

GETTING STARTED



CHAPTER 1

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USER MANUAL OVERVIEW

OVERVIEW OF THIS PUBLICATION

The *DURAPULSE* GS4 AC Drive User Manual describes the installation, configuration, and methods of operation of the *DURAPULSE* GS4 Series AC Drive.

WHO SHOULD READ THIS MANUAL

This manual contains important information for those who will install, maintain, and/or operate any of the GS4 Series AC Drives.

SUPPLEMENTAL PUBLICATIONS

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

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

TECHNICAL SUPPORT

By Telephone: 770-844-4200

(Mon.–Fri., 9:00 a.m.–6:00 p.m. E.T.)

On the Web: www.automationdirect.com

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

We also encourage you to visit our web site where you can find technical and non-technical information about our products and our company. Visit us at www.automationdirect.com.

SPECIAL SYMBOLS



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



WARNING: WHEN YOU SEE THE “EXCLAMATION MARK” ICON IN THE LEFT-HAND MARGIN, THE PARAGRAPH TO ITS IMMEDIATE RIGHT WILL BE A WARNING. THIS INFORMATION COULD PREVENT INJURY, LOSS OF PROPERTY, OR EVEN DEATH (IN EXTREME CASES).

PURPOSE OF AC DRIVES

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

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

SELECTING THE PROPER DRIVE RATING

DETERMINE MOTOR FULL-LOAD AMPERAGE (FLA)

Motor FLA is located on the nameplate of the motor.

NOTE: FLA of motors that have been rewound may be higher than stated.

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.

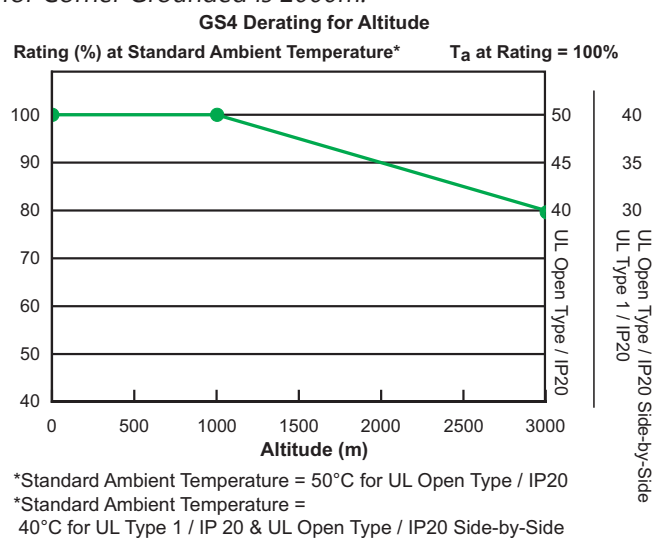
SELECTING THE PROPER DRIVE RATING (CONTINUED)**INSTALLATION ALTITUDE**

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. Most AC 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 1000~3000m, 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.



SELECTING THE PROPER DRIVE RATING (CONTINUED)**DETERMINE MAXIMUM ENCLOSURE INTERNAL TEMPERATURE**

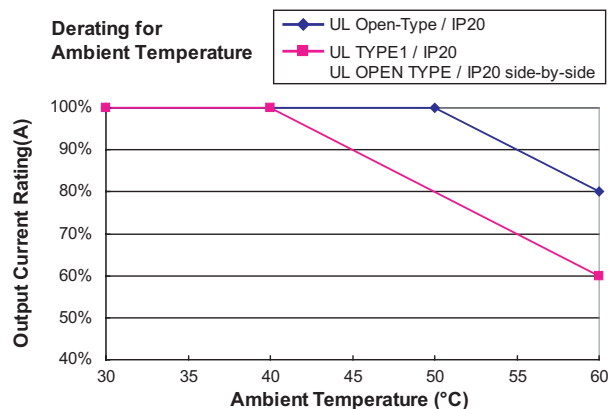
AC drives generate a significant amount of heat and will cause the internal temperature of an enclosure to exceed the rating of the AC drive, even when the ambient temperature is less than 104°F (40°C). Enclosure ventilation and/or cooling may be required to maintain a maximum internal temperature of 104°F (40°C) or less. Ambient temperature measurements/calculations should be made for the maximum expected temperature. When permissible, flange mounting the AC drive (mounting with the drive heatsink in open ambient air) can greatly reduce heating in the enclosure.



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)

Drive Derating by Temperature and Protection Level	
Protection Level	Derating
UL Type 1 / IP20 *	When the GS4 drive is operating at rated current, the ambient temperature has to be between -10°C and +40°C. When ambient temperature exceeds 40°C, decrease the rated current by 2% for every 1°C temperature increase. Maximum allowable temperature is 60°C.
UL Open Type / IP20 *	When the GS4 drive is operating at rated current, the ambient temperature has to be between -10°C and +50°C. When ambient temperature exceeds 50°C, decrease the rated current by 2% for every 1°C temperature increase. Maximum allowable temperature is 60°C.
* For more information about environmental ratings, refer to the "Operating Temperature and Protection Level" table on page 1-9 of this chapter.	



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 AC drives, the Carrier Frequency can range from 2kHz to 15kHz. The Carrier Frequency can be adjusted in most AC Drives.

There are trade-offs between choosing 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

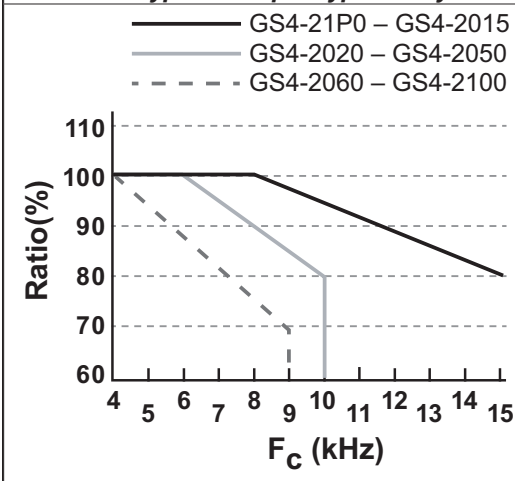
As a general rule, the Carrier Frequency should be set as low as possible without creating unacceptable audible noise in the motor. Smaller systems can have higher Carrier Frequencies, but larger drives (>20 or 30hp) should not have Carrier Frequencies set higher than 6kHz. Heavy Duty applications typically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

SELECTING THE PROPER DRIVE RATING (CONTINUED)**CARRIER FREQUENCY DERATING (CONTINUED)**

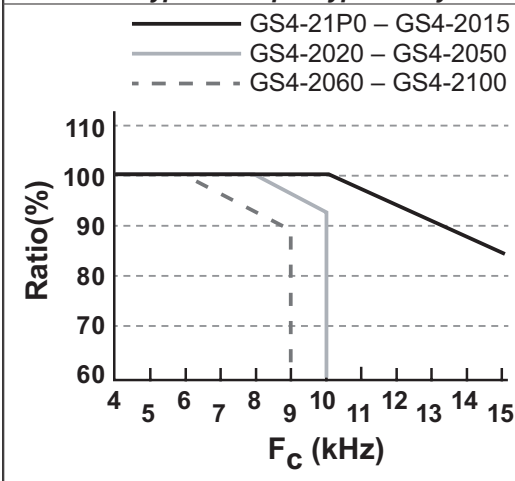
These Variable Torque (VT) and Constant Torque (CT) derating curves are for drives with 3-phase input power. The 230VAC, CT curves also apply equally whether the drive is supplied with 3-phase or 1-phase input power.

