal RFI capacitor (filter capacitor) between the GS30 drive frame and circuitry to avoid damaging those circuits and (according to IEC 61800-3) to reduce ground leakage current.

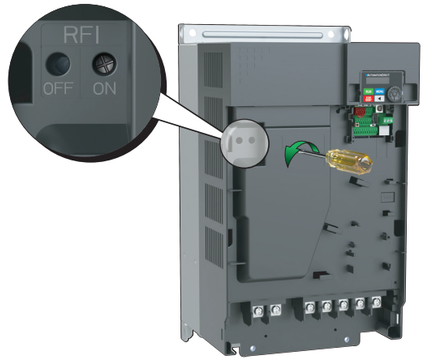
GS30 Frame A through G





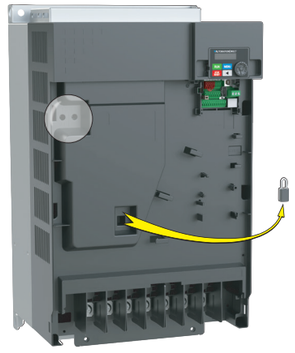
Loosen the screw and remove the RFI jumper as shown, then re-fasten the screw.

GS30 Frame H



1) *Remove the RFI ON*

GS30 Frame I



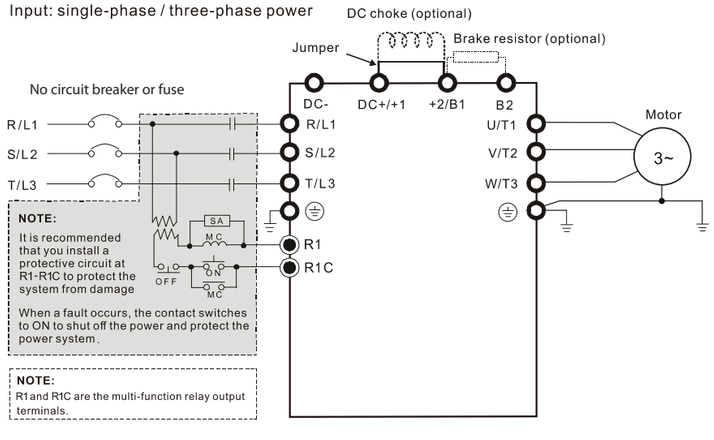
1) *Remove the screw for RFI-1 ON*
2) *Remove the RFI jumper RFI-2*

Main Wiring (Power Circuit)

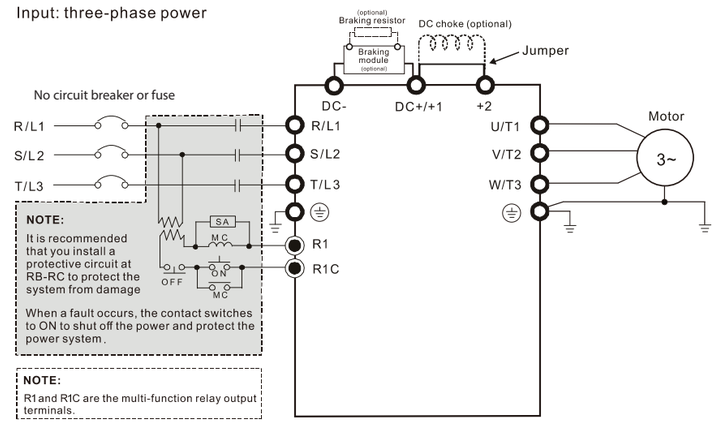
For main (power) wiring terminal specifications, Please refer to "Specifications for Wiring Terminals – Main-Circuit Terminals" (page 2).

GS30 Frames A through G:

*Note that 1-phase drives do not have a T/L3 terminal.

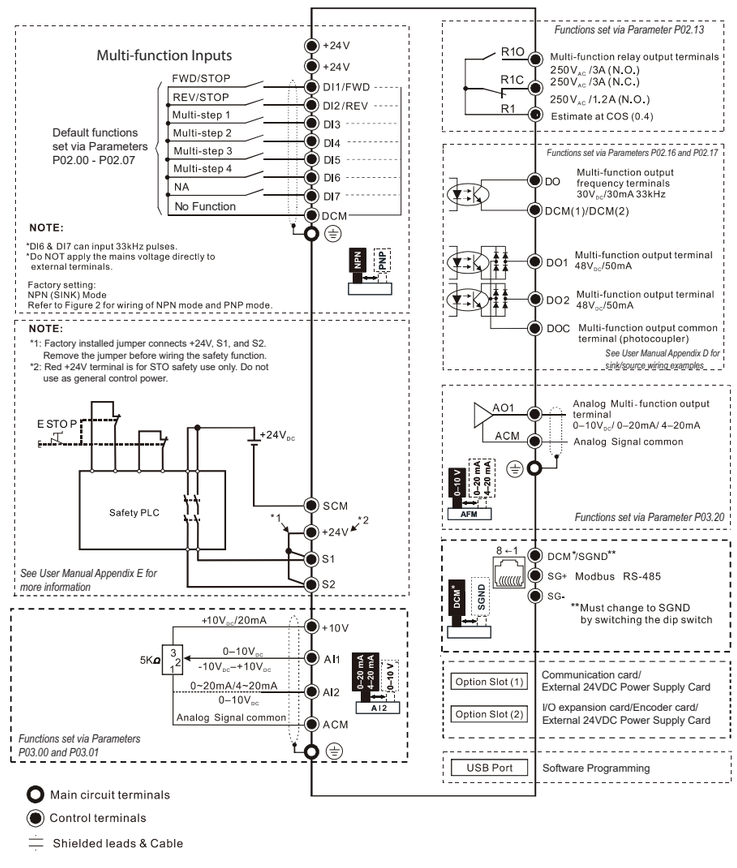


GS30 Frames H and I:

