

GS Series AC Drives

GS1
AC DRIVE

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GS1 AC minidrive

¼ and ½ hp, 115 VAC single-phase
¼, ½ and 1 hp, 230 VAC single-phase/3-phase
2 hp, 230 VAC 3-phase

- Simple Volts/Hertz control
- 130% starting torque at 5 Hz
- Electronic overload protection
- Use of integrated potentiometer or keypad for local speed setting
- External analog input (0-10V, 0-20 mA or 4-20 mA)
- Three preset speeds
- Four programmable digital inputs
- One programmable relay output
- RS485 Modbus communications up to 19.2K
- Optional Ethernet communications DIN-rail mountable
- Two-year replacement warranty*
- UL, CUL, CE-listed

GS2
AC DRIVE

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GS2 AC microdrive

¼ hp to 1 hp, 115 VAC single-phase
½ hp to 7.5 hp, 230 VAC
1 to 10 hp, 460 VAC
1 to 10 hp, 575 VAC

- Simple Volts/Hertz control
- 150% starting torque
- Dynamic braking circuit
- Electronic overload protection
- Use of integrated potentiometer or keypad for local speed setting
- External analog input (0-10V, 0-20 mA or 4-20 mA)
- Removable keypad
- Seven preset speeds
- CE Listed (except 575V model)
- Six programmable digital inputs
- Two programmable relay outputs
- PID control
- RS-232/RS-485 Modbus communications up to 38.4K
- Optional Ethernet communications
- Two-year replacement warranty*
- UL, CUL

GSoft configuration software
available for \$50:

<http://support.automationdirect.com/products/gsoft.html>



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DuraPulse® Series AC Drives

DURAPULSE AC sensorless vector drives

1 hp to 50 hp, 230 VAC, 3-phase only
1 hp to 100 hp, 460 VAC

The *DURAPULSE* series is a line of autotuning and sensorless vector control AC drives. All parameters are programmable via a removable keypad that will store up to four different application programs. The PWM output of the drive is controlled by a 16-bit microprocessor with an output frequency from 0.1 to 400 Hz.

- V/Hz or sensorless vector control modes
- 150% starting torque
- Removable keypad
- Three analog inputs - (0-10V, -10 to +10 VDC or 4-20 mA/0 - 20 mA)
- 16 preset speeds
- 11 programmable digital inputs
- Four programmable outputs
- Optional encoder feedback card
- RS-485 Modbus communications up to 38.4K
- Optional Ethernet communications
- Two-year replacement warranty*
- UL, CE listed

*Failures due to misuse or mis-application are not covered.

Hitachi® SJ300 AC flux vector drives

½ hp to 30 hp, 230/460 VAC



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- Closed-loop vector**, sensorless vector, or Volts/Hertz control
- 200% starting torque
- Auto-tuning of motor constants
- Dynamic braking circuit -15 hp and smaller
- Electronic overload protection
- Integral speed potentiometer
- External analog input (0-10V, ±10V or 4-20 mA)
- 16-stage multispeed presets
- PID control
- Remote keypad operation available
- Electronic line shaft (electronic gearing) with ratio control available**
- RS-232/RS-485 communication with optional SC-OPE3I card

**Requires SJ-FB option card

3 Steps to Selecting the Right AC Drive



STEP 1 - Select The Right Model

A. Determine motor voltage, horsepower and full-load amperage

	AC drive models			
	GS1	GS2	DURAPULSE	SJ300
Horsepower	1/4 - 2	1/4 - 10*	1 - 100**	1/2 - 30
Input voltage	115/230 VAC	115/230/460 VAC	230/460 VAC	230/460 VAC
Motor voltage	230 VAC	230/460 VAC	230/460 VAC	230/460 VAC

* 230V up to 7.5 hp
460V up to 10 hp
575V up to 10 hp

** 230V up to 50 hp
460V up to 100 hp

Check the nameplate on the motor for specs needed:

Inverter Duty Motor							
HP	1	Volts	460	PHASE	3	TYPE	P
RPM	1725	AMPS	2.6	HZ	60	SF	1.15
DESIGN	B	AMB	40°C	INSUL CLASS	F		
DUTY	CONT	ENCL	TEFC	CODE	K		

Motor voltage, horsepower, and amperage can be found on the motor's nameplate.

