

# GS1 Series Introduction



## GS1 Series Drives

Motor Rating	hp	0.25	0.5	1	2
	kW	0.2	0.4	0.75	1.5
115V Single-Phase Input / 230V Three-Phase Output		✓	✓		
230V Single-Phase Input / 230V Three-Phase Output		✓	✓	✓	
230V Three-Phase Input / Output		✓	✓	✓	✓

## Overview

The GS1 series of AC drives is our most affordable and compact inverter, offering V/Hz control with general purpose application features. These drives can be configured using the built-in digital keypad (which also allows you to set the drive speed, start and stop, and monitor specific parameters) or with the standard RS-485 serial communications port. Standard GS1 features include one analog input, four programmable digital inputs and one programmable normally open relay output.

## Features

- Simple Volts/Hertz control
- Pulse Width Modulation (PWM)
- 3–10 kHz carrier frequency
- IGBT technology
- 130% starting torque at 5Hz
- 150% rated current for one minute
- Electronic overload protection
- Stall prevention
- Adjustable accel and decel ramps
- S-curve settings for acceleration and deceleration
- Manual torque boost
- Automatic slip compensation
- DC braking
- Three skip frequencies
- Trip history
- Integral keypad and speed potentiometer
- Programmable jog speed
- Three programmable preset speeds
- Four programmable digital inputs
- One programmable analog input
- One programmable relay output
- RS-485 Modbus communications up to 19.2K
- Optional Ethernet communications
- DIN rail or panel mountable
- Two-year warranty
- UL/cUL/CE listed

## Accessories

- AC line reactors
- RF filter
- Fuse kits and replacement fuses
- Ethernet interface
- Four and eight-port RS-485 multi-drop termination board
- Serial communication cables available for creating plug and play RS-232/RS-485 networks with AutomationDirect PLCs. See the comm cable matrix ([pg.tGSX-168](http://pg.tGSX-168)).
- GSoft drive configuration software
- USB-485M – USB to RS-485 PC adapter (see “Communications Products” chapter for detailed information)
- Detailed descriptions and specifications for GS accessories are available in the “GS/DURApulse Accessories” section.

## Typical Applications

- Conveyors
- Fans
- Pumps
- Shop tools

# GS1 Series Specifications

115V/230V CLASS GS1 Series			
Model		<b><u>GS1-20P2</u></b>	<b><u>GS1-21P0</u></b>
Price		Retired	Retired
Motor Rating	HP	1/4 hp	1hp
	kW	0.2 kW	0.7 kW
Rated Output Capacity (200V) kVA		0.6	1.6
Rated Input Voltage	Single/three-phase: 200–240 VAC ±10%; 50/60 Hz ±5%		
Rated Output Voltage	Three-phase corresponds to the input voltage		
Rated Input Current (A)		4.9/1.9	9.7/5.1
Rated Output Current (A)		1.6	4.2
Watt Loss @ 100% I (W)		18.4	44.6
Cooling Fan		no	yes
Weight: kg (lb)		2.20	2.20
Dimensions (HxWxD) (mm [in])	132.0 x 68.0 x128.1 [5.20 x 2.68 x 5.04]		
Accessories			
Line Reactor *	LR-1xxPx-xxx (refer to "GS/DURApulse Drives Accessories – Line Reactors" section for exact part #)		
RF Filter	RF220X00A		
Fuse Kit **	Single-Phase**	<a href="#">GS-20P2-FKIT-1P</a>	<a href="#">n/a</a>
	Three-Phase	<a href="#">GS-20P2-FKIT-3P</a>	<a href="#">n/a</a>
Replacement Fuses	Single-Phase	<a href="#">GS-20P2-FUSE-1P</a>	<a href="#">GS-21P0-FUSE-1P</a>
	Three-Phase	<a href="#">GS-20P2-FUSE-3P</a>	<a href="#">n/a</a>
Ethernet Communications module for GS Series Drives (DIN rail mounted)	<a href="#">GS-EDRV100</a>		
USB to RS-485 PC Communication Adapter	<a href="#">USB-485M</a>		
RS-485 Communication Distribution Module (for creating plug and play RS-485 networks)	<a href="#">ZL-CDM-RJ12X4</a> / <a href="#">ZL-CDM-RJ12X10</a>		
RS-485 Serial Cable, GS Drive to DL06/D2-260	<a href="#">GS-485HD15-CBL-2</a>		
RS-485 Serial Cable, GS Drive to ZIPLink CDM Module	<a href="#">GS-485RJ12-CBL-2</a>		
Software	<a href="#">GSOFT</a>		
* GS1-1xxx drives require 115V class input line reactors and 230V class output line reactors.			
** Single-phase fuse kits and fuses are used only with GS1-1xxx drives.			