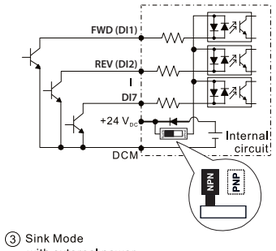


GS30 Control Terminal Wiring (All Frame Sizes)

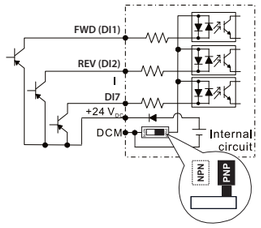
(See page 2 for Start/Stop wiring options)



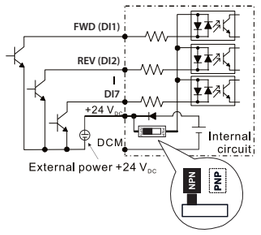
① Sink Mode with internal power (+24 V_{DC})



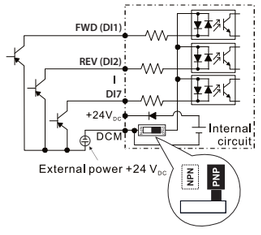
② Source Mode with internal power (+24 V_{DC})

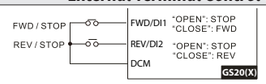
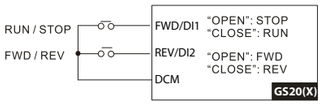


③ Sink Mode with external power



④ Source Mode with external power

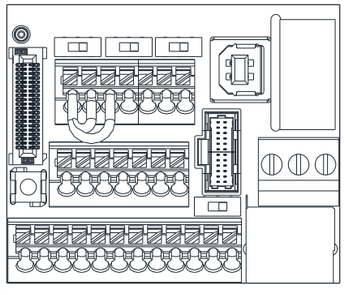


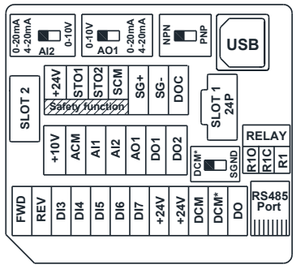
P02.00	External Terminal Control Circuits
Setting value: 1 Two-wire operation control FWD / STOP REV / STOP	
Setting value: 2 Two-wire operation control RUN / STOP FWD / REV	
Setting value: 3 Three-wire operation control	

Specifications for Wiring Terminals – Control Circuit

GS30 All Models; All Frame Sizes

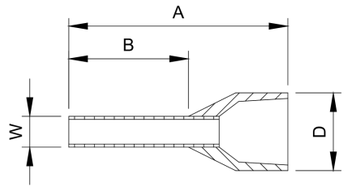
Terminal	Wire Gauge	Torque
Control	24–18 AWG [0.21–0.82 mm²]	n/a (spring terminals)
Relay	24–16 AWG [0.21–1.31 mm²]	5kg·cm [4.3 lb·in]





Wiring Precautions

1) *The factory default condition is +24 V/STO1/STO2 shorted by jumper, as shown in the block 1 of the figure above. Refer to the wiring chapter of the User Manual for more details.*
2) *The +24 V power supply for safety function is only for STO use and cannot be used for other purposes.*
3) *The RELAY terminal uses the PCB terminal block:*
   - *Tighten the wiring with a 2.5 mm (wide) x 0.4 mm (thick) slotted screwdriver.*
   - *The ideal length of stripped wire at the connection side is 6–7 mm.*
   - *When wiring bare wires, make sure they are perfectly arranged to go through the wiring holes.*
4) *The control circuit terminal uses a spring clamp terminal block:*
   - *Tighten the wiring with a 2.5 mm (wide) x 0.4 mm (thick) slotted screwdriver.*
   - *The ideal length of stripped wire at the connection side is 9 mm.*



Recommended Models or Dimensions for Ferrule Terminals

Wire Gauge	Manufacturer	Model Name	A (MAX)	B (MAX)	D (MAX)	W (MAX)
0.25 mm2 [24 AWG]	PHOENIX CONTACT	AI 0,25- 8 YE	12.5	8	2.6	1.1
0.34 mm2 [22 AWG]	PHOENIX CONTACT	AI 0,34- 8 TQ	12.5	8	3.3	1.3
0.5 mm2 [20 AWG]	PHOENIX CONTACT	AI 0,5 - 8 WH	14	8	3.5	1.4
	Z+F	V30AE000006	14	8	2.6	1.15

Specifications for Wiring Terminals – Main-Circuit Terminals

Notes:

- *If you install at Ta 50°C above environment (all frames) or 40°C (Frame H, I, with conduit box), please use copper wire with a 600V voltage rating and temperature resistance of 90°C or higher.*
- *For UL compliant installation, you must:*
  1) *Use 75°C temperature resistant copper wire or better. Do not reduce wire gauge when using higher temperature wire.*
  2) *Use the specific ring lug part listed in the table below.*
  3) *Use crimp tool KST2000D-1322 or IZUMI 5N18 for 22–8 AWG wire, or IZUMI 9H-60 for 6–4 AWG wire.*

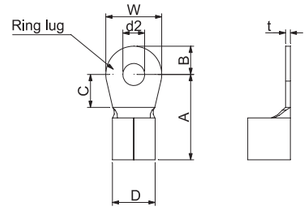


Figure 1.

