

ACCESSORIES



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Appendix A: Accessories

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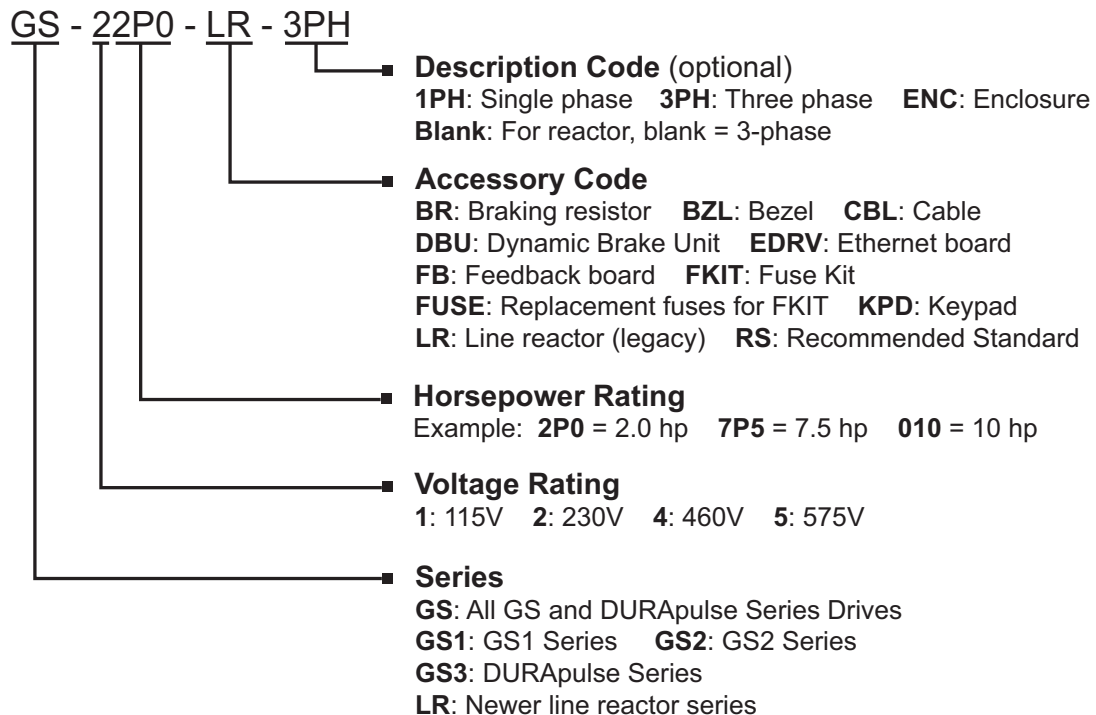
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Accessories Part Numbering

With the exception of EMI filters, RF filters, and LR series line reactors, each accessory part number begins with GS, followed by the AC Drive rating, and then the relevant accessory code. Following the accessory code, you will find a description code when applicable. The diagram below shows the accessory part numbering system.

GS Series-specific Part Number Explanation



Line Reactors

Input line reactors protect the AC drive from transient overvoltage conditions typically caused by utility capacitor switching. Input line reactors also reduce the harmonics associated with AC drives, and are recommended for all installations.

Output line (load) reactors protect the motor insulation against AC drive short circuits and IGBT reflective wave damage, and also allow the motor to run cooler by “smoothing” the motor current waveform. They are recommended for operating “non-inverter-duty” motors, and for any motors when the length of wiring between the AC drive and motor exceeds 75 feet.

There are two types of AutomationDirect line reactors that can be used with *DURAPULSE* GS3 AC Drives; the original GS series reactors (legacy) and the newer LR series reactors.

LR series reactors have universal mounting feet with multiple mounting slots, and they can replace most reactors using the existing mounting holes. Use four bolts to mount the reactors to the mounting panel.

Line Reactors – LR Series

Line Reactors – LR Series										
Part Number	Rated Amps	Impedance	Inductance	Watt Loss	System Voltage	Phase – Use*	GS3 Drive Model	Drive hp		
LR-21P0-1PH **	8	3%	2.29 mH	15.9	240	1 – In	GS3-21P0	1		
LR-22P0-1PH **	12		1.53 mH	24.3			GS3-22P0	2		
LR-23P0-1PH **	17		1.08 mH	27.3			GS3-23P0	3		
LR-21P0	4.6		2.46 mH	11	208/240		GS3-21P0	1		
LR-22P0	7.5		1.35 mH	21			GS3-22P0	2		
LR-23P0	10.6		0.97 mH	38			GS3-23P0	3		
LR-25P0	16.7		0.626 mH	48			GS3-25P0	5		
LR-27P5	24.2		0.434 mH	65			GS3-7P5	7.5		
LR-2010	30.8		0.342 mH	96			GS3-2010	10		
LR-2015	46.2		0.22 mH	64			GS3-2015	15		
LR-2020	59.4		0.172 mH	85			GS3-2020	20		
LR-2025	74.8		0.138 mH	94			GS3-2025	25		
LR-2030	88		0.116 mH	135			GS3-2030	30		
LR-2040	114		0.0886 mH	149			GS3-2040	40		
LR-2050	143		0.0699 mH	154			GS3-2050	50		
LR-41P0	2.1		8.927 mH	10.4			480	3 – I/O	GS3-41P0	1
LR-42P0	3.4		5.79 mH	19					GS3-42P0	2
LR-43P0	4.8		4.27 mH	23	GS3-43P0	3				
LR-45P0	7.6		2.77 mH	49	GS3-45P0	5				
LR-47P5	11		1.68 mH	40	GS3-47P5	7.5				
LR-4010	14		1.29 mH	64	GS3-4010	10				
LR-4015	21	0.912 mH	65	GS3-4015	15					
LR-4020	27	0.694 mH	79	GS3-4020	20					
LR-4025	34	0.569 mH	96	GS3-4025	25					
LR-4030	40	0.469 mH	105	GS3-4030	30					
LR-4040	52	0.387 mH	114	GS3-4040	40					
LR-4050	65	0.295 mH	114	GS3-4050	50					
LR-4060	77	0.227 mH	169	GS3-4060	60					
LR-4075	96	0.196 mH	193	GS3-4075	75					
LR-4100	124	0.152 mH	225	GS3-4100	100					

* Use: In = input side of drive only; I/O = input or output side of drive.
** Single phase line reactors should NOT be installed on the output side of the AC drive.

Line Reactors – LR Series (continued)

Line Reactors – LR Series – Additional Specifications						
Part Number	Wire Range	Terminal Torque	Fasteners	Temperature Range		Environment
				Operating	Storage	
LR-21P0-1PH	#12–#18 AWG	10 lb-in	#6-32x5/16in flathead screw	-40 – 104 °F [-40 – 40 °C]	-40 – 149 °F [-40 – 65 °C]	NEMA: open IP00 no corrosive gases
LR-22P0-1PH		20 lb-in				
LR-23P0-1PH			10 lb-in			
LR-21P0						
LR-22P0						
LR-23P0		#18–#4 AWG	20 lb-in			
LR-25P0						
LR-27P5						
LR-2010						
LR-2015						
LR-2020						
LR-2025	2/0 – #6AWG (AL or CU)	#18–#16 AWG: 25 lb-in #14–#6 AWG: 30 lb-in #4 AWG: 35 lb-in	captive Phillips screw			
LR-2030		120 lb-in	7/16in-20x5/8in setscrew			
LR-2040						
LR-2050		250kcmil – #6AWG (AL or CU)	275 lb-in			
LR-41P0		#12–#18 AWG	10 lb-in	#6-32x5/16in flathead screw		
LR-42P0						
LR-43P0						
LR-45P0						
LR-47P5						
LR-4010						
LR-4015	#18–#4 AWG	20 lb-in	1/4in-28x3/8in setscrew			
LR-4020						
LR-4025						
LR-4030						
LR-4040						
LR-4050				#22–#4 AWG	#22–#16 AWG: 25 lb-in #14–#6 AWG: 30 lb-in #4 AWG: 35 lb-in	captive Phillips screw
LR-4060						
LR-4075	2/0 – #6AWG (AL or CU)	120 lb-in	7/16in-20x5/8in setscrew			
LR-4100	250kcmil – #6AWG (AL or CU)	275 lb-in	5/8in-18x7/8in setscrew			

Line Reactors – Legacy GS Series (do not use for new installations)

Line Reactors – GS Series					
230 VOLT Class – Three Phase					
Part Number	Rated HP	Rated Amps	Impedance	Inductance	Watts Loss
GS-21P0-LR-3PH	1	5	3%	3.00 mH	7
GS-22P0-LR-3PH	2	7	3%	1.50 mH	11
GS-23P0-LR-3PH	3	11	3%	1.30 mH	23
GS-25P0-LR	5	17	3%	0.80 mH	19
GS-27P5-LR	7.5	25	3%	0.50 mH	23
GS-2010-LR	10	33	3%	0.40 mH	36
GS-2015-LR	15	49	3%	0.30 mH	33
GS-2020-LR	20	65	3%	0.25 mH	39
GS-2025-LR	25	75	3%	0.20 mH	88
GS-2030-LR	30	90	3%	0.20 mH	88
GS-2040-LR	40	120	3%	0.10 mH	95
GS-2050-LR	50	145	3%	0.10 mH	95

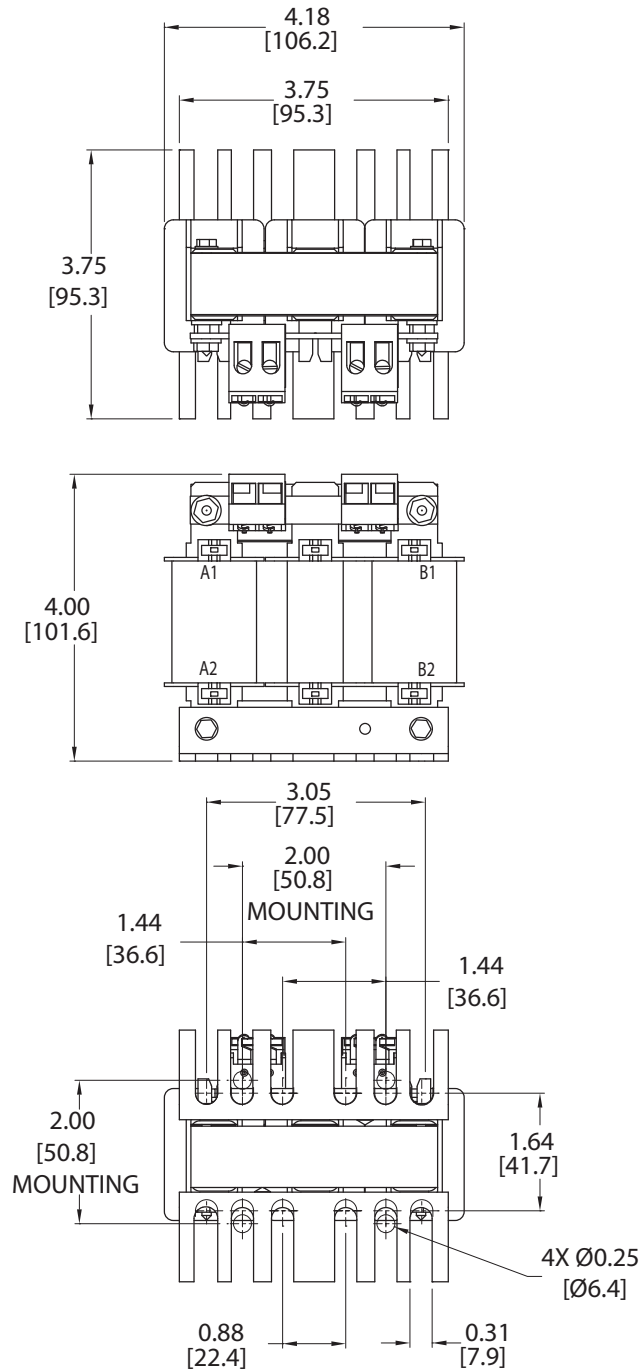
Line Reactors – GS Series					
460 VOLT Class – Three Phase					
Part Number	Rated HP	Rated Amps	Impedance	Inductance	Watts Loss
GS-41P0-LR	1	2	3%	12.0 mH	7
GS-42P0-LR	2	4	3%	6.50 mH	13
GS-43P0-LR	3	8	3%	5.00 mH	31
GS-45P0-LR	5	8	3%	3.00 mH	25
GS-47P5-LR	7.5	12	3%	2.50 mH	26
GS-4010-LR	10	18	3%	1.50 mH	29
GS-4015-LR	15	24	3%	1.20 mH	44
GS-4020-LR	22	32	3%	0.80 mH	51
GS-4025-LR	25	38	3%	0.80 mH	51
GS-4030-LR	30	45	3%	0.70 mH	64
GS-4040-LR	40	60	3%	0.50 mH	75
GS-4050-LR	50	73	3%	0.40 mH	138
GS-4060-LR	60	91	3%	0.40 mH	138
GS-4075-LR	75	105	3%	0.30 mH	123
GS-4100-LR	100	145	3%	0.20 mH	115

Line Reactor Dimensions – LR Series

LR-21P0-1PH

Mounting feet with multiple mounting slots allow replacement of most other reactors using existing mounting holes. Use four bolts to mount the LR reactors.

(Units = inches [mm])

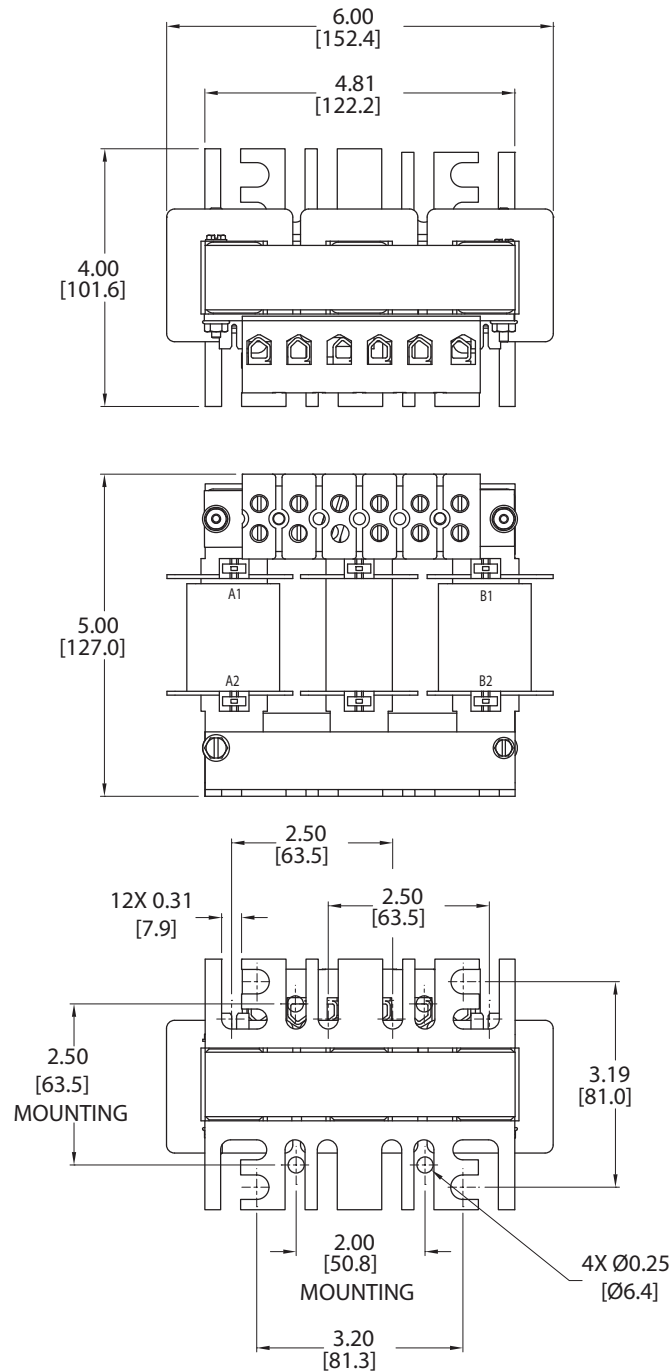


Line Reactor Dimensions – LR Series (continued)

LR-22P0-1PH, LR-23P0-1PH

Mounting feet with multiple mounting slots allow replacement of most other reactors using existing mounting holes. Use four bolts to mount the LR reactors.

(Units = inches [mm])

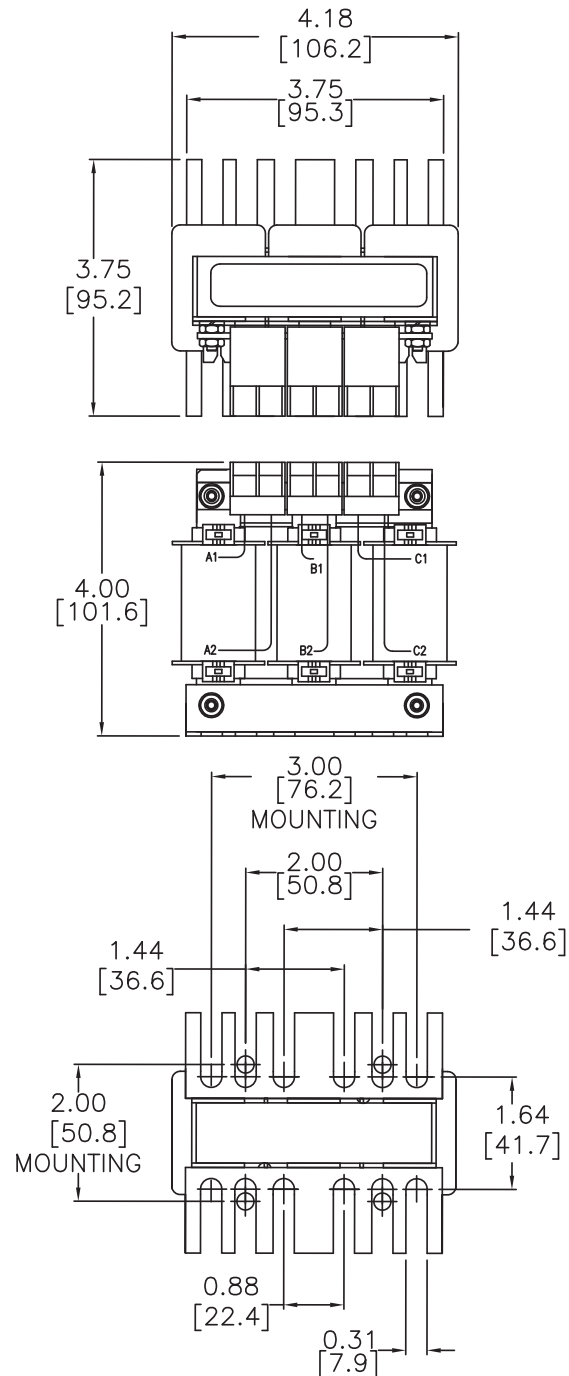


Line Reactor Dimensions – LR Series (continued)

LR-21P0, LR-22P0, LR-23P0, LR-41P0, LR-42P0, LR-43P0, LR-45P0, LR-47P5, LR-4010

Mounting feet with multiple mounting slots allow replacement of most other reactors using existing mounting holes. Use four bolts to mount the LR reactors.

(Units = inches [mm])

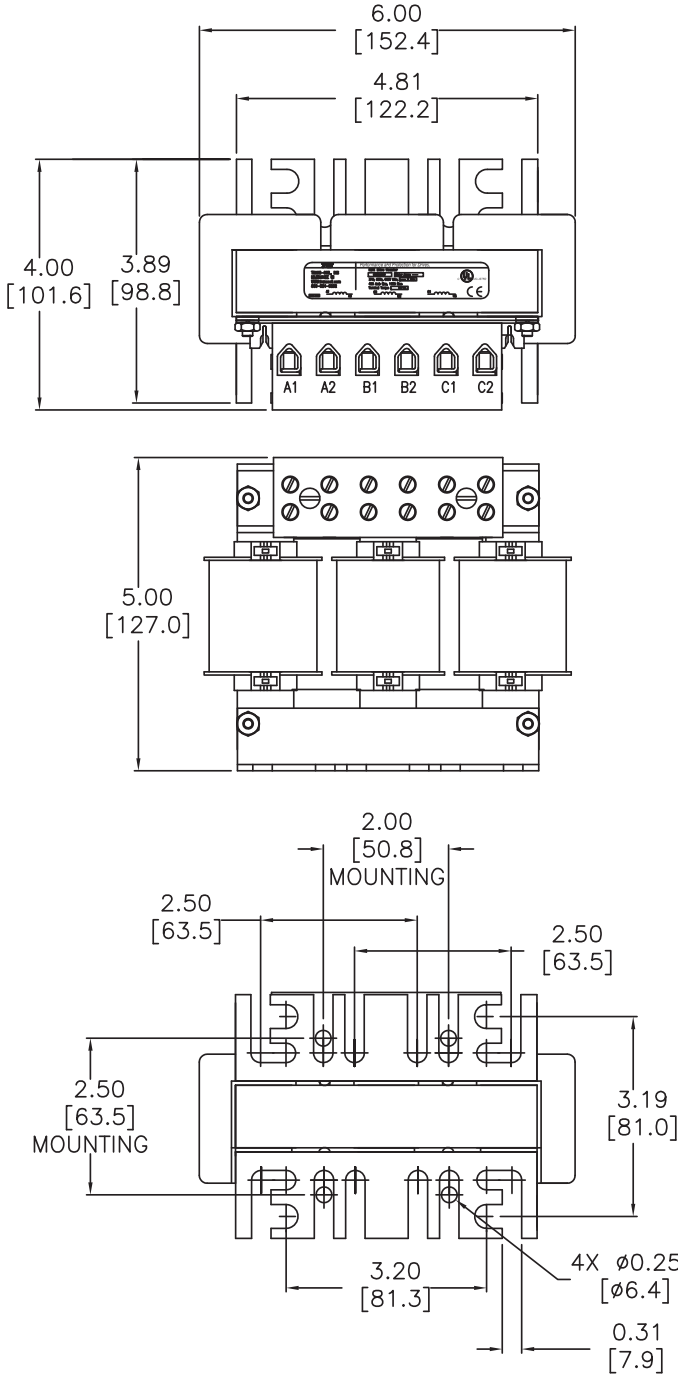


Line Reactor Dimensions – LR Series (continued)

LR-25P0, LR-27P5, LR-4015, LR-4020

Mounting feet with multiple mounting slots allow replacement of most other reactors using existing mounting holes. Use four bolts to mount the LR reactors.