# GS1 General Specifications

General Specifications			
Control Characteristics			
<b>Control System</b>		Sinusoidal Pulse Width Modulation, carrier frequency 3kHz–10kHz	
<b>Rated Output Frequency</b>		1.0 to 400.0 Hz limited to 9999 motor rpm	
<b>Output Frequency Resolution</b>		0.1 Hz	
<b>Overload Capacity</b>		150% of rated current for 1 minute	
<b>Torque Characteristics</b>		Includes manual torque boost, auto-slip compensation, starting torque 130% @ 5.0Hz	
<b>DC Braking</b>		Operation frequency 60–0Hz, 0–30% rated voltage. Start time 0.0–5.0 seconds. Stop time 0.0–25.0 seconds	
<b>Acceleration/Deceleration Time</b>		0.1 to 600 seconds (can be set individually)	
<b>Voltage/Frequency Pattern</b>		V/F pattern adjustable. Settings available for Constant Torque – low and high starting torque, Variable Torque – low and high starting torque, and user configured	
<b>Stall Prevention Level</b>		20 to 200% of rated current	
Operation Specification			
<b>Inputs</b>	<b>Frequency Setting</b>	<b>Keypad</b>	Setting by <UP> or <DOWN> buttons or potentiometer
		<b>External Signal</b>	Potentiometer - 5k $\Omega$ 0.5W, 0 to 10 VDC (input impedance 47k $\Omega$ ), 0 to 20 mA / 4 to 20 mA (input impedance 250 $\Omega$ ), Multi-function inputs 1 to 3 (3 steps, JOG, UP/DOWN command), RS485 communication setting
	<b>Operation Setting</b>	<b>Keypad</b>	Setting by <RUN>, <STOP> buttons
		<b>External Signal</b>	DI1, DI2, DI3, DI4 can be combined to offer various modes of operation, RS485 communication port
<b>Outputs</b>	<b>Multi-Function Input Signal</b>		Multi-step selection 0 to 3, Jog, Accel/decel inhibit, First/second accel/decel switch, Counter, PLC operation, External base block (N.C., N.O.) selection
	<b>Multi-Function Output Signal</b>		AC drive operating, Frequency attained, Non zero speed, Base Block, Fault indication, Local/remote indication, PLC operation indication
	<b>Operating Functions</b>		Automatic voltage regulation, S-curve, Over-voltage stall prevention, DC braking, Fault records, Adjustable carried frequency, Starting frequency setting of DC braking, Over-current stall prevention, Momentary power loss restart, Reverse inhibition, Frequency limits, Parameter lock/reset
<b>Protective Functions</b>		Overcurrent, overvoltage, undervoltage, electronic thermal motor overload, Overheating, Overload, Self testing	
<b>Operator Interface</b>	<b>Operator Devices</b>		5-key, 4-digit, 7-segment LED, 3 status LEDs, potentiometer
	<b>Programming</b>		Parameter values for setup and review, fault codes
	<b>Parameter Monitor</b>		Master Frequency, Output Frequency, Scaled Output Frequency, Output Voltage, DC Bus Voltage, Output Direction, Trip Event Monitor, Trip History Monitor
	<b>Key Functions</b>		RUN/STOP, DISPLAY/RESET, PROGRAM/ENTER, <UP>, <DOWN>
<b>Environment</b>	<b>Enclosure Rating</b>		Protected chassis, IP20
	<b>Ambient Operating Temperature</b>		-10° to 40°C (14°F to 104°F) w/o derating
	<b>Storage Temperature</b>		-20° to 60 °C (-4°F to 140°F) during short-term transportation period)
	<b>Ambient Humidity</b>		0 to 90% RH (non-condensing)
	<b>Vibration</b>		9.8 m/s <sup>2</sup> (1G), less than 10Hz; 5.88 m/s <sup>2</sup> (0.6G) 20 to 50 Hz
<b>Installation Location</b>		Altitude 1000m or lower above sea level, keep from corrosive gas, liquid and dust	
<b>Options</b>		Programming Software (GSOFT)	

# GS1 Specifications - Installation

Understanding the installation requirements for your GS1 drive will help to ensure that it will operate within its environmental and electrical limits.