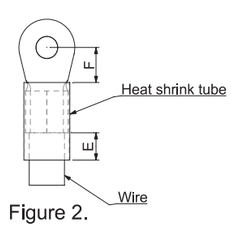


Figure 2.

Drive Models		Max Wire Gauge	Min Wire Gauge	Screw Size	Torque (±10%)	Ring Lug Dimensions (mm)
Frame A	GS31-20P5	14AWG [2.5 mm²]	14AWG [2.5 mm²]	M3.5	9 kg-cm [7,8 lb-in.] [0.88 N·m]	
	GS33-21P0		16AWG [1.5 mm²]			
	GS33-20P5		18AWG [0.75 mm²]			
	GS33-40P5					
	GS33-41P0					
Frame B	GS31-21P0	12AWG [4 mm²]	12AWG [4 mm²]	M4	15 kg-cm [13,0 lb-in.] [1.47 N·m]	
	GS33-22P0					
	GS33-42P0		14AWG [2.5 mm²]			

Dimension	Value	Min/Max
A	9.8	Max
B	3.2	Max
C	4.8	Min
D	4.1	Max
d2	3.7	Min
E	13.0	Min
F	4.2	Min
W	6.6	Max
t	0.8	Max

Dimension	Value	Min/Max
A	12.1	Max
B	3.6	Max
C	6.1	Min
D	5.6	Max
d2	4.3	Min
E	13.0	Min
F	4.5	Min
W	7.2	Max
t	1	Max

Specifications for Wiring Terminals – Main-Circuit Terminals (continued)

Drive Models		Max Wire Gauge	Min Wire Gauge	Screw Size	Torque (±10%)	Ring Lug Dimensions (mm)
Frame C	GS31-22P0	8AWG [10 mm²]	8AWG [10 mm²]	M4	20 kg-cm [17,4 lb-in.] [1.96 N·m]	
	GS31-23P0					
	GS33-25P0					
	GS33-23P0		10AWG [6 mm²]			
	GS33-45P0		12AWG [4 mm²]			
	GS33-43P0		14AWG [2.5 mm²]			
Frame D	GS33-27P5	8AWG [10 mm²]	8AWG [10 mm²]	M4	20 kg-cm [17,4 lb-in.] [1.96 N·m]	
	GS33-4010					
	GS33-47P5		10AWG [6 mm²]			
Frame E	GS33-2015	4AWG [25 mm²]	4AWG [25 mm²]	M5	25 kg-cm [21,7 lb-in.] [2.45 N·m]	
	GS33-2010	6AWG [16 mm²]	6AWG [16 mm²]			
	GS33-4015					
	GS33-4020					
Frame F	GS33-2020	2AWG [35 mm²]	2AWG [35 mm²]	M6	40 kg-cm [34,7 lb-in.] [3.92 N·m]	
	GS33-4030					
	GS33-4025		4AWG [25 mm²]			
Frame G	GS33-2025	4AWG [25 mm²]	6AWG [16 mm²]	M8	80 kg-cm [69.4 lb-in.] [7.84 N·m]	
	GS33-2030	2AWG [35 mm²]				
	GS33-4040					
Frame H	GS33-4050	3/0 AWG [95 mm²]	4AWG [25 mm²]	M8	80 kg-cm [69.4 lb-in.] [7.84 N·m]	
	GS33-4060		1/0 AWG [50 mm²]			

Dimension	Value	Min/Max
A	17.8	Max
B	5.0	Max
C	6.1	Min
D	7.2	Max
d2	4.3	Min
E	13.0	Min
F	5.5	Min
W	10.5	Max
t	1.2	Max

Dimension	Value	Min/Max
A	27.1	Max
B	6.1	Max
C	10.5	Min
D	11.5	Max
d2	5.3	Min
E	13.0	Min
F	6.5	Min
W	12.6	Max
t	1.7	Max

Dimension	Value	Min/Max
A	35.0	Max
B	9.0	Max
C	13.3	Min
D	14.0	Max
d2	6.2	Min
E	13.0	Min
F	10	Min
W	19.5	Max
t	1.8	Max

Dimension	Value	Min/Max
A	35.0	Max
B	9.0	Max
C	13.3	Min
D	14.0	Max
d2	6.2	Min
E	13.0	Min
F	10	Min
W	19.5	Max
t	1.8	Max

SPECIFICATIONS FOR WIRING TERMINALS – MAIN-CIRCUIT TERMINALS (CONTINUED)

Drive Models		Max Wire Gauge	Min Wire Gauge	Screw Size	Torque (±10%)	Ring Lug Dimensions (mm)
Frame I	GS33-2040	300 MCM [150 mm²]	3/0 AWG [95 mm²]	M8	80 kg-cm [69.4 lb-in.] [7.84 N·m]	
	GS33-2050					
	GS33-4075		2/0 AWG [70 mm²]			
	GS33-4100		3/0 AWG [95 mm²]			

Dimension	Value	Min/Max
A	35.0	Max
B	9.0	Max
C	13.3	Min
D	14.0	Max
d2	6.2	Min
E	13.0	Min
F	10	Min
W	19.5	Max
t	1.8	Max

DIGITAL KEYPAD FUNCTIONS AND INDICATIONS

Description of the functions of the keys and indicators of the GS30 AC Drive Keypad.

NOTE: Drive default is Remote (AUTO) mode. There is no indication on the keypad of the mode. Local mode can be set by changing Parameter P00.21 via the keypad, GS4-KPD software.

