

# GETTING STARTED

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## In This Chapter...

Manual Overview . . . . .	1-2
Overview of this Publication . . . . .	1-2
Who Should Read This Manual . . . . .	1-2
Supplemental Publications . . . . .	1-2
Technical Support . . . . .	1-2
Special Symbols . . . . .	1-2
GS2 AC Drive Introduction . . . . .	1-3
Purpose of AC Drives . . . . .	1-3
Unpacking . . . . .	1-3
Model Explanation: . . . . .	1-3
Nameplate Information: . . . . .	1-3
External Parts and Labels: . . . . .	1-4
GS2 AC Drive Specifications . . . . .	1-5

# Manual Overview

## Overview of this Publication

The GS2 AC Drive User Manual describes the installation, configuration, and methods of operation of the GS2 Series AC Drive.

## Who Should Read This Manual

This manual contains important information for those who will install, maintain, and/or operate any of the GS2 Series AC Drives.

## Supplemental Publications

The National Electrical Manufacturers Association (NEMA) publishes many different documents that discuss standards for industrial control equipment. Global Engineering Documents handles the sale of NEMA documents. For more information, you can contact Global Engineering Documents at:

**15 Inverness Way East  
Englewood, CO 80112-5776  
1-800-854-7179 (within the U.S.)  
303-397-7956 (international)  
www.global.ihs.com**

NEMA documents that might assist with your AC drive systems are:

- **Application Guide for AC Adjustable Speed Drive Systems**
- **Safety Standards for Construction and Guide for Selection, Installation, and Operation of Adjustable Speed Drive Systems.**

## Technical Support

**By Telephone: 770-844-4200**  
(Mon.-Fri., 9:00 a.m.-6:00 p.m. E.T.)

**On the Web: [www.automationdirect.com](http://www.automationdirect.com)**

Our technical support group is glad to work with you in answering your questions. If you cannot find the solution to your particular application, or, if for any reason you need additional technical assistance, please call technical support at **770-844-4200**. We are available weekdays from 9:00 a.m. to 6:00 p.m. Eastern Time.

We also encourage you to visit our web site where you can find technical and non-technical information about our products and our company. Visit us at **[www.automationdirect.com](http://www.automationdirect.com)**.

## Special Symbols



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*When you see the “notepad” icon in the left-hand margin, the paragraph to its immediate right will be a special note.*

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**When you see the “exclamation mark” icon in the left-hand margin, the paragraph to its immediate right will be a WARNING. This information could prevent injury, loss of property, or even death (in extreme cases).**

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# GS2 AC Drive Introduction

## Purpose of AC Drives

AC drives are generally known by many different names: Adjustable Frequency Drives (AFD), Variable Frequency Drives (VFD), and Inverters. Drives are used primarily to vary the speed of three phase AC induction motors, and they also provide non-emergency start and stop control, acceleration and deceleration, and overload protection. By gradually accelerating the motor, drives can reduce the amount of motor startup inrush current.

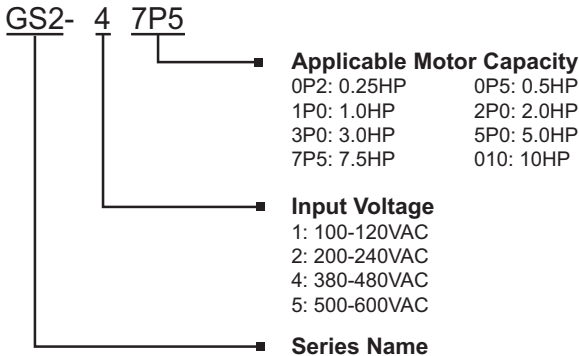
AC drives function by converting incoming AC power to DC, which is then synthesized back into three phase output power. The voltage and frequency of this synthesized output power is directly varied by the drive, where the frequency determines the speed of the three phase AC induction motor.