(Units = inches [mm])

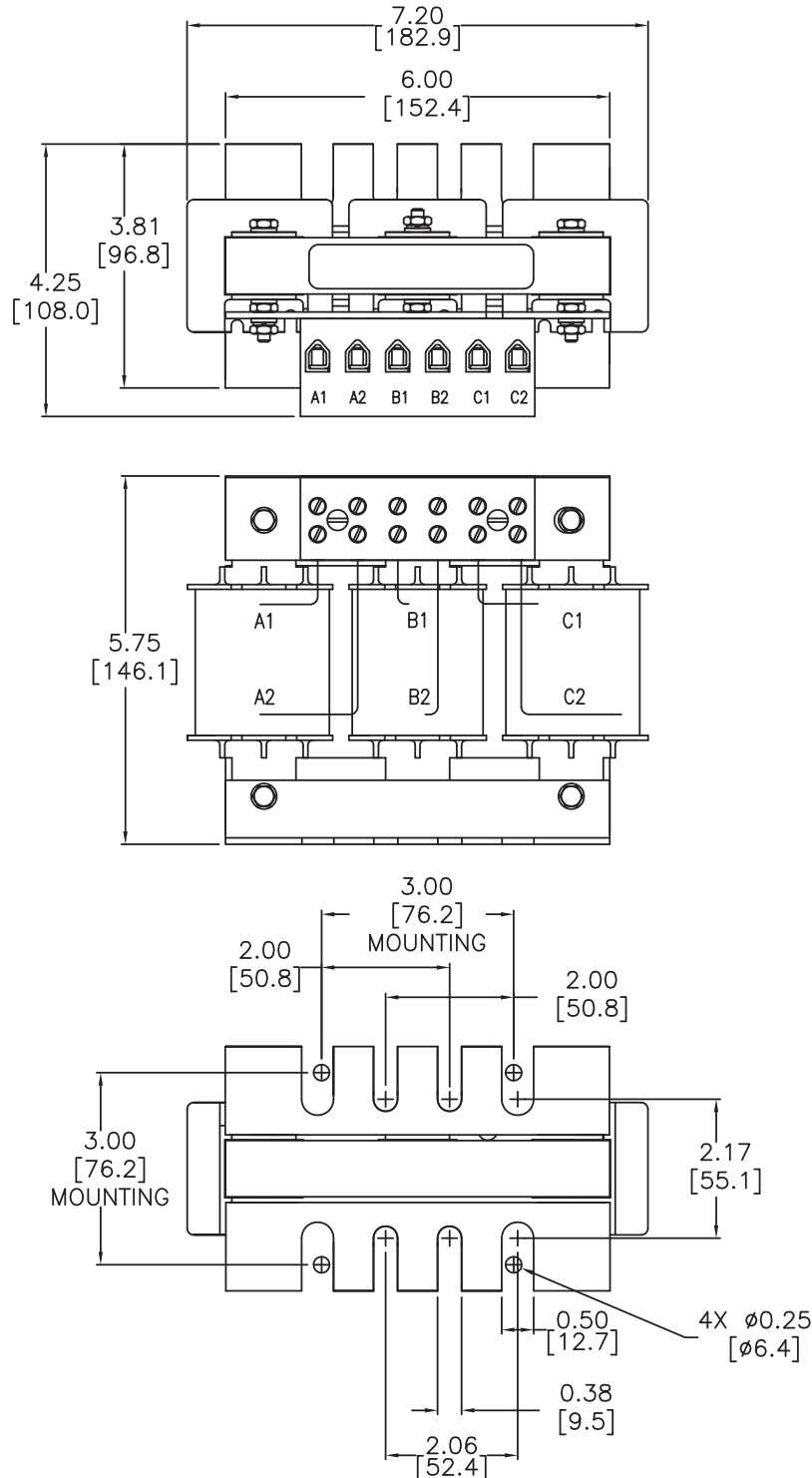


Line Reactor Dimensions – LR Series (continued)

LR-2010, LR-2015, LR-2020, LR-4025, LR-4030

Mounting feet with multiple mounting slots allow replacement of most other reactors using existing mounting holes. Use four bolts to mount the LR reactors.

(Units = inches [mm])

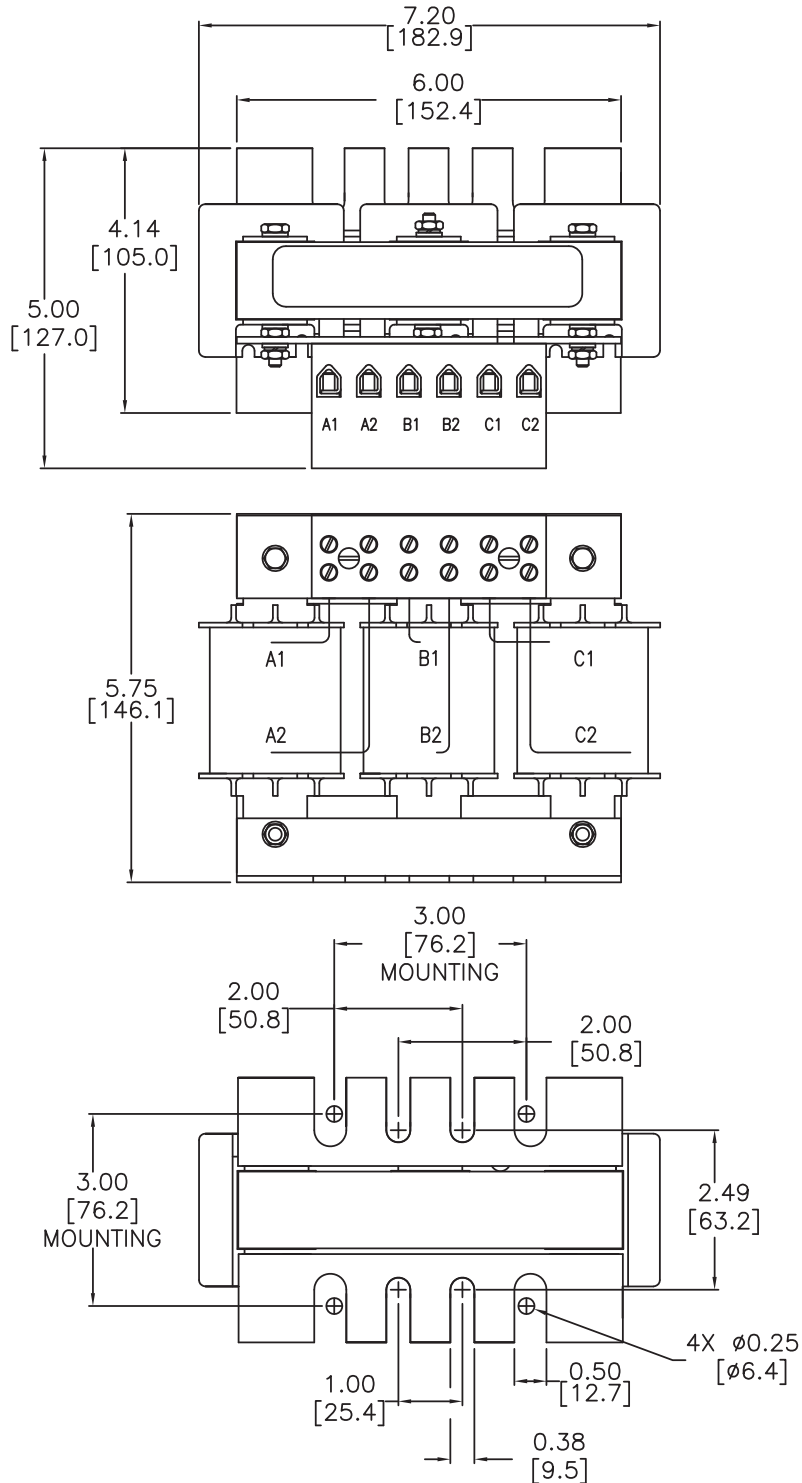


Line Reactor Dimensions – LR Series (continued)

LR-2025, LR-4040

Mounting feet with multiple mounting slots allow replacement of most other reactors using existing mounting holes. Use four bolts to mount the LR reactors.

(Units = inches [mm])

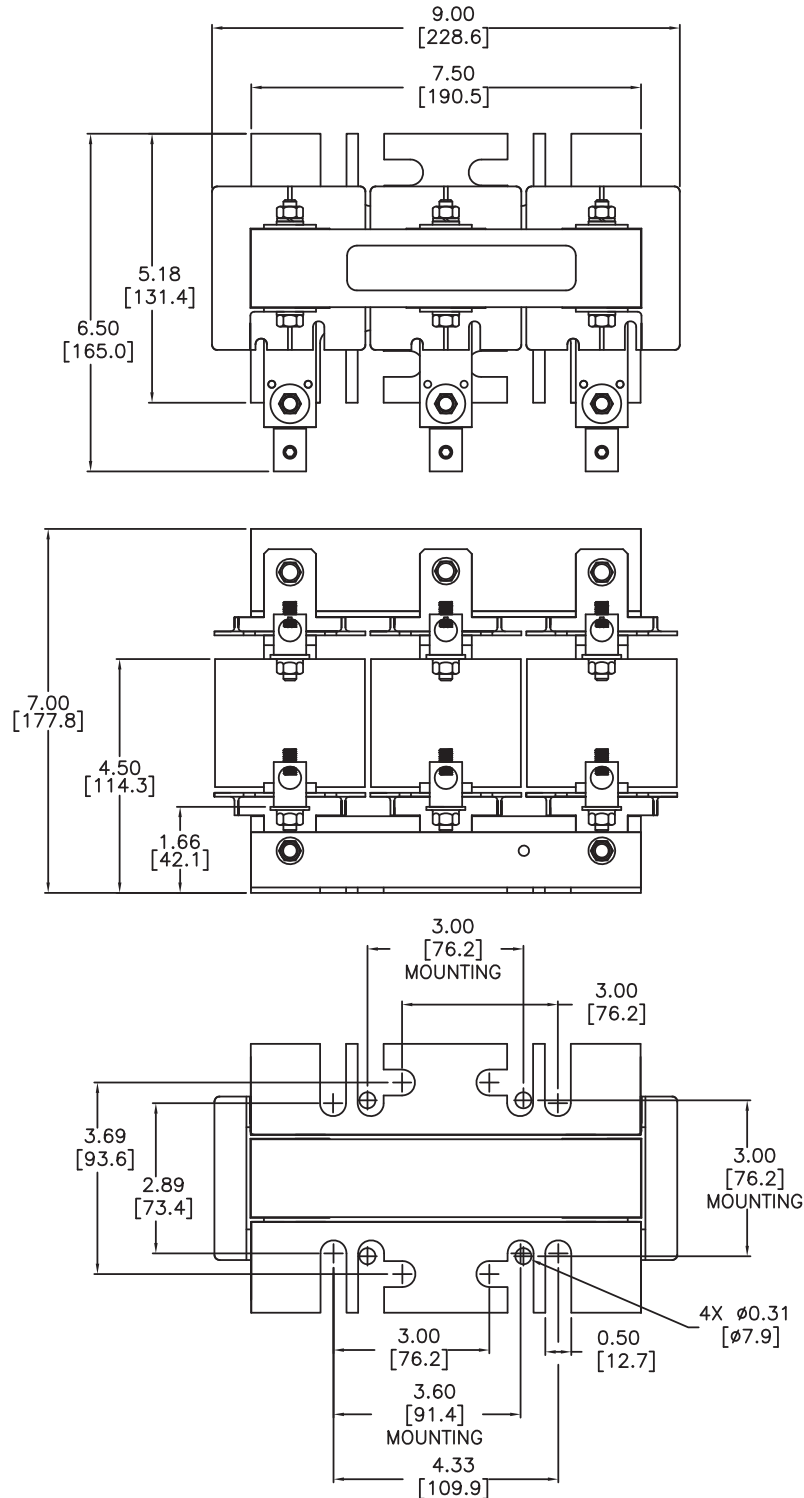


Line Reactor Dimensions – LR Series (continued)

LR-2030, LR-2040, LR-4075

Mounting feet with multiple mounting slots allow replacement of most other reactors using existing mounting holes. Use four bolts to mount the LR reactors.

(Units = inches [mm])

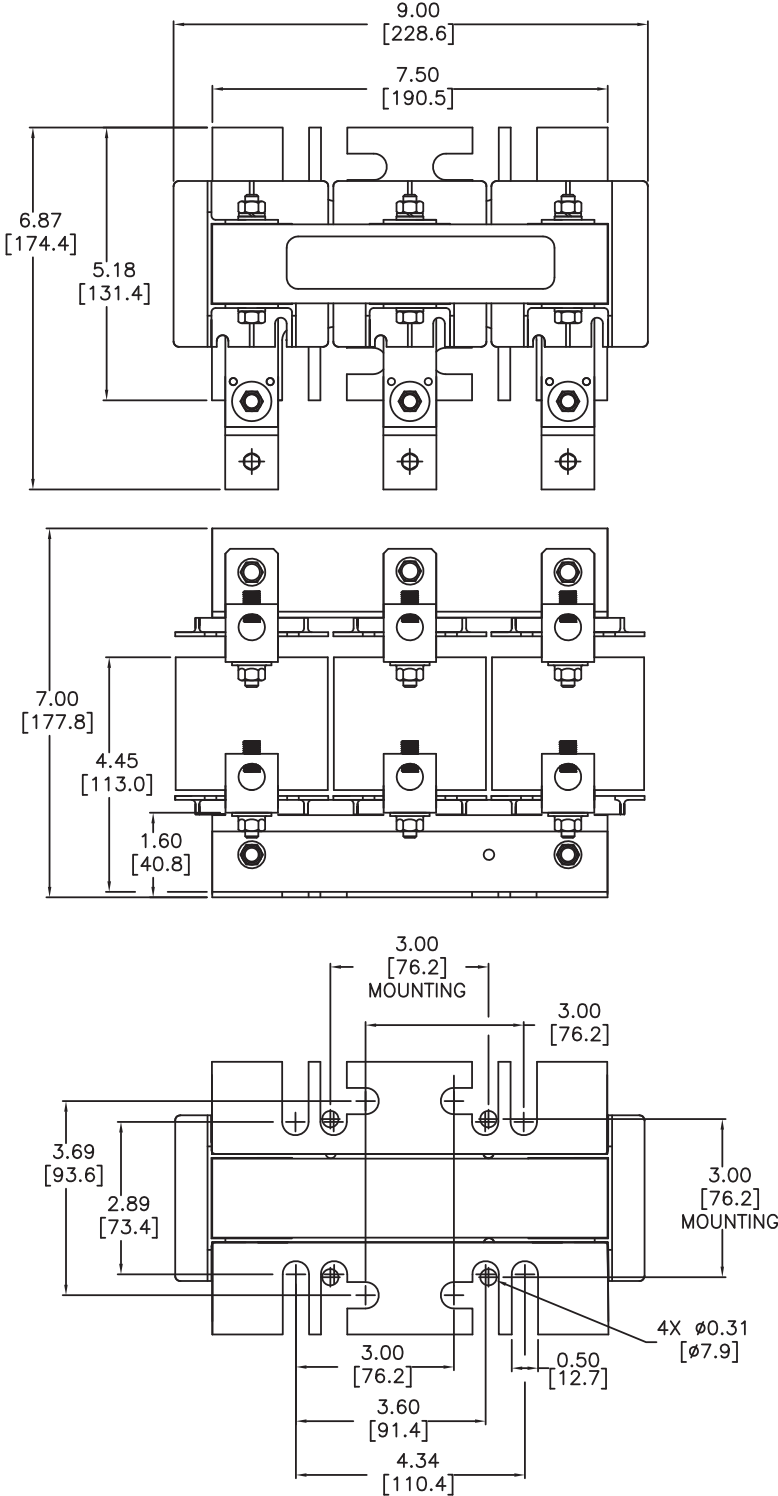


Line Reactor Dimensions – LR Series (continued)

LR-2050

Mounting feet with multiple mounting slots allow replacement of most other reactors using existing mounting holes. Use four bolts to mount the LR reactors.

(Units = inches [mm])

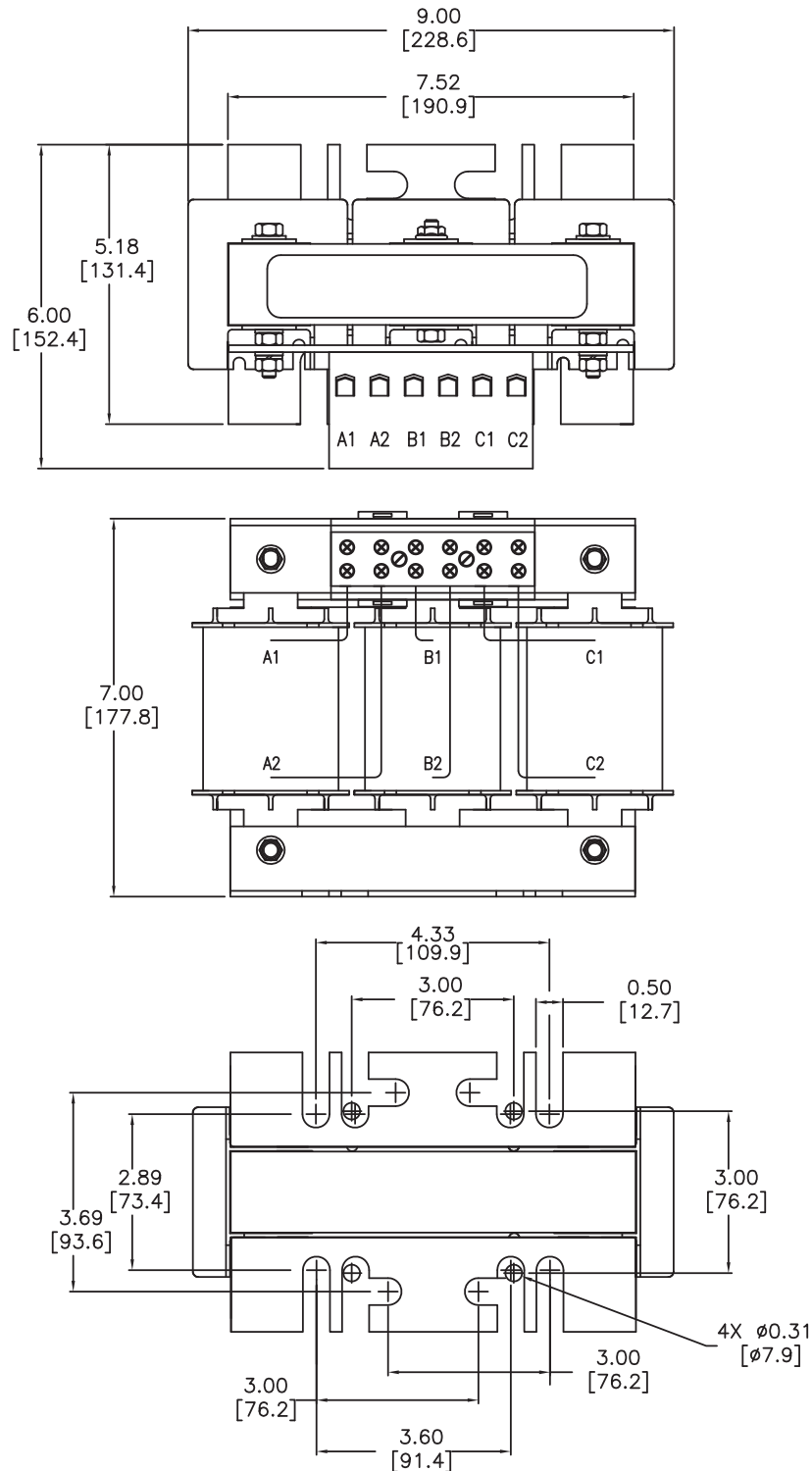


Line Reactor Dimensions – LR Series (continued)

LR-4050, LR-4060

Mounting feet with multiple mounting slots allow replacement of most other reactors using existing mounting holes. Use four bolts to mount the LR reactors.

(Units = inches [mm])

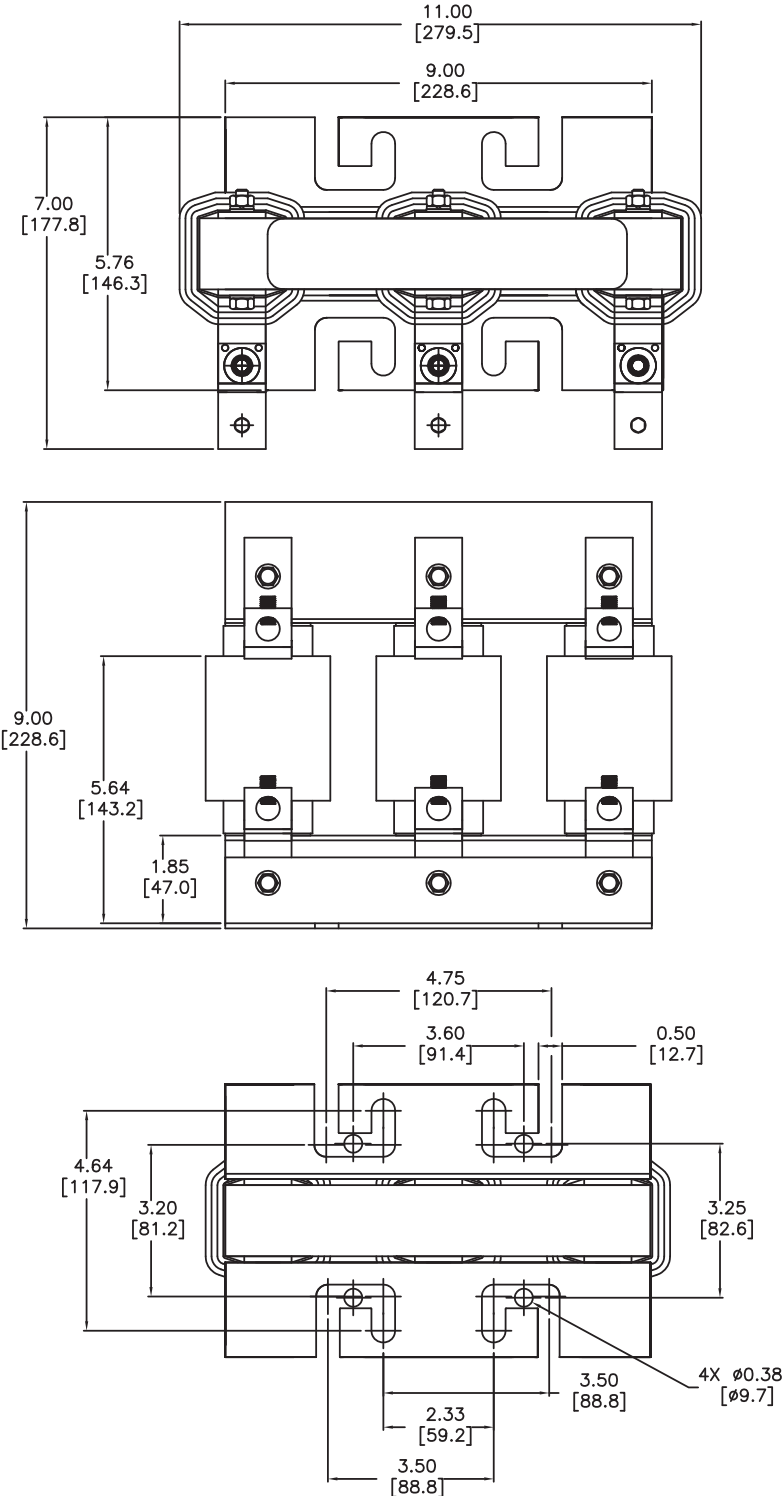


Line Reactor Dimensions – LR Series (continued)

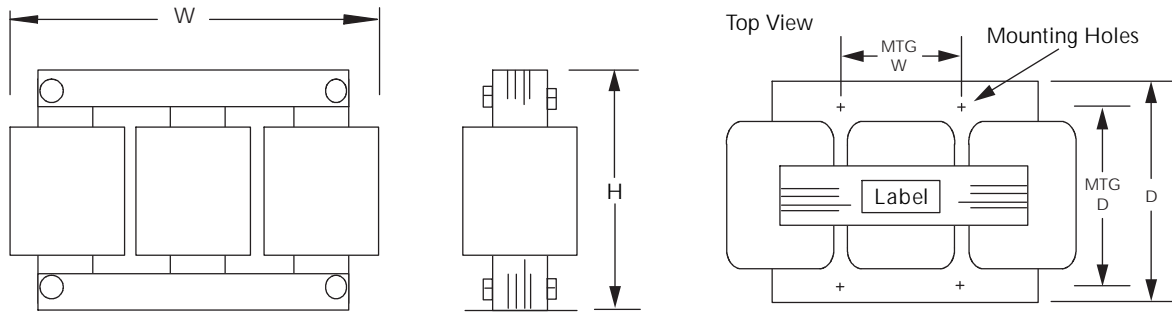
LR-4100

Mounting feet with multiple mounting slots allow replacement of most other reactors using existing mounting holes. Use four bolts to mount the LR reactors.

(Units = inches [mm])



Line Reactor Dimensions – Legacy GS Series (not for new installations)



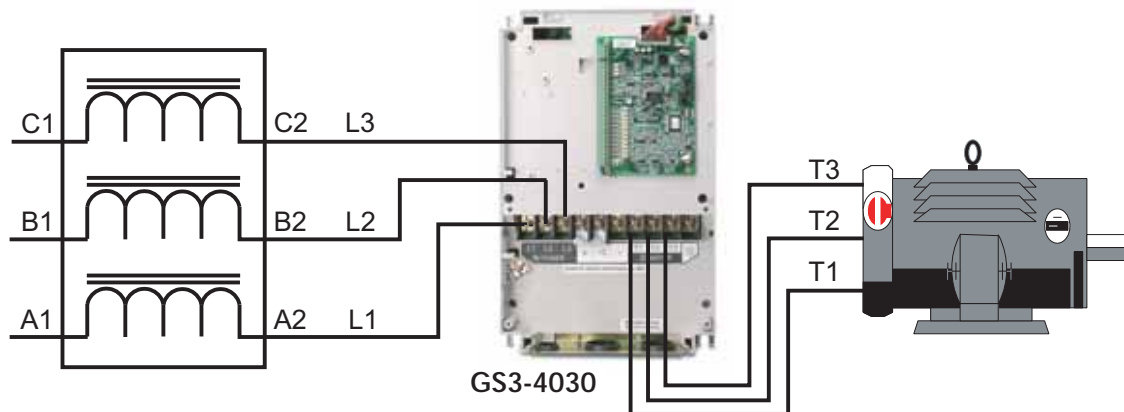
AC Line Reactor Dimensions

AC Line Reactor Dimensions – GS Series (inches)							
Part Number	H	W	D	Mtg D	Mtg W	Mtg Slot Hole Size	Weight (lb)
GS-21P0-LR-1PH	3.40	4.40	2.83	1.77	1.44	0.28 x 0.63	2.80
GS-21P0-LR-3PH	3.40	4.40	2.83	1.77	1.44	0.28 x 0.63	2.30
GS-22P0-LR-1PH	4.80	6.00	3.30	2.09	2.00	0.28 x 0.63	7.10
GS-22P0-LR-3PH	3.40	4.40	2.83	1.77	2.00	0.28 x 0.63	2.80
GS-23P0-LR-1PH	4.80	6.00	3.30	2.09	2.00	0.28 x 0.63	7.50
GS-23P0-LR-3PH	3.40	4.40	2.83	1.77	2.00	0.28 x 0.63	2.90
GS-25P0-LR	4.80	6.00	3.30	2.09	2.00	0.28 x 0.63	7.10
GS-27P5-LR	5.70	6.00	3.09	2.09	3.00	0.28 x 0.63	7.00
GS-2010-LR	5.70	6.00	3.34	2.34	3.00	0.28 x 0.63	9.00
GS-2015-LR	5.70	6.00	3.84	2.84	3.00	0.28 x 0.63	13.0
GS-2020-LR	5.70	6.00	3.84	2.84	3.00	0.28 x 0.63	12.0
GS-2025-LR	6.88	8.50	4.37	3.12	3.60	0.44 x 1.00	26.0
GS-2030-LR	6.88	8.50	4.37	3.12	3.60	0.44 x 1.00	26.0
GS-2040-LR	6.88	8.50	4.37	3.12	3.00	0.44 x 1.00	27.0
GS-2050-LR	6.88	8.50	4.37	3.12	3.00	0.44 x 1.00	27.0
GS-41P0-LR	3.40	4.40	2.83	1.77	1.44	0.28 x 0.63	2.30
GS-42P0-LR	3.40	4.40	2.83	1.77	1.44	0.28 x 0.63	2.80
GS-43P0-LR	3.40	4.40	3.39	2.39	2.00	0.28 x 0.63	4.30
GS-45P0-LR	3.40	4.40	2.83	1.77	2.00	0.28 x 0.63	3.10
GS-47P5-LR	4.80	6.00	3.30	2.09	2.00	0.28 x 0.63	7.50
GS-4010-LR	4.80	6.30	3.55	2.34	2.00	0.28 x 0.63	9.10
GS-4015-LR	5.70	6.00	3.34	2.34	3.00	0.28 x 0.63	10.0
GS-4020-LR	5.61	6.90	3.95	2.75	3.00	0.38 x 0.63	17.0
GS-4025-LR	5.61	6.90	3.95	2.75	3.00	0.38 x 0.63	17.0
GS-4030-LR	5.61	6.90	4.45	3.25	3.00	0.38 x 0.63	22.0
GS-4040-LR	6.88	8.50	4.37	3.12	3.00	0.44 x 1.00	26.0
GS-4050-LR	6.88	8.50	4.87	3.62	3.60	0.44 x 1.00	36.0
GS-4060-LR	6.88	8.50	4.87	3.62	3.60	0.44 x 1.00	36.0
GS-4075-LR	8.29	10.50	5.35	3.73	3.60	0.44 x 1.00	52.0
GS-4100-LR	8.29	10.50	5.35	3.73	3.60	0.44 x 1.00	41.0

Line Reactor Applications and Wiring Connections

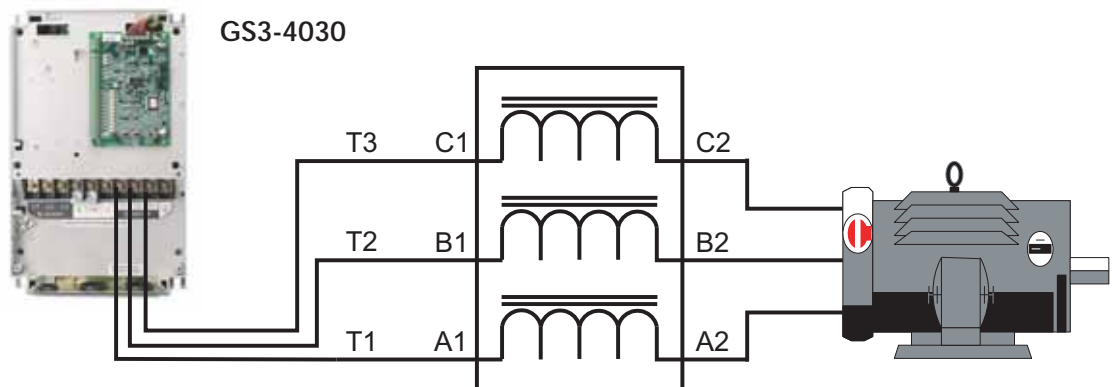
Input Side of AC Drive

When installed on the input side of the AC Drive, line reactors will reduce line notching, limit current and voltage spikes and surges from the incoming line, and reduce the available short circuit current. The line reactors will also reduce harmonic distortion from the AC Drive onto the line. Units are installed in front of the AC Drive as shown.



Output Side of AC Drive

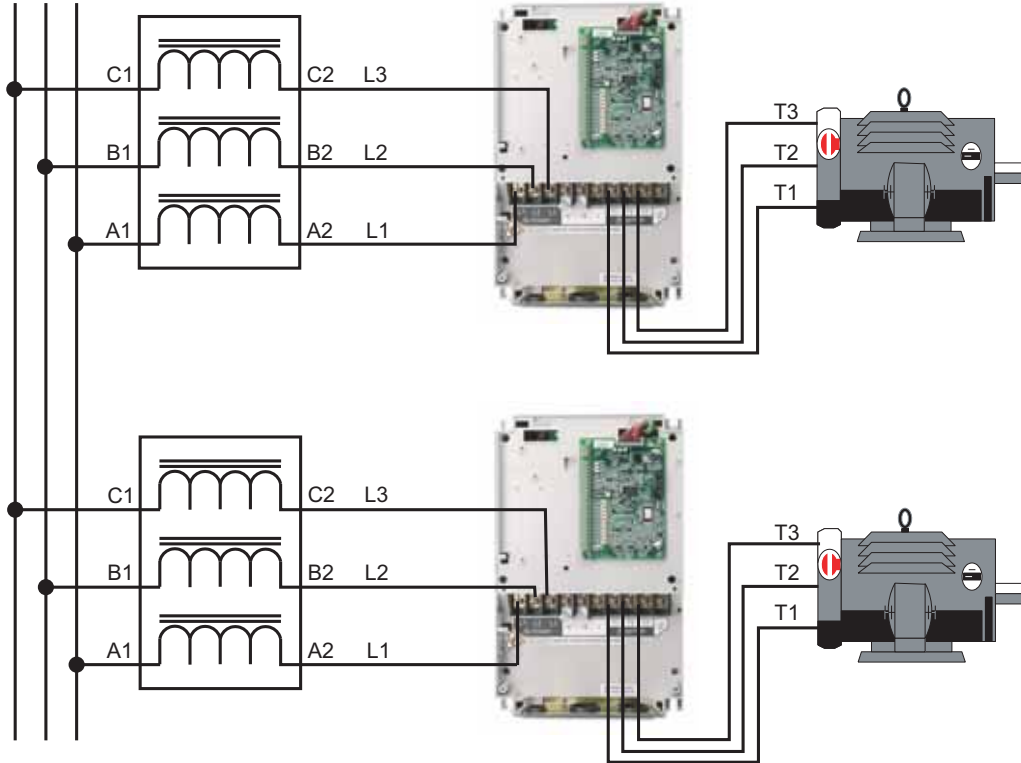
When installed on the output side of the AC Drive, line (load) reactors protect the AC Drive from short circuits at the load. Voltage and current waveforms from the AC Drive are enhanced, reducing motor overheating and noise emissions.



Single phase line reactors should not be installed on the output side of an AC Drive. Use only three-phase reactors on drive outputs, and only for three-phase motors.

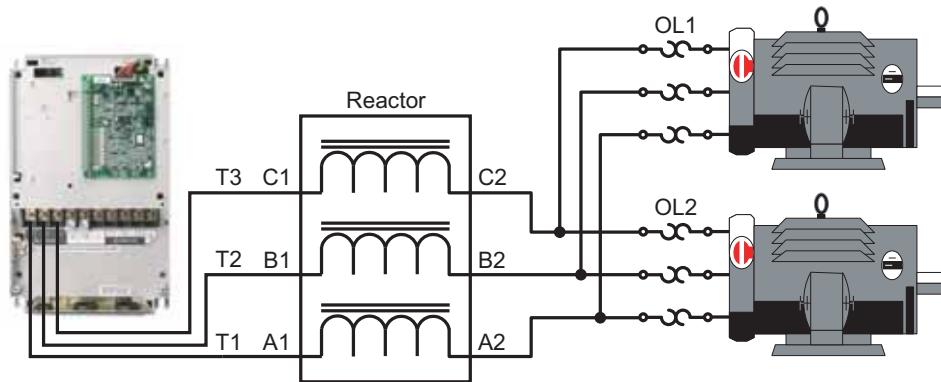
Multiple AC Drives

Individual line reactors are recommended when installing multiple AC Drives on the same power line. Individual line reactors eliminate cross-talk between multiple AC Drives and provide isolated protection for each AC Drive for its own specific load.



Multiple Motors

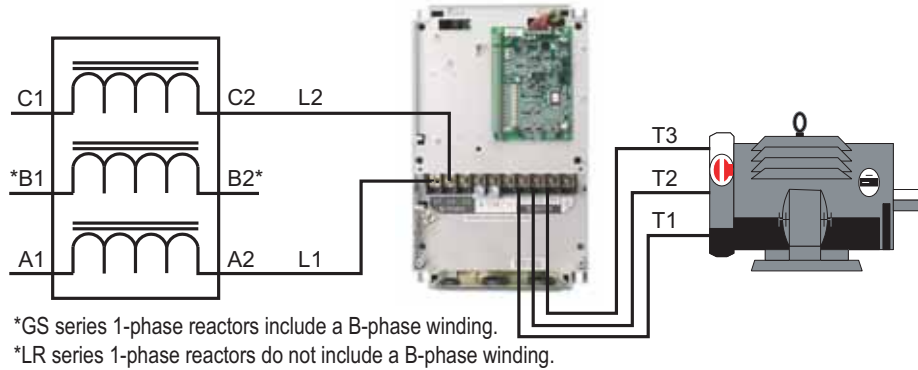
A single output (load) reactor can be used for multiple motors on the same AC Drive, but only if the motors operate simultaneously. Size the reactor based upon the total horsepower of all the motors, and select a reactor with a current rating greater than the sum of the motor full-load currents. Overload relays are recommended for use in multi-motor applications.



A single reactor should be used with multiple motors ONLY when the motors will operate simultaneously from a single AC drive. OVERLOAD RELAYS are recommended for use in multiple motor applications.

Single-Phase Applications

Some of the line reactors are listed for use with single-phase input power. Follow the connection diagram shown below. Make sure that terminals B1 and B2, if present, are properly insulated before any connections are made.



WARNING: Ensure that you properly insulate terminals B1 and B2 before making any connections to single-phase power.

Braking Units and Braking Resistors

Braking units are used to absorb the motor regeneration energy when the motor stops by deceleration. With the braking unit, the regeneration energy is dissipated by braking resistors. Our braking units are suitable for 230V and 460V *DURAPULSE* drives, and must be used in conjunction with GS series braking resistors to provide the best braking results.



To avoid possible injury, please refer to the dynamic braking manual, GS3-DB-M, before wiring.

Braking Units

AC Drive		Brake Unit		Braking Resistor			Torque	O/L
Voltage Class	AC Drive Part No.	QTY	Brake Unit Part No.	QTY	Resistor Part No.	Resistor Specification for Each Braking Unit	Braking Torque 10% Duty Cycle	Typical Thermal Overload Relay Value
230V	GS3-2020	1	GS-2DBU	1	GS-2020-BR-ENC	3000W 10Ω	125%	30A
	GS3-2025	1		1	GS-2025-BR-ENC	4800W 8Ω	125%	35A
	GS3-2030	1		1	GS-2030-BR-ENC	4800W 6.8Ω	125%	40A
	GS3-2040	2		2	GS-2040-BR-ENC	3000W 10Ω	125%	30A
	GS3-2050	2		2	GS-2050-BR-ENC	4800W 8Ω	125%	30A
460V	GS3-4020	1	GS-4DBU	1	GS-4020-BR-ENC	1500W 40Ω	125%	15A
	GS3-4025	1		1	GS-4025-BR-ENC	4800W 32Ω	125%	15A
	GS3-4030	1		1	GS-4030-BR-ENC	4800W 27.2Ω	125%	20A
	GS3-4040	1		1	GS-4040-BR-ENC	6000W 20Ω	125%	30A
	GS3-4050	1		1	GS-4050-BR-ENC	9600W 16Ω	125%	40A
	GS3-4060	1		1	GS-4060-BR-ENC	9600W 13.6Ω	125%	50A
	GS3-4075	2		2	GS-4075-BR-ENC	6000W 20Ω	125%	30A
	GS3-4100	2		2	GS-410 0-BR-ENC	9600W 13.6Ω	125%	50A

Dynamic Brake Unit Terminal Specifications

Dynamic Brake Unit Terminal Specifications				
Circuit	Terminal Mark	Wire Gauge AWG/mm ²	Terminal	Torque
Power Input Circuit	+ (P), - (N)	10 ~12AWG/3.5~5.5mm ²	M4 Screw	18 kg·cm
Braking Resistor	B1, B2			
Slave and Fault Circuit	M1, M2	20~18AWG/0.25~0.75mm ² M1, M2, S1, S2 with shielded wires	M2 Screw	4 kg·cm
	S1, S2			
	RA, RB, RC			

Dynamic Brake Unit General Specifications

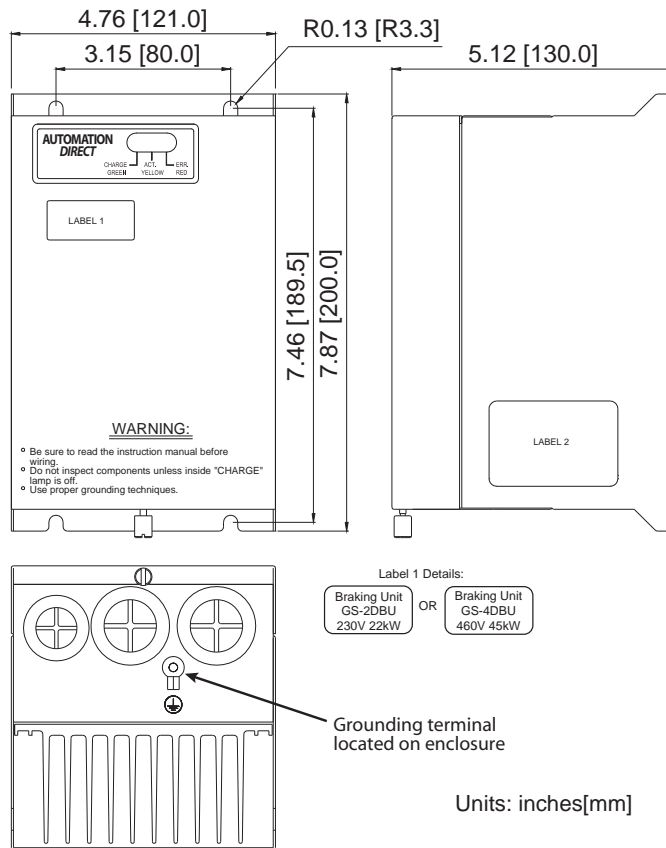
Dynamic Brake Unit Specifications			
Model		230V Class	460V Class
Part Number		GS-2DBU	GS-4DBU
Max. Motor Capacity HP (KW)		30 (22)	60 (45)
Output Rating	Max. Peak Discharge Current (A) 10% ED (Duty Cycle)	60	60
	Continuous Discharge Current (A)	20	18
	Braking Start-up Voltage (DC)	330/345/360/380/400/415 ±3V	660/690/720/760/800/830 ±6V
	Maximum On-Time	60 seconds	60 seconds
Input Rating	DC Voltage	200~400 VDC	400~800 VDC
Protection	Heat Sink Overheat	Temperature over +95 °C (203 °F)	
	Alarm Output	Relay contact 5A @ 120VAC/28VDC (RA, RB, RC)	
	Power CHARGE LED (Green)	ON until the bus (P-N) voltage is below 50VDC	
	Braking ACT LED (Yellow)	ON during braking	
Usage Environment	Fault ERR LED (Red)	ON if a fault has occurred	
	Installation Location	Indoor (no corrosive gases, metallic dust)	
	Operating Temperature	-10 °C to +50 °C (14 °F to 122 °F)	
	Storage Temperature	-20 °C to +60 °C (-4 °F to 140 °F)	
	Humidity	90% Non-condensing	
	Vibration	9.8m/s ² (1G) under 20 2m/s ² (0.2G) @ 20-50Hz	
Mechanical Configuration		Wall-mounted enclosed type IP50	

Braking Unit Wiring

For information on braking unit wiring, refer to the power wiring diagrams in “Chapter 2: Installation and Wiring” of this manual, and to the *DURAPULSE* Dynamic Braking Units User Manual GS3-DB-M.