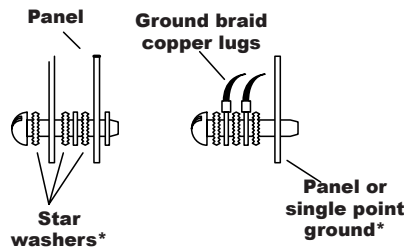
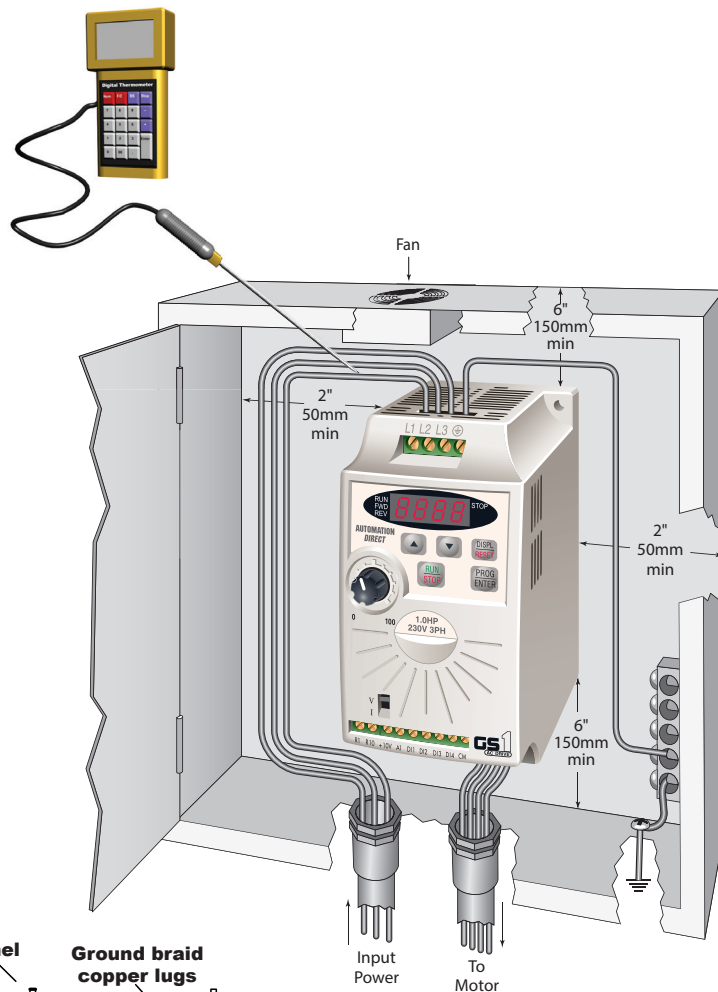
**NOTE:**

Never use only this catalog for installation instructions or operation of equipment; refer to the user manual, GS1-M.

Environmental Specifications	
<b>Protective Structure</b> <sup>1</sup>	IP20
<b>Ambient Operating Temperature</b> <sup>2</sup>	-10 to 40 °C (14 to 104 °F)
<b>Storage Temperature</b> <sup>3</sup>	-20 to 60°C (-4 to 140 °F)
<b>Humidity</b>	up to 90% (no condensation)
<b>Vibration</b> <sup>4</sup>	5.9 m/s <sup>2</sup> (0.6g), 10 to 55 Hz
<b>Location</b>	Altitude 1,000 m or less, indoors (no corrosive gases or dust)

1: Protective structure is based upon EN60529  
 2: The ambient temperature must be in the range of -10 to 40 °C (14 to 104 °F). If the range will be up to 50 °C (122°F), you will need to set the carrier frequency to 3.0 kHz and derate the output current to 80% or less. See our web site for derating curves.  
 3: The storage temperature refers to the short-term temperature during transport.  
 4: Conforms to the test method specified in JIS C0911 (1984)

Watt Loss Chart	
<b>GS1 Drive Model</b>	<b>At full load</b>
GS1-20P2	18.4
GS1-21P0	44.6



\* For painted sub-panels, scrape the paint from underneath the star washers before tightening them.