## Drive Package Contents

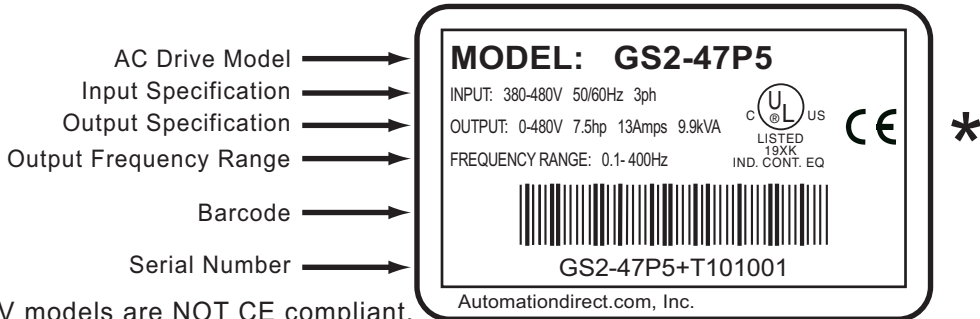
After receiving the AC motor drive, please check for the following:

- Make sure that the package includes an AC drive, the GS2 Series AC Drive User Manual, and the GS2 Series AC Drive Quick Reference.
- Inspect the unit to insure it was not damaged during shipment.
- Make sure that the part number indicated on the nameplate corresponds with the part number of your order.

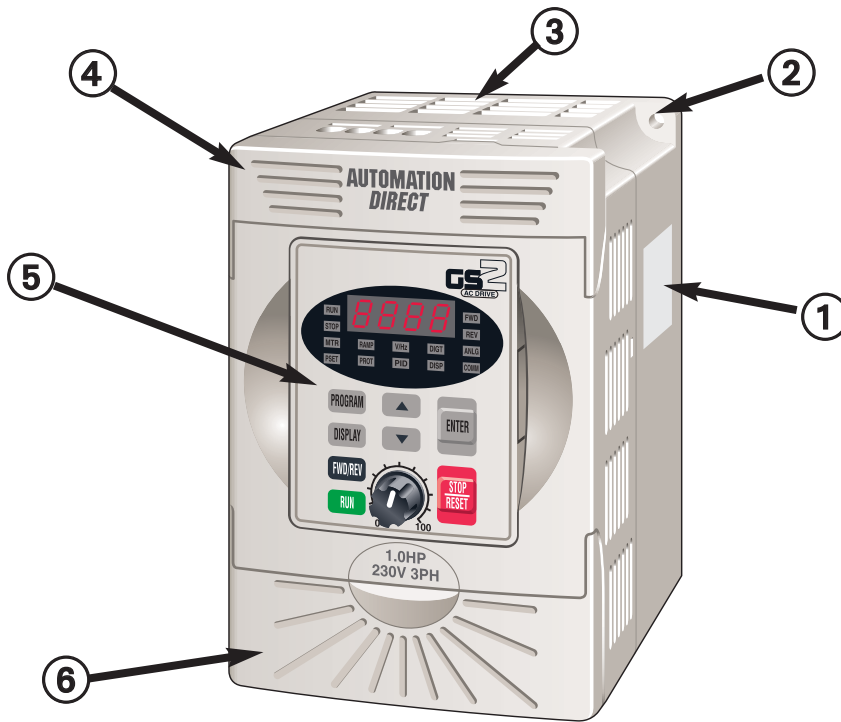
## Model Explanation:



