



Preface

Thank you for purchasing our FRENIC5000G11S or FRENIC5000P11S series inverter. This product is used to drive a 3-phase electric motor at variable speed. As incorrect use of this product may result in personal injury and/or property damage, read all operating instructions before using. As this manual does not cover the use of option cards, etc., refer to relevant manuals for option operations.

Safety Instructions


Read this manual carefully before installing, connecting (wiring), operating, servicing, or inspecting the inverter. Familiarize yourself with all safety features before using the inverter.

In this manual, safety messages are classified as follows:


 WARNING	Improper operation may result in serious personal injury or death.
 CAUTION	Improper operation may result in slight to medium personal injury or property damage.

Situations more serious than those covered by CAUTION will depend on prevailing circumstances. Always follow instructions.

Instructions on use

 WARNING	
<ul style="list-style-type: none">• This inverter is designed to drive a 3-phase induction motor and is not suitable for a single-phase motor or others, as fire may result.• This inverter may not be used (as is) as a component of a life-support system or other medical device directly affecting the personal welfare of the user.• This inverter is manufactured under strict quality control standards. However, safety equipment must be installed if the failure of this device may result in personal injury and/or property damage. There is a risk of accident.	

Instructions on installation

 WARNING	
<ul style="list-style-type: none">• Mount this inverter on an incombustible material such as metal. There is a risk of fire.• Do not place combustible or flammable material near this inverter, as fire may result.	

 CAUTION	
<ul style="list-style-type: none">• Do not hold or carry this inverter by the surface cover. Inverter may be dropped causing injury.• Ensure that the inverter and heat sink surfaces are kept free of foreign matter (lint, paper dust, small chips of wood or metal, and dust), as fire or accident may result.• Do not install or operate a damaged inverter or an inverter with missing parts, as injury may result.	

Instructions on wiring

WARNING

- Connect the inverter to power via a line-protection molded-case circuit breaker or Fuse, **as fire may result.**
- Always connect a ground wire, **as electric shock or fire may result.**
- A licensed specialist must perform the wiring works, **as electric shock may result.**
- Turn off the power before starting the wiring work, **as electric shock may result.**
- Wire the inverter after installation is complete, **as electric shock or injury may occur.**

CAUTION

- Confirm that the phases and rated voltage of this product match those of the AC power supply, **as injury may result.**
- Do not connect the AC power supply to the output terminals (U,V,and W), **as injury may result.**
- Do not connect a braking resistor directly to the DC terminals (P(+)and N(-)), **as fire may result.**
- Ensure that the noise generated by the inverter, motor, or wiring does not adversely affect peripheral sensors and equipment, **as accident may result.**

Instructions on operation

WARNING

- Be sure to install the surface cover before turning on the power (closed). Do not remove the cover while power to the inverter is turned on.
Electric shock may occur.
- Do not operate switches with wet hands, **as electric shock may result.**
- When the retry function is selected, the inverter may restart automatically after tripping.
(Design the machine to ensure personal safety in the event of restart)
Accident may result.
- When the torque limiting function is selected, operating conditions may differ from preset conditions (acceleration/deceleration time or speed). In this case, personal safety must be assured.
Accident may result.
- As the STOP key is effective only when a function setting has been established, install an emergency switch independently, and when an operation via the external signal terminal is selected, the STOP key on the keypad panel will be disabled.
Accident may result.
- As operations start suddenly if alarm is reset with a running signal input, confirm that no running signal is input before resetting alarm.
Accident may result.
- Do not touch inverter terminals when energized even if inverter has stopped.
Electric shock may result.

CAUTION

- Do not start or stop the inverter using the main circuit power.
Failure may result.
- Do not touch the heat sink or braking resistor because they become very hot.
Burns may result.
- As the inverter can set high speed operation easily, carefully check the performance of motor or machine before changing speed settings.
Injury may result.
- Do not use the inverter braking function for mechanical holding.
Injury may result.

Instructions on maintenance, inspection, and replacement

WARNING

- Wait a minimum of five minutes (30HP or less) or ten minutes (40HP or more) after power has been turned off (open) before starting inspection. (Also confirm that the charge lamp is off and that DC voltage between terminals P (+) and N (-) do not exceed 25V.)
Electrical shock may result.
- Only authorized personnel should perform maintenance, inspection, and replacement operations. (Take off metal jewelry such as watches and rings. Use insulated tools.)
Electric shock or injury may result.

Instructions on disposal

CAUTION

- Treat as industrial waste when disposing it.
Injury may result.



Other instructions

WARNING

- Never modify the product.
Electric shock or injury may result.

Conformity to Low Voltage Directive in Europe

CAUTION

- The contact capacity of alarm output for any fault (30A, B, C) and relay signal output (Y5A, Y5C) is 0.5A at 48V DC.
- The ground terminal  G should be connected to the ground.
Use a crimp terminal to connect a cable to the main circuit terminal or inverter ground terminal.
- Where RCD (Residual-current protective device) is used for protection in case of direct or indirect contact, only **RCD of type B** is allowed on the supply side of this EE (Electric equipment).
Otherwise another protective measure shall be applied such as separation of the EE from the environment by double or reinforced insulation or isolation of EE and supply system by the transformer.
- Use a single cable to connect the  G inverter ground terminal. (Do not use two or more inverter ground terminals.)
- Use a molded-case circuit breaker (MCCB) and magnetic contactor (MC) that conform to EN or IEC standards.
- Use the inverter under over-voltage category III conditions and maintain Pollution degree 2 or better as specified in IEC664. To maintain Pollution degree 2 or more, install the inverter in the control panel (IP54 or higher level) having structure free from water, oil, carbon, dust, etc.
- For the input-output wiring of the inverter, use cable (diameter and type) as specified in Appendix C in EN60204.
- To ensure safety, install an optional AC reactor, DC reactor, or external braking resistor as follows:
 - 1) