DURAPULSE GS10 AC Drives – Introduction

DURAPULSE GS10 AC Drives									
Motor Rating	HP	1/4	1/2	1	2	3	5	7.5	10
	kW	0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5
120V Single-phase		✓	✓	✓					
230V Single-phase		✓	✓	✓	✓	✓			
230V Three-phase		✓	✓	✓	✓	✓	✓	✓	
460V Three-phase			✓	✓	✓	✓	✓	✓	✓
✓ = GS10 model available									

Overview

The DURAPulse GS10 new generation of Micro drives with vector control provides many standard and advanced functions—all in a compact size and cost effective price.

The drives include many of the same standard features as our GS family of drives including dynamic braking, PID, and RS-485 Modbus communication.

The GS10 drive includes 230VAC models for 1-phase or 3-phase applications. The drive supports parameter sets for up to two (2) independent induction AC motors (IM) or a single permanent magnet AC motor(PM).

DURApulse GS10 AC drives offers two control modes: standard V/Hz and sensorless vector (SVC) for IM or PM motors..

DURApulse GS10 provides one analog input, one analog output, five digital inputs (including one pulse train input up to 10kHz), one digital output, and one SPDT relay output. All of the analog and digital I/O can be configured for a wide variety of input or output functions.

The drive parameter set also includes function groups to provide multi-pump control, automatic operation programming, and simple positioning stop.

Features

- Broad offering from 1/4 to 10 hp
- Single-phase 120VAC up to 1hp
- Single-phase 230VAC up to 3hp
- Three-phase 230VAC up to 7.5 hp (also 1-phase capable with derating, see selection tables)
- Three-phase 460VAC up to 10hp
- Dual rating design – CT/VT Ratings (Normal & Heavy Duty)
- "Zero Stack" side-by-side zero gap installation
- Compact Design
- Spring clamp terminal blocks
- Speed control potentiometer built in
- Flexible carrier frequency to 15khz and output frequency to 599Hz
- Free downloadable software for drive configuration
- Field-upgradable drive firmware
- Optional LCD text-based advanced keypad (IP66/NEMA 1) can be remotely mounted
- Local/Remote control mode selection or digital/comm input with Hand/Off/Auto control
- Display custom values on keypad
- Momentary power loss restarts
- 100kA Short Circuit Current Rating
- DC Bus Connection Terminals (except 120VAC models)
- Conduit Box(s) for NEMA 1
- Analog I/O – configurable 1 Input/1 Output
- Multi-Motor Control (2 total)
- PID Controller – including sleep and wake
- Built-in functions include multi-pump control, auto sequence, and simple position stop
- Password protection
- RTD and/or PTC input motor protection
- Modular Cooling Fan with quick disconnect for easy replacement
- High speed communication interfaces with MODBUS RTU built in
- Circuit boards have conformal coating for improved environmental tolerance
- Excellent heat-sink design; able to operate at 50°C ambient temperature
- Fire Mode – Run fire mode during emergencies to have uninterrupted smoke removal and system pressure
- Two-year warranty
- CE, UL, cUL

Accessories

- AC line reactors
- EMI filters
- Braking resistors
- Fuses
- Conduit boxes
- Mounting Kits
- Replacement cooling fans
- Optional advanced LCD keypad (and remote-mount bezel kit)
- GSoft2 drive configuration software
- USB-485M USB to Serial Converter (needed for software connection)
- Detailed descriptions and specifications for GS accessories are available in the "GS/DURApulse Accessories" section.

Typical Applications

- Conveyors
- Compressors
- Material handling
- Extruding
- Grinding
- Shop tools
- Fans
- Pumps
- HVAC
- Mixing

DURAPULSE GS10 AC Drives – Selection

Selecting the Proper Drive Rating

Selecting the Proper Drive Rating

Determine Motor Voltage and Full-Load Amperage (FLA)

Motor voltage and FLA are located on the nameplate of the motor.
NOTE: FLA of motors that have been rewound may be higher than stated.

Determine Motor 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.

Determine Application Type: Constant Torque or Variable Torque

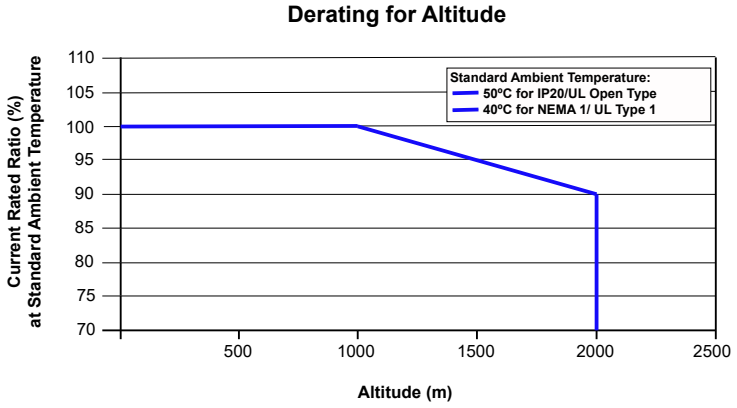
This torque requirement has a direct effect on which drive to select. Variable Torque applications are generally easier to start; typically fans and pumps. Most other applications outside fans and pumps fall into the Constant Torque category (machine control, conveyors, etc.). If you are unsure of the application, assume Constant Torque. The specification, derating, and selection tables are generally segregated by Constant Torque and Variable Torque.

Installation Altitude

AC drives rely on air flow for cooling. As the altitude increases, the air becomes less dense, and this drop in air density decreases the cooling properties of the air. Therefore, the AC drive must be oversized to compensate for the decrease in cooling. GS10 drives are designed to operate at 100% capacity at altitudes up to 1000 meters.
NOTE: For use above 1000m, the AC drive must be derated as described below.

Derate Output Current Based on Altitude Above 1000 Meters

- If the AC drive is installed at an altitude of 0–1000m, follow normal operation restrictions.
- If installed at an altitude of 1000–2000m, decrease 1% of the rated current or lower 0.5°C of temperature for every 100m increase in altitude.
- Maximum altitude for Corner Grounded is 2000m. If installation at an altitude higher than 2000m is required, please contact AutomationDirect.



DURAPULSE GS10 AC Drives – Selection

Selecting the Proper Drive Rating, continued

Determine Maximum Enclosure Internal Temperature

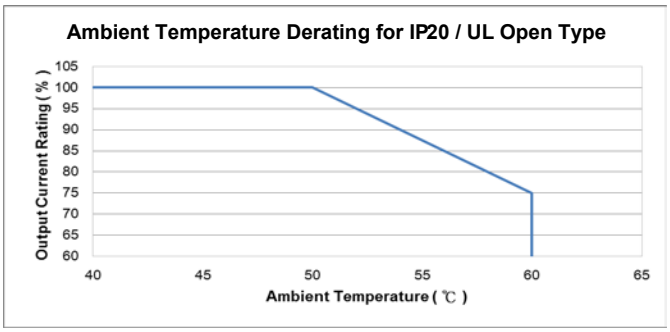
AC drives generate a significant amount of heat and can cause the internal temperature of an enclosure to exceed the rating of the GS10 drive, even when the ambient temperature is less than 104°F (40°C). Enclosure ventilation and/or cooling may be required to reduce maximum internal temperature to 104°F (40°C) or less. Ambient temperature measurements/calculations should be made for the maximum expected temperature.

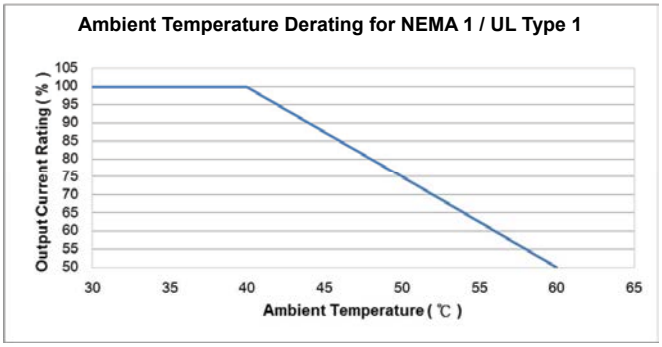
NOTE: For use above 104°F (40°C), the AC drive must be derated as described below.

Derate Output Current Based on Temperature Above 104°F (40°C) or 122°F (50°C)

Drive Derating by Temperature and Protection Level	
Protection Level	***Derating***
UL Open Type / IP20*	If the GS10 drive operates at the rated current, the ambient temperature needs to be between -20–50°C. If the temperature is above 50°C, decrease 2.5% of the rated current for every 1°C increase in temperature. The maximum allowable temperature is 60°C.
NEMA 1 / UL Type 1*	When the GS10 drive is operating at the rated current, the ambient temperature must be between -20–40°C. When the temperature is over 40 °C, for every increase by 1°C, decrease the rated current 2.5%. The maximum allowable temperature is 60°C.

** For more information about environmental ratings, refer to "Environmental Conditions for GS10 AC Drives" on page tGSX-9.*





DURAPULSE GS10 AC Drives – Selection

Selecting the Proper Drive Rating, continued

Derate Output Current Based on Carrier Frequency (if necessary)

Carrier Frequency Effects

AC Drives rectify the incoming 50 or 60Hz line power resulting in DC power at 0Hz. The resulting DC power is then pulse-width modulated and supplied to the motor by the drive's power electronics. IGBTs invert the DC power, simulating a sine wave at the desired frequency (that's what allows variable speed in AC induction motors). The speed at which the IGBTs are turned ON and OFF is called Carrier Frequency. In GS10 drives, the Carrier Frequency can range from 2kHz to 15kHz. Though Carrier Frequency can be adjusted, there are trade-offs between high Carrier Frequencies and low Carrier Frequencies.

Benefits of Higher Carrier Frequencies:

- Better efficiency (lower harmonic losses) in the motor
- Lower audible noise

Benefits of Lower Carrier Frequencies:

- Better efficiency in the drive
- Lower EMI (electrical noise)
- Reduced reflective wave peak voltage

As a general rule, the Carrier Frequency should be set as low as possible without creating unacceptable audible noise in the motor. Smaller systems can have higher Carrier Frequencies, but larger drives (>20 or 30hp) should not have Carrier Frequencies set higher than 6kHz. Heavy duty applications typically run around 2–4 kHz.

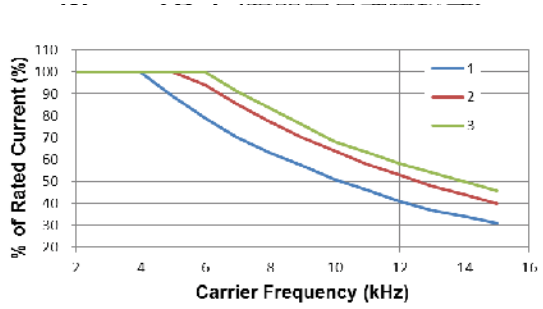
Derating Tables

The tables below show the derating curves for GS10 drives running in two different modes under variable torque and constant torque conditions.
Line 1: Ta = 50°C / Load = 100%
Line 2: Ta = 50°C / Load = 75% or Ta = 40°C / Load = 100%
Line 3: Ta = 50°C / Load = 50% or Ta = 35°C / Load = 100%

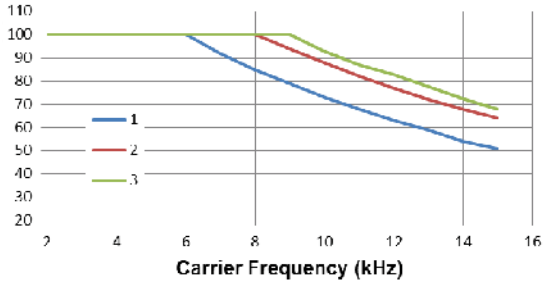
Set PWM mode via P11.41.
SVPWM = Space Vector Pulse Width Modulation mode
DPWM = Two Phase Pulse Width Modulation mode