Descriptions of Keypad Functions

RUN	**RUN Key** • Valid only when the source of operation command is from the keypad. • RUN can be pressed even when drive is in process of stopping. • When in "LOCAL" mode, RUN is valid only when the source of operation command is from the keypad (drive default is Auto mode). Local mode can be set by changing P00.21 via the keypad, GS4-KPD, or software.
STOP RESET	**STOP/RESET Key** *This key has the highest processing priority in any situation.* • When the drive receives a STOP command, whether or not the drive is in operation or stop status, the drive will execute a "STOP" command. • The RESET key can be used to reset the drive after a fault occurs. For those faults that can't be reset by the RESET key, see the fault records after pressing MENU key for details. *NOTE: The ability to STOP the drive from the keypad is effective ONLY if the drive is configured to RUN and/or STOP from the keypad. Keypad STOP can be disabled by parameter 00.32, Digital Keypad STOP Function.*
MENU	**MENU Key** Press MENU to return to the Main screen or cycle through the available menu options.
◀	**Left Shift Key** • Changes values and parameters
	Digital Dial The Digital Dial acts as both a potentiometer and a button. • Rotate to select parameters or adjust values • Press to confirm selections (acts as ENTER key) The Digital Dial can also be set as the main frequency input. Set P00.20 or P00.30 to "0: Digital Keypad".

Descriptions of LED Functions

RUN	**Steady ON**: Drive is running. **Blinking**: Drive is stopping or in base block. **Steady OFF**: Drive is not running.
FWD	**Steady ON**: Drive is operating in Forward mode. **Blinking**: Drive is changing direction. **Steady OFF**: Drive is operating in Forward mode.
REV	**Steady ON**: Drive is operating in Reverse mode. **Blinking**: Drive is changing direction. **Steady OFF**: Drive is operating in Forward mode.
STOP	**Steady ON**: Drive is stopped or in the process of stopping. **Blinking**: Drive is in standby (run but does not output). **Steady OFF**: Drive is not currently executing an operational (STOP) command. *NOTE: The ability to STOP the drive from the keypad is effective ONLY if the drive is configured to RUN and/or STOP from the keypad. Keypad STOP can be disabled by parameter 00.32, Digital Keypad STOP Function.*
PLC	**Steady ON**: PLC STOP (PLC 2) initiated. **Blinking**: PLC Run (PLC1) initiated. **Steady OFF**: No PLC functions implemented (PLC 0).

KEYPAD NAVIGATION EXAMPLE

Instruction	Press Key	Display Will Show	
First screen to display after power up.	n/a	Displays the present frequency setting of the drive	RUN FWD REV F 60.00 STOP PLC
Press MENU once from startup.	MENU	Displays the actual output frequency of the drive	RUN FWD REV H 50.00 STOP PLC
Press MENU twice from startup.	MENU	Displays user defined output	RUN FWD REV U 180 STOP PLC
Press MENU three times from startup.	MENU	Displays output current	RUN FWD REV A 5.00 STOP PLC
Press MENU four times from startup. Displays Frd if the drive is currently configured for Forward operation. Scroll with the dial to change to Reverse. Press ENTER to confirm the change.	MENU, ENTER	Displays the Forward command if configured for Forward operation.	RUN FWD REV Frd STOP PLC
		Displays the Reverse command if configured for Reverse operation.	RUN FWD REV rEv STOP PLC
Press MENU five times from startup. Displays the current PLC setting. Scroll with the dial to change the PLC setting, then press ENTER to confirm.	MENU, ENTER	Displays the current PLC setting.	RUN FWD REV PLC0 STOP PLC
Press MENU six times from startup. Used to Read/Write parameters between the drive and the local keypad. Scroll with the dial to select READ or WRITE, FILE Number and Save	MENU, ENTER	Parameter Read/ Write function	RUN FWD REV READ STOP PLC
From the Frequency setting, Actual Frequency, User, Amps, or Frd/Rev screen, press ENTER to bring up the parameter number (Format XX.YY). Scroll with the dial to change the parameter number as needed, then press ENTER to alter the parameter value.	ENTER ENTER	Displays the parameter number	RUN FWD REV 06.00 STOP PLC
From the parameter number screen, press ENTER to bring up the current value of the selected parameter. Scroll with the dial to adjust the value. Press ENTER again to confirm the choice.	ENTER ENTER	Displays the value of the selected parameter	RUN FWD REV 10 STOP PLC
Once a desired parameter value has been set using the Dial, press ENTER to save the choice and display End message.	ENTER	End message. Displays when data has been accepted and stored	RUN FWD REV End STOP PLC
Displays when an external fault is detected.	n/a	External fault message	RUN FWD REV EF STOP PLC
Displays when data is not accepted or the value exceeded	n/a	Error message.	RUN FWD REV Err STOP PLC
Scroll sequentially through the suggested parameters (listed on page 4), and set those parameters as needed for your application. Consult User Manual for additional parameters. After changing all of the applicable parameters, press "MENU" key repeatedly to return to the Menu screen.			

GS30 FAULT CODES

See Chapter 6 of the User Manual for more details.

Fault Codes	
0: No Error	49: External Fault input (EF)
1: Overcurrent during Accel (ocA)	50: Emergency Stop (EF1)
2: Overcurrent during Decel (ocd)	51: External Base Block (bb)
3: Overcurrent during constant speed (ocn)	52: Password Error (Pcod)
4: Ground Fault (GFF)	54: Communication Error (CE1)
6: Overcurrent during Stop (ocS)	55: Communication Error (CE2)
7: Overvoltage during Accel (ovA)	56: Communication Error (CE3)
8: Overvoltage during Decel (ovd)	57: Communication Error (CE4)
9: Overvoltage during constant speed (ovn)	58: PC Communication Time Out (CE10)
10: Overvoltage during Stop (ovS)	61: Y-Delta connection Error (ydc)
11: Low voltage during Accel (LvA)	62: Decel Energy Backup Error (dEb)
12: Low voltage during Decel (Lvd)	63: Slip Error (oSL)
13: Low voltage during constant speed (Lvn)	72: STO loss 1 (STL1)
14: Low voltage during Stop (LvS)	76: Safety Torque Off (STO)
15: Input phase loss (OrP)	77: STO loss 2 (STL2))
16: IGBT Overheat 1 (oH1)	78: STO loss 3 (STL3)
17: Internal Key Parts Overheating (oH2)	79: U Phase over current before run (Aoc)
18: Thermistor 1 open (tH1o)	80: V Phase over current before run (boc)
19: Capacitor hardware error (tH2o)	81: W Phase over current before run (coc)
21: Drive over-load (oL)	82: U Phase output phase loss (oPL1)
22: Electronics thermal relay protection 1 (EoL1)	83: V Phase output phase loss (oPL2)
23: Electronics thermal relay protection 2 (EoL2)	84: W Phase output phase loss (oPL3)
24: Motor Overheat-PTC (oH3)	87: Drive overload in low frequency (oL3)
26: Over Torque 1 (ot1)	89: Initial rotor position detection error (roPd)
27: Over Torque 2 (ot2)	111: InrCOM time-out error (InerCOM)
28: Under current (uc)	121: Internal communication error (CP20)
29: Limit error (LiT)	123: Internal communication error (CP22)
31: Memory read-out error (cF2)	124: Internal communication error (CP30)
33: U phase current sensor detection error (cd1)	126: Internal communication error (CP32)
34: V phase current sensor detection error (cd2)	127: Internal communication error (CP33)
35: W phase current sensor detection error (cd3)	128: Over-torque 3 (ot3)
36: Clamp current detection error (Hd0)	129: Over-torque 4 (ot4)
37: Over-current detection error (Hd1)	134: Electronics thermal relay 3 protection (EoL3)
40: Auto tuning error (AuE)	135: Electronics thermal relay 4 protection (EoL4)
41: PID Feedback loss (AFE)	140: GFF detected when power on (Hd6)
42: PG feedback error (PGF1)	141: GFF occurs before run (b4GFF)
43: PG feedback loss (PGF2)	142: Auto tuning error 1 (AUE1)
44: PRG feedback stall (PGF3)	143: Auto tuning error 2 (AUE2)
45: Encoder slip error (PGF4)	144: Auto tuning error 3 (AUE3)
48: Analog current input loss (ACE)	

INTRODUCTION – HOW TO GET STARTED

Automationdirect.com would like to thank you for your purchase of the Durapulse GS30 AC drive. The GS30 drive is a state-of-the-art, full-featured AC drive. The Quick-Start Guide below will introduce you to many of the GS30 drive features and help you configure the GS30 drive in a minimum amount of time.

STO (Safe Torque Off) / Emergency Stop

The GS30 drive offers Safe Torque Off (STO) functionality, instead of a standard Emergency Stop circuit. STO provides the ability to immediately turn off the output of the GS30 drive in the event of an emergency, without the need for an emergency stop contactor between the drive and motor.

Please see the Control-Circuit Wiring diagrams (page 1) for how to wire the STO circuit. From the factory, the GS30 STO terminals are jumpered and the STO circuitry of the drive is bypassed. STO is recommended for personnel safety.

After wiring the drive (*but before applying power*), the first thing you should do is press the E-stop button (or otherwise break the safety circuit) and verify that the circuit between the STO1/STO2 terminals and the STO +24V terminal is not connected. If these circuits are open, the STO feature will stop all power from going to the motor and there will be no danger of unexpected movement when you power up the drive.

Powering Up the GS30 Drive

Apply AC line power to the GS30 drive, but don't engage the safety circuit yet (keep the E-stop PB pushed in).

Starting, Stopping, and Controlling the Speed of the GS30 Drive

Out of the box GS30 drives are set to use the keypad buttons to RUN and STOP the drive and vary the drive speed. The drive can also be configured to run from potentiometers, external pushbuttons, Ethernet communication, etc.

Do not attempt to run the motor yet. Certain parameters (especially the motor protection parameters) must be set first.

Configure the Drive

The tables below list those parameters typically used in most applications. You can navigate to any of these parameters through the keypad. (Refer to page 3 for information and instructions for using the Digital Keypad.)

All applications need to configure the parameters in the "Quick Configuration" table. At minimum, you MUST configure these motor parameters before operating the drive:

- *01.00 Motor1 Max Output Frequency (this will typically be 50Hz or 60Hz)*
- *01.02 Motor1 Max Output Voltage (this will typically be either 230V or 460V)*
- *05.01 Motor1 Rated Amps (depends on the motor)*

The main configuration parameters required to get your drive up and running are included in this guide. For more advanced configuration options, please see the User Manual. Your application will dictate which parameters need to be configured. It is NOT necessary to configure every parameter listed in the tables in the User Manual, use only those you need.

Parameter Groups

Group Number	Group Category
00	Drive Config
01	Basic Config
02	Digital I/O Config
03	Analog I/O Config
04	Multi-Step Speed Config
05	Motor Config
06	Protection Config
07	Special Parameters
08	PID Config
09	Communications Config
10	Speed Control Config
11	Advanced Config
12	Tension Config
13	Macro Config
14	Protection (2) Config

After configuring the minimum settings, you can now engage the safety circuit. The RUN and STOP/RESET buttons should Start and Stop the drive. To adjust the output frequency, press the MENU button repeatedly until the "F xx" appears for "Frequency Setpoint". Use the Digital Dial to adjust the frequency.

PARAMETER SET UP

*DURA*PULSE GS30 AC Drives offer parameter setup from the keypad for some of the most common drives applications. Choose parameters from the table below, then set the applicable parameters for that application as shown.

To Configure Parameters:

From the power up screen:

1) *Press* **MENU** *until you see* **H 0.00** *(this is the actual drive frequency) and press* **ENTER**.
2) *Use the* **Dial** *to select the parameter group you want and press* **ENTER**.
3) *Use the* **Dial** *to select the parameter number you want within that group and press* **ENTER**.
4) *Change the value of the parameter using the* **Dial** *and press* **ENTER**.
5) *Press* **MENU** *to exit back to the main menu.*
6) *Repeat as needed until all required parameters are configured.*

Please refer to the user manual if you need more detailed information about the parameters.

DURA*PULSE GS30 Parameter Settings – Quick Configuration

Parameter Group	Parameter #	Description	Range	Default	User
00	00	GS30 Model ID	Read Only	n/a	
00	01	Displays AC drive rated current	Displays amperage	n/a	
00	02	Restore to default**	0=No function 1=Parameter write protect 5=Reset kWH display to 0 6=Reset PLC 7=Reserved 8=Keypad doesn't respond 9=Reset 50Hz defaults 10=Reset 60Hz defaults 11=Reset 50Hz defaults (keep user config) 12=Reset 60Hz defaults (keep user config)	0	
00	06	Firmware Version	Read Only	n/a	
00	10	Control Method	0=Speed mode 2=Torque mode	0	
00	11	Velocity Mode	0=VF Open Ctrl 1=VF Enc Close Ctrl 2=SVC Sensorless 3=IM FOC Enc Ctrl 4=PM FOC Enc Ctrl 5=FOC Sensorless 6=Reserved 7=IPM Sensorless	0	
00	16	Duty Selection	0=Variable Torque 1=Constant Torque	1	
00	20	Master Frequency Command Source (AUTO, REMOTE)	0: Digital keypad 1: RS-485 communication input 2: Analog input (Refer to P03.00) 3: External UP / DOWN terminal 4: Pulse Command (PG2) Reference w/o Direction 5: Pulse Command (PG2) Reference with Direction 8: Communication card 9: PID controller (See User Manual Chapter 4 for additional details)	0	
00	21	Operation Command Source	0=Digital keypad 1=External terminals 2=Communication RS-485 input 5=Communication card	0	
00	22	Stop Method	0=Ramp to stop 1=Coast to stop	0	
00	23	Motor Direction Control	0=Enable forward/reverse 1=Disable reverse 2=Disable forward	0	
01	00	Motor 1 Max Frequency	0.00-599.00 Hz	60	
01	01	Motor 1 Base Frequency	0.00-599.00 Hz	60	
01	02	Motor 1 Rated Voltage	110V/230V: 0.0~255.0, 460V: 0.0~510.0V	220.0 440.0	
01	09	Startup Frequency	0.00-599.0 Hz	0.5	
01	10	Output Frequency Upper Limit	0.00-599.0 Hz	599.0	
01	11	Output Frequency Lower Limit	0.00-599.0 Hz	0.00	
01	12	Acceleration Time 1	P01.45=0: 0.00-600.0 sec P01.45=1: 0.00-6000.0 sec	10.00 10.00	
01	13	Deceleration Time 1		10.00 10.00	
01	20	Jog Acceleration Time		10.00 10.00	
01	21	Jog Deceleration Time		10.00 10.00	
01	22	Jog Frequency	0.00-599.0 Hz	0.5	

* Assumes default V/Hz mode with no feedback. To change control modes see complete parameter listing in User manual.
** Reboot drive after resetting defaults.

Note: *Drive default is Auto mode and cannot be changed from the keypad. For Local/Hand, use Discrete input configuration settings (P02.00–P02.07) and P00.29–P00.31.*

(table continued next column)

***DURA*PULSE GS30 Parameter Settings – Quick Configuration (continued)**

Parameter		Description	Settings	Default	User
02	00	2-wire / 3-wire Control	0=No function 1=2-wire mode 1, power on for operation control (M1: FWD/STOP, M2: REV/STOP) 2=2-wire mode 2, power on for operation control (M1: RUN/STOP, M2 REV/FWD) 3=3-wire, power on for operation control (M1: RUN, M2: REV/FWD, M3: STOP) 4=2-wire mode 1, fast start up (M1: FWD/STOP, M2: REV/STOP) 5=2-wire mode 2, fast start up (M1: RUN/STOP, M2: REV/FWD) 6=3-wire, fast start up (M1: RUN, M2: REV/FWD, M3: STOP) Note: In fast start up mode, the drive skips detecting IGBT signal and will run immediately. When using fast start up mode: Terminal output stays in ready status and drive responds to commands immediately. The output terminal will have higher voltage If the drive is short circuited an OC error will display when running up	1	
02	01	DI1 Assignment Select 1 (FWD/DI1)	See "Multi-function Input Selections" on page 5	0	
02	02	DI2 Assignment Select 2 (REV/DI2)		0	
02	03	DI3 Assignment Select 3 (DI3)		1	
02	04	DI4 Assignment Select 4 (DI4)		2	
02	05	DI5 Assignment Select 5 (DI5)		3	
02	06	DI6 Assignment Select 6 (DI6)		4	
02	07	DI7 Assignment Select 7 (DI7)		0	
02	13	Relay 1 Function Select (R1)	See "Multi-function Output Selections" on page 5	11	
02	16	DO1 Assignment Select 2 (DO1)		0	
02	17	DO2 Assignment Select 3 (DO2)		0	
02	35	Auto-run on Power-up (includes after a Fault reset)	0: Disable 1: Drive Runs on Run Command after Fault Reset or Power Up	0	
03	00	Analog Input Selection (AI1)	See "AI Multi-function Input Selections" on page 5	1	
03	01	Analog Input Selection (AI2)		0	
03	20	Multi-function Output (AO1)	See "AO1 Multi-function Output Selections" on page 5	0	
03	28	AI1 terminal input selection	0=0–10 V 3=-10–10 V	0	
03	29	AI2 terminal input selection	0=0–10 V 2=0–20 mA	0	
05	00	Auto-tuning selection	0=No function 1=IM rotary tuning 2=IM static tuning 4=Permanent magnet static pole angle 5=Permanent magnet rotary tuning 12=SVC inertia estimation 13=Permanent magnet static tuning	0	
05	01	Motor 1 Full Load Amps (FLA)	10-120% of drive rated current	#.##	
05	02	Motor 1 Rated Power	0.00–655.35 kW	Based on model	
05	03	Motor 1 Rated RPM	0-65535	1710	
05	04	Motor 1 Number of poles	2-20	4	
06	06	Over-torque Detection Selection (Motor 1)	0=Disable 1=Continue operation after over-torque detection during constant speed operation 2=Stop after over-torque detection during constant speed operation 3=Continue operation after over-torque detection during RUN 4=Stop after over-torque detection during RUN	0	
06	07	Over-torque Detection Level (Motor 1)	10–250% (100% corresponds to the rated current of the drive)	120	
06	08	Over-torque Detection Time (Motor 1)	0.1–60.0 seconds	0.1	
06	13	Motor 1 Electronic Thermal Overload Relay	0=Inverter motor (with external forced cooling) 1=Standard motor (motor with fan on the shaft) 2=Disabled **Note:** A value of 0 or 1 is recommended to protect the motor in most applications.	1	
06	14	Motor 1 Electronic Thermal Relay Time	30.0-600.0	60	
06	55	Drive Derating Method	0=Carrier Freq Derate 1=Current Derate 2=Carrier Freq Derate W.O Constant Current	0	

(table continued next page)

DURAPULSE GS30 Parameter Settings – Quick Configuration (continued)					
Parameter		Description	Range	Default	User
Group	#				
07	10	Restart after fault action	0=Stop operation 1=Speed tracking by current speed 2=Speed tracking by minimum output frequency	0	
07	11	Number of times to attempt auto-restart after fault	0–10	0	
07	19	Fan cooling control*	0=Fan is always ON 1=Fan is OFF after the AC motor drive stops for one minute 2=Fan is ON when the AC motor drive runs, fan is OFF when the AC motor drive stops 3=Fan turns ON when temperature (IGBT) reaches approximately 60℃	3	
08	00	PID Feedback terminal selection	0=Disabled 1=Negative PID feedback: by analog input (P03.00) 2=Negative PID feedback: by single-phase pulse input (DI7), without direction (P10.02) 3=Negative PID feedback: by single -phase pulse input (DI7), with direction (P10.02) 4=Positive PID feedback: by analog input (P03.00) 5=Positive PID feedback: by single -phase pulse input (DI7), without direction (P10.02) 6=Positive PID feedback: by single -phase pulse input (DI7), with direction (P10.02) 7=Negative PID feedback: by communication protocol 8=Positive PID feedback: by communication protocol	0	
08	01	Proportional gain (P)	0.0–1000.0 (When P08.23 bit 1=0) 0.00–100.00 (When P08.23 bit 1=1)	1.00	
08	02	Integral time (I)	0.00–100.00 sec.	1.00	
08	03	Differential time (D)	0.00–1.00 sec.	0.00	
08	04	Upper limit of integral control	0.0–100.0%	100.0	
08	05	PID output command limit (positive limit)	0.0–110.0%	100.0	
08	06	PID feedback value by communication protocol	-200.00–200.00%	0.00	
08	07	PID delay time	0.0–2.5 sec.	0.0	
08	08	Feedback signal detection time	0.0–3600.0 sec.	0.0	
08	09	Feedback signal fault treatment	0=Warn and Keep Run 1=Fault and Ramp Stop 2=Fault and Coast Stop 3=Warn and Keep Freq	0	
08	65	PID target value source	0=Freq Cmd 1=From Pr08-66 2=RS485 Comm 3=Analog Input 6=Comm Card	0	
13	00	Application Selection	00=Disabled 01=User parameter 02=Compressor 03=Fan 04=Pump 05=Conveyor 06=Machine tool 07=Packing 08=Textiles 10=Logistics 11=Tension PID function 12=Tension PID master/aux frequency function	0	

** Note, not all drives come standard with fans*

Multi-function Input Selections		
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 auto-acceleration / auto-deceleration time 15=Frequency command from AI1 16=Frequency command from AI2 18=Forced to stop (P07.20) 19=Frequency up command 20=Frequency down command 21=PID function disabled 22=Clear the counter	23=Counter input (DI6) 24=FWD JOG command 25=REV JOG command 26=TRQ / Field Oriented Control (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 43=Enable resolution selection (P02.48) 44=Negative limit switch (NL) 45=Positive limit switch (PL) 46=Homing (ORG) 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 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 78=Multi-step position confirmation 79=Position/speed mode switching (0=Speed mode, 1=Position mode) 80=Location command source switching (increase) (0=Internal register, 1=External pulse input) 83=Multi-motor (IM) selection bit 0 84=Multi-motor (IM) selection bit 1 86=Enable initial reel diameter 87=Initial reel diameter 1 88=Initial reel diameter 2 89=PID integration reset 90=Stop calculating the reel diameter 91=Winding mode selection 92=Enable tension control 93=Pause tension PID function 94=Enable to auto switch the reel