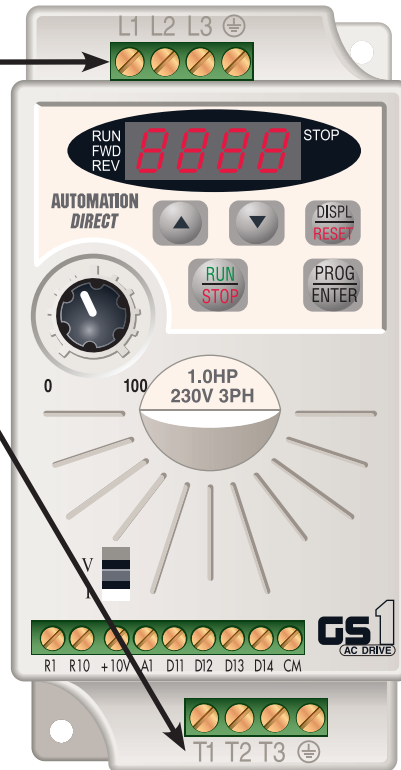
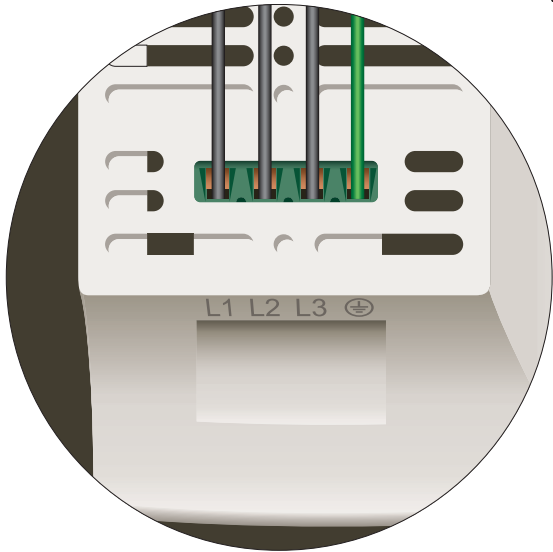


**WARNING: AC DRIVES GENERATE A LARGE AMOUNT OF HEAT, WHICH MAY DAMAGE THE AC DRIVE. AUXILIARY COOLING METHODS ARE TYPICALLY REQUIRED IN ORDER TO NOT EXCEED MAXIMUM AMBIENT TEMPERATURES.**

# GS1 Specifications - Terminals

## Main Circuit Wiring

Terminal	Description
L1, L2, L3	Input power
T1, T2, T3	AC drive output
⊕	Ground



## Control Circuit Terminals

Terminal Symbol	Description
R10	Relay output 1 normally open
R1	Relay output 1 common
D11	Digital input 1
D12	Digital input 2
D13	Digital input 3
D14	Digital input 4
AI <sup>1</sup>	Analog input
+10V	Internal power supply (10 mA @ 10 VDC)
CM	Common

<sup>1</sup> 0 to +10 VDC, 0 to 20 mA, or 4 to 20 mA input represents zero to maximum output frequency.