230V VARIABLE TORQUE CARRIER FREQUENCY DERATING

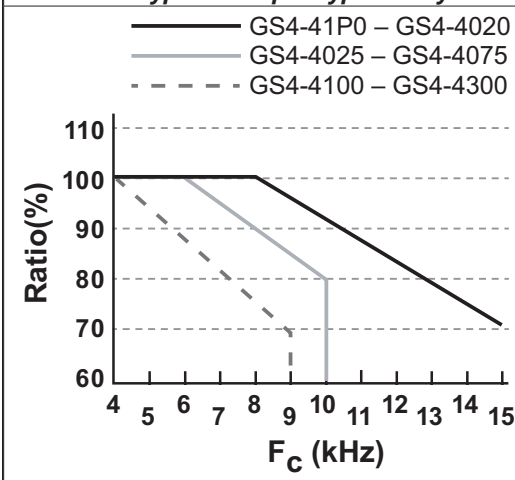
For 230V Variable Torque
VT/CT Duty Selection P6.34 = 0
Method of Derating P6.33 = 0, 1, or 2
50°C UL Open Type
40°C UL Type 1 or Open Type side-by-side



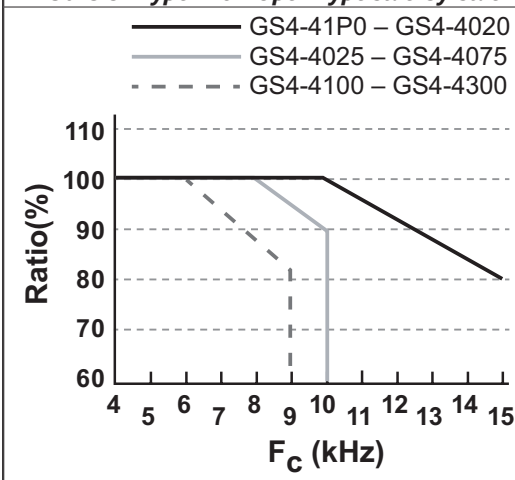
For 230V Variable Torque
VT/CT Duty Selection P6.34 = 0
Method of Derating P6.33 = 0 or 2
40°C UL Open Type
30°C UL Type 1 or Open Type side-by-side

**460V VARIABLE TORQUE CARRIER FREQUENCY DERATING**

For 460V Variable Torque
VT/CT Duty Selection P6.34 = 0
Method of Derating P6.33 = 0, 1, or 2
50°C UL Open Type
40°C UL Type 1 or Open Type side-by-side



For 460V Variable Torque
VT/CT Duty Selection P6.34 = 0
Method of Derating P6.33 = 0 or 2
40°C UL Open Type
30°C UL Type 1 or Open Type side-by-side



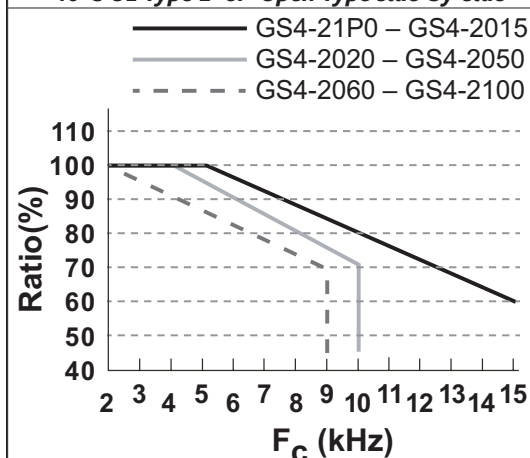
Reference Chapter 4, Parameters, for complete descriptions of parameters P6.33 and P6.34.



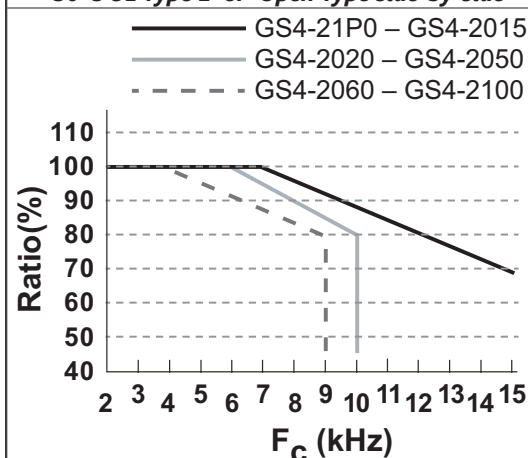
When working with P6.33 (Drive Derating Method), and P6.34 (VT/CT Duty Selection), refer to P2.10 (PWM Carrier Frequency) for the carrier frequency setting. When P6.34 is set it will change P2.10, while P6.00/P6.02 (Electronic Thermal Overload Relay (Motor1)/(Motor2)) must be set independently.

SELECTING THE PROPER DRIVE RATING (CONTINUED)**CARRIER FREQUENCY DERATING (CONTINUED)****230V CONSTANT TORQUE CARRIER FREQUENCY DERATING**

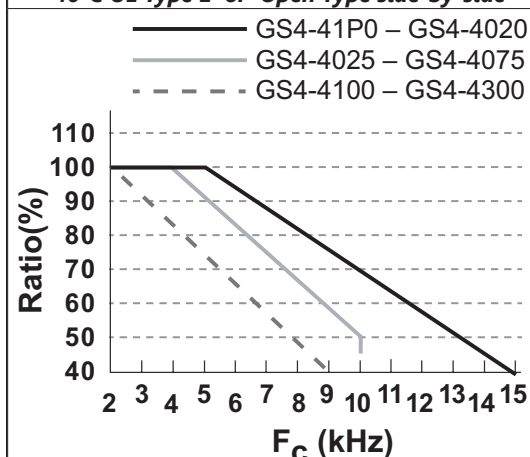
For 230V Constant Torque
 VT/CT Duty Selection P6.34 = 1
 Method of Derating P6.33 = 0, 1, or 2
 50°C UL Open Type
 40°C UL Type 1 or Open Type side-by-side