Variable Torque Carrier Frequency Derating

SVPWM Mode

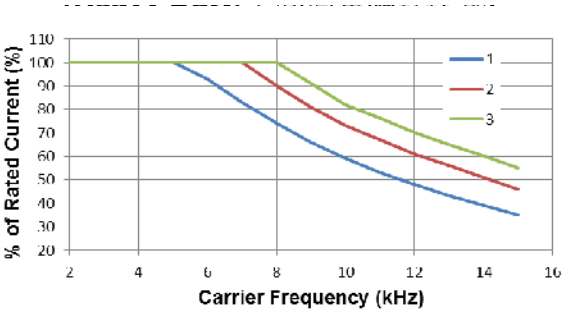


DPWM Mode

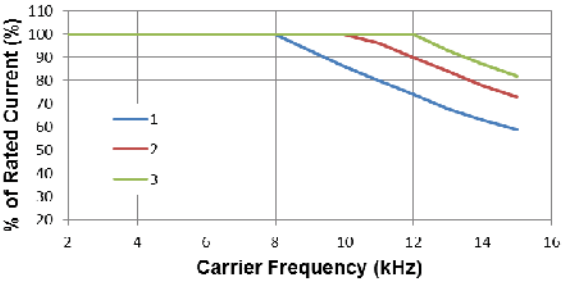


Constant Torque Carrier Frequency Derating

SVPWM Mode



DPWM Mode



DURApulse GS10 AC Drives – Selection Specifications

GS10 Drive Model Selection Tables

GS10 120V[1,4] 1-Phase Specifications – Frame Sizes A, C

Model Name				GS11N-10P2	GS11N-10P5	GS11N-11P0
Price				$127.00	$135.00	$151.00
Frame Size				A	A	C
Dimensional Drawing				PDF	PDF	PDF
Output Rating	Max Motor Output		hp	1/4	1/2	1
			kW	0.2	0.4	0.75
	CT	Rated Output Capacity	kVA	0.6	1.0	1.8
		Rated Output Current	A	1.6	2.5	4.8
		Carrier Frequency[3]	kHz	2–15 (default 4)		
	VT	Rated Output Capacity	kVA	0.7	1.0	2.1
		Rated Output Current	A	1.8	2.7	5.5
		Carrier Frequency[3]	kHz	2–15 (default 4)		
Input Rating[2]	CT	Rated Input Current	A	6	9.4	18
	VT	Rated Input Current	A	6.8	10.1	20.6
	Rated Voltage/Frequency			One-phase: 100–120 VAC (-15% to +10%), 50/60 Hz		
	Operating Voltage Range (VAC)			85–132		
	Frequency Tolerance (Hz)			47–63		
IE2 Efficiency - Relative Power Loss				4.3%	3.2%	2.9%
Weight (kg [lb])				0.4 [0.88]	0.5 [1.10]	1 [2.20]
Cooling Method				Convective		Fan
IP Rating				IP20		

1 - For Use With Three-Phase Motors Only.
2 - If 3-phase power source is non-symmetrical, refer to "Circuit Connections – RFI Jumper" in the GS10 AC Drives User Manual, Chapter 2. Please refer to "GS10 DURApulse Accessories – Fusing" (pg.tGSX-75) for input fusing information.
3 - The carrier frequency value is a factory default. Decrease the current value if you need to increase the carrier frequency. Refer to "Derate Output Current Based on Carrier Frequency".
4 - No DC bus connection terminals (DC+,DC-) are provided on 120V models.

GS10 230V[1] 1-Phase Specifications – Frame Sizes A, B, C

Model Name				GS11N-20P2	GS11N-20P5	GS11N-21P0	GS11N-22P0	GS11N-23P0
Price				$119.00	$121.00	$131.00	$167.00	$198.00
Frame Size				A	A	B	C	C
Dimensional Drawing				PDF	PDF	PDF	PDF	PDF
Output Rating	Max Motor Output		hp	1/4	1/2	1	2	3
			kW	0.2	0.4	0.75	1.5	2.2
	CT	Rated Output Capacity	kVA	0.6	1.1	1.8	2.9	4.2
		Rated Output Current	A	1.6	2.8	4.8	7.5	11
		Carrier Frequency[3]	kHz	2–15 (default 4)				
	VT	Rated Output Capacity	kVA	0.7	1.2	1.9	3.2	4.8
		Rated Output Current	A	1.8	3.2	5	8.5	12.5
		Carrier Frequency[3]	kHz	2–15 (default 4)				
Input Rating[2]	CT	Rated Input Current	A	5.1	7.3	10.8	16.5	24.2
	VT	Rated Input Current	A	5.8	8.3	11.3	18.5	27.5
	Rated Voltage/Frequency			One-phase 200-240 VAC (-15% to +10%) 50/60 Hz				
	Operating Voltage Range (VAC)			170–265				
	Frequency Tolerance (Hz)			47–63				
IE2 Efficiency - Relative Power Loss				4.7%	3.1%	2.7%	2.5%	2.4%
Weight (kg [lb])				0.4 [0.88]	0.5 [1.10]	0.8 [1.76]	1 [2.20]	1 [2.20]
Cooling Method				Convective				Fan
IP Rating				IP20				

1 - For Use With Three-Phase Motors Only.
2 - If 3-phase power source is non-symmetrical, refer to "Circuit Connections – RFI Jumper" in the GS10 AC Drives User Manual, Chapter 2. Please refer to "GS10 DURApulse Accessories – Fusing" (pg.tGSX-75) for input fusing information.
3 - The carrier frequency value is a factory default. Decrease the current value if you need to increase the carrier frequency. Refer to "Derate Output Current Based on Carrier Frequency".

DURApulse GS10 AC Drives – Selection Specifications

GS10 Drive Model Selection Tables, continued

GS10 230V[1] 3-Phase Specifications – Frame Sizes A, B							
Model Name				GS13N-20P2	GS13N-20P5	GS13N-21P0	GS13N-22P0
Price				$127.00	$129.00	$142.00	$170.00
Frame Size				A	A	A	B
Dimensional Drawing				PDF	PDF	PDF	PDF
Output Rating	**Max Motor Output (3-phase [1-phase])[4]**		hp	0.25 [0.1]	0.5 [0.25]	1 [0.5]	2 [1]
			kW	0.2 [0.1]	0.4 [0.2]	0.75 [0.375]	1.5 [0.75]
	CT	**Rated Output Capacity (3-phase [1-phase])**	kVA	0.6 [0.3]	1.1 [0.55]	1.8 [0.9]	2.9 [1.5]
		Rated Output Current (3-phase [1-phase])	A	1.6 [0.8]	2.8 [1.4]	4.8 [2.4]	7.5 [3.75]
		Carrier Frequency[3]	kHz	2–15 (default 4)			
	VT	**Rated Output Capacity**	kVA	0.7	1.2	1.9	3.0
		Rated Output Current	A	1.8	3.0	5.0	8.0
		Carrier Frequency[3]	kHz	2–15 (default 4)			
Input Rating[2]	**CT**	**Rated Input Current**	A	1.9	3.4	5.8	9.0
	VT	**Rated Input Current**	A	2.2	3.8	6.0	9.6
	Rated Voltage/Frequency			3-phase or 1-phase 200–240 VAC (-15% to +10%), 50/60 Hz			
	Operating Voltage Range (VAC)			170–265			
	Frequency Tolerance (Hz)			47-63			
IE2 Efficiency - Relative Power Loss				4.7%	3.1%	2.7%	2.4%
Weight (kg [lb])				0.4 [0.88]	0.5 [1.10]	0.6 [1.32]	0.8 [1.76]
Cooling Method				Convective			Fan
IP Rating				IP20			

See table below for notes.

GS10 230V[1] 3-Phase Specifications – Frame Sizes C, D						
Model Name				GS13N-23P0	GS13N-25P0	GS13N-27P5
Price				$209.00	$222.00	$338.00
Frame Size				C	C	D
Dimensional Drawing				PDF	PDF	PDF
Output Rating	**Max Motor Output (3-phase [1-phase])[4]**		hp	3 [1.5]	5 [2.5]	7.5 [3.5]
			kW	2.2 [1.1]	3.7 [1.85]	5.5 [2.75]
	CT	**Rated Output Capacity (3-phase [1-phase])**	kVA	4.2 [2.1]	6.5 [3.25]	9.5 [4.75]
		Rated Output Current (3-phase [1-phase])	A	11 [5.5]	17 [8.5]	25 [12.5]
		Carrier Frequency[3]	kHz	2–15 (default 4)		
	VT	**Rated Output Capacity**	kVA	4.8	7.4	10.3
		Rated Output Current	A	12.5	19.5	27
		Carrier Frequency[3]	kHz	2–15 (default 4)		
Input Rating[2]	**CT**	**Rated Input Current**	A	13.2	20.4	30
	VT	**Rated Input Current**	A	15	23.4	32.4
	Rated Voltage/Frequency			3-phase or 1-phase 200–240 VAC (-15% to +10%), 50/60 Hz		
	Operating Voltage Range (VAC)			170–265		
	Frequency Tolerance (Hz)			47-63		
IE2 Efficiency - Relative Power Loss				2.4%	2.2%	2.3%
Weight (kg [lb])				1 [2.20]	1 [2.20]	2 [4.41]
Cooling Method				Fan		
IP Rating				IP20		

1 - For Use With Three-Phase Motors Only.

2 - If 3-phase power source is non-symmetrical, refer to "Circuit Connections – RFI Jumper" in the GS10 AC Drives User Manual, Chapter 2. Please refer to "GS10 DURApulse Accessories – Fusing" (pg.tGSX-75) for input fusing information.

3 - The carrier frequency value is a factory default. Decrease the current value if you need to increase the carrier frequency. Refer to "Derate Output Current Based on Carrier Frequency".

4 - Three phase models can be powered with 1-phase or 3-phase input power. If using 1-phase input power, GS11 models up to 3HP provide higher output power than equivalent GS13 models with 1-phase.

DURAPULSE GS10 AC Drives – Selection Specifications

GS10 Drive Model Selection Tables, continued

GS10 460V[1] 3-Phase Specifications – Frame Sizes A, B						
Model Name				GS13N-40P5	GS13N-41P0	GS13N-42P0
Price				$156.00	$157.00	$181.00
Frame Size				A	A	B
Dimensional Drawing				PDF	PDF	PDF
Output Rating	**Max Motor Output**		**hp**	1/2	1	2
			kW	0.4	0.75	1.5
	CT	**Rated Output Capacity**	**kVA**	1.1	2.1	3.2
		Rated Output Current	**A**	1.5	2.7	4.2
		Carrier Frequency[3]	**kHz**	2–15 (default 4)		
	VT	**Rated Output Capacity**	**kVA**	1.4	2.3	3.5
		Rated Output Current	**A**	1.8	3.0	4.6
		Carrier Frequency[3]	**kHz**	2–15 (default 4)		
Input Rating[2]	**CT**	**Rated Input Current**	**A**	2.1	3.7	5.8
	VT	**Rated Input Current**	**A**	2.5	4.2	6.4
	Rated Voltage/Frequency			Three-phase 380-480 VAC (-15% to +10%), 50/60 Hz		
	Operating Voltage Range (VAC)			323–528		
	Frequency Tolerance (Hz)			47–63		
IE2 Efficiency - Relative Power Loss				3.7%	2.5%	2.2%
Weight (kg [lb])				0.6 [1.32]	0.7 [1.54]	0.8 [1.76]
Cooling Method				Convective		Fan
IP Rating				IP20		
See table below for notes.						