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

# GS1 Specifications - Basic Wiring Diagram

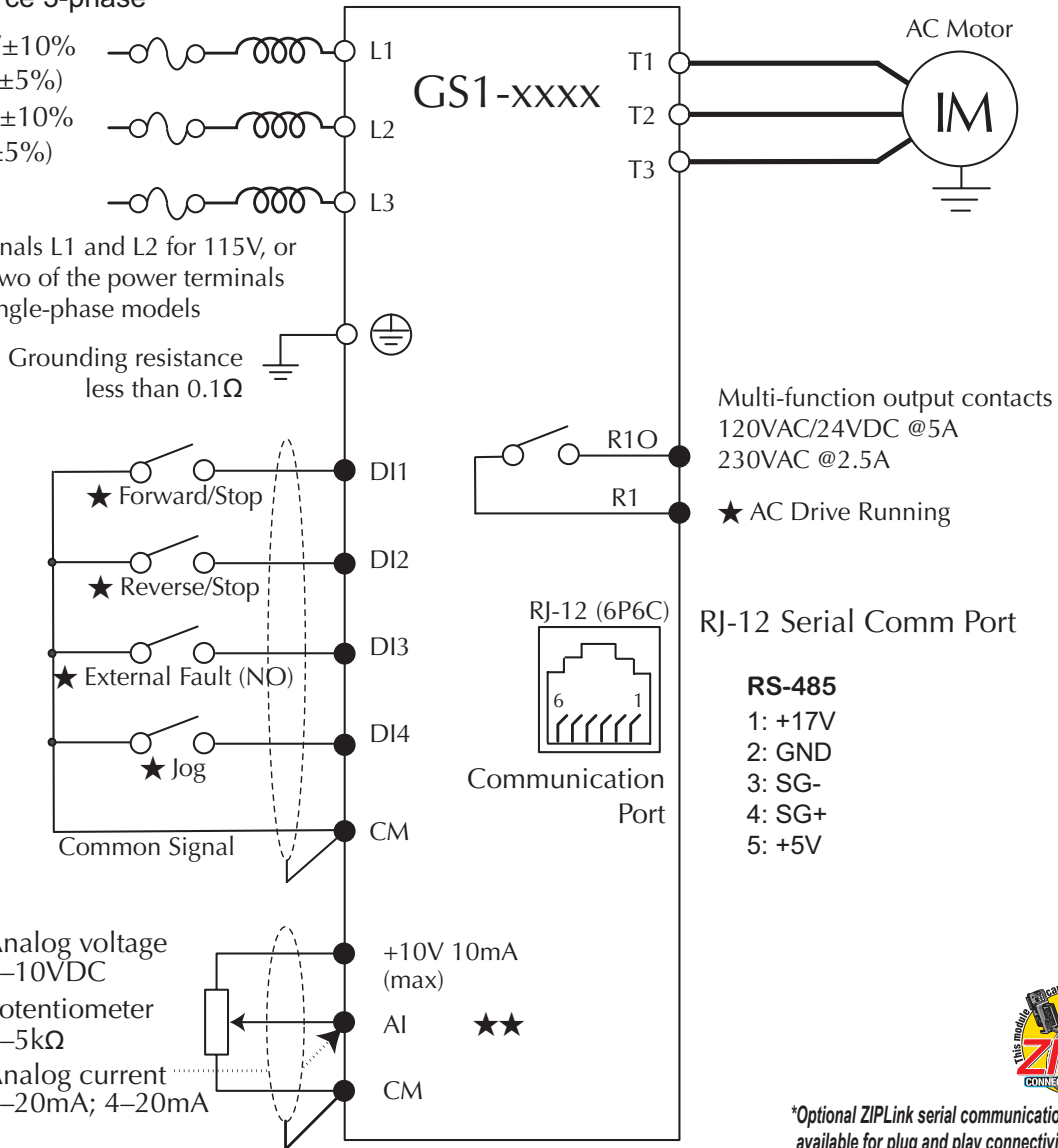
**Note:** Users **MUST** connect wiring according to the circuit diagram shown below. (Refer to user manual GS1-M for additional specific wiring information.)

**Note:** Please refer to the following pages for explanations and information regarding line reactors (pg.tGSX-117) and RF filters (pg.tGSX-157).

## Power Source 3-phase\*

100–120V±10%  
(50/60Hz ±5%)  
200–240V±10%  
(50/60Hz±5%)

\* Use terminals L1 and L2 for 115V, or select any two of the power terminals for 230V single-phase models