Braking Unit Dimensions

Part Numbers: GS-2DBU, GS-4DBU



For more information regarding brake units, please refer to the brake unit user manual GS3-DB-M

Braking Resistors

Braking resistors are used to increase the control torque of the AC Drive, for frequently repeated ON-OFF cycles of the AC Drive, or for decelerating a load with large inertia.

Braking Resistor Specifications

Braking Resistor Specifications								
Voltage Class	AC Drive Model	Qty	Braking Resistor Part Number	Motor HP	Braking Torque ED 10%	Type (Ohms)	Power (W)	Duty Cycle
230V	GS3-21P0	1	GS-21P0-BR	1	125%	200Ω	80	10%
	GS3-22P0	1	GS-22P0-BR	2	125%	100Ω	300	10%
	GS3-23P0	1	GS-23P0-BR	3	125%	70Ω	300	10%
	GS3-25P0	1	GS-25P0-BR	5	125%	40Ω	400	10%
	GS3-27P5	1	GS-27P5-BR	7.5	125%	30Ω	500	10%
	GS3-2010	1	GS-2010-BR-ENC	10	125%	20Ω	1000	10%
	GS3-2015	1	GS-2015-BR-ENC	15	125%	13.6Ω	2400	10%
	GS3-2020	1	GS-2020-BR-ENC	20	125%	10Ω	3000	10%
	GS3-2025	1	GS-2025-BR-ENC	25	125%	8Ω	4800	10%
	GS3-2030	1	GS-2030-BR-ENC	30	125%	6.8Ω	4800	10%
	GS3-2040	2	GS-2040-BR-ENC	40	125%	10Ω	3000	10%
GS3-2050	2	GS-2050-BR-ENC	50	125%	8Ω	4800	10%	
460V	GS3-41P0	1	GS-41P0-BR	1	125%	750Ω	80	10%
	GS3-42P0	1	GS-42P0-BR	2	125%	400Ω	300	10%
	GS3-43P0	1	GS-43P0-BR	3	125%	250Ω	300	10%
	GS3-45P0	1	GS-45P0-BR	5	125%	150Ω	400	10%
	GS3-47P5	1	GS-47P5-BR	7.5	125%	100Ω	500	10%
	GS3-4010	1	GS-4010-BR	10	125%	75Ω	1000	10%
	GS3-4015	1	GS-4015-BR-ENC	15	125%	50Ω	1000	10%
	GS3-4020	1	GS-4020-BR-ENC	20	125%	40Ω	1500	10%
	GS3-4025	1	GS-4025-BR-ENC	25	125%	32Ω	4800	10%
	GS3-4030	1	GS-4030-BR-ENC	30	125%	27.2Ω	4800	10%
	GS3-4040	1	GS-4040-BR-ENC	40	125%	20Ω	6000	10%
	GS3-4050	1	GS-4050-BR-ENC	50	125%	16Ω	9600	10%
	GS3-4060	1	GS-4060-BR-ENC	60	125%	13.6Ω	9600	10%
	GS3-4075	2	GS-4075-BR-ENC	75	125%	20Ω	6000	10%
GS3-4100	2	GS-4100-BR-ENC	100	125%	13.6Ω	9600	10%	



For DURAPULSE drive models 20 hp and above, a dynamic braking unit must be used in conjunction with the braking resistor, as shown in the Braking Units and Braking Resistors table earlier in this chapter. For additional information, please refer to the dynamic braking manual, GS3-DB-M

Braking Resistor Wiring

For information on braking resistor wiring, refer to the power wiring diagrams in “Chapter 2: Installation and Wiring”.

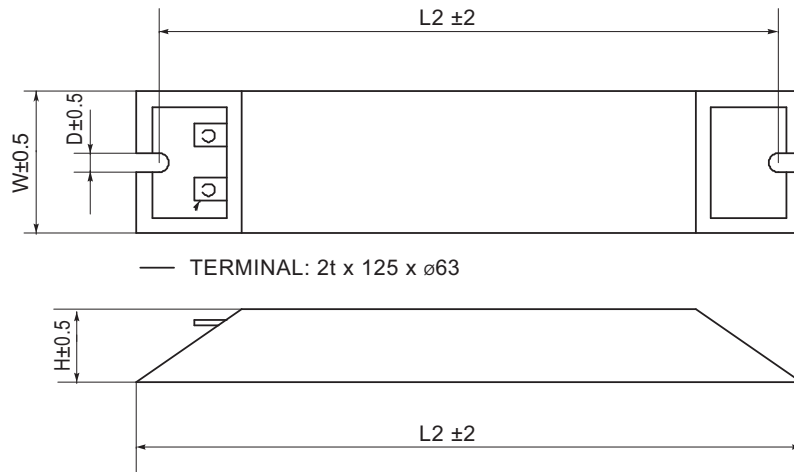
Braking Resistor Dimensions

Braking Resistor Dimensions				
Voltage Class	AC Drive Model	Braking Resistor Part Number	Enclosure Type	Dimensions
230V	GS3-21P0	GS-21P0-BR	none	Figure 1
	GS3-22P0	GS-22P0-BR		
	GS3-23P0	GS-23P0-BR		
	GS3-25P0	GS-25P0-BR		
	GS3-27P5	GS-27P5-BR	none	Figure 2
	GS3-2010	GS-2010-BR-ENC	GCE3	Figure 3
	GS3-2015	GS-2015-BR-ENC	GCE6	Figure 4
	GS3-2020	GS-2020-BR-ENC		
	GS3-2025	GS-2025-BR-ENC	GCE9	Figure 5
	GS3-2030	GS-2030-BR-ENC		
	GS3-2040	GS-2040-BR-ENC	(2) x GCE6	(2) x Figure 4
	GS3-2050	GS-2050-BR-ENC	(2) x GCE9	(2) x Figure 5
460V	GS3-41P0	GS-41P0-BR	none	Figure 1
	GS3-42P0	GS-42P0-BR		
	GS3-43P0	GS-43P0-BR		
	GS3-45P0	GS-45P0-BR		
	GS3-47P5	GS-47P5-BR	none	Figure 2
	GS3-4010	GS-4010-BR		
	GS3-4015	GS-4015-BR-ENC	GCE3	Figure 3
	GS3-4020	GS-4020-BR-ENC	GCE4	Figure 6
	GS3-4025	GS-4025-BR-ENC	GCE12	Figure 7
	GS3-4030	GS-4030-BR-ENC		
	GS3-4040	GS-4040-BR-ENC		
	GS3-4050	GS-4050-BR-ENC	GCE15	Figure 8
	GS3-4060	GS-4060-BR-ENC		
	GS3-4075	GS-4075-BR-ENC	(2) x GCE12	(2) x Figure 7
GS3-4100	GS-4100-BR-ENC	(2) x GCE15	(2) x Figure 8	

Braking Resistor Dimensions (continued)

Figure 1

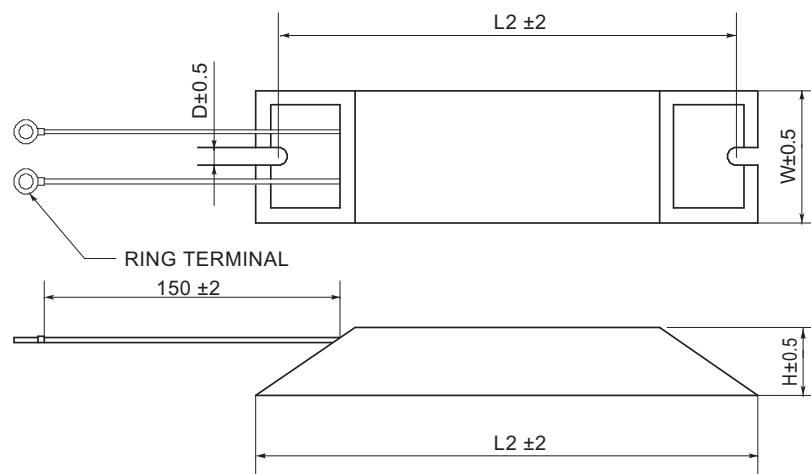
- GS-21P0-BR
- GS-22P0-BR
- GS-23P0-BR
- GS-25P0-BR
- GS-41P0-BR
- GS-42P0-BR
- GS-43P0-BR
- GS-45P0-BR



Resistor Part Number	L1 (mm)	L2 (mm)	H (mm)	D (mm)	W (mm)
GS-21P0-BR	140	125	20	5.3	60
GS-22P0-BR	215	200	30	5.3	60
GS-23P0-BR	215	200	30	5.3	60
GS-25P0-BR	265	250	30	5.3	60
GS-41P0-BR	140	125	20	5.3	60
GS-42P0-BR	215	200	30	5.3	60
GS-43P0-BR	215	200	30	5.3	60
GS-45P0-BR	265	250	30	5.3	60

Figure 2

- GS-27P5-BR
- GS-47P5-BR
- GS-4010-BR

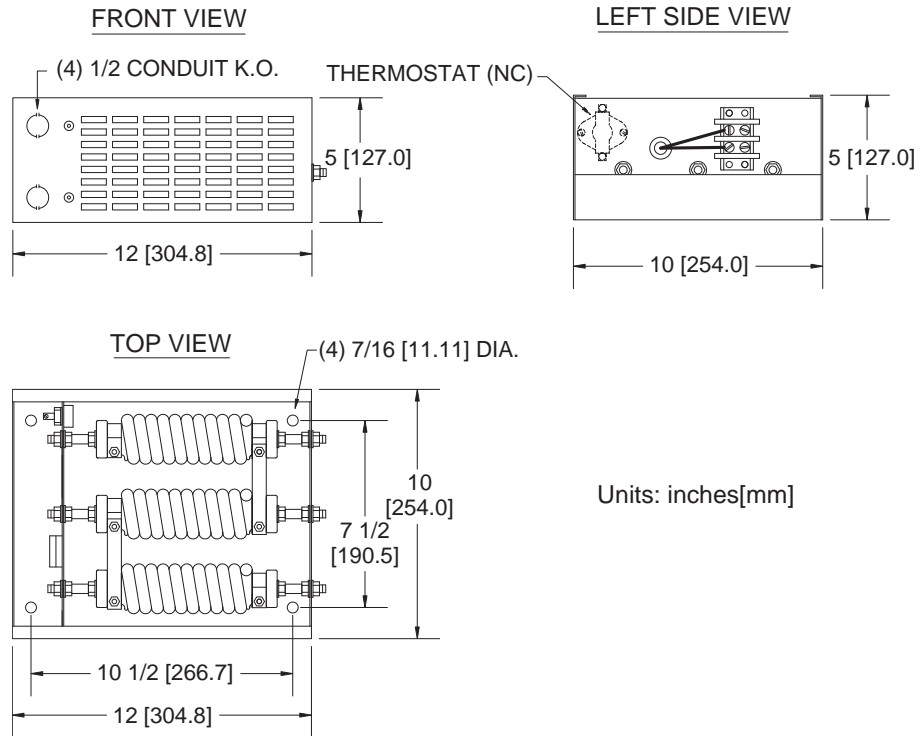


Resistor Part Number	L1 (mm)	L2 (mm)	H (mm)	D (mm)	W (mm)
GS-27P5-BR	335	320	30	5.3	60
GS-47P5-BR	335	320	30	5.3	60
GS-4010-BR	400	385	50	5.3	100

Brake Resistor Dimensions (continued)

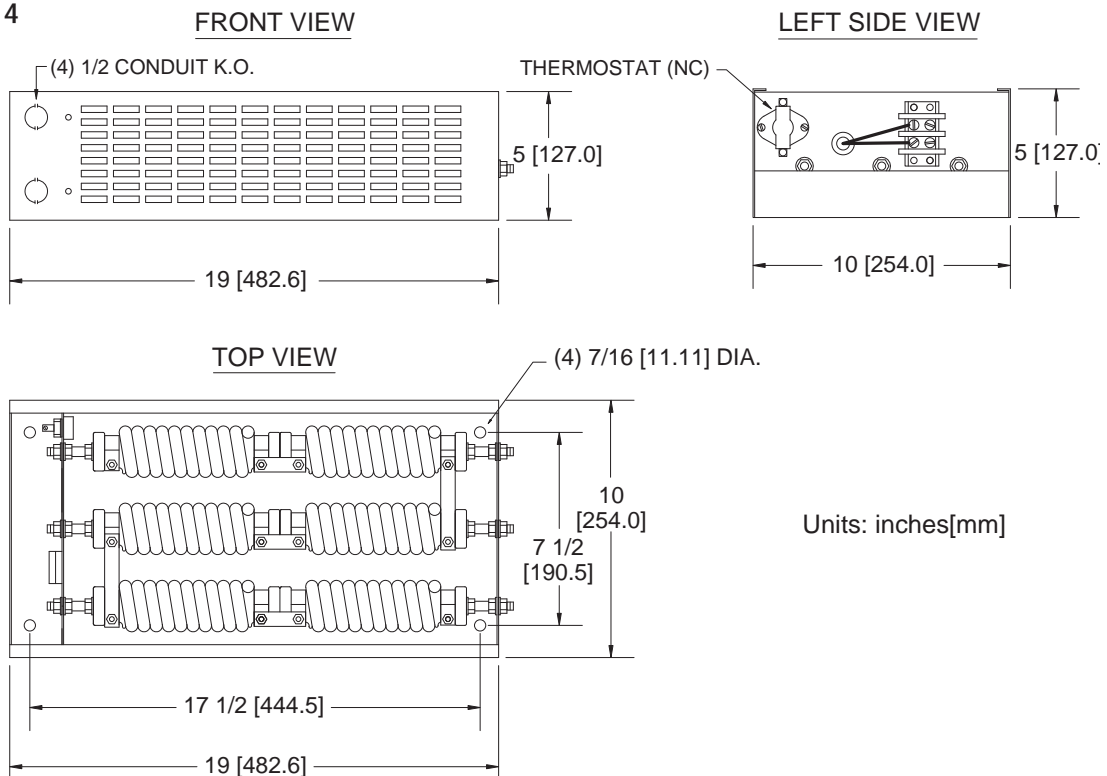
GS-2010-BR-ENC, GS-4015-BR-ENC

Figure 3



GS-2015-BR-ENC, GS-2020-BR-ENC,
GS-2040-BR-ENC = 2 units

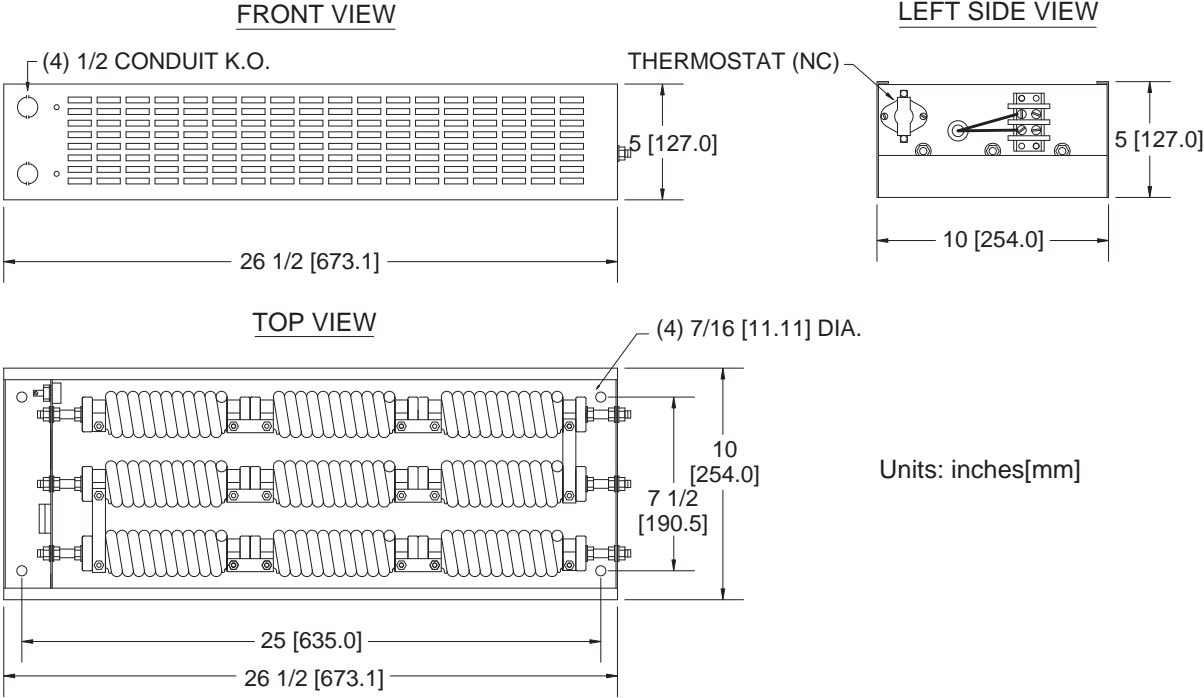
Figure 4



Brake Resistor Dimensions (continued)

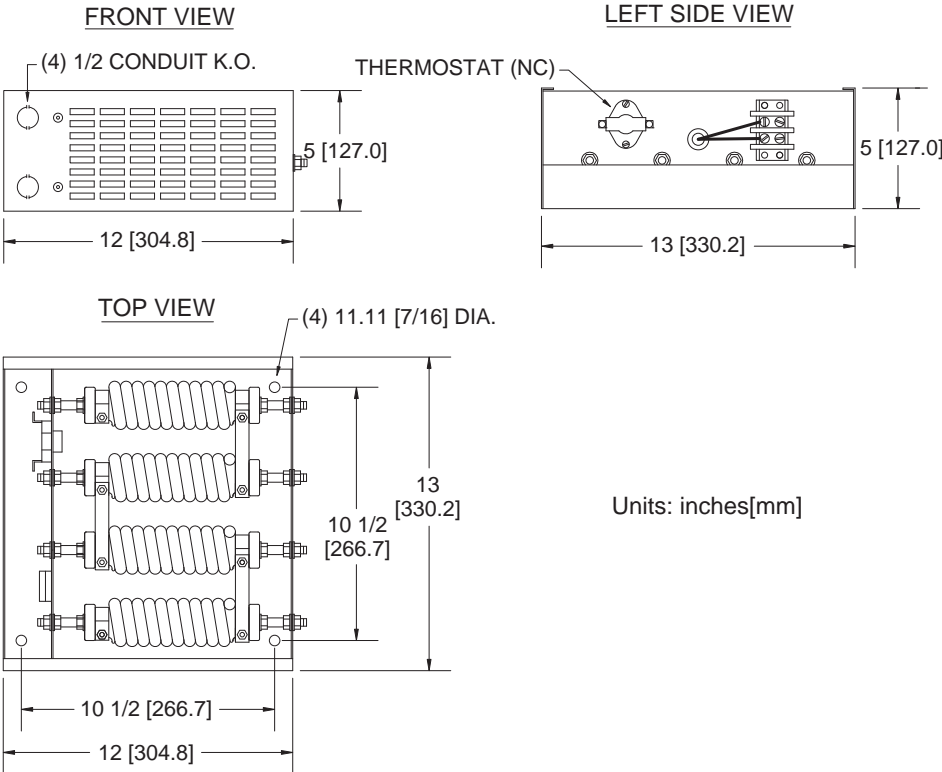
**GS-2025-BR-ENC, GS-2030-BR-ENC,
GS-2050-BR-ENC = 2 units**