Multi-function Output Selections		
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) 39=Position reached (P10.19) 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 66=SO output logic A 67=Analog input level reached 68=SO output logic B 69=Maximum reel diameter reached 70=Empty reel diameter reached 71=Broken belt detection 72=Tension PID feedback error 73=Over-torque 3 74=Over-torque 4 75=Forward RUN status 76=Reverse RUN status

AI Multi-function Input Selections		
0=No function 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 thermistor input value 12=Auxiliary frequency input 13=PID compensation value	14=Tension PID feedback signal 15=Line speed 16=Reel diameter 17=Tension PID target value 18=Tension setting value 19=Zero-speed tension 20=Tension taper 21=VFSM V source

AO1 Multi-function Output Selections		
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 percent 10=AI2 percent 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 (P03.32)

Environment for Operation, Storage, and Transportation

DO NOT expose the GS30 drive to environments that contain dust, direct sunlight, corrosive/inflammable gases, high humidity, liquids, or high vibration. The salt in the air must be less than 0.01 mg/cm^2 throughout the year.

Installation Location	IEC60364-1/IEC60664-1 Pollution degree 2, Indoor use only		
Surrounding Temperature	Operation	IP20/UL Open Type	-20°C to +50°C -20°C to +60°C (with derating)
		IP40/NEMA 1/UL Open Type	-20°C to +40°C -20°C to +50°C (with derating)
		Installed side-by-side	
	Storage: -40°C to +85°C		Transportation: -20°C to +70°C
	No condensation, non-frozen		
Rated Humidity	Operation: Max. 90%		Storage/Transportation: Max. 95%
	No condensed water		
Air Pressure	Operation/Storage: 86 to 106 kPa		Transportation: 70 to 106 kPa
Pollution Level	IEC 60721-3		
	Operation: Class 3C2; Class 3S2	Storage: Class 2C2; Class 2S2	Transportation: Class 1C2; Class 1S2
	No concentrate		
Altitude	Operable at altitudes of 0~1000m. If installed at altitudes greater than 1000m, derating is required.		
Package Drop	Storage / Transportation	ISTA procedure 1A (according to weight) IEC60068-2-31	
Vibration	Operating	1.0mm, peak-to-peak value range from 2Hz to 13.2 Hz; 0.7G~1.0G range from 13.2Hz to 55Hz; 1.0G range from 55Hz to 512 Hz. Comply with IEC 60068-2-6.	
	Non-operating	2.5 G peak, 5Hz~2kHz: 0.015" maximum displacement.	
Impact	Operating	IEC/EN60068-2-27: 15G, 11ms	
	Non-operating	30G	
Protection Level	IP20 or IP40 depending on drive. Please see the GS30 User Manual for details.		

To prevent personal injury, please make sure that the case and wiring are installed according to these instructions. The figures in these instructions are only for reference. They may be slightly different from the one you have, but it will not affect your customer rights.

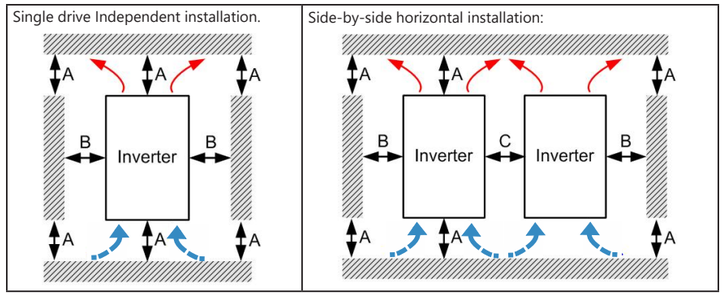
These installation instructions may be revised without prior notice. The most recent edition can be downloaded from the AutomationDirect web site at any time: http://www.automationdirect.com/static/manuals/index.html.

Minimum Mounting Clearances

When installing your GS30 drive, please keep the following in mind:

- *Prevent fiber particles, scraps of paper, shredded wood, saw dust, metal particles, etc., from adhering to the heat sink.*
- *Install the AC motor drive in a metal cabinet. When installing one drive below another one, use a metal separation between the AC motor drives to prevent mutual heating and to prevent the risk of accidental fire.*
- *Install the AC motor drive in Pollution Degree 2 environments only: normally only nonconductive pollution occurs and temporary conductivity caused by condensation is expected.*
- *In Pollution Degree 2 environments, install drives in an IP54 cabinet or in a pollution-controlled environment. Pollution Degree 2 defines an environment in which dew can form causing temporary electrical conduction. Electrical equipment in the control panel and thermostatic chamber only causes non-conductive pollution.*

← *(Blue Arrow) Inflow* ← *(Red Arrow) Outflow*



GS30 Frames A-F

Installation Method	A (mm)	B (mm)	C (mm)	Operation Temperature	
				Max (w/out derating)	Max (Derating)
Single drive installation	50	30	–	50	60
Side-by-side horizontal installation	50	30	30	50	60
Zero stack installation	50	30	0	40	50

GS30 Frames G-I

Installation Method	A (mm)	B (mm)	C (mm)	Operation Temperature	
				Max (w/out derating)	Max (Derating)
Single drive installation	100	50	–	50	60
Side-by-side horizontal installation	100	50	50	50	60
Zero stack installation	100	50	0	40	50

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