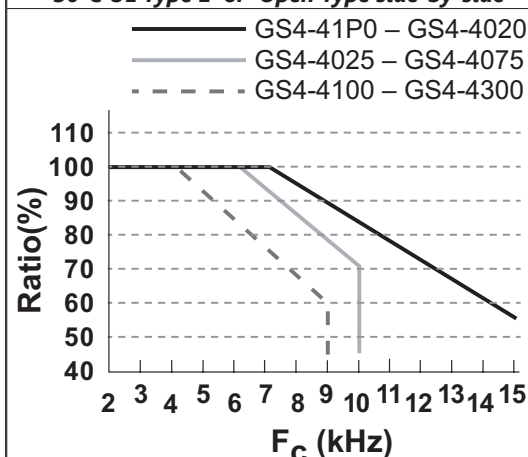
For 230V Constant Torque
 VT/CT Duty Selection P6.34 = 1
 Method of Derating P6.33 = 0 or 2
 40°C UL Open Type
 30°C UL Type 1 or Open Type side-by-side

**460V CONSTANT TORQUE CARRIER FREQUENCY DERATING**

For 460V Constant Torque
 VT/CT Duty Selection P6.34 = 1
 Method of Derating P6.33 = 0, 1, or 2
 50°C UL Open Type
 40°C UL Type 1 or Open Type side-by-side



For 460V Constant Torque
 VT/CT Duty Selection P6.34 = 1
 Method of Derating P6.33 = 0 or 2
 40°C UL Open Type
 30°C UL Type 1 or Open Type side-by-side



Reference Chapter 4, Parameters, for complete descriptions of parameters P6.33 and P6.34.



When working with P6.33 (Drive Derating Method), and P6.34 (VT/CT Duty Selection), refer to P2.10 (PWM Carrier Frequency) for the carrier frequency setting. When P6.34 is set it will change P2.10, while P6.00/P6.02 (Electronic Thermal Overload Relay (Motor1)/(Motor2)) must be set independently.

DURAPULSE GS4 AC DRIVE ENVIRONMENTAL INFORMATION

STORAGE AND TRANSPORTATION


AC drives should be kept in the shipping cartons or crates until they are installed. In order to retain the warranty coverage, they should be stored as described below if not to be installed and used within three months.

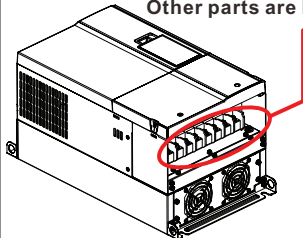
- Store in a clean and dry location free from direct sunlight and corrosive fumes.
- Store within environmental conditions shown below in the "Environmental Conditions" table.
- DO NOT store in an area with rapid changes in temperature, to avoid condensation and frost.
- DO NOT place directly on the ground.



If the drive is stored or is otherwise unused for more than a year, the drive's internal DC link capacitors should be recharged before use. Otherwise, the capacitors may be damaged when the drive starts to operate. We recommend recharging the capacitors of any unused drive at least once per year. (Refer to Chapter 6, "Maintenance and Troubleshooting" for information about recharging DC link capacitors.)

ENVIRONMENTAL CONDITIONS

Environmental* Conditions for GS4 AC Drives			
Condition	Operation	Storage	Transportation
Installation Location	IEC60364-1/IEC60664-1 Pollution degree 2, Indoor use only	n/a	n/a
Ambient Temperature	see separate Operating Temperature table below	-25°C to +70°C	
	allowed only in non-condensation, non-frost, non-conductive environment		
Relative Humidity	Max 95%; allowed only in non-condensation, non-frost, non-conductive environment		
Air Pressure	86 to 106 kPa		70 to 106 kPa
Pollution Level	IEC60721-3-3; allowed only in non-condensation, non-frost, non-conductive environment		
	Class 3C2; Class 3S2	Class 1C2; Class 1S2	Class 2C2; Class 2S2
Altitude	0~1000m (see separate derating section for altitudes of 1000~3000m)	n/a	n/a
Package Drop	n/a	ISTA procedure 1A (according to weight) IEC60068-2-31	
Vibration	1.0mm, peak to peak value range from 2Hz to 13.2 Hz; 0.7G~1.0G range from 13.2Hz to 55Hz; 1.0G range from 55Hz to 512 Hz. Comply with IEC 60068-2-6		
Impact	IEC/EN 60068-2-27		
Installation Orientation	10°→  ←10°		
	Max allowed offset angle ±10° (from vertical installation position)		
DO NOT expose the GS4 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/cm² every year.			

Operating Temperature and Protection Level					
Frame Size		Top cover	Conduit Box	Protection Level	Operating Temperature
A~C	230V: 1.0~30 hp	With top cover removed	Standard conduit plate	IP20 / UL Open Type	-10~50°C [14~122°F]
	460V: 1.0~40 hp	With top cover in place		IP20 / UL Type1 / NEMA1	-10~40°C [14~104°F]
D0~G	230V: >30hp	N/A	With conduit box	IP20 / UL Type1 / NEMA1	-10~40°C [14~104°F]
	460V: >40hp	N/A	Without conduit box	IP00 / IP20 / UL Open Type * Only the circled area is IP00. Other parts are IP20. 	-10~50°C [14~122°F]