★ Factory default setting

★★ Factory default source of frequency command is via the keypad potentiometer

○ Main circuit (power) terminals ● Control circuit terminal ⊕ Shielded leads

## RJ-12 Serial Comm Port

### RS-485

- 1: +17V
- 2: GND
- 3: SG-
- 4: SG+
- 5: +5V

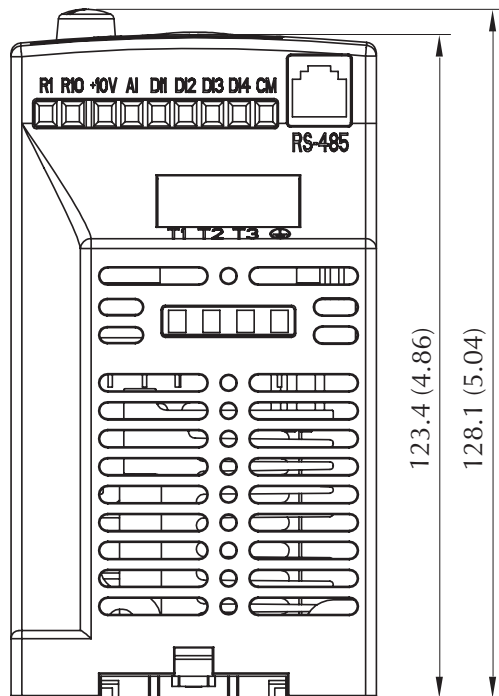
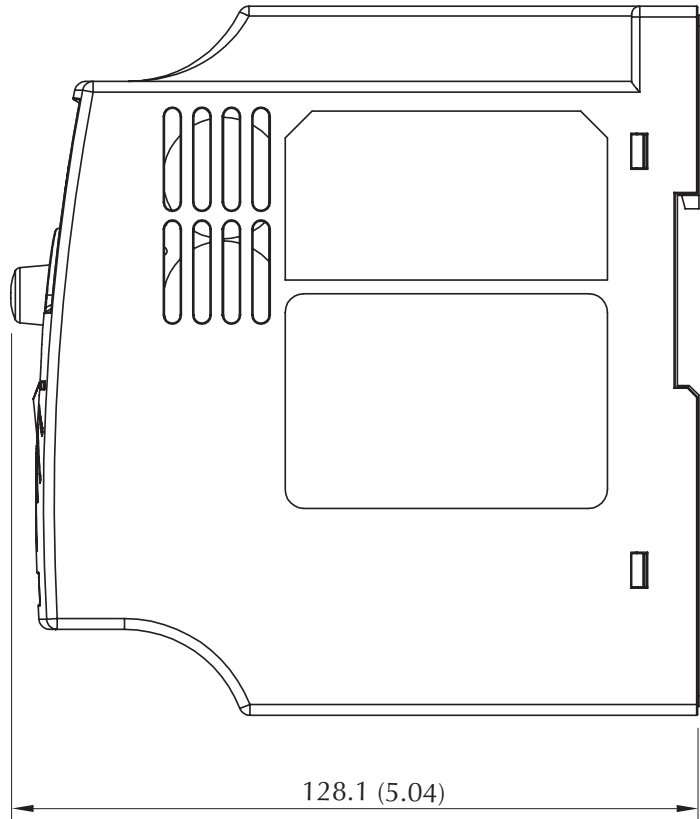
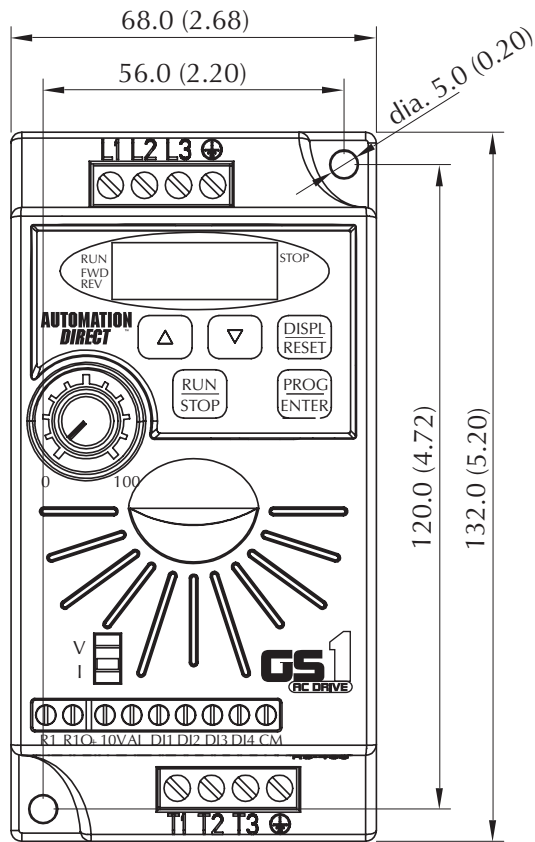


\*Optional ZIPLink serial communication cables available for plug and play connectivity to AutomationDirect PLCs. See the comm cable selection matrix on page pg.tGSX-17.



**DO NOT PLUG A MODEM OR TELEPHONE INTO THE GS1 RJ-12 SERIAL COMM PORT, OR PERMANENT DAMAGE MAY RESULT. TERMINALS 2 AND 5 SHOULD NOT BE USED AS A POWER SOURCE FOR YOUR COMMUNICATION CONNECTION.**

# GS1 Specifications - Dimensions



Unit: mm (in)





# Wiring Solutions

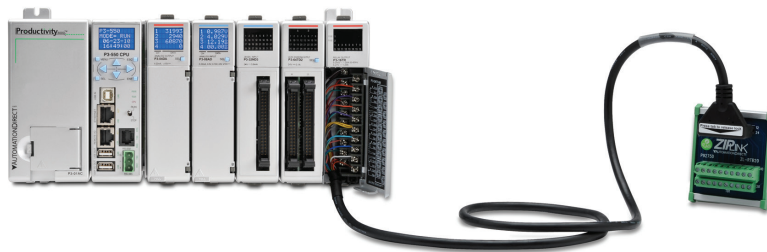
## Wiring Solutions using the ZIPLink Wiring System

ZIPLinks eliminate the normally tedious process of wiring between devices by utilizing prewired cables and DIN rail mount connector modules. It's as simple as plugging in a cable connector at either end or terminating wires at only one end. Prewired cables keep installation clean and efficient, using half the space at a fraction of the cost of standard terminal blocks. There are several wiring solutions available when using the ZIPLink System ranging from PLC I/O-to-ZIPLink Connector Modules that are ready for field

termination, options for connecting to third party devices, GS, DuraPulse and SureServo Drives, and specialty relay, transorb and communications modules. Pre-printed I/O-specific adhesive label strips for quick marking of ZIPLink modules are provided with ZIPLink cables. See the following solutions to help determine the best ZIPLink system for your application.

### **Solution 1: DirectLOGIC, CLICK and Productivity I/O Modules to ZIPLink Connector Modules**

When looking for quick and easy I/O-to-field termination, a ZIPLink connector module used in conjunction with a prewired ZIPLink cable, consisting of an I/O terminal block at one end and a multi-pin connector at the other end, is the best solution.



Using the PLC I/O Modules to ZIPLink Connector Modules selector tables located in this section,

- 1. Locate your I/O module/PLC.
- 2. Select a ZIPLink Module.
- 3. Select a corresponding ZIPLink Cable.

### **Solution 2: DirectLOGIC, CLICK and Productivity I/O Modules to 3rd Party Devices**

When wanting to connect I/O to another device within close proximity of the I/O modules, no extra terminal blocks are necessary when using the ZIPLink Pigtail Cables. ZIPLink Pigtail Cables are prewired to an I/O terminal block with color-coded pigtail with soldered-tip wires on the other end.



Using the I/O Modules to 3rd Party Devices selector tables located in this section,

- 1. Locate your PLC I/O module.
- 2. Select a ZIPLink Pigtail Cable that is compatible with your 3rd party device.

### **Solution 3: GS Series and DURAPULSE Drives Communication Cables**

Need to communicate via Modbus RTU to a drive or a network of drives?

ZIPLink cables are available in a wide range of configurations for connecting to PLCs and SureServo, SureStep, Stellar Soft Starter and AC drives. Add a ZIPLink communications module to quickly and easily set up a multi-device network.

Using the Drives Communication selector tables located in this section,

- 1. Locate your Drive and type of communications.
- 2. Select a ZIPLink cable and other associated hardware.







# Wiring Solutions

## **Solution 4: Serial Communications Cables**

ZIPLink offers communications cables for use with *Direct*LOGIC, CLICK, and Productivity CPUs, that can also be used with other communications devices. Connections include a 6-pin RJ12 or 9-pin, 15-pin and 25-pin D-sub connectors which can be used in conjunction with the RJ12 or D-Sub Feedthrough modules.

Using the **Serial Communications Cables** selector table located in this section,

- 1. Locate your connector type
- 2. Select a cable.



## **Solution 5: Specialty ZIPLink Modules**

For additional application solutions, ZIPLink modules are available in a variety of configurations including stand-alone relays, 24VDC and 120VAC transorb modules, D-sub and RJ12 feedthrough modules, communication port adapter and distribution modules, and SureServo 50-pin I/O interface connection.

Using the **ZIPLink Specialty Modules** selector table located in this section,

- 1. Locate the type of application.
- 2. Select a ZIPLink module.