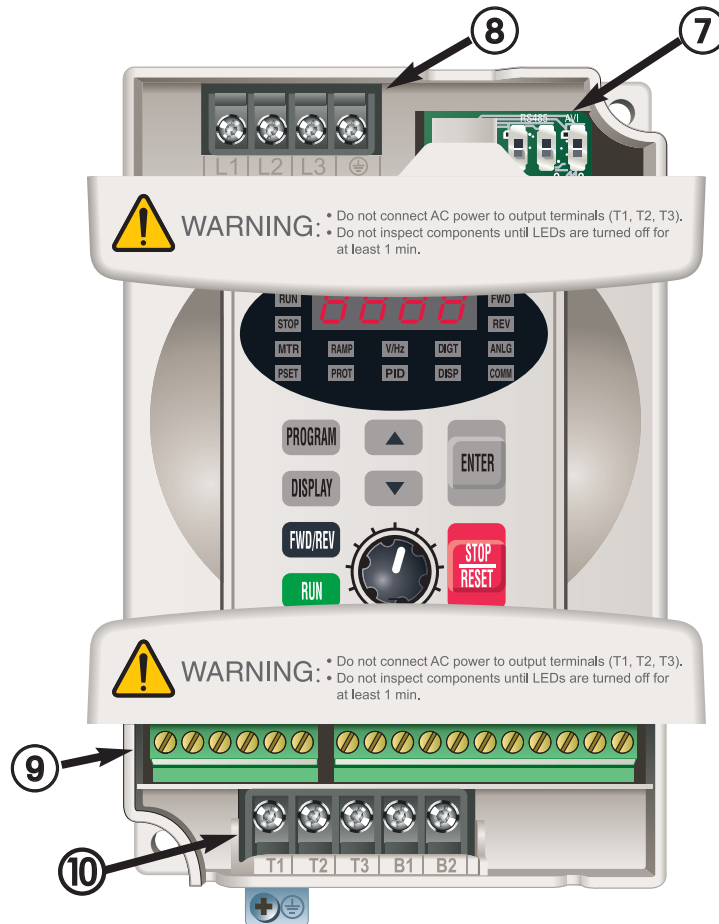
## Nameplate Information:



External Parts and Labels:



- ① Nameplate Label
- ② Mounting Screw Holes
- ③ Ventilation Slots
- ④ Upper Cover
- ⑤ Digital Keypad
- ⑥ Lower Cover
- ⑦ DIP Switches
- ⑧ Input Power Terminals
- ⑨ Control Input/Output Terminals
- ⑩ Output Power Terminals



# GS2 AC Drive Specifications

115V Class					
Model Name: GS2-xxx			10P2	10P5	11P0
Output Rating	Maximum Motor Output	HP	0.25	0.5	1.0
		kW	0.2	0.4	0.75
	Rated Output Current (A)		1.6	2.5	4.2
	Maximum Output Voltage		Three-phase 200 to 240V (x2 of input voltage)		
	Rated Output Frequency		0.1 to 400 Hz		
Input Rating	Rated Voltage/Frequency		Single-phase, 100 to 120 VAC, 50/60Hz		
	Rated Input Current (A)		6	9	16
	Voltage/Frequency Tolerance		Voltage: +/- 10%; Frequency: +/- 5%		
	Short Circuit Withstand (A, rms symmetrical)		5kA @ 120 VAC		
Watt Loss @ 100% I (W)			24	34	46
Weight (lbs.)			3.5	3.6	3.7

230V Class								
Model Name: GS2-xxx			20P5	21P0	22P0	23P0	25P0	27P5
Output Rating	Maximum Motor Output	HP	0.5	1.0	2.0	3.0	5.0	7.5
		kW	0.4	0.75	1.5	2.2	3.7	5.5
	Rated Output Current (A)		2.5	5.0	7.0	10	17	25
	Maximum Output Voltage		Three-phase 200 to 240V (proportional to input voltage)					
Rated Output Frequency		0.1 to 400 Hz						
Input Rating	Rated Voltage/Frequency		Single/Three-phase, 200/208/220/230/240 VAC, 50/60 Hz			Three-phase, 200/208/220/230/240 VAC, 50/60 Hz		
	Rated Input Current (A)		6.3/3.2	11.5/6.3	15.7/9.0	27/12.5	19.6	28
	Voltage/Frequency Tolerance		Voltage: +/- 10%; Frequency: +/- 5%					
	Short Circuit Withstand (A, rms symmetrical)		5kA @ 240 VAC					
Watt Loss @ 100% I (W)			34	57	77	111	185	255
Weight (lbs.)			3.5	3.6	3.7	8.5	8.5	8.5

## GS2 AC Drive Specifications (continued)

460V Class								
Model Name: GS2-xxx			41P0	42P0	43P0	45P0	47P5	4010
Output Rating	Maximum Motor Output	HP	1.0	2.0	3.0	5.0	7.5	10
		kW	0.8	1.5	2.2	4.0	5.5	7.5
	Rated Output Current (A)		3.0	4.0	5.0	8.2	13	18
	Maximum Output Voltage		Three-phase 380 to 480V (proportional to input voltage)					
Rated Output Frequency		0.1 to 400 Hz						
Input Rating	Rated Voltage/Frequency		Three-phase 380/400/415/440/460/480 VAC 50/60Hz					
	Rated Input Current (A)		4.2	5.7	6.0	8.5	14	23
	Voltage/Frequency Tolerance		Voltage: +/- 10%; Frequency: +/- 5%					
	Short Circuit Withstand (A, rms symmetrical)		5kA @ 480 VAC					
Watt Loss @ 100% I (W)			73	86	102	170	240	255
Weight (lbs.)			3.5	3.6	3.7	8.5	8.5	8.5

575V Class								
Model Name: GS2-xxx			51P0	52P0	53P0	55P0	57P5	5010
Output Rating	Maximum Motor Output	HP	1.0	2.0	3.0	5.0	7.5	10
		kW	0.75	1.5	2.2	3.7	5.5	7.5
	Rated Output Current (A)		1.7	3.0	4.2	6.6	9.9	12.2
	Maximum Output Voltage		Three-phase 500 to 600V (proportional to input voltage)					
Rated Output Frequency		0.1 to 400 Hz						
Input Rating	Rated Voltage/Frequency		Three-phase 500 to 600V					
	Rated Input Current (A)		2.4	4.2	5.9	7.0	10.5	12.9
	Voltage/Frequency Tolerance		Voltage: -15 to +10% ; Frequency: +/- 5%					
	Short Circuit Withstand (A, rms symmetrical)		5kA @ 600 VAC					
Watt Loss @ 100% I (W)			30	58	83	132	191	211
Weight (lbs.)			3.3	3.3	4.4	7.0	7.0	7.3