* Only the exposed terminal blocks are IP00; the other components are IP20

* Only the exposed terminal blocks are IP00; the other components are IP20

DURAPULSE GS4 AC DRIVE SPECIFICATIONS**230V CLASS**

230V Class GS4 Model-Specific Specifications; Frame Sizes A~B											
For Use With Three-Phase Motors Only											
Model Name: GS4-xxxx				21P0	22P0	23P0	25P0	27P5	2010	2015	
Frame Size				A				B			
Output Rating	Constant Torque (CT)	Max Motor Output (1-phase/3-phase)	hp	0.5/1	0.75/2	1/3	2/5	3/7.5	3/10	5/15	
			kW	0.37/0.75	0.55/1.5	0.75/2.2	1.5/3.7	2.2/5.5	2.2/7.5	3.7/11	
		Rated Output Capacity (1-phase/3-phase)	kVA	1.0/1.9	1.3/2.8	2.0/4.0	3.2/6.4	4.4/9.6	4.4/12	6.8/19	
		Rated Output Current (1-phase/3-phase)	A	2.4/4.8	3.2/7.1	5/10	8/16	11/24	11/31	17/47	
		Carrier Frequency	kHz	2 to 6							
	Variable Torque (VT)	Max Motor Output	hp	1	2	3	5	7.5	10	15	
			kW	0.75	1.5	2.2	3.7	5.5	7.5	11	
		Rated Output Capacity	kVA	2.0	3.2	4.4	6.8	10	13	20	
		Rated Output Current	A	5	8	11	17	25	33	49	
		Carrier Frequency	kHz	2 to 15							
Input Rating *	CT	Rated Input Current * (1-phase/3-phase)	A	6.4/6.1	9.7/11	15/15	20/18.5	26/26	26/34	40/50	
	VT	Rated Input Current *	A	6.4	12	16	20	28	36	52	
	VT CT	Rated Voltage/Frequency	1-phase/3-phase 200~240 VAC (-15% to +10%), 50/60Hz								
			3-phase 200~240 VAC (-15% to +10%), 50/60Hz								
	Operating Voltage Range			170~265 VAC							
	Frequency Tolerance			47~63 Hz							
	Short Circuit Withstand (SCCR) (A, rms symmetrical)			100kA							
IE2 Efficiency – Relative Power Loss				3.1%	2.8%	2.5%	2.1%	2.3%	2.1%	2.2%	
Weight (kg [lb])				2.6 [5.7]				5.4 [11.9]			
Watt Loss 100% I (W)				61	88	115	159	264	335	529	
Cooling Method				Air-cooled	fan						
Braking Chopper				built in							
DC Reactor				optional							
EMI Filter				optional							
* If 3-phase power source is non-symmetrical, refer to “Circuit Connections – RFI Jumper” in Chapter 2: Installation and Wiring, page 2-14 .											
* Please refer to “Appendix A: Accessories” for input fusing information.											
Note: For single phase models with identical HP and current ratings, choosing a larger size drive will provide greater tolerance to heavy current and loads.											

230V Class GS4 Model-Specific Specifications; Frame Sizes C~E												
For Use With Three-Phase Motors Only												
Model Name: GS4-xxxx				2020	2025	2030	2040	2050	2060	2075	2100	
Frame Size				C			D		E			
Output Rating	Constant Torque (CT)	Max Motor Output (1-phase/3-phase)	hp	7.5/20	10/25	10/30	10/40	10/50	15/60	20/75	25/100	
			kW	5.5/15	7.5/18.5	7.5/22	7.5/30	7.5/37	11/45	15/55	18.5/75	
		Rated Output Capacity (1-phase/3-phase)	kVA	10/25	13/28	13/34	13/45	13/55	20/68	26/81	30/96	
			A	25/62	33/71	33/86	33/114	33/139	49/171	65/204	75/242	
		Carrier Frequency	kHz	2 to 6								
	Variable Torque (VT)	Max Motor Output	hp	20	25	30	40	50	60	75	100	
			kW	15	18.5	22	30	37	45	55	75	
		Rated Output Capacity	kVA	26	30	36	48	58	72	86	102	
		Rated Output Current	A	65	75	90	120	146	180	215	255	
		Carrier Frequency	kHz	2 to 10			2 to 6					
Input Rating *	CT	Rated Input Current * (1-phase/3-phase)	A	58/68	76/78	76/95	63/118	63/136	94/162	124/196	143/233	
	VT	Rated Input Current *	A	72	83	99	124	143	171	206	245	
	CT VT	Rated Voltage/Frequency	1-phase/3-phase 200~240 VAC (-15% to +10%), 50/60Hz									
			3-phase 200~240 VAC (-15% to +10%), 50/60Hz									
	Operating Voltage Range			170~265 VAC								
	Frequency Tolerance			47~63 Hz								
	Short Circuit Withstand (SCCR) (A, rms symmetrical)			100kA								
IE2 Efficiency – Relative Power Loss				2.3%	2.4%	2.3%	1.9%	2.1%	1.9%	1.9%	2.7%	
Weight (kg [lb])				9.8 [21.6]			38.5 [84.9]		64.8 [143]			
Watt Loss 100% I (W)				616	733	865	1099	1311	1518	1709	2139	
Cooling Method				fan								
Braking Chopper				built in			optional					
DC Reactor				optional			built in					
EMI Filter				optional								
* If 3-phase power source is non-symmetrical, refer to “Circuit Connections – RFI Jumper” in Chapter 2: Installation and Wiring, page 2-14 .												
* Please refer to “Appendix A: Accessories” for input fusing information.												
Note: For single phase models with identical HP and current ratings, choosing a larger size drive will provide greater tolerance to heavy current and loads.												

460V CLASS

460V Class GS4 Model-Specific Specifications												
Model Name: GS4-xxxx				41P0	42P0	43P0	45P0	47P5	4010	4015	4020	
Frame Size				A					B			
Output Rating	Constant Torque (CT)	Max Motor Output	hp	1	2	3	5	7.5	10	15	20	
			kW	0.75	1.5	2.2	3.7	5.5	7.5	11	15	
		Rated Output Capacity	kVA	2.3	3.0	4.5	6.5	8.8	14	18	24	
		Rated Output Current	A	2.9	3.8	5.7	8.1	11	17	23	30	
		Carrier Frequency	kHz	2 to 6								
	Variable Torque (VT)	Max Motor Output	hp	1	2	3	5	7.5	10	15	20	
			kW	0.75	1.5	2.2	3.7	5.5	7.5	11	15	
		Rated Output Capacity	kVA	2.4	3.2	4.8	7.2	9.6	14	19	25	
		Rated Output Current	A	3	4	6	9	12	18	24	32	
		Carrier Frequency	kHz	2 to 15								
Input Rating *	CT	Rated Input Current	A	4.1	5.6	8.3	13	16	19	25	33	
	VT			4.3	5.9	8.7	14	17	20	26	35	
	Rated Voltage/Frequency			3-phase 380~480 VAC (-15% to +10%), 50/60Hz								
	Operating Voltage Range			323~528 VAC								
	Frequency Tolerance			47~63 Hz								
	Short Circuit Withstand (SCCR) (A, rms symmetrical)			100kA								
IE2 Efficiency – Relative Power Loss				2.6%	2.3%	2.2%	2.0%	1.9%	2.1%	2.0%	1.8%	
Weight (kg [lb])				2.6 [5.7]					5.4 [11.9]			
Watt Loss 100% I (W)				59	74	104	141	180	292	380	518	
Cooling Method				natural convection		fan						
Braking Chopper				built in								
DC Reactor				optional								
EMI Filter				optional								
* If 3-phase power source is non-symmetrical, refer to “Circuit Connections – RFI Jumper” in Chapter 2: Installation and Wiring, page 2-14 . Please refer to “Appendix A: Accessories” for input fusing information.												