GS10 460V[1] 3-Phase Specifications – Frame Sizes C, D							
Model Name				GS13N-43P0	GS13N-45P0	GS13N-47P5	GS13N-4010
Price				$202.00	$238.00	$327.00	$369.00
Frame Size				C	C	D	D
Dimensional Drawing				PDF	PDF	PDF	PDF
Output Rating	**Max Motor Output**		**hp**	3	5	7 1/2	10
			kW	2.2	3.7	5.5	7.5
	CT	**Rated Output Capacity**	**kVA**	4.2	6.9	9.9	13
		Rated Output Current	**A**	5.5	9	13	17.5
		Carrier Frequency[3]	**kHz**	2–15 (default 4)			
	VT	**Rated Output Capacity**	**kVA**	5.0	8.0	12	15.6
		Rated Output Current	**A**	6.5	10.5	14.5	19.8
		Carrier Frequency[3]	**kHz**	2–15 (default 4)			
Input Rating[2]	**CT**	**Rated Input Current**	**A**	6.1	9.9	14.3	19.3
	VT	**Rated Input Current**	**A**	7.2	11.6	16.0	21.8
	Rated Voltage/Frequency			Three-phase 380-480 VAC (-15% to +10%), 50/60 Hz			
	Operating Voltage Range (VAC)			323–528			
	Frequency Tolerance (Hz)			47–63			
IE2 Efficiency - Relative Power Loss				2.3%	2.0%	1.9%	1.9%
Weight (kg [lb])				1 [2.20]	1 [2.20]	2 [4.41]	2 [4.41]
Cooling Method				Fan			
IP Rating				IP20			

1 - For Use With Three-Phase Motors Only.

2 - If 3-phase power source is non-symmetrical, refer to "Circuit Connections – RFI Jumper" in the GS10 AC Drives User Manual, Chapter 2. Please refer to "GS10 DURApulse AccessoriesFusing" (pg.tGSX-75) for input fusing information.

3 - The carrier frequency value is a factory default. Decrease the current value if you need to increase the carrier frequency. Refer to "Derate Output Current Based on Carrier Frequency".

DURAPULSE GS10 AC Drives – General Specifications

GS10 Drive Model Selection Tables, continued

GS10 General Specifications (Applicable to All Models)			
Control Characteristics	Control Method	V/F, Sensorless Vector (SVC)	
	Applicable Motor	IM (Induction Motor), Permanent Magnet AC (IPM and SPM)	
	Starting Torque[1]	150% / 3Hz 100% / (motor rated frequency/20)	(V/F, SVC control for IM, CT) (SVC control for PM, CT)
	Speed Control Range[1]	1: 50 (V/F, SVC control for IM, CT) 1: 20 (SVC control for PM, CT)	
	Max. Output Frequency	0.00–599.00 Hz	
	Overload Capacity	VT: rated output current of 120% 60 sec, 150% 3 sec. CT: rated output current of 150% 60 sec, 200% 3 sec.	
	Frequency Setting Signal	0–10 V / 4(0)–20 mA Pulse input: Single Pulse (10kHz), PWM (1kHz),	
	Digital Inputs	Five (5) - 24VDC NPN or PNP, includes 1 frequency input 10kHz	
	Digital Outputs	Two (2) - (1)-48VDC, (1) Relay-250VAC/30VDC	
	Analog Inputs	One (1) - selectable Voltage or Current	
	Analog Outputs	One (1) - voltage	
	Main Functions	• Multiple motor switching (max 2 motor settings) • Fast start-up • Deceleration Energy Back (DEB) function • Fast deceleration function • Master and Auxiliary frequency source selectable • Restart after momentary power loss • Speed tracking • Over-torque detection • 16-step speed (including the master speed) • Accel./decel. time switch • S-curve accel./decel • Three-wire operation control • JOG frequency • Frequency upper/lower limit settings • DC brake at start-up and stop • PID control • Simple Positioning Function • Multi Pump Sequence • RS-485 Serial Communications (38.4kps max)	
	Application Macro	Built-in application parameter groups (selected by industry) and user-defined application parameter groups.	
Protection Characteristics	Motor Protection	Over-current, over-voltage, over-heating, phase loss, over-load	
	Stall Prevention	Stall prevention during acceleration, deceleration, and running (independent settings).	
Agency Approvals		*UL, cUL, CE, REACH*	
1: Control accuracy may vary depending on the environment, application conditions, or different motors. For more information, contact AutomationDirect.			

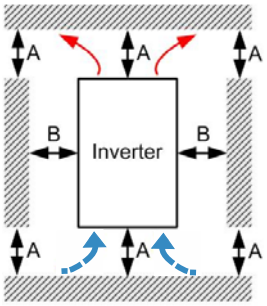
DURAPULSE GS10 AC Drives – Environmental Specifications

GS10 Environmental Specifications

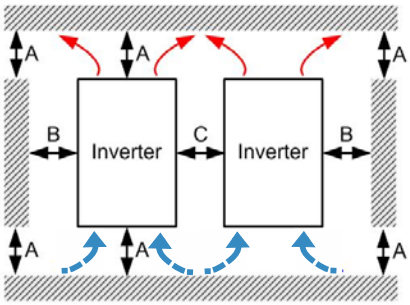
Environmental Conditions for GS10 AC Drives			
Condition	Operation	Storage	Transportation
Installation Location	IEC 60364-1/ IEC 60664-1 Pollution degree 2, Indoor use only.	n/a	n/a
Ambient Temperature	IP20/UL Open Type: -20–50°C (-20–60°C w/derating)	-40–85°C	-20–70°C
	Non-condensing, non-freezing		
Relative Humidity	90%, no water condensation	95%, no water condensation	
Air Pressure	86–106 kPa	70–106 kPA	
Pollution Level	Concentrate prohibited		
	Class 3C2; Class 3S2	Class 2C2; Class 2S2	Class 1C2; Class 1S2
Environmental Air	No corrosive/inflammable gases permitted		
Altitude	<1000 m (For altitudes > 1000 m, derate to use it.)		
Package Drop	n/a	ISTA procedure 1A (according to weight) IEC 60068-2-31	
Vibration	1.0 mm, peak to peak value range from 2–13.2 Hz; 0.7–2.0 G range from 13.2–55 Hz; 2.0 G range from 55–512 Hz. Compliance with IEC 60068-2-6	2.5 G peak, 5 Hz–2 kHz 0.015" maximum displacement	
Impact	15G, 11ms Compliance with IEC/EN60068-2-27	30G	
DO NOT expose the GS10 AC Drive to harsh environments such as dust, direct sunlight, corrosive/flammable gases, humidity, liquid, or vibrations. The salts in the air must be less than 0.01 mg/cm^2 every year.			

DURAPULSE GS10 AC Drives Specifications – Air Flow and Power (Heat) Dissipation

Minimum Clearances and Air Flow for GS10 Series Drives



Single Drive Installation



Side by Side Drive Installation

GS10 Minimum Mounting Clearances*

Installation Method	A (mm)	B (mm)	C (mm)	Operation Temperature (°C) 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

** Failure to follow the minimum mounting clearances may cause the fan to malfunction and cause a heat dissipation problem.*

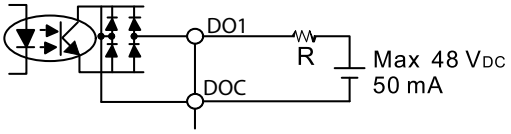
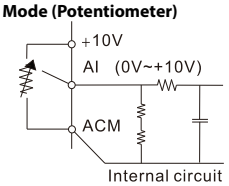
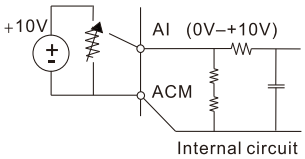
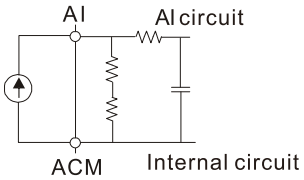
GS10 Airflow and Power Dissipation

Model Number	Frame Size	Airflow Rate for Cooling		Power Dissipation (Watts)		
		Flow Rate (cfm)	Flow Rate (m^3/hr)	Loss External (Heat sink)	Internal	Total
GS11N-10P2	A	0	0	8	10	18
GS11N-10P5				14.2	13.1	27.3
GS11N-11P0	C	16.0	27.2	29.1	23.9	53
GS11N-20P2	A	0	0	8.6	10	18.6
GS11N-20P5				16.3	14.5	30.8
GS11N-21P0	B	10	16.99	29.1	20.1	49.2
GS11N-22P0	C	16.0	27.2	46.5	31	77.5
GS11N-23P0				70	35	105
GS13N-20P2	A	0	0	8.6	10	18.6
GS13N-20P5				16.5	12.6	29.1
GS13N-21P0				31	13.2	44.2
GS13N-22P0	B	10	16.99	50.1	24.2	74.3
GS13N-23P0	C	16	27.2	76	30.7	106.7
GS13N-25P0				108.2	40.1	148.3
GS13N-27P5	D	23.4	39.7	192.8	53.3	246.1
GS13N-40P5	A	0	0	17.6	11.1	28.7
GS13N-41P0				30.5	17.8	48.3
GS13N-42P0	B	10	16.99	45.9	21.7	67.6
GS13N-43P0	C	16	27.2	60.6	22.8	83.4
GS13N-45P0				93.1	42	135.1
GS13N-47P5	D	23.4	39.7	132.8	39.5	172.3
GS13N-4010				164.7	55.8	220.5

- Published flow rates are the result of active cooling using fans, factory installed in the drive.
- Unpublished flow rates (0.0) are the result of passive cooling in drives without factory installed fans.
- The required airflow shown in the chart is for installing a single GS10 drive in a confined space.
- When installing multiple GS10 drives, the required air volume would be the required air volume for a single GS10 drive multiplied by the number of GS10 drives.
- When calculating power dissipation (Watt Loss), use the Total value. Heat dissipation shown in the chart is for installing a single GS10 drive in a confined space.
- When installing multiple drives, the volume of heat/power dissipation should be the heat/power dissipated by a single GS10 drive multiplied by the number of GS10 drives.
- Heat dissipation for each model is calculated by rated voltage, current and default carrier frequency.

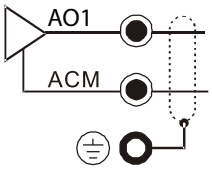
DURAPULSE GS10 AC Drives Specifications – Terminals

Control Circuit Terminal Names and Definitions

Control Circuit Terminals		
Terminal Symbol	***Terminal Function***	***Description***
+24V	Digital control signal common (Source)	+24V ± 10% 100mA
DCM	Digital control / Frequency signal common (Sink)	Digital control common
FWD (DI1) REV (DI2) DI3 - DI5	Digital input 1–5	***Source Mode:*** ON: activation current 3.3 mA ≥ 11 VDC OFF: cut-off voltage ≤ 5 VDC ***Sink Mode:*** ON: activation current 3.3 mA ≤ 13 VDC OFF: cut-off voltage ≥ 19 VDC DI5: Single pulse input, the maximum input frequency=10kHz. PWM pulse input, the maximum input frequency=1kHz. Digital inputs can be configured by the user for many different functions. Refer to P02.00–02.05 to program the digital inputs FWD (DI1), REV (DI2), DI3–DI5. • When P02.00=0, FWD (DI1) and REV (DI2) can be programmed. • When P02.00≠0, the functions of FWD (DI1) and REV (DI2) act according to P02.00 setting. • When P02.05=0, DI5 is pulse input terminal. • When P00.20 = 4, DI5 is the speed command source. • Refer to P10.16 for DI5 pulse configuration.
DO1	Digital Output 1 (photo coupler)	The AC motor drive outputs various monitoring signals through a transistor (open collector). Refer to P2.16 to program the output. 
DOC	Digital Output Common (photo coupler)	
R1O	Relay Output 1 (N.O.)	The AC motor drive outputs various monitoring signals through a relay output. Refer to P2.13 to program the output. **Resistive Load** • 3.0 A (NO), 3.0 A (NC) @250VAC • 5.0 A (NO), 3.0 A (NC) @30VDC **Inductive Load (COS 0.4)** • 1.2 A (NO), 1.2 A (NC) @250VAC • 2.0 A (NO), 1.2 A (NC) @30VDC
R1C	Relay Output 1 (N.C.)	
R1	Relay Output 1 Common	
+10V	Potentiometer power supply	Power supply for analog frequency setting: +10.5 ± 0.5 VDC / 20mA
AI	Analog voltage frequency command **AI-V Mode (Potentiometer)**  **AI-V Mode (voltage input)**  **AI-C Mode** 	The AI default is 0–10 V (AI-V, voltage mode). To switch to current mode, two steps are required: 1. A dip switch must be configured (follow the instructions on the inner side of the front cover or see page 2–xx) 2. Change P03.28 to 1 (0mA) or 2 (4mA) Use P03.00 to program AI functionality for either Voltage or Current mode. AI resolution=12 bits **Voltage (AI-V) mode** • Impedance: 20 kΩ • Range 0–Max. Output Frequency (P01.00): 0 to 10 V • P03.28 = 0 **Current (AI-C) mode** • Impedance: 250 Ω • Range 0– Maximum Output Frequency (P01.00): 0–20 mA/4–20 mA • Range switching according to P03.28 = 1 (0mA) or 2 (4mA)