General Specifications			
<b>Control Characteristics</b>			
<b>Control System</b>		Pulse Width Modulation, Carrier frequency 1-12 kHz	
<b>Rated Output Frequency</b>		1.0 to 400.0 Hz	
<b>Output Frequency Resolution</b>		0.1 Hz	
<b>Overload Capacity</b>		150% of rated current for 1 minute	
<b>Torque Characteristics</b>		Includes auto-torque boost, auto-slip compensation, starting torque 125% @ 0.5 Hz / 150% @ 5.0 Hz	
<b>Braking Torque</b>		20% without dynamic braking, 125% with optional braking resistor - braking transistor built-in	
<b>DC Braking</b>		Operation frequency 60-0 Hz, 0 - 100% rated current, Start time 0.0 - 5.0 seconds, Stop time 0.0 - 25.0 seconds	
<b>Acceleration/Deceleration Time</b>		0.1 to 600 seconds (linear or non-linear acceleration/deceleration), second acceleration/deceleration available	
<b>Voltage/Frequency Pattern</b>		Settings available for Constant Torque - low & high starting torque, Variable Torque - low & high starting torque, and user configured	
<b>Stall Prevention Level</b>		20 to 200% or rated current	
<b>Operation Specification</b>			
<b>Inputs</b>	<b>Frequency Setting</b>	<b>Keypad</b>	Setting by <UP> or <DOWN> buttons or potentiometer
		<b>External Signal</b>	Potentiometer - 3-5 k $\Omega$ , 0 to 10 VDC (input impedance 10 k $\Omega$ ), 0 to 20 mA / 4 to 20 mA (input impedance 250 $\Omega$ ). Multi-Speed Inputs 1 to 3, RS-232C/RS-485 communication interface
	<b>Operation Setting</b>	<b>Keypad</b>	Setting by <RUN>, <FWD/REV>, <STOP/RESET> buttons
		<b>External Signal</b>	Forward/Stop, Reverse/Stop (run/stop, fwd/rev), 3-wire control, Serial Communication RS-232C & RS-485 (Modbus RTU)
	<b>Input Terminals</b>	<b>Digital</b>	6 user-programmable: FWD/STOP, REV/STOP, RUN/STOP, REV/FWD, RUN momentary (N.O.), STOP momentary (N.C.), External Fault (N.O./N.C.), External Reset, Multi-Speed Bit (1-3), Jog, External Base Block (N.O./N.C.), Second Accel/Decel Time, Speed Hold, Increase Speed, Decrease Speed, Reset Speed to Zero, PID Disable (N.O.), PID Disable (N.C.), Input Disable
		<b>Analog</b>	1 user-configurable, 0 to 10 VDC (input impedance 10 k $\Omega$ ), 0 to 20 mA / 4 to 20 mA (input impedance 250 $\Omega$ ), 10 bit resolution
<b>Outputs</b>	<b>Output Terminals</b>	<b>Digital</b>	2 user-programmable: Inverter Running, Inverter Fault, At Speed, Zero Speed, Above Desired Frequency, Below Desired Frequency, At Maximum Speed, Over Torque Detected, Above Desired Current, Below Desired Current, PID Deviation Alarm
		<b>Analog</b>	1 user-programmable, 0 to 10 VDC (max load 2mA), 8 bit resolution frequency, current, process variable PV
	<b>Operating Functions</b>		Automatic voltage regulation, voltage/frequency characteristics selection, non-linear acceleration/deceleration, upper and lower frequency limiters, 7-stage speed operation, adjustable carrier frequency (1 to 12 kHz), PID control, skip frequencies, analog gain & bias adjustment, jog, electronic thermal relay, automatic torque boost, trip history, software protection

General Specifications (continued)		
<b>Protective Functions</b>	Electronic Thermal, Overload Relay, Auto Restart after Fault, Momentary Power Loss, Reverse Operation Inhibit, Auto Voltage Regulation, Over-Voltage Trip Prevention, Auto Adjustable Accel/Decel, Over-Torque Detection Mode, Over-Torque Detection Level, Over-Torque Detection Time, Over-Current Stall Prevention during Acceleration, Over-Current Stall Prevention during Operation	
<b>Operator Interface</b>	<b>Operator Devices</b>	8-key, 4-digit, 7-segment LED, 14 status LEDs, potentiometer
	<b>Programming</b>	Parameter values for setup and review, fault codes
	<b>Status Display</b>	Actual Operating Frequency, RPM, Scaled Frequency, Amps, % Load, Output Voltage, DC Bus Voltage, Process Variable, Set-point Frequency
	<b>Key Functions</b>	RUN, STOP/RESET, FWD/REV, PROGRAM, DISPLAY, <UP>, <DOWN>, ENTER
<b>Environment</b>	<b>Enclosure Rating</b>	Protected Chassis, IP20
	<b>Ambient Temperature</b>	-10°C to 50°C (14°F to 122°F) -10°C to 40°C (14°F to 104°F) for models 7.5 hp (5.5 kW) and higher
	<b>Storage Temperature</b>	-20°C to 60°C (-4°F to 140°F) – during short term transportation period
	<b>Ambient Humidity</b>	20 to 90% RH (non-condensing)
	<b>Vibration</b>	9.8 m/s <sup>2</sup> (1G) less than 10 Hz, 5.9 m/s <sup>2</sup> (0.6G) 10 to 60 Hz
	<b>Installation Location</b>	Altitude 1000m or lower above sea level, keep from corrosive gas, liquid and dust
<b>Options</b>	Noise filter, input AC reactor, output AC reactor, cable for remote operator, programming software, Dynamic braking resistor, input fuses	
<b>Agency Approvals</b>	UL & cUL listed; CE* *CE certification applies only to 115V, 230V, 460V class drives.	