460V Class GS4 Model-Specific Specifications (continued)											
Model Name: GS4-xxxx				4025	4030	4040	4050	4060	4075	4100	
Frame Size				C			D0		D		
Output Rating	Constant Torque (CT)	Max Motor Output	hp	25	30	40	50	60	75	100	
			kW	18.5	22	30	37	45	55	75	
		Rated Output Capacity	kVA	29	34	45	55	69	84	114	
		Rated Output Current	A	36	43	57	69	86	105	143	
		Carrier Frequency	kHz	2 to 6							
	Variable Torque (VT)	Max Motor Output	hp	25	30	40	50	60	75	100	
			kW	18.5	22	30	37	45	55	75	
		Rated Output Capacity	kVA	30	36	48	58	73	88	120	
		Rated Output Current	A	38	45	60	73	91	110	150	
Carrier Frequency		kHz	2 to 10								
Input Rating *	CT	Rated Input Current	A	38	45	60	70	96	108	149	
	VT		40	47	63	74	101	114	157		
	Rated Voltage/Frequency			3-phase 380~480 VAC (-15% to +10%), 50/60Hz							
	Operating Voltage Range			323~528 VAC							
	Frequency Tolerance			47~63 Hz							
	Short Circuit Withstand (SCCR) (A, rms symmetrical)			100kA							
	IE2 Efficiency – Relative Power Loss			1.6%	1.6%	1.6%	1.6%	1.6%	1.4%	1.3%	
Weight (kg [lb])				9.8 [21.6]			27.0 [59.5]		38.5 [84.9]		
Watt Loss 100% I (W)				507	635	866	993	1147	1413	1742	
Cooling Method				fan							
Braking Chopper				built in			optional				
DC Reactor				optional			built in				
EMI Filter				optional							

* If 3-phase power source is non-symmetrical, refer to “Circuit Connections – RFI Jumper” in Chapter 2: Installation and Wiring, [page 2-14](#).
Please refer to “Appendix A: Accessories” for input fusing information.

460V Class GS4 Model-Specific Specifications (continued)									
Model Name: GS4-xxxx				4125	4150	4175	4200	4250	4300
Frame Size				E		F		G	
Output Rating	Constant Torque (CT)	Max Motor Output	hp	125	150	175	215	250	300
			kW	90	110	132	160	185	220
		Rated Output Capacity	kVA	136	167	197	235	280	348
		Rated Output Current	A	171	209	247	295	352	437
	Carrier Frequency	kHz	2 to 6						
	Variable Torque (VT)	Max Motor Output	hp	125	150	175	215	250	300
			kW	90	110	132	160	185	220
		Rated Output Capacity	kVA	143	175	207	247	295	367
		Rated Output Current	A	180	220	260	310	370	460
	Carrier Frequency	kHz	2 to 9						
Input Rating *	CT	Rated Input Current	A	159	197	228	285	361	380
	VT			167	207	240	300	380	400
	Rated Voltage/Frequency			3-phase 380~480 VAC (-15% to +10%), 50/60Hz					
	Operating Voltage Range			323~528 VAC					
	Frequency Tolerance			47~63 Hz					
	Short Circuit Withstand (SCCR) (A, rms symmetrical)			100kA					
IE2 Efficiency – Relative Power Loss				1.2%	1.2%	1.3%	1.3%	1.4%	1.5%
Weight (kg [lb])				64.8 [143]		86.5 [191]		134 [295]	
Watt Loss 100% I (W)				2092	2599	3081	3783	4589	5772
Cooling Method				fan					
Braking Chopper				optional					
DC Reactor				built in					
EMI Filter				optional					
* If 3-phase power source is non-symmetrical, refer to “Circuit Connections – RFI Jumper” in Chapter 2: Installation and Wiring, page 2-14 . Please refer to “Appendix A: Accessories” for input fusing information.									

SPECIFICATIONS APPLICABLE TO ALL GS4 MODELS

GS4 General Specifications (Applicable to All Models)		
Control Characteristics	Control Method	1: V/F (V/Hz control); 2: SVC (sensorless vector control)
	Starting Torque	Up to 120% (VT) or 150% (CT) for one minute
	V/F Curve	4 point adjustable V/F curve and square curve
	Speed Response Ability	5Hz
	Torque Limit	VT: 170% torque current CT: 180% torque current
	Torque Accuracy	±5%
	Max Output Frequency (Hz)	230V series: 599.00 Hz (75hp & above: 400.00 Hz) 460V series: 599.00 Hz (125hp & above: 400.00 Hz)
	Output Frequency Accuracy	Digital command: ±0.01%, -10°C to +40°C Analog command: ±0.1%, 25±10°C
	Output Frequency Resolution	Digital command: 0.01Hz Analog command: (0.03) x (max output frequency) / 60Hz [±11 bit]
	Overload Tolerance	VT duty: rated output current is 120% for 60 seconds CT duty: rated output current is 150% for 60 seconds
	Frequency Setting Signal	+10V to -10V, 0 to 10V, 4~20mA, 0~20mA
	Accel/Decel Time	0.00~600.00 / 0.0~6000.0 seconds
	Main Control Function	Fault restart; Parameter copy; Dwell; BACnet communication; Momentary power loss ride-through; Speed search; Over-torque detection; Torque limit; 16-step speed (max); Accel/Decel time switch; S-curve accel/decel; 3-wire sequence; Auto-Tuning (rotational, stationary); Frequency upper/lower limit settings; Cooling fan on/off switch; Slip compensation; Torque compensation; JOG frequency; MODBUS communication (RS-485 RJ45, max 115.2 kbps); DC injection braking at start/stop; Smart stall; PID control (with sleep function); Energy saving control
	Fan Control	230V model GS4-2020 and above: PMW control 230V model GS4-2015 and below: ON/OFF switch control 460V model GS4-4025 and above: PMW control 460V model GS4-4020 and below: ON/OFF switch control
Protection Characteristics	Motor Protection	Electronic thermal relay protection
	Over-current Protection	For drive model 230V and 460V: Over-current protection for 240% rated current Current clamp: VT duty 170~175%; CT duty 180~185%
	Over-voltage Protection	230V: drive will stop when DC-BUS voltage exceeds 410V 460V: drive will stop when DC-BUS voltage exceeds 820V
	Over-temperature Protection	Built-in temperature sensor
	Stall Prevention	Stall prevention during acceleration, deceleration, and running independently
	Restart After Instantaneous Power Failure	Parameter setting up to 20 seconds
	Ground Leakage Current Protection	Leakage current is higher than 50% of rated current of the AC motor drive
Agency Approvals		CE, cUL _{US} , Reach, RoHS (Agency approvals do not apply to accessory conduit box kits, fan kits, flange mount kits, and braking resistors.)