## **Solution 6: ZIPLink Connector Modules to 3rd Party Devices**

If you need a way to connect your device to terminal blocks without all that wiring time, then our pigtail cables with color-coded soldered-tip wires are a good solution. Used in conjunction with any compatible ZIPLink Connector Modules, a pigtail cable keeps wiring clean and easy and reduces troubleshooting time.

Using the **Universal Connector Modules and Pigtail Cables** table located in this section,

- 1. Select module type.
- 2. Select the number of pins.
- 3. Select cable.





# Motor Controller Communication

AC Drive / Motor Controller (GS/DuraPulse) ZIPLink Selector							
AC Drive / Controller		Communications			ZIPLink Cable		
Controller	Comm Port Type	Network/Protocol	Connects to	Comm Port Type	Cable (2 meter length)	Cable Connectors	Other Hardware Required
GS1	RJ12	RS-485 Modbus RTU	BRX MPUs	RS-485, 3-Pin	ZL-RJ12-CBL-2P	RJ12 to pigtail	N/A
			P1 CPUs	RS-485			
			P2 CPUs				
			P3 CPUs				
			P2-SCM	RS-485, 4-Pin			
			P3-SCM				
			DL06 PLCs	Port 2 (HD15)	GS-485HD15-CBL-2	RJ12 to HD15	
			D2-260, D2-262 CPU	RJ12	GS-EDRV-CBL-2	RJ12 to RJ12	
			GS-EDRV100				
			ZL-CDM-RJ12Xxx *		GS-485RJ12-CBL-2		
FA-ISOCOCON	5-pin connector	GS-ISOCOCON-CBL-2	RJ12 to 5-pin plug				
GS2	RJ12	RS-232 Modbus RTU	BRX MPUs	RS-232/485, 3-Pin	ZL-RJ12-CBL-2P	RJ12 to pigtail	N/A
			P1 CPUs	RS-485			
			P2 CPUs				
			P3 CPUs				
			P2-SCM	Ports 1, 2 & 3			
			P3-SCM	Ports 1 to 4			
			CLICK PLCs	Port 2 (RJ12)	GS-RJ12-CBL-2	RJ12 to RJ12	
			DL05 PLCs				
			DL06 PLCs	Port 2 (HD15)		FA-15HD	
			D2-250-1 CPU				
		D2-260, D2-262 CPU					
		D4-450, D4-454 CPU	Port 3 (25-pin)	FA-CABKIT			
		RS-485 Modbus RTU	BRX MPUs	RS-232/485, 3-Pin	ZL-RJ12-CBL-2P	RJ12 to pigtail	N/A
			P1 CPUs	RS-485			
			P2 CPUs				
			P3 CPUs				
			P2-SCM	RS-485, 4-Pin			
			P3-SCM				
			DL06 PLCs	Port 2 (HD15)	GS-485HD15-CBL-2	RJ12 to HD15	
			D2-260, D2-262 CPU	RJ12	GS-EDRV-CBL-2	RJ12 to RJ12	
GS-EDRV100							
ZL-CDM-RJ12Xxx *	GS-485RJ12-CBL-2						
FA-ISOCOCON	5-pin connector	GS-ISOCOCON-CBL-2	RJ12 to 5-pin plug				
DuraPulse (GS3)	RJ12	RS-485 Modbus RTU	BRX MPUs	RS-485, 3-Pin	ZL-RJ12-CBL-2P	RJ12 to pigtail	N/A
			P1 CPUs	RS-485			
			P2 CPUs				
			P3 CPUs				
			P2-SCM	RS-485, 4-Pin			
			P3-SCM				
			DL06 PLCs	Port 2 (HD15)	GS-485HD15-CBL-2	RJ12 to HD15	
			D2-260, D2-262 CPU	RJ12	GS-EDRV-CBL-2	RJ12 to RJ12	
			GS-EDRV100				
			ZL-CDM-RJ12Xxx *		GS-485RJ12-CBL-2		
FA-ISOCOCON	5-pin Connector	GS-ISOCOCON-CBL-2	RJ12 to 5-pin plug				

\* When using the ZL-CDM-RJ12Xxx ZIPLink Communication Distribution Module, replace the lowercase xx with the number of RJ12 ports, i.e. 4 for four ports or 10 for ten ports. (ex: ZL-CDM-RJ12X4 or ZL-CDM-RJ12X10)