DURAPULSE GS10 AC Drives Specifications – Terminals

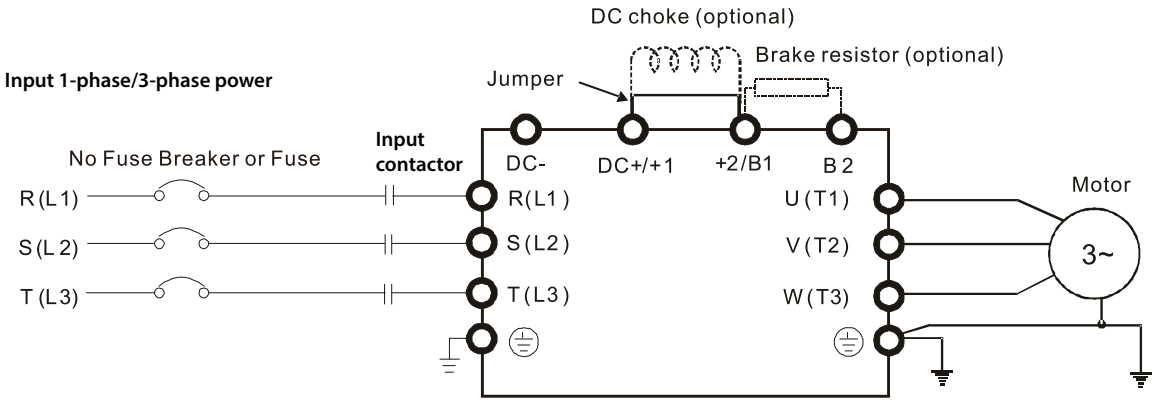
Control Circuit Terminal Names and Definitions

Control Circuit Terminals (continued)		
Terminal Symbol	***Terminal Function***	***Description***
AO1	Multi-function analog voltage output 	AO1 outputs an analog voltage signal based on P03.20. • Range: 0–10 V (P03.21=0) corresponds to the maximum operating range of the control target • Max. output current: 2 mA • Max. Load: 5 kΩ • AO1 resolution=12 bits
ACM	Analog Signal Common	Analog signal common terminal
PE	RS485	The PE terminal is for shielded cable to ground to decrease interference when you use RS485 communication.
RJ45	PIN 1, 2, 6: Reserved	The RJ45 port provides a serial communications connection. Max Baud Rate = 38.4kbps
	PIN 3, 7: SGND	
	PIN 4: SG-	
	PIN 5: SG+	
	PIN 8: +10V supply GS4-KPD (provides (optional) power supply)	

DURAPULSE GS10 AC Drives – Basic Wiring Diagram

Main Circuit Wiring Diagram: GS10 All Models

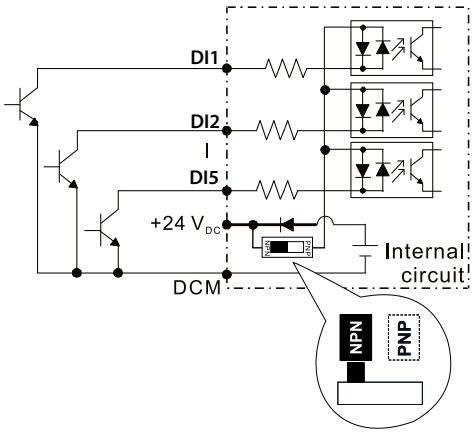
Note: Users MUST connect wiring according to the circuit diagram shown below. (Refer to GS10 User Manual for additional specific wiring information.)
Note: DC reactors (chokes) are specified but not stocked by AutomationDirect.
Note: DC- and DC+/+1 terminals not provided on 120V models.



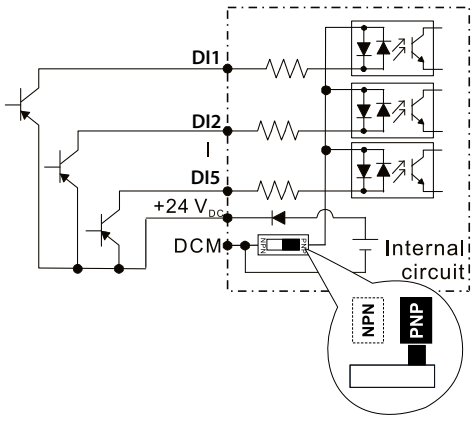
Control Circuit Wiring Diagram: Digital Inputs - Internal Power

Note: Users MUST connect wiring according to the circuit diagram shown below. (Refer to GS10 User Manual for additional specific wiring information.)

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



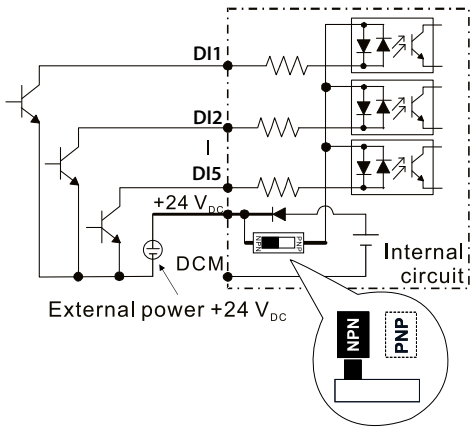
② Source Mode
with internal power (+24 V_{DC})



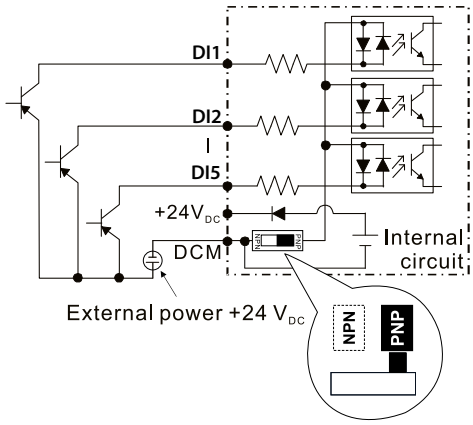
Control Circuit Wiring Diagram: Digital Inputs - External Power

Note: Users MUST connect wiring according to the circuit diagram shown below. (Refer to GS10 User Manual for additional specific wiring information.)

③ Sink Mode
with external power



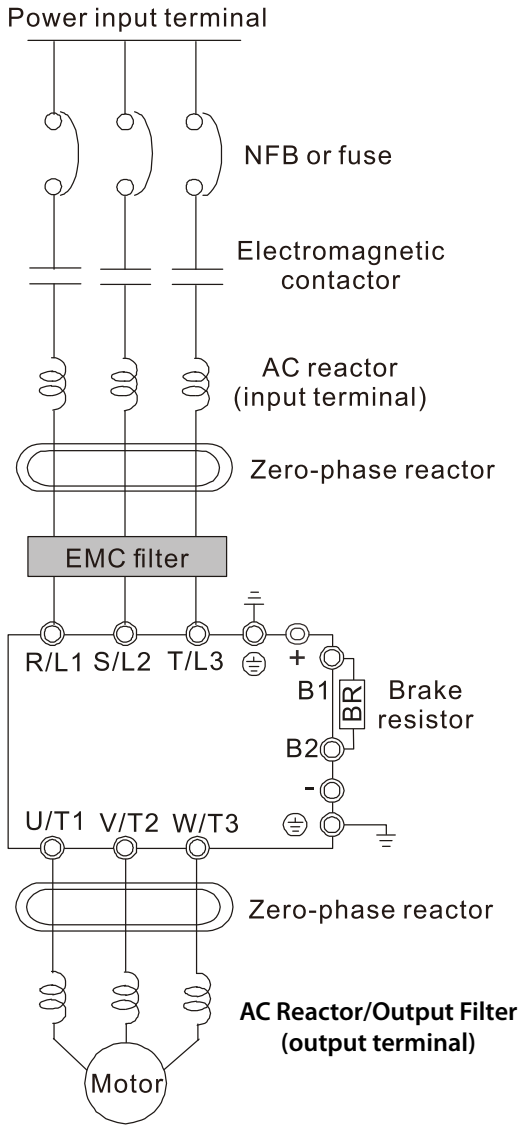
④ Source Mode
with external power



DURAPULSE GS10 AC Drives – Basic Wiring Diagram

System Wiring Diagram:

Note: Users MUST connect wiring according to the circuit diagram shown below. (Refer to user G10 User Manual for additional specific wiring information.)