EFFICIENCY CLASS

The EU Ecodesign regulation directive establishes a framework to set mandatory ecological requirements for energy-using and energy-related products. The IEC 61800-9-2 standard defines the efficiency classes for AC drives. The efficiency classes range (low to high) from IE0 to IE2. These classes apply to AC drives rated 100 to 1000 V and 0.12 to 1000 kW (1/6 to 1,340 HP).

Drive manufacturers must declare power losses in terms of percentage of rated apparent output power at eight different operating points, as well as standby losses. The International Efficiency (IE) level is given at the nominal point.

The power losses of GS4 drives shall not exceed the maximum power losses corresponding to the IE2 efficiency level. For specific power losses of each drive model, see the drive specification tables.

RECEIVING AND INSPECTION

DRIVE PACKAGE CONTENTS

After receiving the GS4 AC drive, please check the following:

- 1) Make sure that the package includes the DURAPULSE GS4 AC drive and the DURAPULSE GS4 AC Drive Quick-Start Guide.
- 2) Carefully follow the unpacking instructions contained in this chapter of this user manual when unpacking your DURAPULSE GS4 AC drive.
- 3) Please inspect the unit after unpacking to assure it was not damaged during shipment. Make sure that the part number printed on the package corresponds with the part number indicated on the nameplate.
- 4) Make sure that the part number indicated on the nameplate corresponds with the part number of your order.
- 5) Make sure that the voltage for the wiring lies within the range as indicated on the nameplate. Please install the GS4 AC drive according to this manual.
- 6) Before applying the power, please make sure that all the devices, including power, motor, control board, and digital keypad are connected correctly.
- 7) When wiring the GS4 AC drive, please make sure that the wiring of input terminals “R/L1, S/L2, T/L3” and output terminals “U/T1, V/T2, W/T3” are correct to prevent drive damage.
- 8) When power is applied, select the language and set parameter groups via the digital keypad (GS4-KPD). When executing a trial run, please begin with a low speed, and then gradually increase the speed until the desired speed is reached.

The GS4 AC drive should be kept in the shipping carton or crate before installation. In order to retain the warranty coverage, the GS4 AC drive should be stored properly when it is not to be used for an extended period of time. Refer to the preceding “Environmental Information” section for proper storage conditions.

MODEL NUMBER EXPLANATION

GS4- 4 7P5

■ Applicable Motor Capacity*

1P0: 1.0hp	2P0: 2.0hp	3P0: 3.0hp	5P0: 5.0hp
7P5: 7.5hp	010: 10hp	015: 15hp	020: 20hp
025: 25hp	030: 30hp	040: 40hp	050: 50hp
060: 60hp	075: 75hp	100: 100hp	125: 125hp
150: 150hp	175: 175hp	200: 200hp	250: 250hp
300: 300hp			

*Not all capacities are available in each voltage.

■ Input Voltage

2: 230VAC
4: 460VAC

■ Series Name

NAMEPLATE INFORMATION

MODEL : GS4-21P0

INPUT : (Variable Torque / Constant Torque)

VT : 3PH 200-240V 50/60Hz 6.4A

CT : 3PH 200-240V 50/60Hz 6.1A

CT : 1PH 200-240V 50/60Hz 6.4A

OUTPUT : (Variable Torque / Constant Torque)

VT : 3PH 0-240V 5A 2.0KVA 0.75KW/1HP

CT : 3PH 0-240V 4.8A 1.9KVA 0.75KW/1HP

CT : 3PH 0-240V 2.4A 1.0KVA 0.37KW/0.5HP

FREQUENCY RANGE : 0-600Hz

SHORT CIRCUIT CURRENT : 100KA

IP20 / UL Open-Type with top cover removed
(rated -10°C to 50°C Ambient).

IP20 / NEMA 1 / UL Type 1 with top cover

Installed (rated -10°C to 40°C Ambient).

Refer to user manual.



GS4-21P0+W15170017

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MODEL : GS4-41P0

INPUT : (Variable Torque / Constant Torque)

VT : 3PH 380-480V 50/60Hz 4.3A

CT : 3PH 380-480V 50/60Hz 4.1A

OUTPUT : (Variable Torque / Constant Torque)

VT : 3PH 0-480V 3.0A 2.4KVA 0.75KW/1HP

CT : 3PH 0-480V 2.9A 2.3KVA 0.75KW/1HP

FREQUENCY RANGE : 0-600Hz

SHORT CIRCUIT CURRENT : 100KA

IP20 / UL Open-Type with top cover removed
(rated -10°C to 50°C Ambient).

IP20 / NEMA 1 / UL Type 1 with top cover

Installed (rated -10°C to 40°C Ambient).

Refer to user manual.



GS4-41P0+W15150001

Automationdirect.com

Ver : 01.00

MADE IN CHINA

UNPACKING YOUR GS4 DURAPULSE AC DRIVE

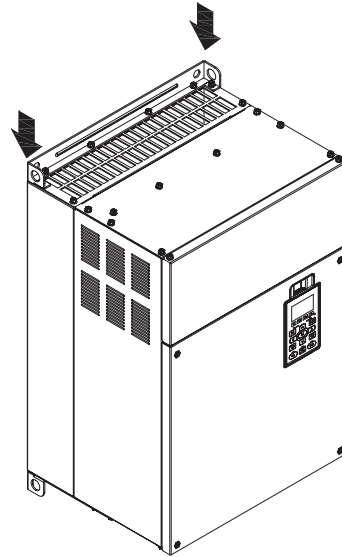


CAUTION: The larger GS4 DURAPULSE AC drives, frame sizes D through G, can easily be permanently damaged during unpacking, unless the following instructions are followed carefully.

LIFTING EYE LOCATIONS AND INSTRUCTIONS

1)

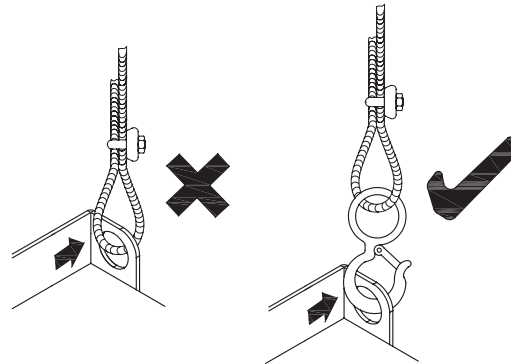
GS4 DURAPULSE AC drives frame sizes D(0) through G have lifting eyes built in to the four corners of the backplane, as shown in this typical drawing.