Figure 5



GS-4020-BR-ENC

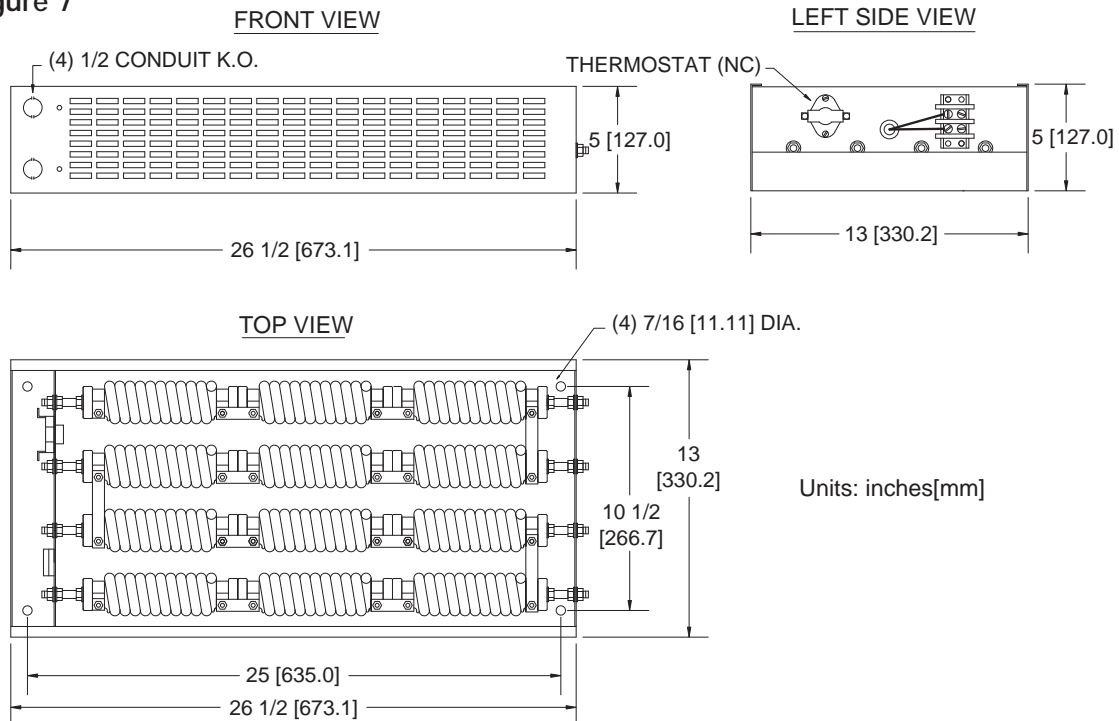
Figure 6



Brake Resistor Dimensions (continued)

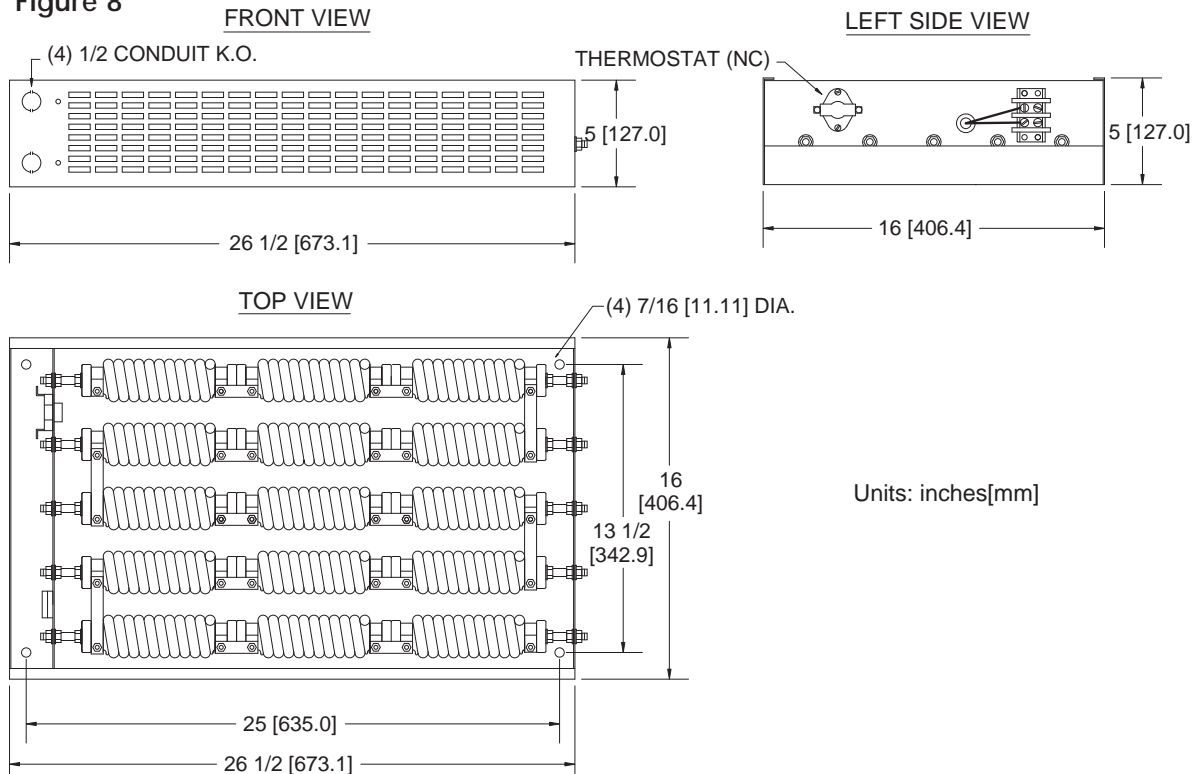
**GS-4025-BR-ENC, GS-4030-BR-ENC, GS-4040-BR-ENC,
GS-4075-BR-ENC = 2 Units**

Figure 7



**GS-4050-BR-ENC, GS-4060-BR-ENC,
GS-4100-BR-ENC = 2 Units**

Figure 8



EMI Input Filters

The EC Declaration of Conformity for the *DURAPULSE* AC Drives was completed in conjunction with EMI Filters listed below. Use the following table to specify the corresponding EMI Filter for each AC Drive model.



CE compliance requires the use of EMI filters.

EMI Input Filter Specifications

EMI Input Filter Specifications					
AC Drive Model / Input Phase		EMI Filter	Input Power Max Rating	Dimension Drawing	Terminal Screw Max Torque
230V	460V				kg·cm [lb·in]
GS3-21P0 / 1ph GS3-22P0 / 1ph	–	20DRT1W3S	250V, 1-phase, 20A	Figure 1-1	18 [16]
GS3-23P0 / 1ph	–	32DRT1W3C	250V, 1-phase, 32A	Figure 1-2	
GS3-21P0 / 3ph GS3-22P0 / 3ph	–	10TDT1W4C	250V, 3-phase, 10A	Figure 3-1	
GS3-23P0 / 3ph GS3-25P0 / 3ph	–	26TDT1W4C	250V, 3-phase, 26A	Figure 3-2	
GS3-27P5 / 3ph GS3-2010 / 3ph	GS3-4020 / 3ph GS3-4025 / 3ph	50TDS4W4C	250/480V, 3-phase, 50A	Figure 3-3	30 [26]
GS3-2015 / 3ph GS3-2020 / 3ph	GS3-4030 / 3ph GS3-4040 / 3ph GS3-4050 / 3ph	100TDS84C	250/480V, 3-phase, 100A	Figure 3-4	65 [56]
GS3-2025 / 3ph GS3-2030 / 3ph GS3-2040 / 3ph	GS3-4060 / 3ph	150TDS84C	250/480V, 3-phase, 150A	Figure 3-5	
GS3-2050 / 3ph	–	180TDS84C	250V, 3-phase, 180A	Figure 3-6	
–	GS3-41P0 / 3ph GS3-42P0 / 3ph GS3-43P0 / 3ph	RF022B43AA	480V, 3-phase, 5.9A	Figure 3-7	n/a
–	GS3-45P0 / 3ph	RF037B43BA	480V, 3-phase, 11.2A	Figure 3-8	
–	GS3-47P5 / 3ph GS3-4010 / 3ph GS3-4015 / 3ph	RF110B43CA	480V, 3-phase, 25A	Figure 3-9	
–	GS3-4075 / 3ph GS3-4100 / 3ph	200TDDS84C	480V, 3-phase, 200A	Figure 3-10	65 [56]

EMI Filter Dimensions

Figure 1-1 (units = mm)
20DRT1W3S

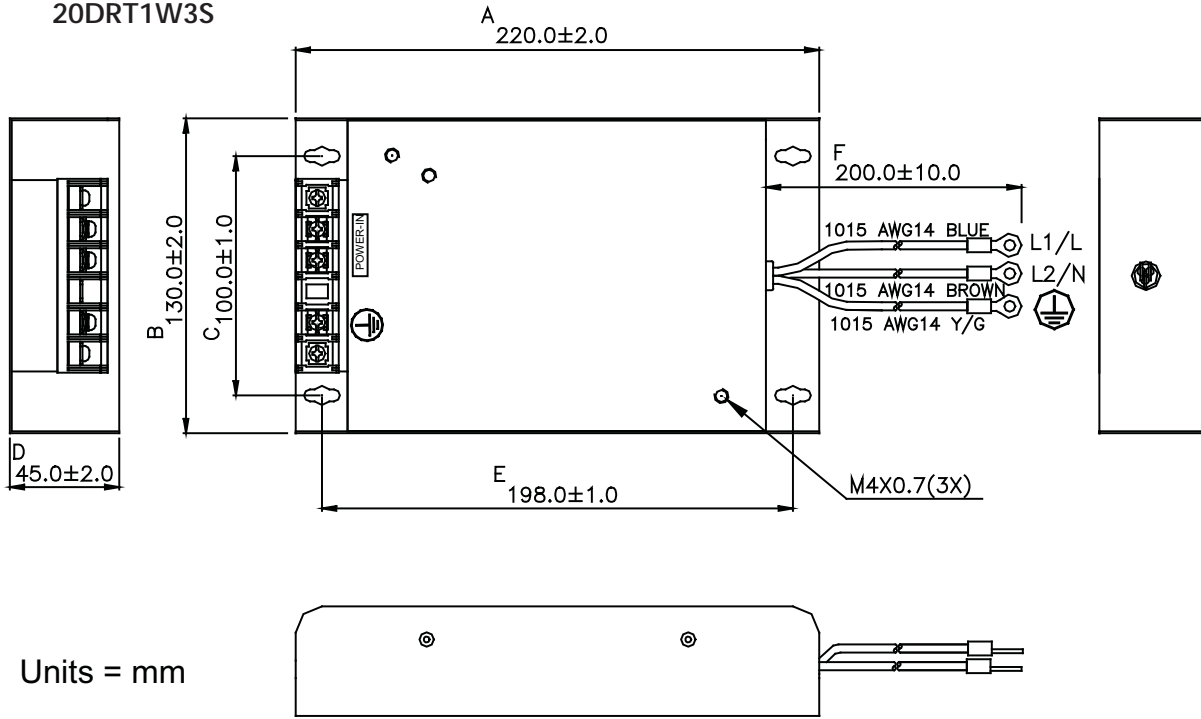
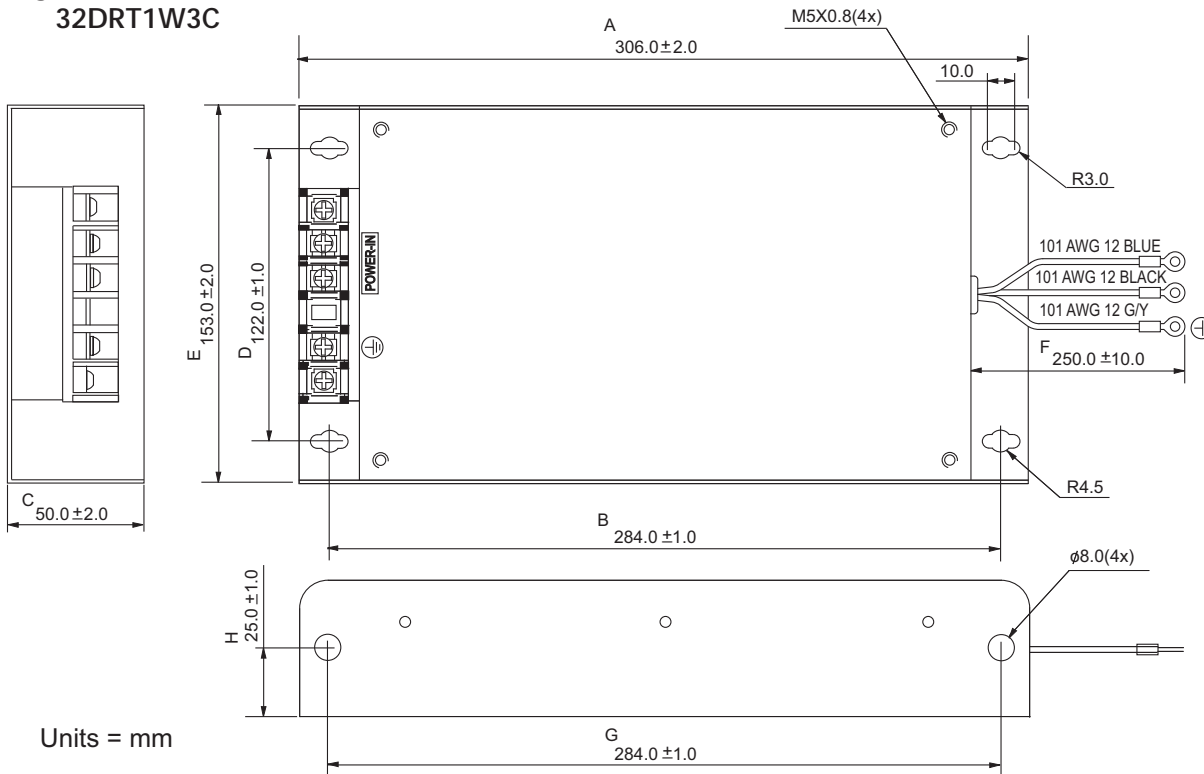


Figure 1-2 (units = mm)
32DRT1W3C



EMI Filter Dimensions (continued)

Figure 3-1 Units = mm (in)

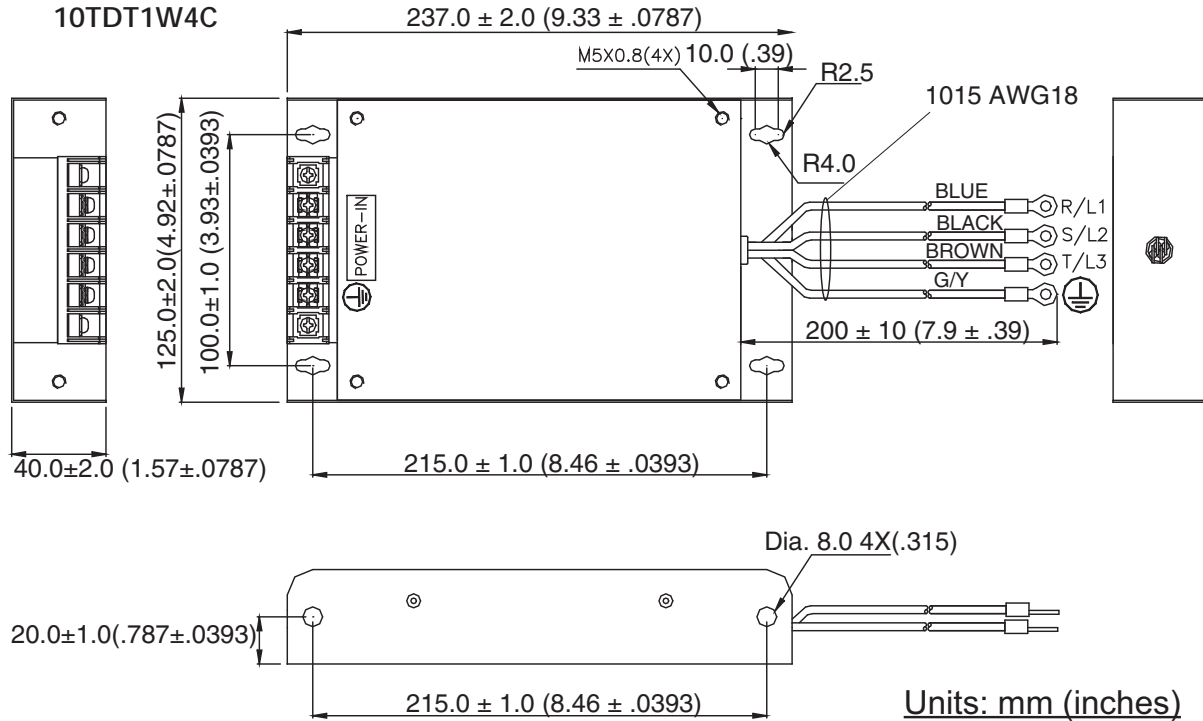
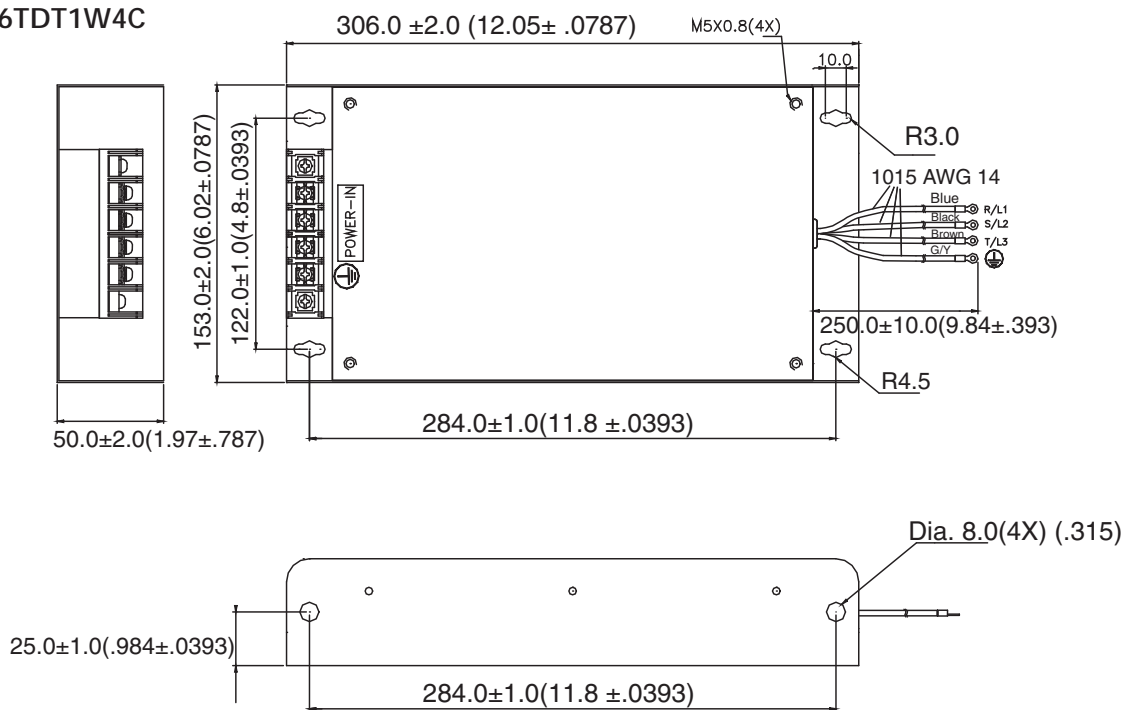


Figure 3-2 Units = mm (in)



EMI Filter Dimensions (continued)