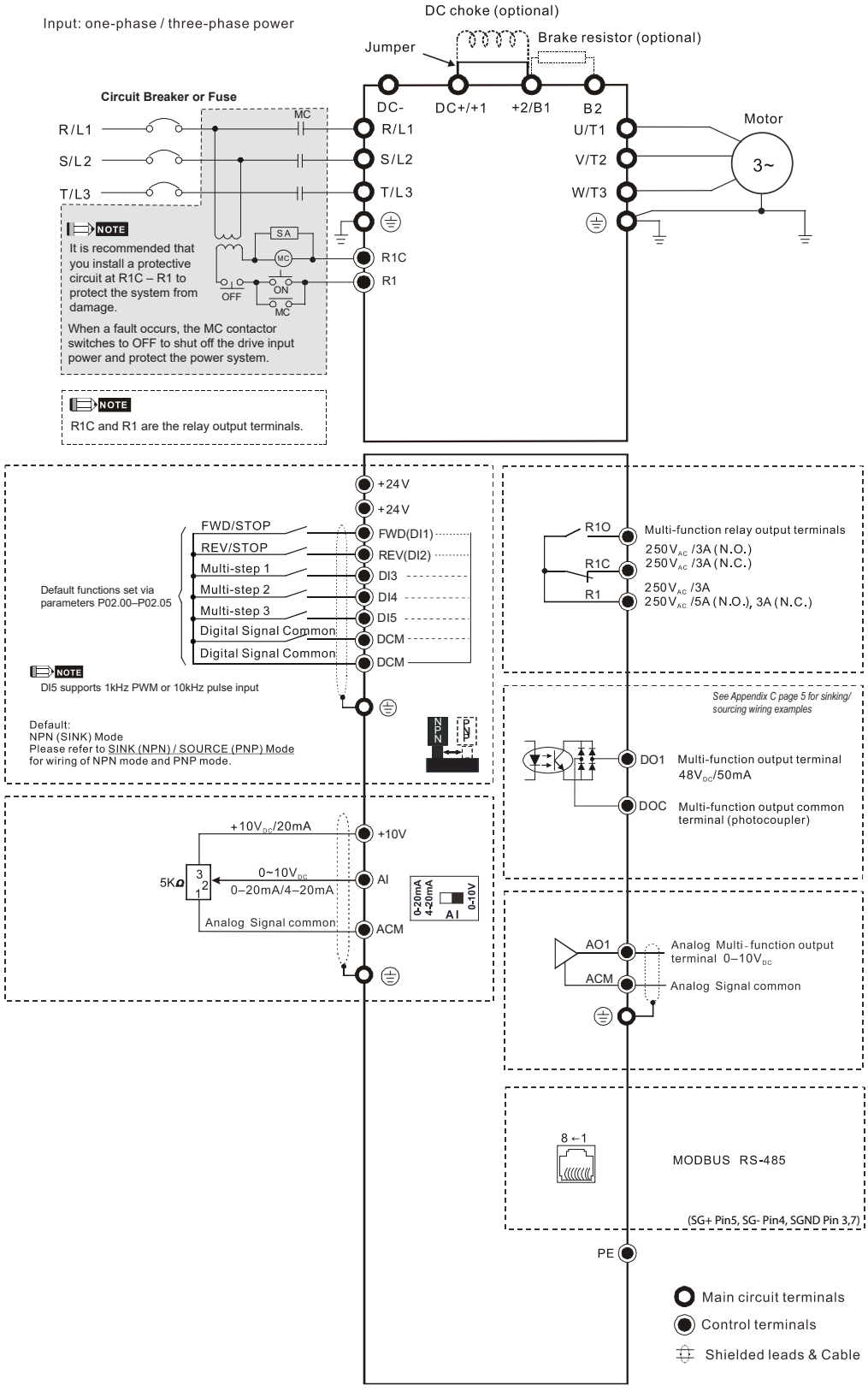


System Wiring Components	
Component	***Function***
Power input terminal	Supply power according to the rated power specifications indicated in the manual
NFB or fuse	There may be a large inrush current during power on. Select a suitable NFB (Non Fuse Breaker or Circuit Breaker) or Fuse.
Electromagnetic contactor	Switching the power ON/OFF on the primary side of the electromagnetic contactor can turn the drive ON/OFF, but frequent switching can cause machine failure. Do not switch ON/OFF more than once an hour. Do not use the electromagnetic contactor as the power switch for the drive; doing so shortens the life of the drive.
AC reactor (input terminal)	When the main power supply capacity is greater than 500 kVA, or when it switches into the phase capacitor, the instantaneous peak voltage and current generated may destroy the internal circuit of the drive. It is recommended that you install an input side AC reactor in the drive. This also improves the power factor and reduces power harmonics. The wiring distance should be within 10 m.
Zero phase reactor	Used to reduce radiated interference, especially in environments with audio devices, and reduce input and output side interference. The effective range is AM band to 10 MHz.
EMC filter	Can be used to reduce electromagnetic interference.
Brake module and Brake resistor (BR)	Used to shorten the deceleration time of the motor.
AC reactor (output terminal)	The motor cable length affects the size of the reflected wave on the motor end.

DURAPULSE GS10 AC Drives – Basic Wiring Diagram

Control Wiring Diagram: Full I/O

Note: Users MUST connect wiring according to the circuit diagram shown below. (Refer to the GS10 user manual for additional specific wiring information.)



DURAPULSE GS10 AC Drives – Optional Accessories

Accessories Available for GS10 AC Drives

The table below lists types of accessories available for your GS10 series drive. GS10 uses many of the same accessories as the GS20(X) series drives–GS20 numbered parts that can be used with GS10 are noted in the table below. To see if your specific model can use a particular accessory, please click the reference link to go to the accessory page.

GS10 AC Drives Available Software and Accessories			
Accessory	***GS10 Accessory***	***GS20 Accessory used by GS10***	***Reference***
GSoft 2 Drive Software	✓		"GSoft2 Drive Configuration Software" on page tGSX-103
Braking Resistors	✓		"GS10/GS20 Braking Resistors" on page tGSX-64
Capacitive Filter		✓	"Capacitive Filter" on page tGSX-79
Conduit Boxes	✓		"GS10 Conduit Boxes" on page tGSX-66
DIN Rail Mounting (A–C frame only)		✓	"DIN Rail Mounting" on page tGSX-85
EMC Filter	✓		"GS10 Standard Footprint EMC Filter and Zero Phase Reactor" on page tGSX-69
EMC Shield Plates		✓	"EMC Shield Plate" on page tGSX-79
EMI Filters	✓		"GS10/GS20 High Performance EMI Input Filters" on page tGSX-73
Fuses/Circuit Breakers	✓		"GS10 Fuses/Circuit Breakers" on page tGSX-75
Line/Load Reactor/Voltage Time Filter	✓		"GS10 Line Reactors/Voltage Time Filters" on page tGSX-82
Mounting Adapter Plate (A–C frame only)		✓	"Mounting Adapter Plate" on page tGSX-86
Optional Advanced Keypad		✓	"Advanced Keypad" on page tGSX-105
Replacement Fan Kit		✓	"Cooling Fans for GSxx Series Drives (Spare/Replacement)" on page tGSX-87
RF Filter	✓		"RF Filter" on page tGSX-88

GS10 Series Optional Accessories - Braking

GS10 Braking Resistors

Use the table below to find the appropriate braking resistor model for your GS10 series AC drive. For more information and installation instructions, please see the GS10 series User Manual. All listed resistors are available for purchase at www.automationdirect.com.

GS10 AC Drive Braking Component Selection

Drive Voltage	Drive Model	Motor Power (hp)	Drive Brake Capacity - Max Torque		125% Braking Torque @ 10% Duty Cycle*						
					Open Type Braking Resistor				NEMA1 Resistors with Thermal Switch		
			Min Resistor Value (Ω)	Max Total Brake Current (A)	Part #	Qty.	Brake Torque (kg•m)	Total Brake Current (A)	Part #	Qty.	Total Brake Current (A)
120V	GS11N-10P2	1/4	190.0	2	GS-BR-080W750	1	0.1	0.5	BR-N1-240W200	1	2.0
	GS11N-10P5	1/2	95.0	4	GS-BR-080W200	1	0.3	1.9	BR-N1-240W150	1	2.6
	GS11N-11P0	1	63.3	6		1	0.5			1	
230V	GS11N-20P2	1/4	190.0	2	GS-BR-080W750	1	0.1	0.5	BR-N1-240W200	1	2.0
	GS11N-20P5	1/2	95.0	4	GS-BR-080W200	1	0.3	1.9	BR-N1-240W150	1	2.6
	GS11N-21P0	1	63.3	6		1	0.5			1	
	GS11N-22P0	2	47.5	8	GS-BR-200W091	1	1	4.2	BR-N1-280W50	1	7.8
	GS11N-23P0	3	38.0	10	GS-BR-300W070	1	1.5	5.4		1	
	GS13N-20P2	1/4	190.0	2	GS-BR-080W750	1	0.1	0.5	BR-N1-240W200	1	2.0
	GS13N-20P5	1/2	95.0	4	GS-BR-080W200	1	0.3	1.9	BR-N1-240W150	1	2.6
	GS13N-21P0	1	63.3	6		1	0.5		BR-N1-240W150	1	
	GS13N-22P0	2	47.5	8	GS-BR-200W091	1	1	4.2	BR-N1-280W50	1	7.8
	GS13N-23P0	3	38.0	10	GS-BR-300W070	1	1.5	5.4		1	
	GS13N-25P0	5	19.0	20	GS-BR-400W040	1	2.5	9.5	BR-N1-800W25	1	15.6
	GS13N-27P5	7 1/2	16.5	23	GS-BR-1K0W020	1	3.7	19	BR-N1-800W18P0	1	21.7
460V	GS13N-40P5	1/2	380.0	2	GS-BR-080W750	1	0.3	1	BR-N1-250W400	1	2.0
	GS13N-41P0	1	190.0	4		1	0.5		BR-N1-240W200	1	3.9
	GS13N-42P0	2	126.7	6	GS-BR-200W360	1	1	2.1	BR-N1-240W150	1	5.2
	GS13N-43P0	3	108.6	7	GS-BR-300W250	1	1.5	3	BR-N1-500W200	1	3.9
	GS13N-45P0	5	84.4	9	GS-BR-400W150	1	2.5	5.1	BR-N1-500W130	1	6.0
	GS13N-47P5	7 1/2	50.7	15	GS-BR-1K0W075	1	3.7	10.2	BR-N1-720W85	1	9.2
	GS13N-4010	10	40.0	19		1	5.1		BR-N1-1K2W50	1	15.6

** 10% Duty Cycle with maximum ON (braking) time for 10 seconds.*

GS10 Series Optional Accessories – Conduit Boxes

GS10 – Conduit Box Selection Table					
Drive		Conduit Box*			Description
Model	Frame	Part #	Price	Drawing	
GS11N-10P2 GS11N-20P2 GS13N-20P2 GS13N-20P5	A1, A2	GS10A-N1A1	$25.00	PDF	GS10 series conduit box, NEMA1
GS11N-10P5 GS11N-20P5 GS13N-21P0 GS13N-40P5 GS13N-41P0	A3–A6	GS10A-N1A3	$26.00	PDF	
GS11N-21P0 GS13N-22P0 GS13N-41P0	B	GS10A-N1B	$28.00	PDF	
GS11N-11P0 GS11N-22P0 GS11N-23P0 GS13N-23P0 GS13N-25P0 GS13N-43P0 GS13N-45P0	C	GS10A-N1C	$30.00	PDF	
GS13N-25P5 GS13N-47P5 GS13N-4010	D	GS10A-N1D	$30.00	PDF	

** Conduit Box Kits include mounting hardware; box base, box cover, bushings, and screws. Conduit box dimensions are shown below and on the following page.*

GS10 Conduit Boxes

Optional Conduit Box Kits can be ordered separately. These kits bolt onto the bottom of the applicable GS10 drive to provide a convenient connection point for conduit entry, allowing the GS10 to achieve a NEMA 1/UL type 1 environmental protection rating; especially useful for GS10 drives mounted outside of an electrical control panel.

Example GS10 Conduit Box

GS10 Series Optional Accessories – EMC Filter & Zero Phase Reactor

GS10 Standard Footprint EMC Filter and Zero Phase Reactor

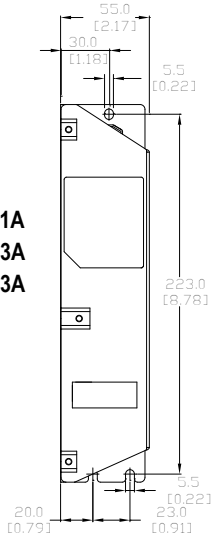
If electromagnetic noise is harmful to your manufacturing environment, we recommend that you select an EMC filter as shown below. For some motor drive models, you need to work with zero phase reactors to be compliant with EMC regulations. Refer to the table and figure below for the recommended model, setting method, and maximum motor cable length of the EMC filter and zero phase reactor. The footprint filter allows mounting of the drive on top of the recommended filter, saving panel space and wiring. For more information and installation instructions, please see your GS10 series User Manual.

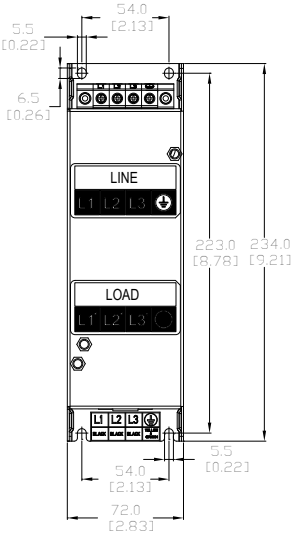
GS10 EMC Filter and Zero Phase Reactor

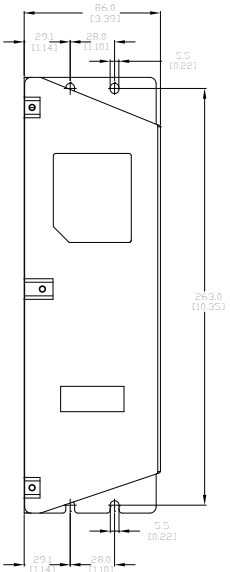
Frame	Drive Model	Input Current (A)	Footprint Filter Model #	Price	Recommended Zero Phase Reactor	Conducted Emission				Radiated Emission		
						C1-motor cable length-30m			C2-motor cable length-100m	C2-motor cable length-100m		
						Position to Install a Zero Phase Reactor						
						1	2	3	n/a	1	2	3
A	GS11N-10P2	6	EMF11AM21A	$58.00	RF008X00A				N/A			
	GS11N-10P5	9.4							N/A			
	GS11N-20P2	5.1					✓	✓	N/A		✓	✓
	GS11N-20P5	7.3					✓	✓	N/A		✓	✓
	GS13N-20P2	1.9	EMF10AM23A	$80.00			✓	✓	N/A		✓	✓
	GS13N-20P5	3.4					✓	✓	N/A		✓	✓
	GS13N-21P0	5.8					✓	✓	N/A		✓	✓
	GS13N-40P5	2.1	EMF6A0M43A	$73.00				✓	N/A			✓
	GS13N-41P0	3.7						✓	N/A*			✓
B	GS11N-21P0	10.8	EMF11AM21A	$58.00			✓	✓	N/A		✓	✓
	GS13N-22P0	9	EMF10AM23A	$80.00			✓	✓	N/A		✓	✓
	GS13N-42P0	5.8	EMF6A0M43A	$73.00				✓	N/A			✓
C	GS11N-11P0	18	EMF27AM21B	$102.00					N/A			
	GS11N-22P0	16.5						✓	N/A			✓
	GS11N-23P0	24.2						✓	N/A			✓
	GS13N-23P0	13.2	EMF24AM23B	$125.00			✓	✓	N/A		✓	✓
	GS13N-25P0	20					✓	✓	N/A		✓	✓
	GS13N-43P0	6.1	EMF12AM43B	$128.00					N/A			
	GS13N-45P0	9.9					✓	✓	N/A		✓	✓
D	GS13N-27P5	30	EMF33AM23B	$182.00		✓	✓		N/A	✓	✓	
	GS13N-47P5	14.3	EMF23AM43B	$175.00		✓	✓	✓	N/A	✓	✓	✓
	GS13N-4010	19.3				✓	✓	✓	N/A	✓	✓	✓

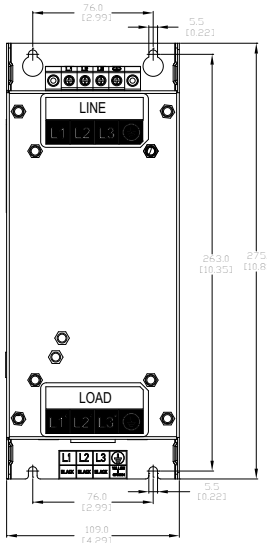
EMF Series Filter Dimensions (Units = mm [in])

EMF11AM21A
EMF10AM23A
EMF6A0M43A









EMF27AM21B;
EMF24AM23B
EMF33AM23B;
EMF12AM43B
EMF23AM43B;
EMF6A0M63B;
EMF16AM63B

GS10/GS20 Series Optional Accessories – EMI Input Filters

GS10/GS20 High Performance EMI Input Filters

High performance EMI filters may improve drive performance for certain applications. Use the table below to select the correct filter for your drive. For additional information and installation instructions, please see your GSx series User Manual.

EMI Filters Selection

Model		Description	EMI Filter*	
GS10 Drives	GS20(X) Drives		Roxburgh Filters Chassis 1ph	Roxburgh Filters C2 Rated
GS11N-10P2	GS21-10P2	120V 1ph 0.25 hp	RES90F10	MIF10
GS11N-10P5	GS21-10P5	120V 1ph 0.5 hp	RES90F16	MIF16
GS11N-11P0	GS21-11P0	120V 1ph 1.0 hp	RES90S30	MIF23
GS11N-20P2	GS21-20P2	230V 1ph 0.25 hp	RES90F06	MIF06
GS11N-20P5	GS21-20P5	230V 1ph 0.5 hp	RES90F10	MIF10
GS11N-21P0	GS21-21P0	230V 1ph 1.0 hp	RES90F16	MIF16
GS11N-22P0	GS21-22P0	230V 1ph 2.0 hp	RES90S20	MIF23
GS11N-23P0	GS21-23P0	230V 1ph 3.0 hp	RES90S30	MIF330B
GS13N-20P2	GS23-20P2	230V 3ph 0.25 hp	-	KMF306A
GS13N-20P5	GS23-20P5	230V 3ph 0.5 hp	-	KMF306A
GS13N-21P0	GS23-21P0	230V 3ph 1.0 hp	-	KMF306A
GS13N-22P0	GS23-22P0	230V 3ph 2.0 hp	-	KMF318A
GS13N-23P0	GS23-23P0	230V 3ph 3.0 hp	-	KMF318A
GS13N-25P0	GS23-25P0	230V 3ph 5.0 hp	-	KMF325A
GS13N-27P5	GS23-27P5	230V 3ph 7.5 hp	-	KMF336A
n/a	GS23-2010	230V 3ph 10hp	-	KMF350A
	GS23-2015	230V 3ph 15hp	-	KMF370A
	GS23-2020	230V 3ph 20hp	-	KMF3100A
GS13N-40P5	GS23-40P5	460V 3ph 0.5 hp	-	KMF306A
GS13N-41P0	GS23-41P0	460V 3ph 1.0 hp	-	KMF306A
GS13N-42P0	GS23-42P0	460V 3ph 2.0 hp	-	KMF306A
GS13N-43P0	GS23-43P0	460V 3ph 3.0 hp	-	KMF310A
GS13N-45P0	GS23-45P0	460V 3ph 5.0 hp	-	KMF318A
GS13N-47P5	GS23-47P5	460V 3ph 7.5 hp	-	KMF318A
GS13N-4010	GS23-4010	460V 3ph 10hp	-	KMF325A
n/a	GS23-4015	460V 3ph 15hp	-	KMF336A
	GS23-4020	460V 3ph 20hp	-	KMF350A
	GS23-4025	460V 3ph 25hp	-	KMF350A
	GS23-4030	460V 3ph 30hp	-	KMF370A
	GS23-51P0	575V 3ph 1.0 hp	-	KMF306V
	GS23-52P0	575V 3ph 2.0 hp	-	KMF306V
	GS23-53P0	575V 3ph 3.0 hp	-	KMF306V
	GS23-55P0	575V 3ph 5.0 hp	-	KMF310V
	GS23-57P5	575V 3ph 7.5 hp	-	KMF318V
	GS23-5010	575V 3ph 10hp	-	KMF318V
	GS21X-20P5	230V 1ph 0.5 hp	RES90F10	MIF10
	GS21X-21P0	230V 1ph 1.0 hp	RES90F16	MIF16
	GS21X-22P0	230V 1ph 2.0 hp	RES90S20	MIF23
n/a	GS21X-23P0	230V 1ph 3.0 hp	RES90S30	MIF330B
	GS23X-20P5	230V 3ph 0.5 hp	-	KMF306A
	GS23X-21P0	230V 3ph 1.0 hp	-	KMF306A
	GS23X-22P0	230V 3ph 2.0 hp	-	KMF310A
	GS23X-23P0	230V 3ph 3.0 hp	-	KMF318A
	GS23X-25P0	230V 3ph 5.0 hp	-	KMF325A
	GS23X-27P5	230V 3ph 7.5 hp	-	KMF336A
	GS23X-40P5	460V 3ph 0.5 hp	-	KMF306A
	GS23X-41P0	460V 3ph 1.0 hp	-	KMF306A
	GS23X-42P0	460V 3ph 2.0 hp	-	KMF306A
	GS23X-43P0	460V 3ph 3.0 hp	-	KMF310A
	GS23X-45P0	460V 3ph 5.0 hp	-	KMF318A
	GS23X-47P5	460V 3ph 7.5 hp	-	KMF318A
	GS23X-4010	460V 3ph 10hp	-	KMF325A

** All specs for the EMI filters can be found at www.automationdirect.com or by clicking the following links: -KMF Series Filters, -MIF Series Filters, -RES90 Series Filters*

GS10 Series Optional Accessories – Fuses/Circuit Breakers

GS10 Fuses/Circuit Breakers

Protection devices are essential to prevent damage to your GS10 series drive and application equipment. Please use the fuse specification chart below to select fuses that are applicable to your drive. Only use UL-certified fuses which comply with your local regulations.

Fuse Specification Chart GS10 *DURAPULSE* Drives

Drive Model	HP	Input Power			Input Fuse			Circuit Breaker	
		Ø	Volts	GS10 Input Amps	Fuse Amps	Fast Acting Class T	Edison Class J*	Size	Molded Case CB
GS11N-10P2	1/4	1	120	6	7.2	TJN10	JHL10	20	G3P-020
GS11N-10P5	1/2	1	120	9.4	10.8	TJN10	JHL10	25	G3P-025
GS11N-11P0	1	1	120	18	22	TJN25	JHL25	50	G3P-050
GS11N-20P2	1/4	1	230	5.1	7.2	TJN10	JHL10	15	G3P-015
GS11N-20P5	1/2	1	230	7.3	12.8	TJN15	JHL15	20	G3P-020
GS11N-21P0	1	1	230	10.8	20	TJN20	JHL20	30	G3P-030
GS11N-22P0	2	1	230	16.5	34	TJN35	JHL35	45	G3P-030
GS11N-23P0	3	1	230	24.2	50	TJN50	JHL50	70	G3P-070
GS13N-20P2	1/4	3	230	1.9	7.2	TJN10	JHL10	15	G3P-015
GS13N-20P5	1/2	3	230	3.4	12.8	TJN15	JHL15	15	G3P-015
GS13N-21P0	1	3	230	5.8	20	TJN20	JHL20	15	G3P-015
GS13N-22P0	2	3	230	9	32	TJN35	JHL35	25	G3P-025
GS13N-23P0	3	3	230	13.2	50	TJN50	JHL50	40	G3P-040
GS13N-25P0	5	3	230	20	78	TJN80	JHL80	60	G3P-060
GS13N-27P5	7 1/2	3	230	30	59.4	TJN60	JHL60	63	G3P-060
GS13N-40P5	1/2	3	460	2.1	7.2	TJS10	JHL10	15	G3P-015
GS13N-41P0	1	3	460	3.7	12	TJS15	JHL15	15	G3P-015
GS13N-42P0	2	3	460	5.8	18.4	TJS20	JHL20	15	G3P-015
GS13N-43P0	3	3	460	6.1	26	TJS25	JHL25	20	G3P-020
GS13N-45P0	5	3	460	9.9	42	TJS45	JHL45	30	G3P-030
GS13N-47P5	7 1/2	3	460	14.3	34.5	TJS35	JHL35	32	G3P-030
GS13N-4010	10	3	460	19.3	45.1	TJS45	JHL45	45	G3P-040

** High-speed Class J.*

Note: JHL fuses can be used with GS and DURAPULSE drives in non-UL applications. Fuse the drive according to NEC guidelines (NEC Article 430). For UL applications, GS, and DURAPULSE drives require Class T fuses (refer to the drive's user manual for details).

*Dura*Pulse Optional Accessories – General

EMC Shield Plate

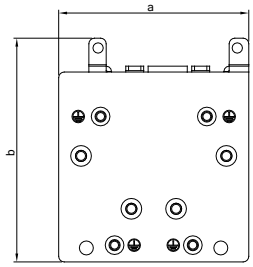
EMC Shield Plates are available for use with shielded cable and your GS10/GS20/GS30 drive. For GS20X drives, please use Earthing Plates. Each shield plate is compatible with all GS10, GS20, and GS30 drives of that frame size. For more information and installation instructions, see your GSxx series User Manual.

EMC Shield Plate Selection

Drive Series	Frame	EMC Shield Plate Model	Price
GS10/20/30	A	GS20A-ESP-A	$28.00
GS10/20/30	B	GS20A-ESP-B	$29.00
GS10/20/30	C	GS20A-ESP-C	$29.00
GS10/20/30	D	GS20A-ESP-D	$31.00
GS20/30	E	GS20A-ESP-E	$43.00
GS20/30	F	GS20A-ESP-F	$43.00
GS30	G	GS30A-ESP-G	$47.00
GS30	H	GS30A-ESP-H	$50.00
GS30	I	GS30A-ESP-I	$54.00

EMC Shield Plate Dimensions

Model	Dimensions mm [inch]	
	a	b
GS20A-ESP-A	69.3 [2.73]	80.0 [3.15]
GS20A-ESP-B	67.7 [2.67]	79.7 [3.14]
GS20A-ESP-C	78.0 [3.07]	91.0 [3.58]
GS20A-ESP-D	103.4 [4.07]	97.0 [3.82]
GS20A-ESP-E	124.3 [4.89]	77.4 [3.05]
GS20A-ESP-F	168.0 [6.61]	80.0 [3.15]
GS30A-ESP-G	243.5 [9.59]	154.9 [6.10]
GS30A-ESP-H	262.0 [10.31]	201.9 [7.95]
GS30A-ESP-I	304.0 [11.97]	260.7 [10.26]



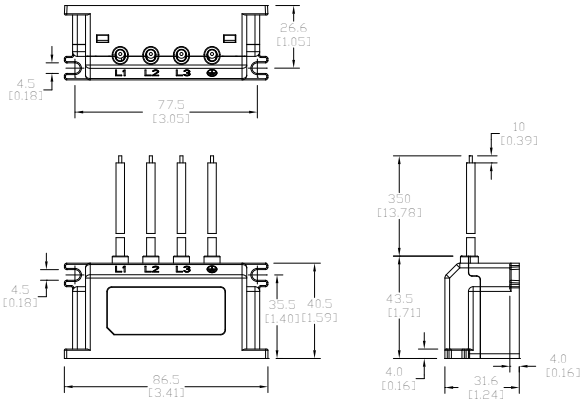
Capacitive Filter

The GS20A-CAPF capacitive filter supports basic filtering and noise interference reduction for all GS10, GS20(X), and G30 models, 460V and below. For more information and installation instructions, please see your GSxx series User Manual.

The GS20A-CAPF cannot be used with 575V models.

Capacitive Filter

Drive Series	Model	Price	Applicable Voltage	Temperature Range	Capacitance
GS10/ GS20(X)/ GS30	GS20A-CAPF	$24.00	110–480 VAC	-40–85°C	Cx: 1uF ± 20% Cy: 0.1uF ± 20%



GS10 Series Optional Accessories – Line Reactors/ VTF Filters

GS10 Line Reactors/Voltage Time Filters

Installing an AC Line Reactor on the input side of an AC motor drive can increase line impedance, improve the power factor, reduce input current, increase system capacity, and reduce interference generated from the motor drive.

Installing a load reactor or voltage time filter on the drive's output side can increase the high-frequency impedance to reduce the dV/dT and terminal voltage to protect the motor. Use output filters if the motor cable length exceeds 100ft.

GS10 Line/Load Reactor and AC Output Filter Selections

GS10 Model	CT Input Amps (rms)	Saturation Amps (rms)	Motor HP	Line Reactor (LR2)**	Load Reactor (LR2)**	AC Output Filter (VTF)**
GS11N-10P2	1.6	3.2	0.25	LR2-10P2-1PH	LR2-20P2	VTF-46-DE
GS11N-10P5	2.5	5	0.5	LR2-10P5-1PH	LR2-20P5	VTF-246-CFG
GS11N-11P0	4.8	9.6	1.0	LR2-11P5-1PH	LR2-21P0	VTF-24-FH
GS11N-20P2	1.6	3.2	0.25	LR2-20P5-1PH	LR2-20P2	VTF-46-DE
GS11N-20P5	2.8	5.6	0.5	LR2-20P5-1PH	LR2-20P5	VTF-246-CFG
GS11N-21P0	4.8	9.6	1.0	LR2-21P5	LR2-21P0	VTF-24-FH
GS11N-22P0	7.5	15	2.0	LR2-22P0-1PH	LR2-22P0	VTF-246-HKL
GS11N-23P0	11	22	3.0	LR-27P5	LR-25P0	VTF-24-JL
GS13N-20P2	1.6	3.2	0.25	LR2-20P2	LR2-20P2	VTF-46-DE
GS13N-20P5	2.8	5.6	0.5	LR2-20P5	LR2-20P5	VTF-246-DGH
GS13N-21P0	4.8	9.6	1.0	LR2-20P7	LR2-20P7	VTF-24-FH
GS13N-22P0	7.5	15	2.0	LR2-22P0	LR2-22P0	VTF-246-HKL
GS13N-23P0	11	22	3.0	LR-25P0	LR-23P0	VTF-24-JL
GS13N-25P0	17	34	5.0	LR-27P5	LR-25P0	VTF-46-LM
GS13N-27P5	25	50	7.5	LR-2010	LR-27P5	VTF-46-NP
GS13N-40P5	1.5	3	0.5	LR2-40P5	LR2-40P5	VTF-46-DE
GS13N-41P0	2.7	5.4	1.0	LR2-42P0	LR2-41P0	VTF-246-CFG
GS13N-42P0	4.2	8.4	2.0	LR2-45P0	LR2-42P0	VTF-24-FH
GS13N-43P0	5.5	11	3.0	LR2-45P0	LR2-43P0	VTF-24-FH
GS13N-45P0	9	18	5.0	LR2-47P5	LR2-45P0	VTF-246-HKL
GS13N-47P5	13	26	7.5	LR-4010	LR2-47P5	VTF-24-JL
GS13N-4010	17.5	34	10.0	LR-4015	LR-4010	VTF-24-JL

** Not available at AutomationDirect.com*
*** All specs for the LR2 and VTF can be found at www.automationdirect.com*

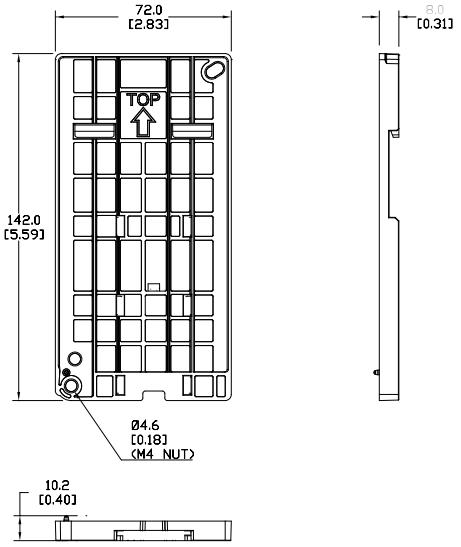
*Dura*Pulse Optional Accessories – Mounting Kits

DIN Rail Mounting

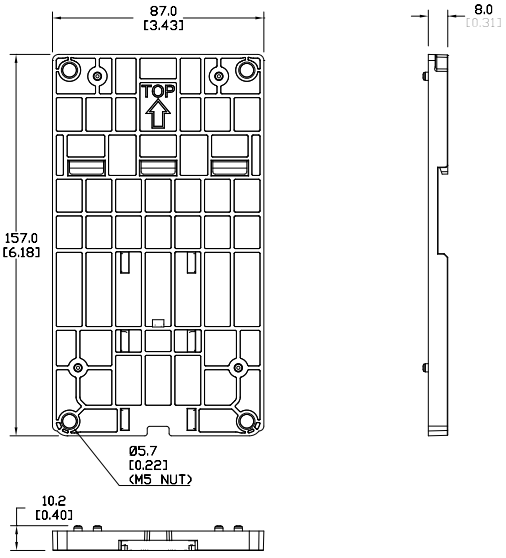
Frame A, B, and C GS10, GS20, and GS30 drives can be DIN rail mounted using a DIN rail mounting kit. One kit is used for A and B frame drives, while a second kit is used for C frame drives. Please see the GSxx series User Manual for additional information and installation instructions.

GSxx DIN Rail Mounting Compatibility

Drive Model			Frame	DIN Rail Kit	Price
GS10 Series	GS20 Series	GS30 Series			
GS11N-10P2	GS21-10P2	–	A1		
GS11N-20P2	GS21-20P2	–	A1		
GS13N-20P2	GS23-20P2	–	A1		
GS13N-20P5	GS23-20P5	GS31-20P5	A2		
–	–	GS33-20P5	A2		
–	–	GS33-40P5	A2		
GS11N-10P5	GS21-10P5	GS33-21P0	A3		
GS11N-20P5	GS21-20P5	GS33-41P0	A3		
GS13N-40P5	GS23-40P5	–	A4	GS20A-DR-AB	$6.00
GS13N-21P0	GS23-21P0	–	A5		
–	GS23-41P0	–	A5		
–	GS23-51P0	–	A5		
GS13N-41P0	–	–	A6		
GS13N-22P0	GS23-22P0	GS33-22P0	B1		
GS13N-42P0	GS23-42P0	GS33-42P0	B1		
–	GS23-52P0	–	B1		
GS11N-21P0	GS21-21P0	GS31-21P0	B2		
GS11N-22P0	GS21-11P0	GS31-22P0	C1		
GS11N-23P0	GS21-22P0	GS33-23P0	C1		
GS13N-23P0	GS21-23P0	GS33-25P0	C1		
GS13N-25P0	GS23-23P0	GS33-43P0	C1		
GS11N-11P0	GS23-25P0	GS33-45P0	C1	GS20A-DR-C	$6.00
GS13N-43P0	GS23-43P0	–	C1		
GS13N-45P0	GS23-45P0	–	C1		
–	GS23-53P0	–	C1		
–	GS23-55P0	–	C1		



GS20A-DR-AB



GS20A-DR-C

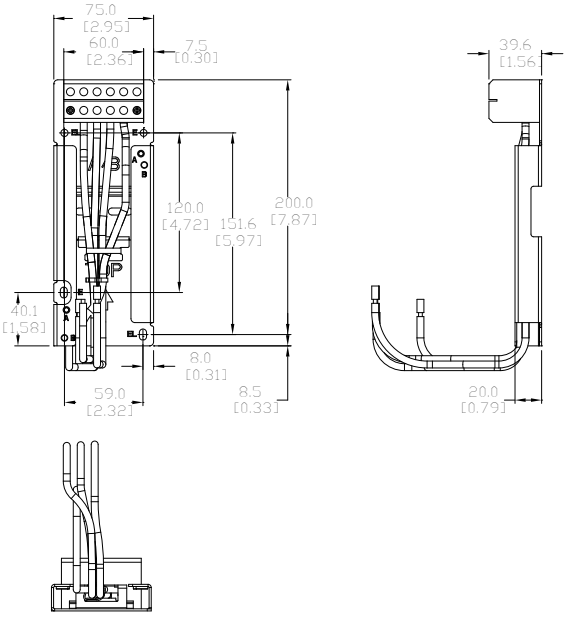
*Dura*Pulse Optional Accessories – Mounting Kits

Mounting Adapter Plate

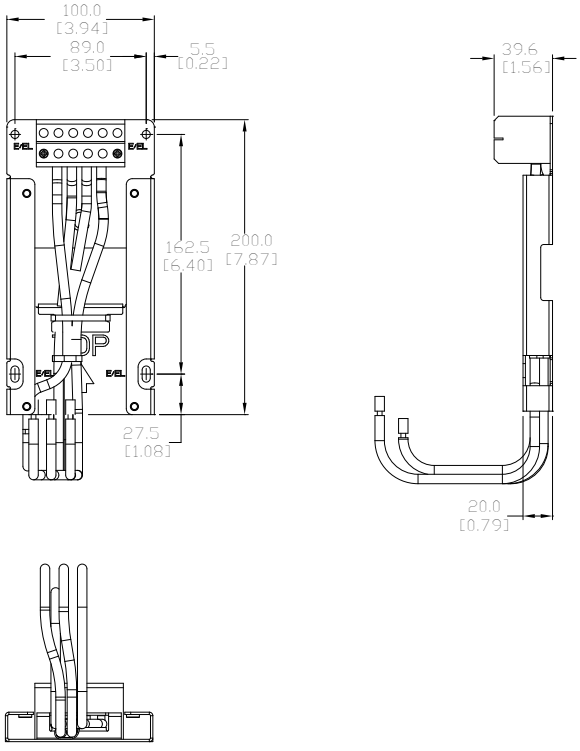
The mounting adapter plate can be used to change the wiring orientation for the GS10, GS20, and GS30 series and provides flexibility for installation. This accessory changes the wiring method from the "bottom-mains input/ bottom-motor output" to the "top-mains input/bottom-motor output" for GS10/GS20/GS30. Use the table below to select the correct mounting plate for your drive. Please see your GSxx series User Manual for additional information and installation instructions.

GSxx Mounting Adapter Compatibility

Drive Model			Frame	Mounting Plate	Price
GS10 Series	GS20 Series	GS30 Series			
GS11N-10P2	GS21-10P2	–	A1	GS20A-MP-AB	$51.00
GS11N-20P2	GS21-20P2	–	A1		
GS13N-20P2	GS23-20P2	–	A1		
GS13N-20P5	GS23-20P5	GS31-20P5	A2		
–	–	GS33-20P5	A2		
–	–	GS33-40P5	A2		
GS11N-10P5	GS21-10P5	GS33-21P0	A3		
GS11N-20P5	GS21-20P5	GS33-41P0	A3		
GS13N-40P5	GS23-40P5	–	A4		
GS13N-21P0	GS23-21P0	–	A5		
–	GS23-41P0	–	A5		
–	GS23-51P0	–	A5		
GS13N-41P0	–	–	A6		
GS13N-22P0	GS23-22P0	GS33-22P0	B1		
GS13N-42P0	GS23-42P0	GS33-42P0	B1		
–	GS23-52P0	–	B1		
GS11N-21P0	GS21-21P0	GS31-21P0	B2		
GS11N-22P0	GS21-11P0	GS31-22P0	C1	GS20A-MP-C	$60.00
GS11N-23P0	GS21-22P0	GS33-23P0	C1		
GS13N-23P0	GS21-23P0	GS33-25P0	C1		
GS13N-25P0	GS23-23P0	GS33-43P0	C1		
GS11N-11P0	GS23-25P0	GS33-45P0	C1		
GS13N-43P0	GS23-43P0	–	C1		
GS13N-45P0	GS23-45P0	–	C1		
–	GS23-53P0	–	C1		
–	GS23-55P0	–	C1		



GS20A-MP-AB



GS20A-MP-C

*Dura*Pulse Optional Accessories – Replacement Cooling Fans

Cooling Fans for GSxx Series Drives (Spare/Replacement)

NOTE: The fans described below are included with the applicable GS10, GS20(X), and GS30 AC Drive, and are also available for purchase separately as spare/replacement components.

GS10, GS20(X), GS30 – Fan Selection Table							
Drive Model			Fan Model *		Description	Size	Voltage
GS10 Series	GS20(X) Series	GS30 Series	Part #	Price			
GS13N-22P0 GS13N-42P0	GS23-22P0 GS23-42P0 GS23-52P0	GS31-21P0 GS33-22P0 GS33-42P0	GS20A-FAN-B	$24.00	GS20 series main cooling fan, replacement.	40x40x15 mm	12VDC
–	GS21X-23P0 GS23X-23P0 GS23X-25P0 GS23X-45P0	–	GS20XA-FAN-B	$56.00	GS20X series main cooling fan, replacement	60x60x25 mm	
GS11N-11P0 GS11N-23P0 GS13N-23P0 GS13N-25P0 GS13N-43P0 GS13N-45P0	GS21-11P0 GS21-22P0 GS21-23P0 GS23-23P0 GS23-25P0 GS23-43P0 GS23-45P0 GS23-53P0 GS23-55P0	GS31-22P0 GS31-23P0 GS33-23P0 GS33-25P0 GS33-43P0 GS33-45P0	GS20A-FAN-C	$26.00	GS20 series main cooling fan, replacement.	50x50x20 mm	
–	GS23X-27P5 GS23X-47P5 GS23X-4010	–	GS20XA-FAN-C	$57.00	GS20X series main cooling fan, replacement	60x60x25 mm	
GS13N-27P5 GS13N-47P5 GS13N-4010	GS23-27P5 GS23-47P5 GS23-4010 GS23-57P5 GS23-5010	GS33-27P5 GS33-47P5 GS33-4010	GS20A-FAN-D	$30.00	GS20 series main cooling fan, replacement.	60x60x25 mm	
–	GS23-2010 GS23-2015 GS23-4015 GS23-4020	GS33-2010 GS33-2015 GS33-4020	GS20A-FAN-E	$41.00	GS20 series main cooling fan, replacement.	92x92x28 mm	24VDC
–	GS23-2020 GS23-4025 GS23-4030	GS33-2020 GS33-4025 GS33-4030	GS20A-FAN-F	$45.00	GS20 series main cooling fan, replacement.	92x92x38 mm	
–	–	GS33-2025 GS33-2030 GS33-4040	GS30A-FAN-G	$52.00	GS30 series main cooling fan, replacement	204x87x50 mm	
–	–	GS33-4050 GS33-4060	GS30A-FAN-H	$98.00	GS30 series main cooling fan, replacement	206x95x50 mm	
–	–	GS33-2040 GS33-2050 GS33-4075 GS33-4100	GS30A-FAN-I	$151.00	GS30 series main cooling fan, replacement	260x121x50 mm	

** These fans are included with the GSx series drive, and also available separately as spare or replacement components. Electrical connectors are included.*

Example GS20A replacement Fan

*Dura*Pulse Optional Accessories – RF Filter

RF Filter

Zero phase reactors, (aka RF noise filters) help reduce radiated noise from the inverter wiring. The wiring must go through the opening to reduce the RF component of the electrical noise. Loop the wires three times (four turns) to attain the full RF filtering effect. For larger wire sizes, place multiple zero-phase reactors (up to four) side by side for a greater filtering effect. These are effective for noise reduction on both the input and output sides of the inverter. Attenuation quality is good in a wide range from 500kHz to 10MHz.

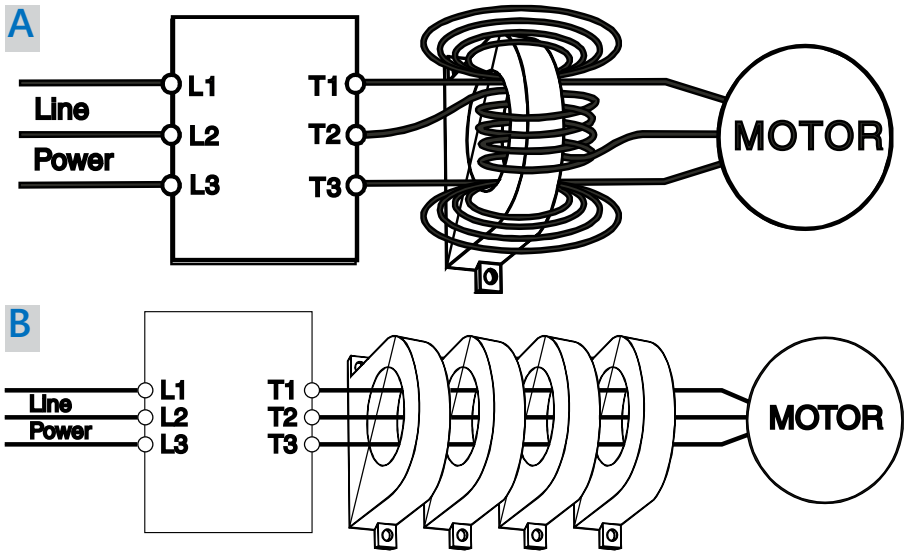
Wiring Method

Wind each wire four times around the core, as shown in diagram A to the right. The reactor must be put at inverter side as closely as possible.

If you are unable to wire as above due to wire size or another aspect of your application, put all wires through four cores in series without winding, as in diagram B to the right.

RF Filter Selection

Drive Series	*Filter Model*	*Drawing*	*Price*
GS10 / GS20(X) / GS30	RF008X00A	PDF	$40.00
GS30	RF004X00A	PDF	$47.00
GS30 (Frame H-I)	RF002X00A	PDF	$235.00



*Dura*Pulse Accessories – Software
GSoft2 Drive Configuration Software

GSoft2 Drive Configuration Software

Available for *FREE* Download

***DURA*PULSE Drives GSOFT2 Drive Configuration Software**			
Part Number	***Price****	***Description***	***For GS Drive***
GSOFT2	$10.50	GSOFT2 Windows configuration software, USB or free download. For use with DURApulse GS4, GS10, GS20, GS20X and GS30 series AC drives. Requires PC serial port or USB-485M serial adapter.	GS4 – all GS10 – all GS20(X) – all GS30 – all
USB-485M	$69.00	PC adapter, USB A to RS-485 (RJ45/RJ12).	GS4/GS10
USB-CBL-AB3	$12.00	Programming cable, USB A to USB B, 3ft cable length.	GS4 – all (for Drive FW only) GS20(X) – all GS30 – all
**** GSOFT2 can be downloaded for free or purchased on USB from AutomationDirect.com (search for GSOFT2).***			

GSOFT2 Drive Configuration Software

GSoft2 is the configuration software for the Automation *Dura*Pulse family of drives. It is designed to allow you to connect a personal computer to the drive, and perform a variety of functions.

GSoft2 includes an integral help file with software instructions. GSoft2 can be downloaded for free or purchased on USB from AutomationDirect.com (search for GSoft2).

Functions

- Create new drive configurations
- Upload/download drive configurations
- Edit drive configurations
- Archive/store multiple drive configurations on your PC
- Trend drive operation parameters (not available with GS10)
- Tune the drive PID loop
- View real time key operating parameters
- Real-time trending
- Start/Stop drive and switch directions, provided drive is set up for remote operation
- View drive faults

Computer System Requirements

GSoft2 will run on Windows PCs that meet the following requirements:

- Windows OS: ***8***: 32 & 64 bit, ***8.1***: 32 & 64 bit, ***10***: 64 bit, 11
- Edge or Chrome (for HTML help support)
- 32 Mb of available memory
- 10 Mb hard drive space
- Available USB port
- USB to RS485 adapter needed for GS4 and GS10 models

*Dura*Pulse Optional Accessories – Advanced LCD Keypad

Advanced Keypad

NOTE: The keypad described below is included with the GS4 AC Drive, and is also available for purchase separately as a spare/replacement component for GS4, or an optional upgrade for GS10/GS20(X)/GS30.

Keypad Panel-Mounting Kit

NOTE: The keypad panel-mounting kit described below is an optional accessory that is NOT included with the GS10/GS20(X)/GS30 AC drive.

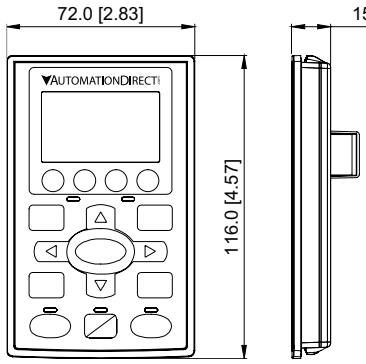
GSx Series *DURA*PULSE Drives Keypad and Keypad Panel-Mounting Kit			
Part Number	***Price***	***Description***	***For GS Drive***
GS4-KPD*	$107.00	Spare or replacement keypad for GS4 AC drives; optional advanced keypad for GS20(X) drives; includes RJ45 connector; great for maintenance or back-up programs.	GS4 – all GS10 – all GS20(X) – all GS30 – all
GS4-BZL **	$29.50	Keypad Panel-Mounting Kit for remote surface mounting or embedded mounting of the AC drive removable keypad; hardware included. Use a standard Cat5e RJ45 patch cable (not included) to connect a remote-mounted keypad to the drive. Max cable length for remote-mounted keypad = 5m.	GS4 – all GS10 – all GS20(X) – all GS30 – all

** A keypad is included with each GS4 AC Drive; additional keypads are available for spare/replacement components.*
*** The keypad mounting kit is an optional accessory that is NOT included with the GS4 AC drive; for mounting the keypad remotely from the drive.*
Note: Keypad firmware can only be upgraded when connected to a GS4 drive.

GS4-KPD

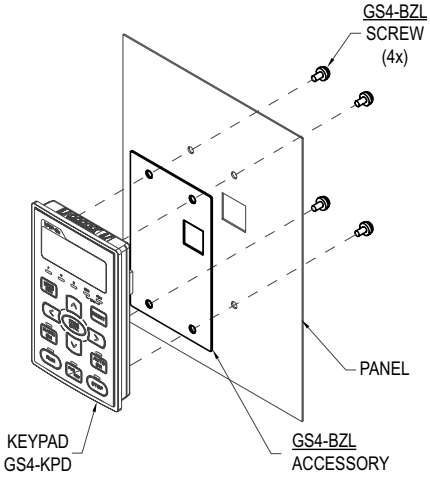
RJ45 Connector

Dimensions (mm [in])



GS4-BZL

Wall Mounting



Embedded Mounting