2)

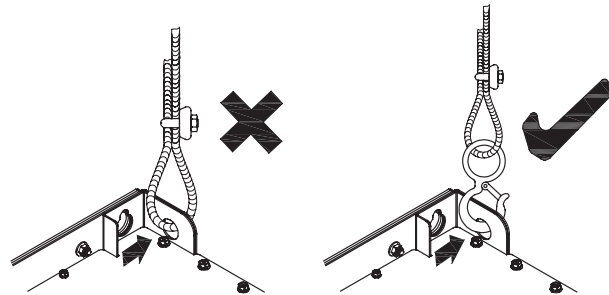
Frames D through E:

Ensure that the lifting hook properly goes through the lifting eyes, as shown.



Frames F through G:

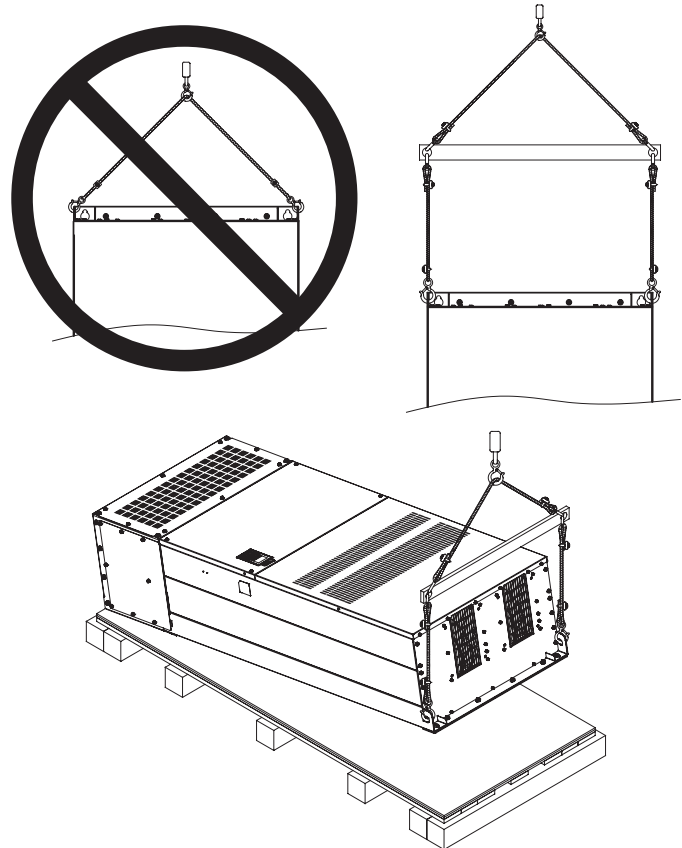
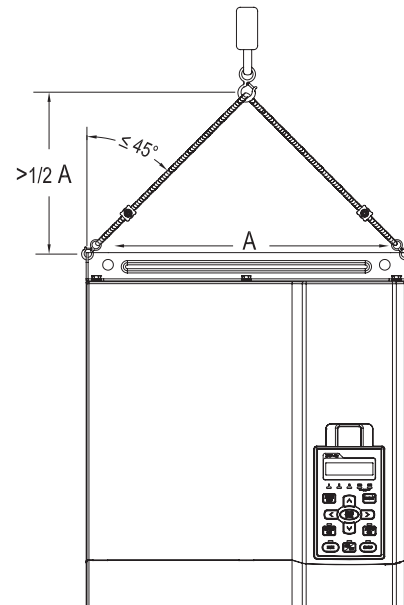
Ensure that the lifting hook properly goes through the lifting eyes, as shown.



3)

Frames D(0) through E:

Ensure that the angle between the lifting eyes and the lifting device is within the specification, as shown.



Frames F through G:

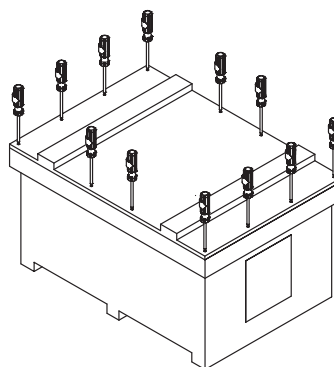
Ensure that the angle between the lifting eyes and the lifting device is within the specification, as shown. Use a spreader bar to avoid bending the lifting eyes.

UNPACKING THE DRIVE

UNPACKING FRAME SIZE D(0) DRIVES

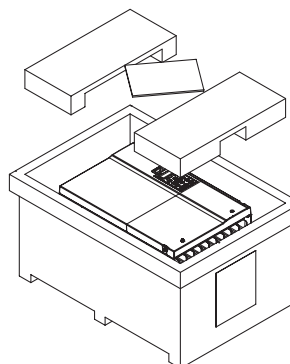
1)

Remove the 12 cover screws to open the crate.



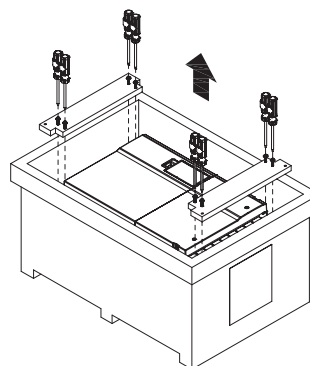
2)

Remove the packing filler and Quick-Start Guide.



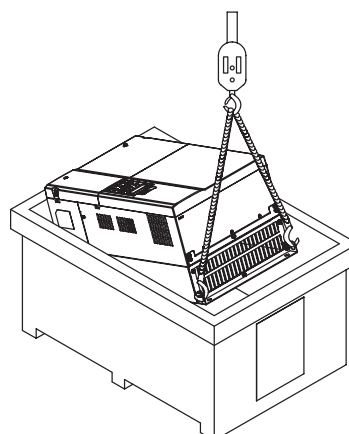
3)

Remove the 8 screws that are fastened on the pallet, and remove the wooden plate.



4)

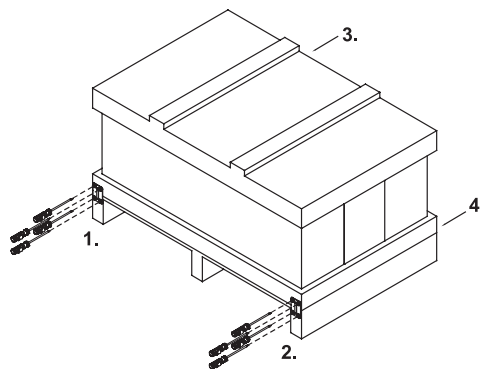
Lift the drive by hooking the lifting eyes. The drive is now ready for installation.



UNPACKING FRAME SIZE E DRIVES

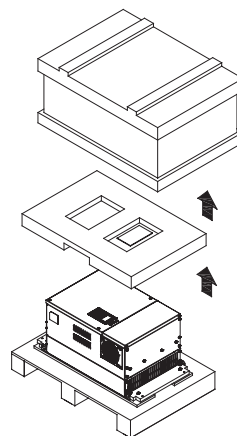
1)

Remove the 4 screws on the iron plates. There are 4 iron plates and a total of 16 screws.