Figure 3-3 Units = mm (in)
50TDS4W4C

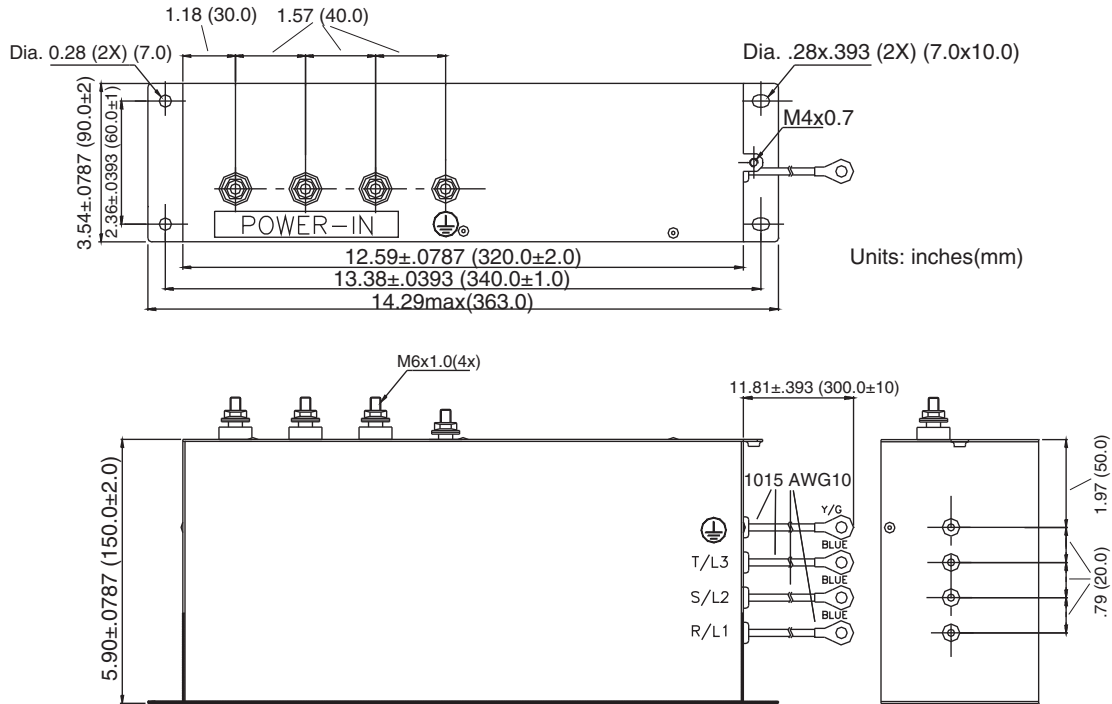
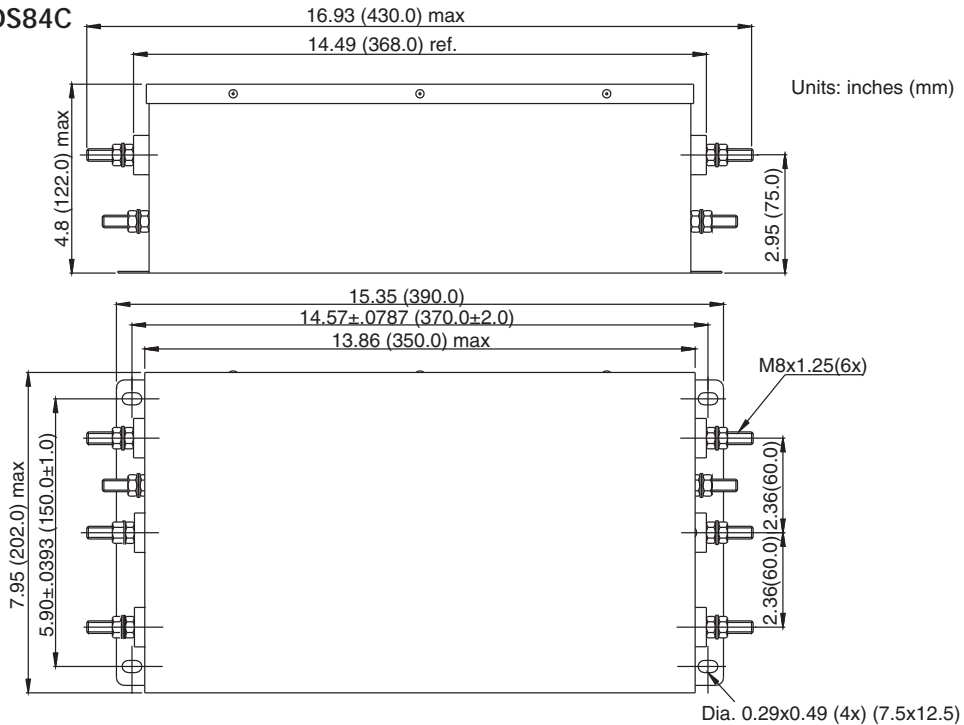


Figure 3-4 Units = mm (in)
100TDS84C



EMI Filter Dimensions (continued)

Figure 3-5 Units = mm (in)

150TDS84C

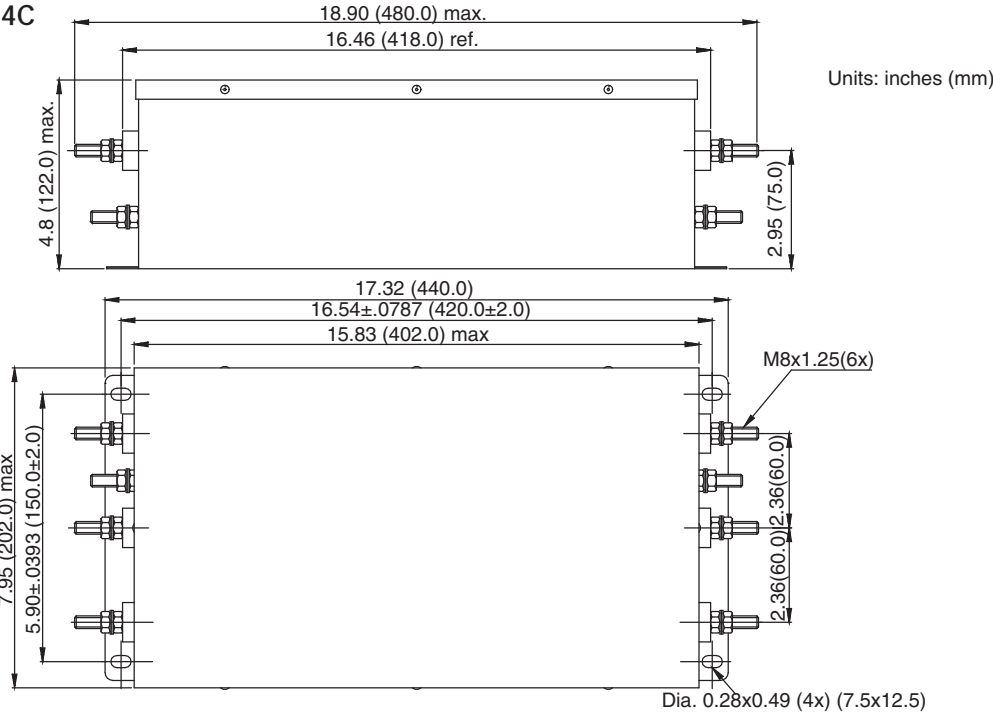
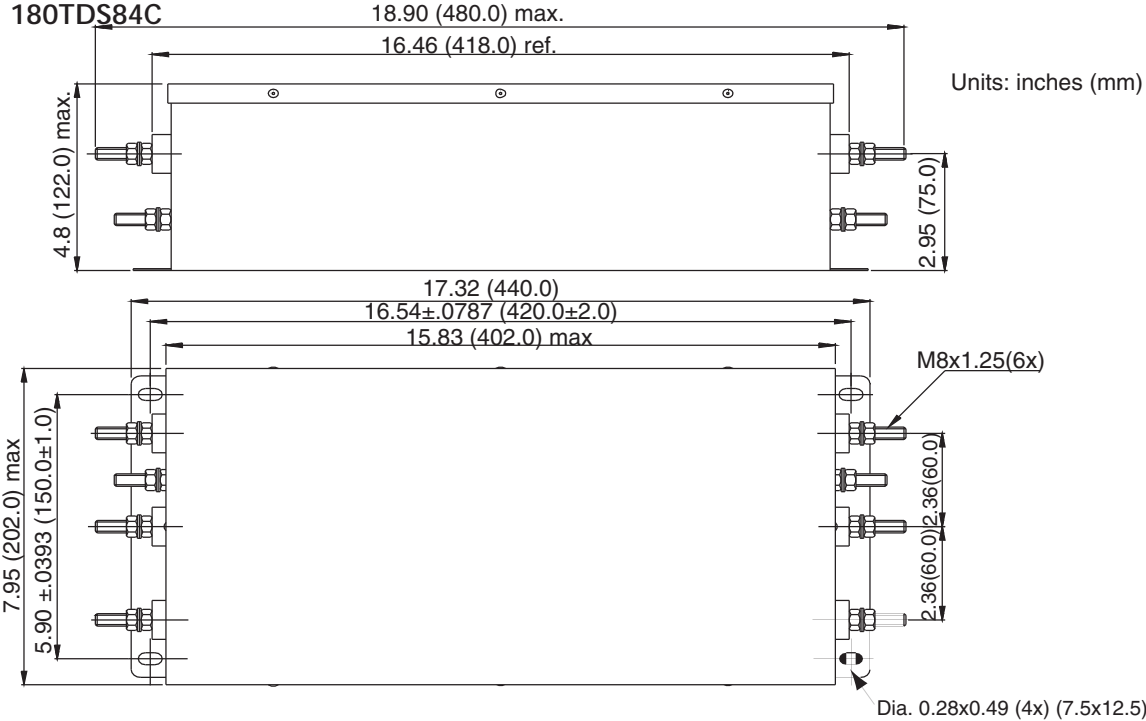


Figure 3-6 Units = mm (in)

180TDS84C



EMI Filter Dimensions (continued)

Figure 3-7 Units = mm (in)
RF022B43AA

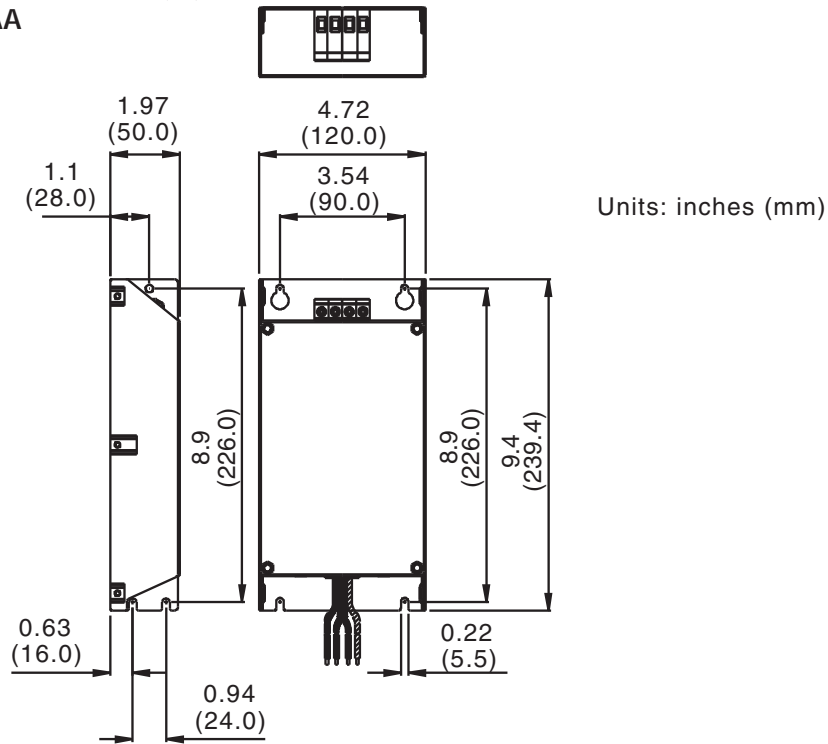
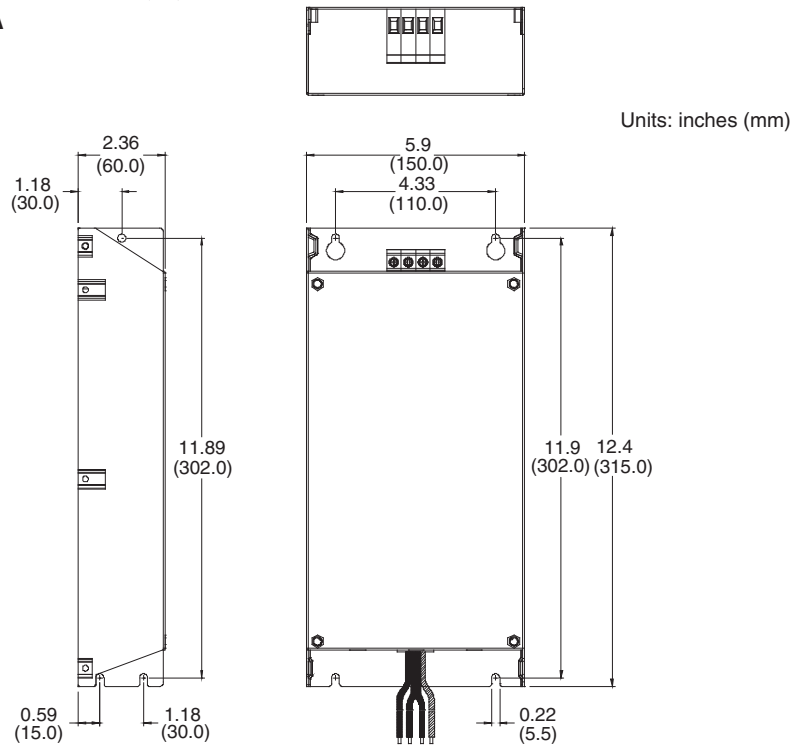


Figure 3-8 Units = mm (in)
RF037B43AA



EMI Filter Dimensions (continued)

Figure 3-9 Units = mm (in)
RF110B43CA

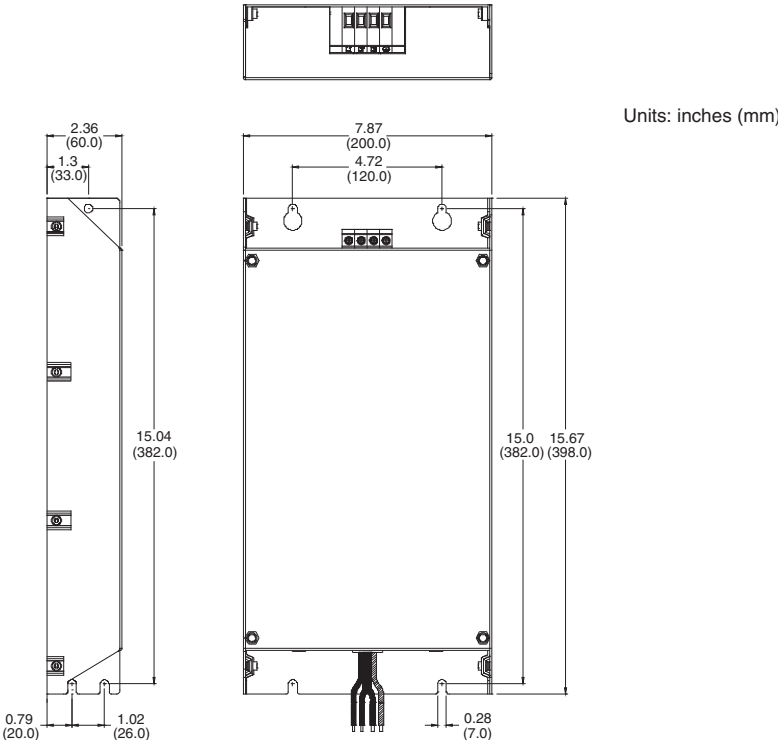
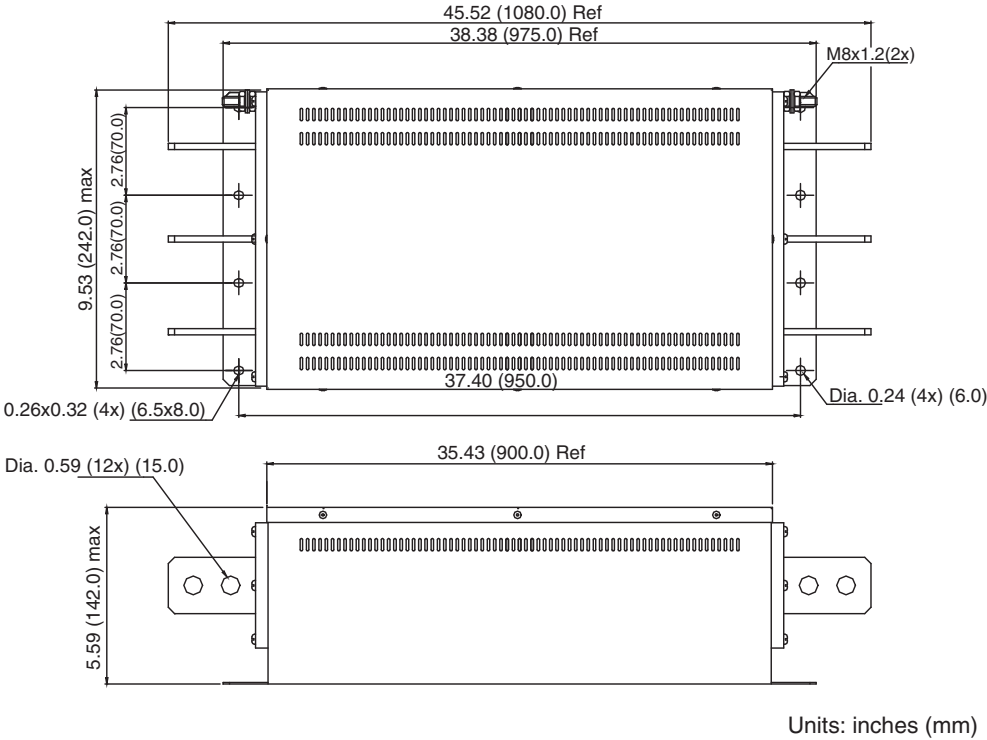
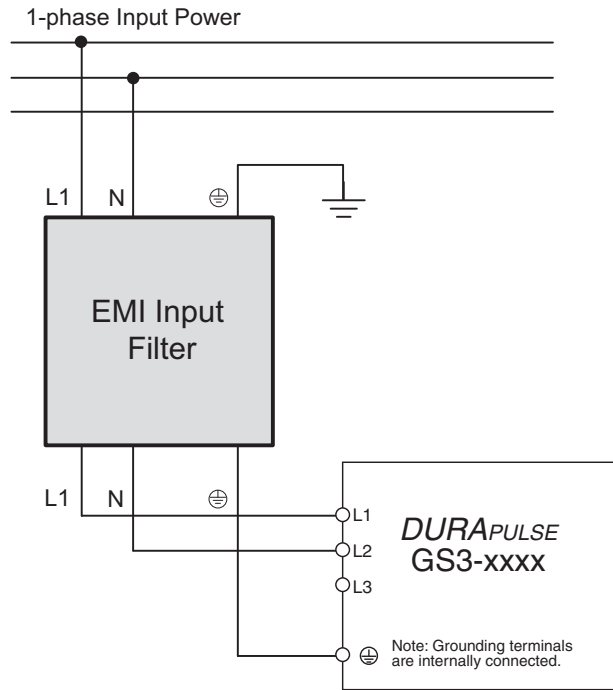


Figure 3-10 Units = mm (in)
200TDDS84C

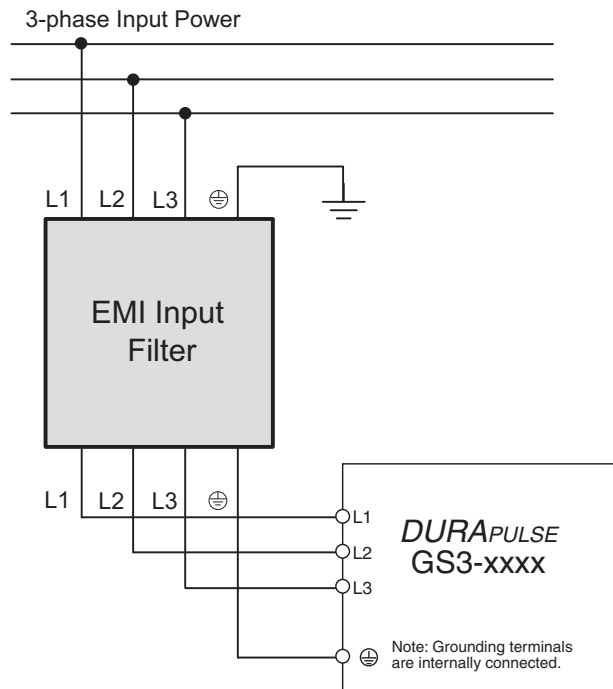


EMI Filter Wiring Connections

Single-Phase Input Connections



Triple-Phase Input Connections



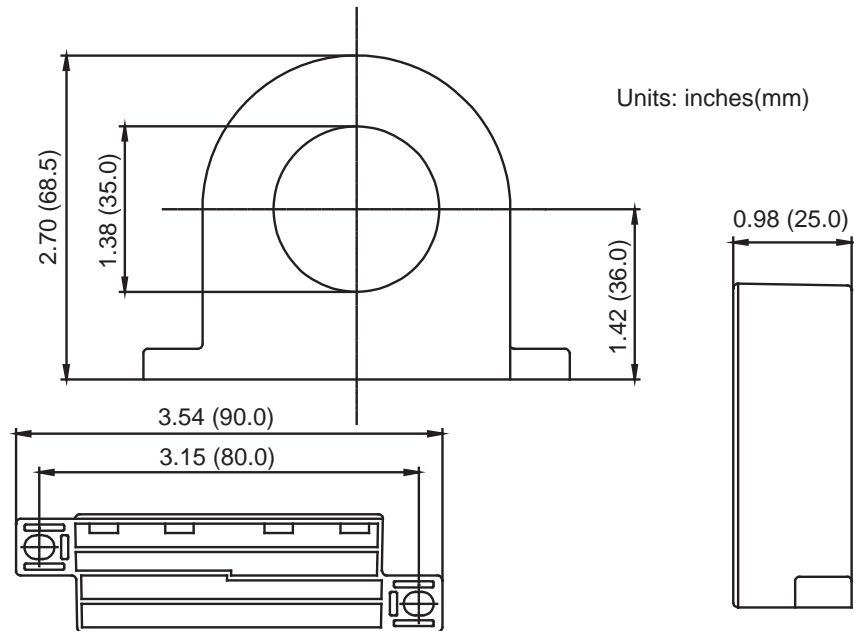
Distance of wires from filter to drive should be as short as possible.

RF Filter

RF Filter Part #: RF220X00A

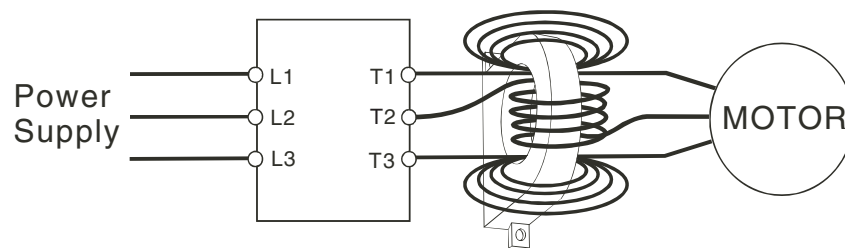
RF Filters are used to reduce the radio frequency interference or noise on the input or output side of the inverter. RF220X00A can be used with all GS model drives.

RF Filter Dimensions

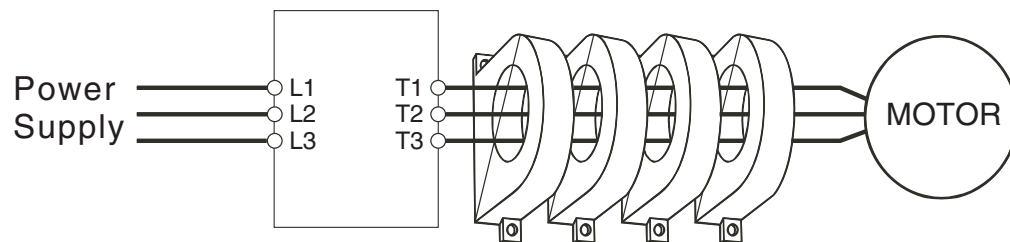


RF Filter Wiring

Wind each wire four times around the core. The RF filter must be located as close as possible to the output side of the inverter.



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



Fuses and Fuse Kits

Short-circuit and ground-fault protection devices are essential to prevent costly damage to your AC Drive application equipment. Fuse kits are available from AutomationDirect for the *DURAPULSE* AC Drives.



Warning: The fuse kits provide protection only for the semiconductor components inside the AC drive. Motor branch circuit overcurrent protection should be separately provided using applicable local codes.

The following fuse kits consist of one fuse block and fuses sized to match each *DURAPULSE* AC Drive. Replacement fuses are also available, as shown below.

Fuse Kit Specifications						
Part Number	Fuse Block	Wire Range	Fuse Type	Dimensions	Fuse Rating	Replacement Fuses
GS-21P0-FKIT-1P	2-pole	Al/Cu #2-14	A3T	Figure 1	300V @ 30A	GS-21P0-FUSE-1P
GS-22P0-FKIT-1P					300V @ 45A	GS-22P0-FUSE-1P
GS-23P0-FKIT-1P					300V @ 60A	GS-23P0-FUSE-1P
GS-21P0-FKIT-3P	3-pole			Figure 2	300V @ 20A	GS-21P0-FUSE-3P
GS-22P0-FKIT-3P					300V @ 25A	GS-22P0-FUSE-3P
GS-23P0-FKIT-3P					300V @ 40A	GS-23P0-FUSE-3P
GS-25P0-FKIT		300V @ 60A		GS-25P0-FUSE		
GS-27P5-FKIT		Al/Cu 2/0-#6		Figure 3	300V @ 100A	GS-27P5-FUSE
GS-2010-FKIT				Figure 4	300V @ 125A	GS-2010-FUSE
GS-2015-FKIT	300V @ 175A				GS-2015-FUSE	
GS-2020-FKIT	Figure 5			300V @ 250A	GS-2020-FUSE	
GS-2025-FKIT				300V @ 300A	GS-2025-FUSE	
GS-2030-FKIT	300V @ 350A		GS-2030-FUSE			
GS-2040-FKIT *	Figure 6	300V @ 450A	GS-2040-FUSE			
GS-2050-FKIT *		300V @ 500A	GS-2050-FUSE			
GS-41P0-FKIT	3-pole	Al/Cu #2-14	A6T	Figure 7	600V @ 10A	GS-41P0-FUSE
GS-42P0-FKIT					600V @ 15A	GS-42P0-FUSE
GS-43P0-FKIT					600V @ 20A	GS-43P0-FUSE
GS-45P0-FKIT				600V @ 30A	GS-45P0-FUSE	
GS-47P5-FKIT				Figure 8	600V @ 50A	GS-47P5-FUSE
GS-4010-FKIT				Figure 9	600V @ 70A	GS-4010-FUSE
GS-4015-FKIT	600V @ 90A	GS-4015-FUSE				
GS-4020-FKIT	Figure 10	600V @ 125A		GS-4020-FUSE		
GS-4025-FKIT		600V @ 150A		GS-4025-FUSE		
GS-4030-FKIT		600V @ 175A		GS-4030-FUSE		
GS-4040-FKIT *	Figure 11	600V @ 225A		GS-4040-FUSE		
GS-4050-FKIT *		600V @ 250A		GS-4050-FUSE		
GS-4060-FKIT *		600V @ 350A	GS-4060-FUSE			
GS-4075-FKIT *		600V @ 400A	GS-4075-FUSE			
GS-4100-FKIT *	Figure 12	600V @ 600A	GS-4100-FUSE			

Short Circuit Current Rating (SCCR) = 200 kA

* Three units required

Fuse Block Dimensions

Figure 1

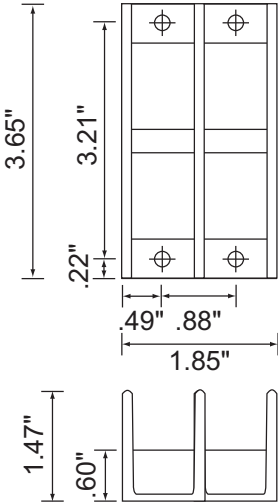


Figure 2

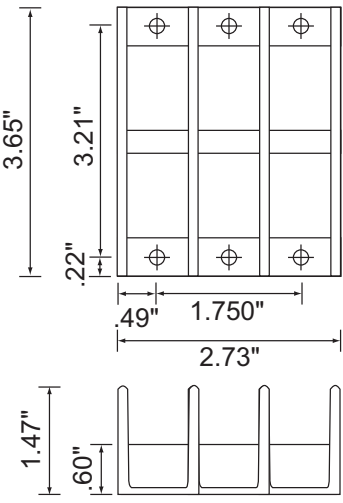


Figure 3

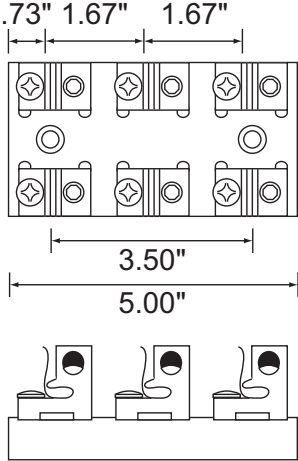


Figure 4

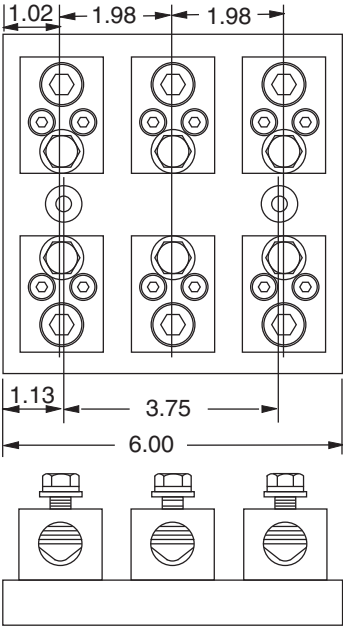


Figure 5

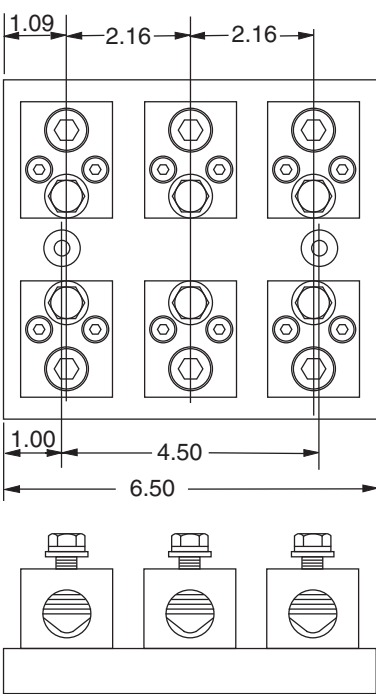
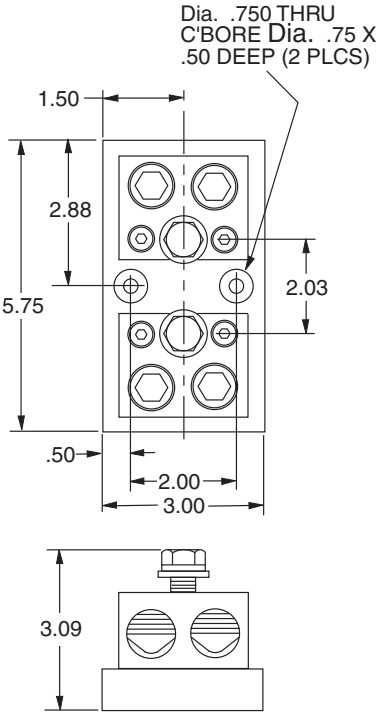


Figure 6



*Units = inches

Fuse Block Dimensions (continued)

Figure 7

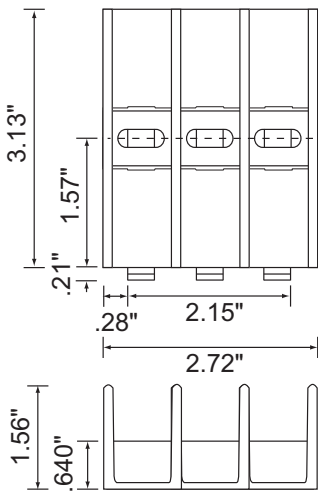


Figure 8

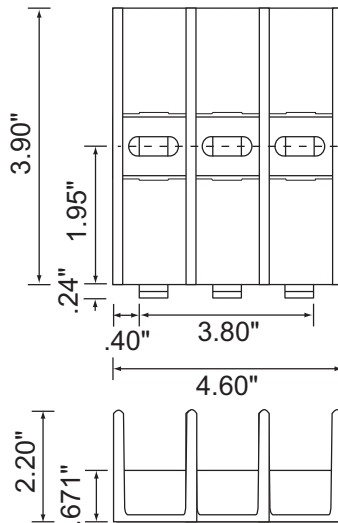


Figure 9

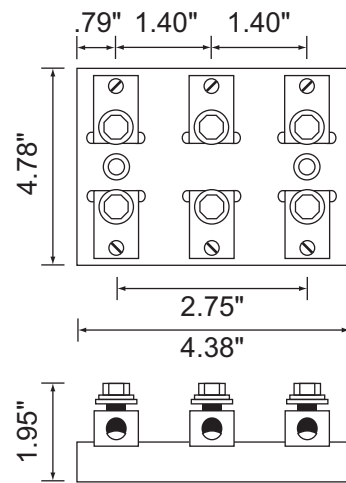


Figure 10

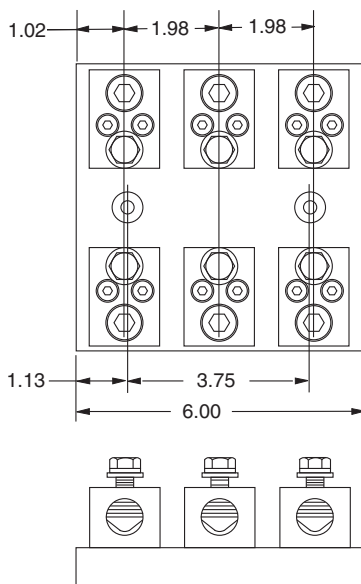


Figure 11

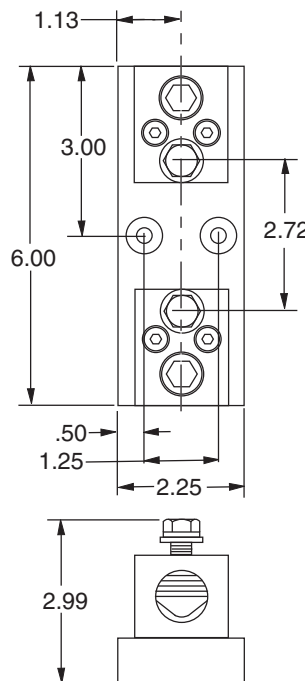
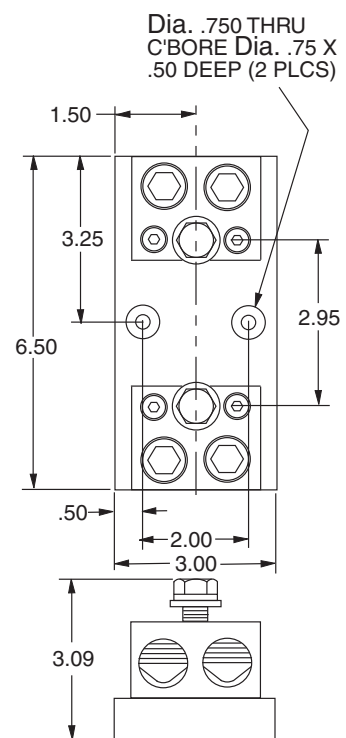


Figure 12



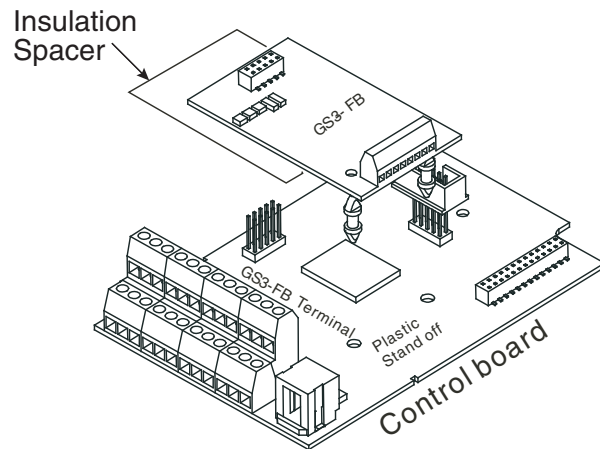
*Units = inches

GS3-FB Feedback Card

1 to 2HP (0.75kW to 1.5kW)

INSTALLATION

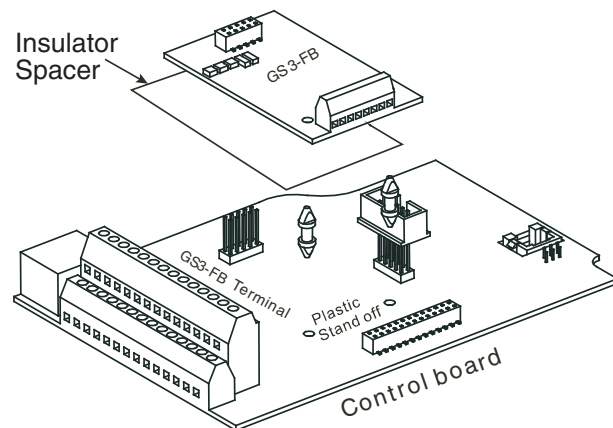
For 1 to 2hp
(0.75kW to 1.5kW)
drives



3 to 5HP (2.2kW to 3.7kW)

INSTALLATION

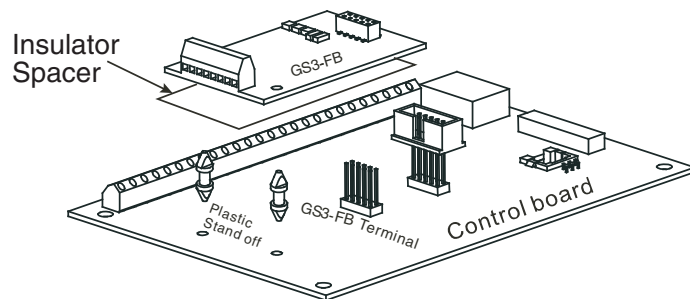
For 3 to 5hp
(2.2kW to 3.7kW)
drives



7.5HP (5.5kW) and above

INSTALLATION

For drives
7.5hp (5.5kW)
and above



Make sure GS3-FB card snaps firmly into board. If it is not properly installed, LEDs will not light upon power-up.

GS3-FB Terminal Descriptions Wiring Notes

Terminal Symbols	Descriptions
VP	Power source of GS3-FB (SW1 can be switched to 12V or 5V) Output Voltage: (+12VDC ±5% 200mA) or (+5VDC ±2% 400mA)
DCM	Power source (VP) and input signal (A, B) common
A, NOT A, B, NOT B	Input signal from Encoder. Input type is selected by SW2. Maximum 500kP/Sec
A/O, B/O	GS3-FB output signal for use with RPM Meter. (Open Collector) Maximum DC24V 100mA
COM	GS3-FB output signal (A/O, B/O) common.
PG	Pulse generator or Encoder.
IM 3~	3-Phase motor

The control, power supply and motor leads must be laid separately. They must not be fed through the same cable conduit / trunking.

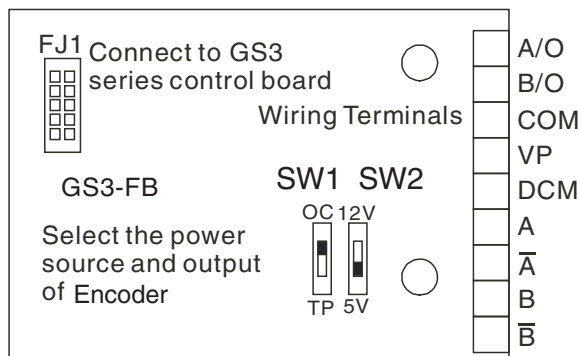
1. Please use a shield cable to prevent interference. Do not run control wire parallel to any high voltage AC power line (220V and up).
2. Connect shielded wire to Ground only.
3. Recommended wire size for shielded cable: AWG24 to AWG18 (0.21 to 0.81mm²)
4. Wire length:

Types of Encoders	Maximum Wire Length	Wire Gauge at Maximum Wire Length
Output Voltage	165 ft (50m)	AWG16 (1.25mm ²) or larger
Open Collector	165 ft (50m)	
Line Driver	1000 ft (300m)	
Complimentary	230 ft (70m)	

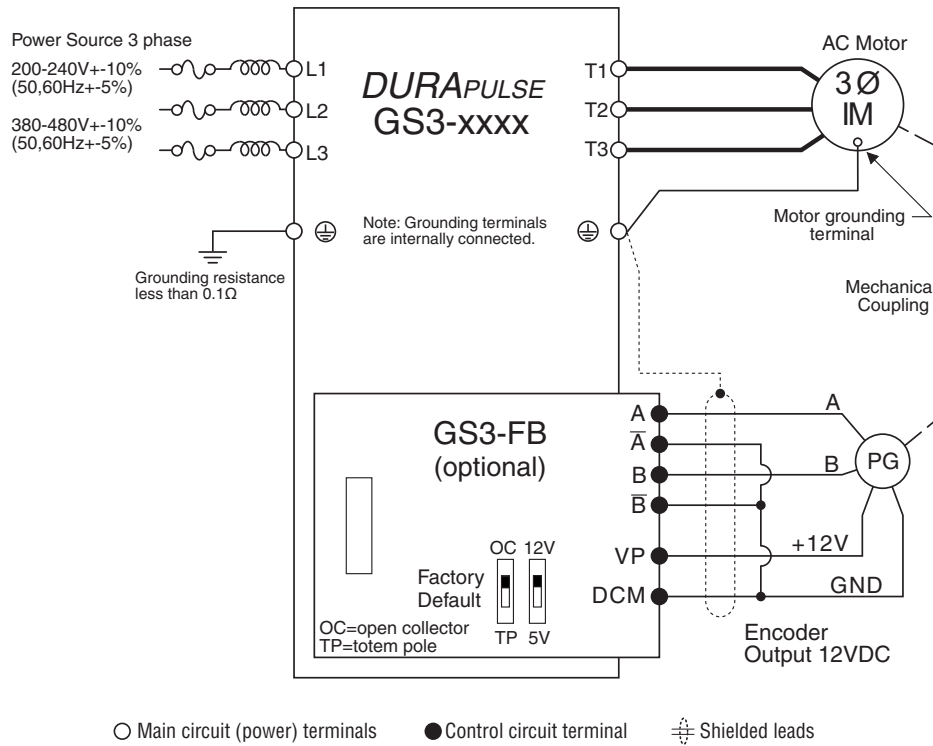


Please refer to instructions supplied with product for additional installation information.

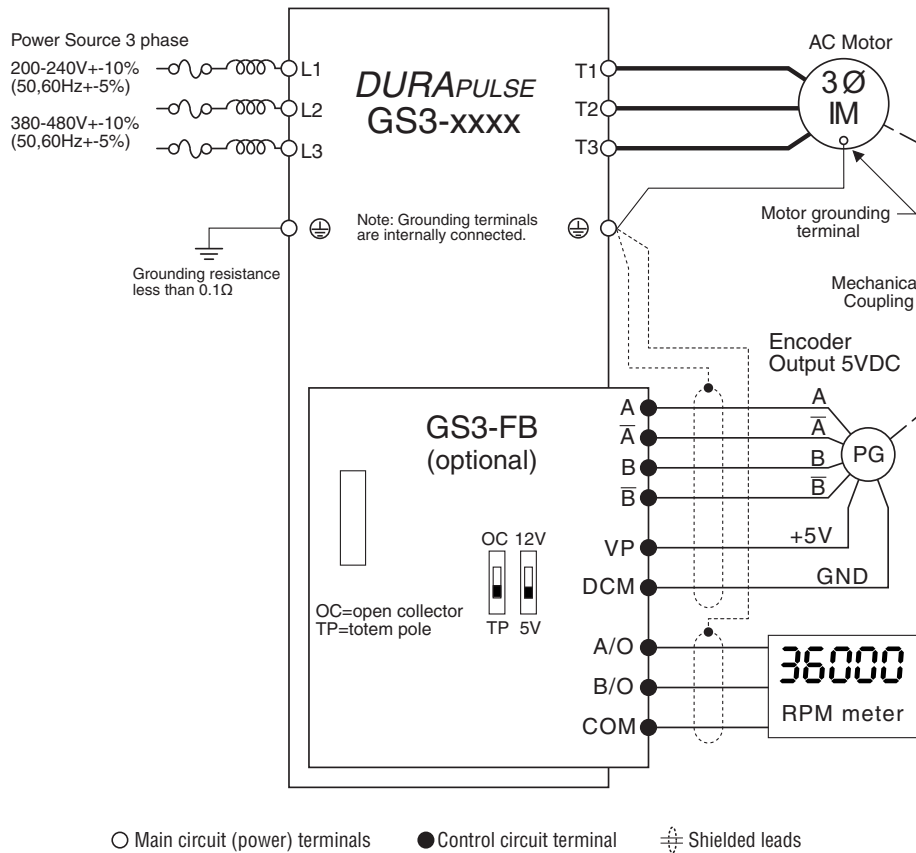
Control Terminals Block Designations



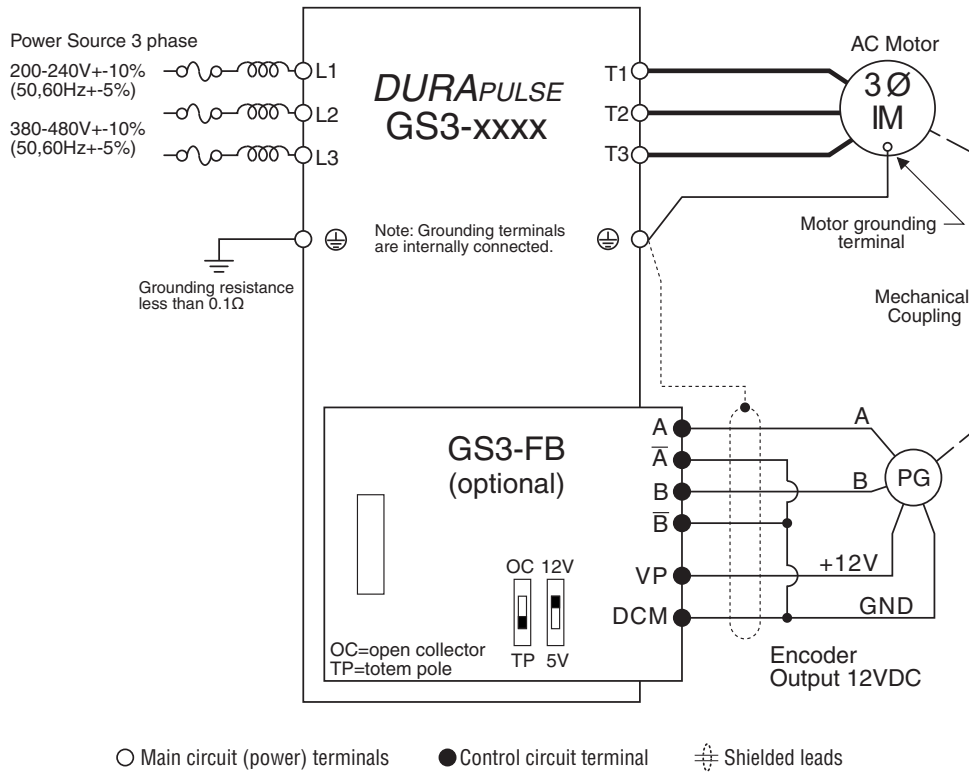
GS3-FB Basic Wiring Diagram – Open Collector type Encoder



GS3-FB Basic Wiring Diagram – Line Driver type Encoder with RPM Meter



GS3-FB Basic Wiring Diagram – Output Voltage or Complimentary type Encoder



Types of Encoders and Dip Switch Settings

Types of Encoders		SW1 and SW2 switches	
		5V	12V
Output Voltage			
Open collector			
Line driver			
Complimentary			

Ethernet Interface GS-EDRV(xxx)

GS-EDRV(xxx) Specifications			
Part Number	Input Voltage	Input Current	Ethernet Communication
GS-EDRV	10-33 VDC	90-135 mA	10BaseT
GS-EDRV100	10-36 VDC	50-220 mA	10/100Mbps
<i>Can be used with all DURAPULSE and other GS AC drives.</i>			

GS-EDRV(xxx) Ethernet Interfaces provide low-cost, high-performance Ethernet links between control systems and any *DURAPULSE* or other GS-series AC Drives. With the appropriate cable connections and, if needed, Ethernet switches or hubs, the GS-EDRV(xxx) allows you to communicate with your AC drives over qualified Ethernet networks.

The control systems can be any of the following:

- DL205 CPU, DL405 CPU, or a WinPLC, with the appropriate Ethernet Remote Master module (H2-ERM or H4-ERM).
- A Productivity3000 CPU using the onboard Ethernet port.
- A PC running Entivity's ThinknDo software, a PC using a custom device driver that was developed using our Ethernet SDK, or a PC running *KEPDirect* EBC or OPC Server.
- Any independent I/O controller with a Modbus TCP/IP driver.

The control function is performed by one of the control systems mentioned above. The I/O mapping function is performed by an H2(4)-ERM module (purchased separately). The H2(4)-ERM module is configured with the ERM Workbench Utility which is part of the *DirectSOFT* PLC programming software.

The functions of the GS-EDRV(xxx) interface are as follows:

- process input signals from the AC drive.
- format these signals to conform to the Ethernet standard.
- transmit converted signals to the control system.
- receive and translate output signals from the control system.
- distribute the output signals to the appropriate drive.
- DIN-rail mounting.
- built-in web browser allows users to configure and control the drive from any web browser via the IP address of the GS-EDRV(xxx).



The GS-EDRV(xxx) requires an external 24 VDC power supply.



The GS series drives have a provision for shutting down control or power to the drive in the event of a communications time-out. This function can be set up through the drive parameter group 9.

Refer to the "GS Series AC Drive Ethernet Interface User Manual" or www.AutomationDirect.com for detailed information.

ZIPLink™ Cables for RS-485 Modbus RTU

ZIPLink communication cables make it very easy to set up RS-485 Modbus RTU control of a single *DURAPULSE* AC drive from a *DirectLOGIC* DL06 or D2-260 PLC.



GS-485HD15-CBL-2

PLC Connections for RS-485 Modbus RTU Control of <i>DURAPULSE</i> Drive					
Drive	PLC * or Device	PLC Port *	Communication	Direct Cable	Length
DURAPULSE (GS3)	CLICK	3	RS-485	ZL-RJ12-CBL-2P ***	2m [6.6 ft] ***
	DL05	2 **	RS-232 – RS-485 **	N/A **	
	DL06 D0-DCM	2	RS-485	GS-485HD15-CBL-2 ***	2m [6.6 ft] ***
	D2-DCM D2-250(-1)	2 **	RS-232 – RS-485 **	N/A **	
	D2-260	2	RS-485	GS-485HD15-CBL-2 ***	2m [6.6 ft] ***
	D4-450	3 **	RS-232 – RS-485 **	N/A **	
	FA-ISOCAN		RS-485	GS-ISOCAN-CBL-2	2m [6.6 ft] ***
	GS-EDRV100		RS-485	GS-EDRV-CBL-2	2m [6.6 ft] ***
	ZL-CDM-RJ12Xxx		RS-485	GS-485RJ12-CBL-2	2m [6.6 ft] ***

* If a PLC type or port is not listed in this chart, it cannot function as a Modbus RTU master.
 ** Requires RS-232–RS-485 converter & generic cabling options described in Ch5 “GS1 Modbus Communications”.
 *** Termination resistors not required due to short cable length.



In addition to these GS-specific cables, the ZIPLink product line also includes other components which can be useful for Modbus wiring, including distribution modules for wiring connections to multiple drives.

For more information, refer to Ch5 “GS1 Modbus Communications” or to www.automationdirect.com/static/specs/fzipselection.pdf.

GS Drive Configuration Software

GSoft is the configuration software for the Automation Direct GS family of drives. It is designed to allow you to connect a personal computer to drives in the GS family, and perform a variety of functions:

- Upload/download drive configurations
- Create new drive configurations using Quick Start, Detailed, or Schematic Views
- Edit drive configurations
- Archive/store multiple drive configurations on your PC
- Trend drive operation parameters
- Tune the drive PID loop
- View real time key operating parameters
- Start/Stop drive and switch directions, provided drive is set up for remote operation
- View drive faults
- Print a schematic representation of the drive configuration
- Print a tabular report of the current drive configuration.

GSoft includes an integral help file with software instructions.

System Requirements

GSoft will run on PCs that meet the following requirements:

- Windows 95, 98, Me, NT, 2000, and XP
- Internet Explorer 4.0 or higher (for HTML help support)
- 24 Mb of available memory
- 8Mb hard drive space
- Available RS-232 serial port



GSoft requires use of a configuration cable, GS-232CBL, which is sold separately. RS-485 communication from an RS-232 PC port requires an FA-ISOCAN or compatible converter, which is sold separately.



Miscellaneous Accessories

Configuration Cable

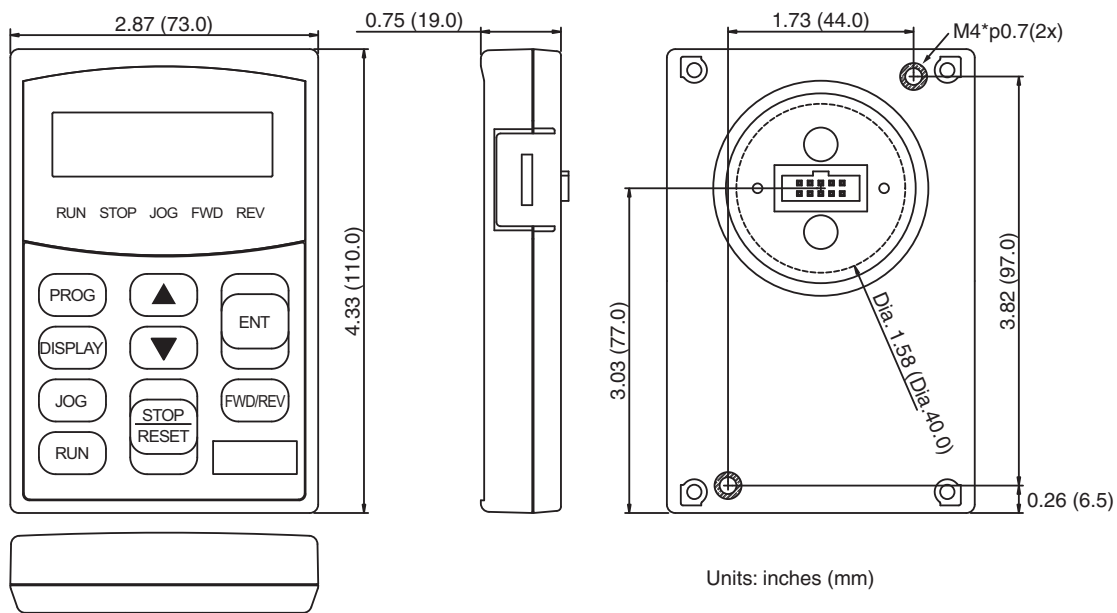
GS-232CBL

Required programming cable for GSOFT software.

Spare Keypad

GS3-KPD

Spare or replacement keypad for *DURAPULSE* AC drives.



Keypad Cables (installation screws included)

GS-CBL2-1L

1 meter keypad cable

GS-CBL2-3L

3 meter keypad cable

GS-CBL2-5L

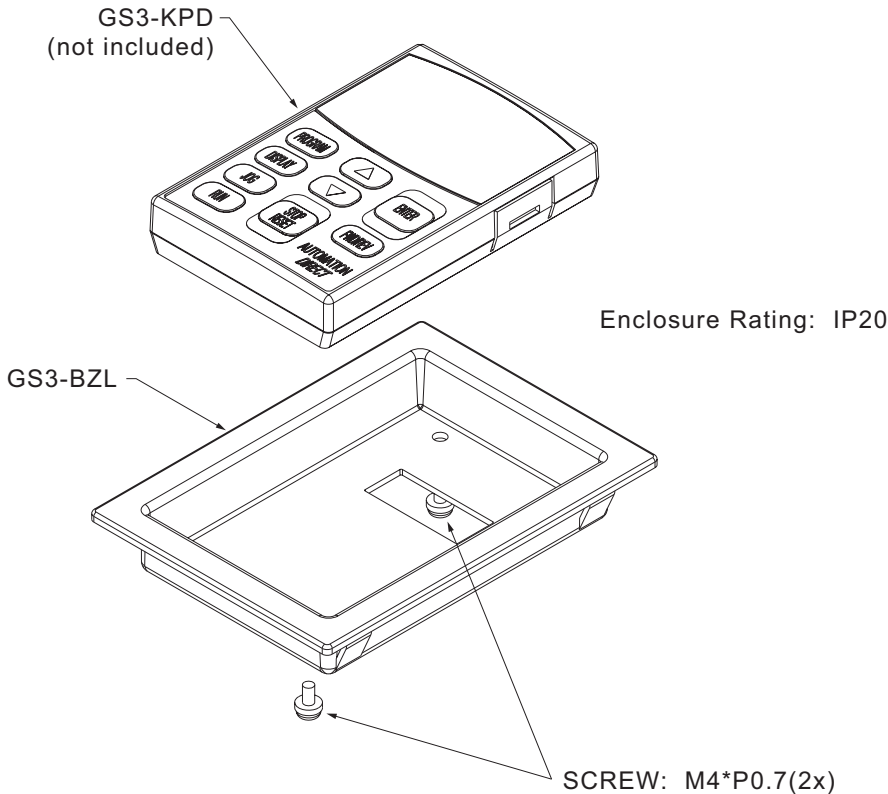
5 meter keypad cable



Remote Panel Adapter, GS3-BZL

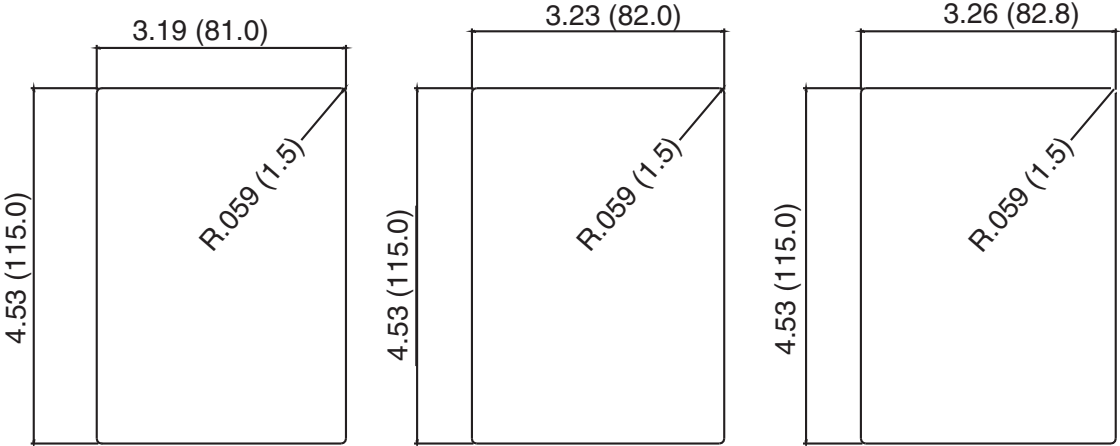
For remote mounting of *DURAPULSE* removable keypad.

Mounting Instructions



The thickness of the panel will determine required screw hole dimensions:

$t = .0393 (1.0) - .0551 (1.4)$ $t = .629 (1.6) - .0787 (2.0)$ $t = .0866 (2.2) - .1181 (3.0)$

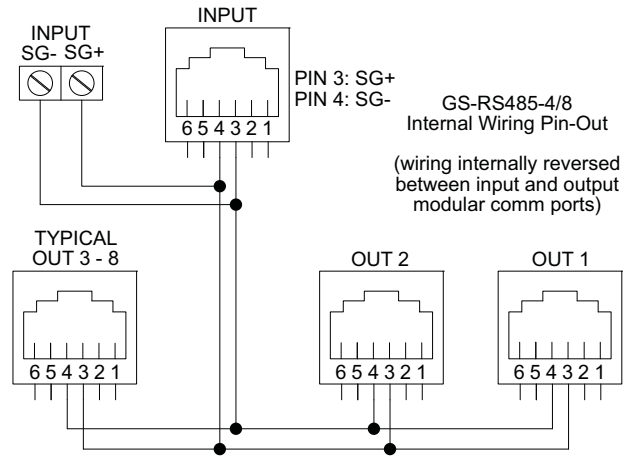


Units: inches(mm)

Communication Distribution Blocks – Legacy GS Series

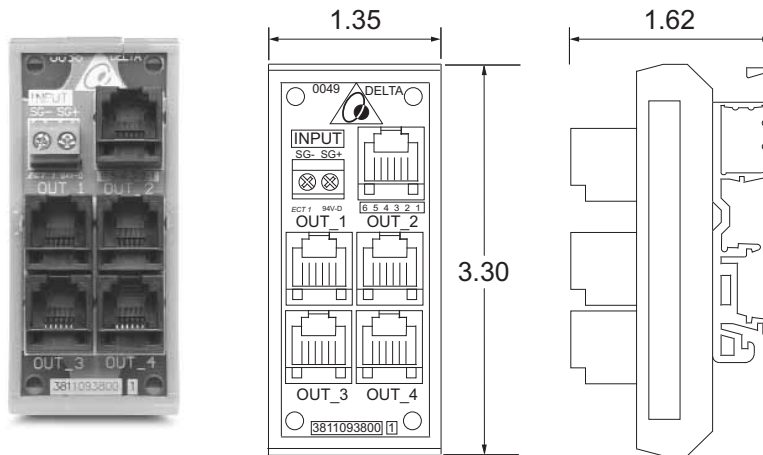
(Do not use for new installations. For new installations, please consider AutomationDirect Z/PLink ZL-CDM-RJ12Xxx distribution modules.)

Using the RS-485 communication board (GS-RS485-4 or GS-RS485-8) provides an easy means to break out the RS-485 signal to several drives at one location. This is a star configuration, but the transmission errors are negligible, so this configuration is acceptable for proper operation of the VFDs.



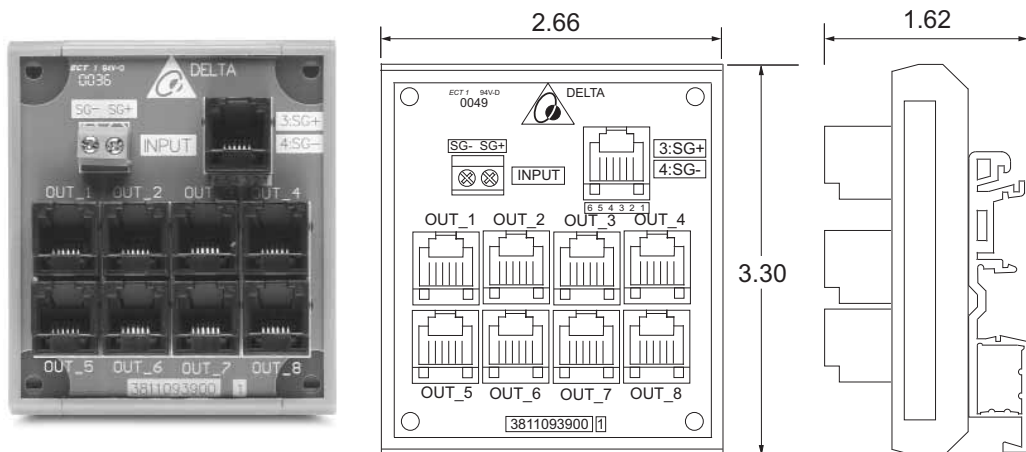
GS-RS485-4

4-port RS485 Communication Distribution Board



GS-RS485-8

8-port RS485 Communication Distribution Board



Replacement Accessories – Cooling Fans

All *DURAPULSE* AC drives have built-in cooling fans, and replacement fans are also available. These fans are direct replacements for the internal factory-installed fans.



Installation instructions are included with the fans.



Fan replacement should only be performed by personnel skilled in the disassembly and repair of variable frequency AC drives.

Replacement Fans for <i>DURAPULSE</i> (GS3 Series) AC Drives				
Part Number ⁽¹⁾	Specifications ⁽²⁾	Fans / Drive ⁽³⁾	GS3 Drive Model ⁽⁴⁾	Drive V / HP
GS-FAN-1	50 mm, 12 VDC, 0.25A	1	GS3-43P0	460 / 3
GS-FAN-2	60 mm, 12 VDC, 0.25A	1	GS3-23P0	230 / 3
			GS3-25P0	230 / 5
			GS3-45P0	460 / 5
GS-FAN-3	80 mm, 12 VDC, 0.42A	2	GS3-27P5	230 / 7.5
			GS3-2010	230 / 10
			GS3-2015	230 / 15
			GS3-47P5	460 / 7.5
			GS3-4010	460 / 10
			GS3-4015	460 / 15
GS-FAN-4	92 mm, 24 VDC, 0.30A	2	GS3-2020	230 / 20
			GS3-2025	230 / 25
			GS3-2030	230 / 30
			GS3-4020	460 / 20
			GS3-4025	460 / 25
			GS3-4030	460 / 30
GS-FAN-5	120 mm, 24 VDC, 1.2A	2	GS3-2040	230 / 40
			GS3-2050	230 / 50
			GS3-4040	460 / 40
			GS3-4050	460 / 50
			GS3-4060	460 / 60
			GS3-4075	460 / 75
			GS3-4100	460 / 100

1) One fan per part number. Includes connectorized electrical cable and installation instructions.

2) Fans are replacements for the internal fans in GS3 drives, are dimensionally and electrically equivalent to the originals, and are not intended for other use. Fan electrical loading is included in the input amperage ratings of the drives, and DC voltage is internally provided by the drives.

3) Some drives require multiple fans.

4) Can be used only with applicable *DURAPULSE* AC Drive.

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