Note: Most motors can be connected for multiple voltages and will have multiple amperages listed.

In the example to the left the motor can be connected for 460V only. The 460V amperage is 2.6.

B. Select your application and/or control mode

	AC Drive Models			
	GS1	GS2	DURAPULSE	SJ300
Volts/Hertz Control	✓	✓	✓	✓
Sensorless Vector Control			✓	✓
Closed Loop Control			Optional	Optional
Encoder Feedback			Optional	Optional
Integral PID Control		✓	✓	✓
Integral Dynamic Braking Unit		✓	15 HP*	15 HP*
Conveyor	✓	✓	✓	✓
Pump	✓	✓	✓	✓
Fan	✓	✓	✓	✓
Shop tools	✓	✓	✓	✓
Material handling		✓	✓	✓
HVAC		✓	✓	✓
Mixing		✓	✓	✓
Compressor		✓	✓	✓
Shop tools		✓	✓	✓
Conveyor				✓
Pump				✓
Fan				✓
Material handling				✓
HVAC				✓
Mixing				✓
Compressor				✓
Extruding				✓
Grinders				✓
Web handling				✓
Spindle				✓

	Control Mode		
	Volts/Hertz	Sensorless Vector	Closed-Loop Control
Complexity	Low	Moderate	Complex
Performance	Good	Good	High
1 min. Overload	150%	150%	150%
Starting Torque	175%	200%	200%
Speed Regulation	+/- 2%	+/- 1%	+/- 0.2%

* >15 hp requires external braking units

Either choose your application from those listed or select the control mode that meets your application's requirements. For applications not listed, either select the control mode that offers the same or higher level of performance as the existing control, or call us and ask for assistance.

C. Determine the I/O requirements of the AC drive

	AC Drive Models			
	GS1	GS2	DURAPULSE	SJ300
Digital Inputs	4	6	11	8
Digital Outputs - Transistor	0	0	3	5
Digital Outputs - Relay	1	2	1	1
Digital Output - Frequency pulse			1	
Analog Input - 0-10VDC/4-20mA	1	1	3	2
Analog Output - 0 - 10 VDC	0	1	1	Optional

Digital inputs are used to interface the AC drive with devices such as pushbuttons, selector switches and PLC digital output modules, either DC or relay. These signals are typically used for functions such as Start/Stop, Forward/Reverse, External Fault, Preset Speed selection, Fault Reset, etc.

Digital outputs are typically used to connect the AC drive to devices such as pilot lights, alarms, auxiliary relays, solenoids,

and PLC digital input modules. Relay outputs are rated for both AC and DC voltages. Transistor outputs are rated for only DC voltages.

The analog input is used to interface the AC drive with an external 0-10 VDC or 4-20 mA signal. This signal can represent either a speed setpoint or if available, PID feedback.

D. Determine location of AC drive's keypad

Removable Keypad	AC Drive Models			
	GS1	GS2	DURAPULSE	SJ300
		✓	✓	✓

The keypad of the GS2, DURApulse and SJ300 are removable and can be remotely mounted. If the AC drive is installed in a location that the operator cannot easily access, its keypad could

be relocated to a more suitable location. Remote mounting would require the purchase of the appropriate cable. Also available for the DURApulse drives is a remote, panel-mount bezel.

E. Determine communications requirements

MODBUS Communications Ethernet Communications	AC Drive Models			
	GS1	GS2	DURAPULSE	SJ300
	Optional	Optional	Optional	Optional N/A

A serial communication interface can be used to connect the AC drive to other devices that have the capability to function as a master device. The master device can control the AC drive with this interface instead of using the digital and analog I/O. The master can also use this interface to monitor the status of various AC drive parameters, speed, current, fault status, etc.

The GS1, GS2 and DURApulse AC drives have a standard Modbus RS-485 interface. The SJ300 requires an optional SC-OPE31 interface for the Modbus interface.

The GS1, GS2, and DURApulse drives also have the optional capability to communicate through an Ethernet interface. Please refer to the technical section of each model to determine the required Ethernet interface adapter and compatible Ethernet devices.

F. Select the proper series

After you have selected the AC drive series that meets your requirements, you need to determine the correct rating. Turn the page and proceed to Step two.

- PLC Overview
- DL05/06 PLC
- DL105 PLC
- DL205 PLC
- DL305 PLC
- DL405 PLC
- Field I/O
- Software
- C-more HMIs
- Other HMI
- AC Drives**
- Motors
- Steppers/Servos
- Motor Controls
- Proximity Sensors
- Photo Sensors
- Limit Switches
- Encoders
- Current Sensors
- Pushbuttons/Lights
- Process
- Relays/Timers
- Comm.
- TB's & Wiring
- Power
- Circuit Protection
- Enclosures
- Appendix
- Part Index

STEP 2

STEP 2 - Select the Proper Rating

A. Determine motor full load amperage (FLA)

Motor FLA is located on the nameplate of the motor.
 Note: FLA of motors that have been rewound may be higher than stated.

B. Determine overload requirements

Many applications experience temporary overload conditions due to starting requirements or impact loading. Most AC drives are designed to operate at 150% overload for 60 seconds. If the application requires an overload greater than 150% or longer than 60 seconds, the AC drive must be oversized. *NOTE: Applications that require replacement of existing motor starters with AC drives may require up to 600% overload.*

C. Installation altitude

AC drives rely upon the cooling properties of air for cooling. As the altitude increases, the air becomes less dense. This decrease in air density decreases the cooling properties of the air. Therefore, the AC drive must be oversized to compensate for the decrease in cooling. Most AC drives are designed to operate at 100% capacity up to altitudes of 1000 m. Above 1000 m, the AC drive must be derated.

D. Determine max enclosure internal temp

AC drives generate a significant amount of heat and will cause the internal temperature of an enclosure to exceed the rating of the AC drive, even when the ambient temperature is less than 104 degrees F (40 degrees C). Enclosure ventilation and/or cooling may be required to maintain a maximum internal temperature of 104 degrees F (40 degrees C) or less. Ambient temperature measurements/calculations should be made for the maximum expected temperature. (SJ300 AC drives may also require a reduction in carrier frequency.)

E. Calculate required output amperage

Use the chart below to calculate the required FLA of the AC drive. Select the rating that equals the motor's voltage and equals or exceeds the calculated amperage.

	Example 1	Example 2
Example 1: Motor FLA=6, Overload=200%@45 secs, Altitude=800m, MEIT=45° C, GS Series Example 2: Motor FLA=8, Overload=135%@75 secs, Altitude=1100m, MEIT=35° C, DURAPULSE		
	ENTER Motor FLA	ENTER Motor FLA
	6	8
Overload Derate (overload %)	If Overload is less than 150% and less than 60 seconds, Then ENTER 1	
	If Overload is greater than 150% and less than 60 seconds, Then ENTER (overload/150%)	1.333
	If Overload is greater than 60 seconds, Then ENTER (overload/100%) Multiply FLA x overload entry (This entry is the overload result)	8 10.8
Altitude Derate (meters)	If Altitude is less than 1000m Then ENTER 1	1
	If Altitude is more than 1000m and less than 3000m Then ENTER 1+ ((altitude-1000) x 0.0001) Multiply overload result x altitude entry (This entry is the altitude result)	8 10.91
Ambient Temperature (°Celsius)	If Max enclosure internal temperature (MEIT) is less than 40° C Then ENTER 1	1
	If 40° C < MEIT < 50° C and GS series AC drive up to 5 hp Then ENTER 1	1
	If 40° C < MEIT < 50° C and GS Series >5 hp or DURAPULSE series AC drive Then ENTER 1.2	1.2
	Multiply altitude result x MEIT entry (This result is the required drive FLA)	8 10.91