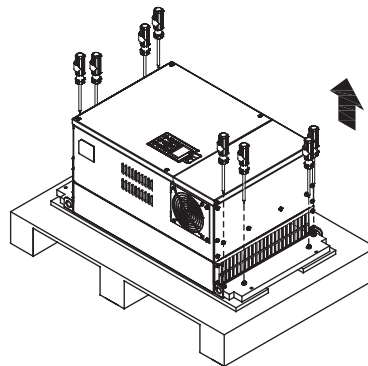
2)

Remove the crate cover, packing filler, and Quick-Start Guide.



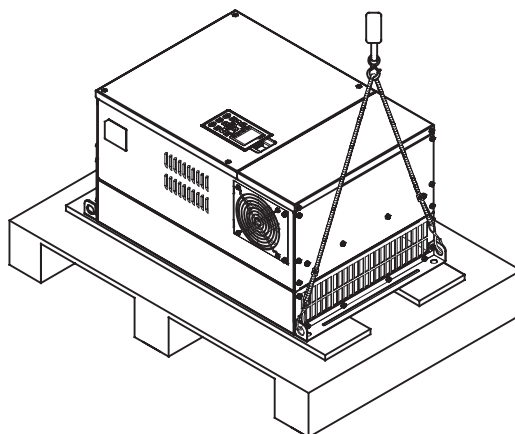
3)

Remove the 8 screws that hold the drive to the pallet.



4)

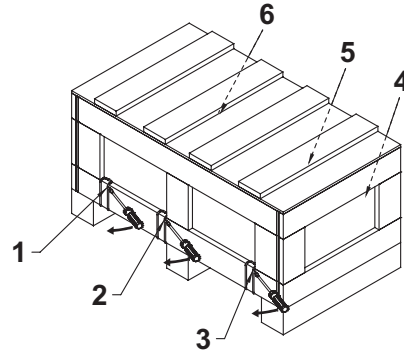
Lift the drive by hooking the lifting eyes. The drive is now ready for installation.



UNPACKING FRAME SIZE F DRIVES

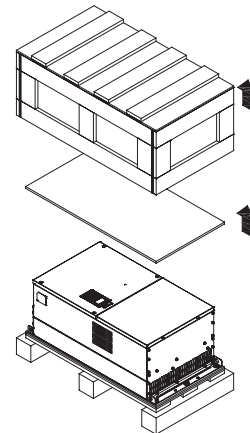
1)

Remove the 6 clips on the side of the crate with a flat-head screwdriver.



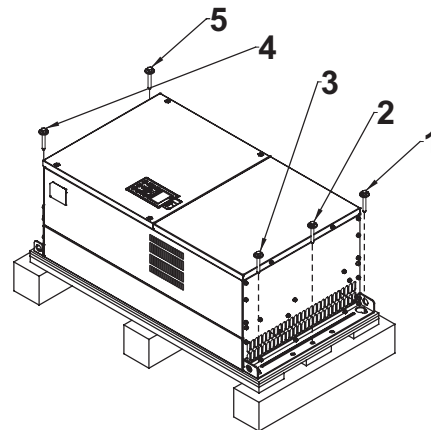
2)

Remove the crate cover, packing filler, and Quick-Start Guide.



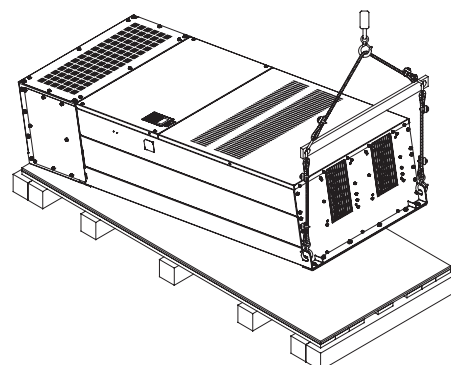
3)

Remove the 5 screws that hold the drive to the pallet.



4)

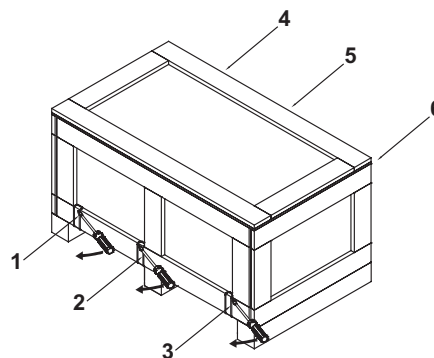
Use a spreader bar to avoid bending the lifting eyes, and lift the drive by hooking the lifting eyes. The drive is now ready for installation.



UNPACKING FRAME SIZE G DRIVES

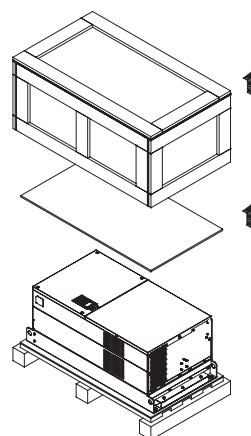
1)

Remove the 6 clips on the side of the crate with a flat-head screwdriver.



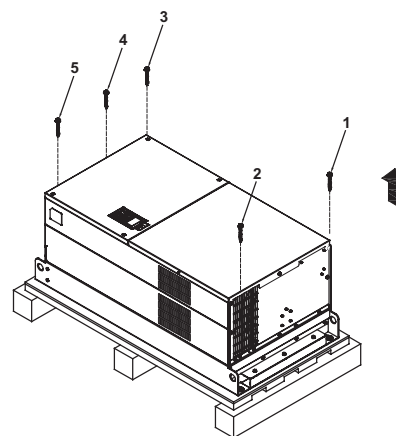
2)

Remove the crate cover, packing filler, and Quick-Start Guide.



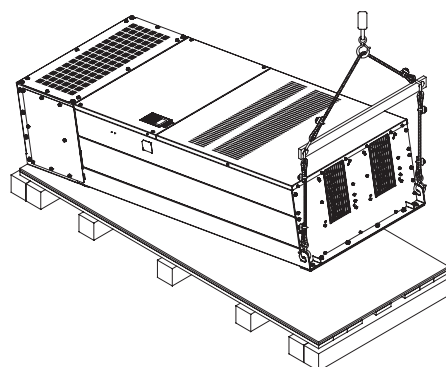
3)

Remove the 5 screws that hold the drive to the pallet.



4)

Use a spreader bar to avoid bending the lifting eyes, and lift the drive by hooking the lifting eyes. The drive is now ready for installation.



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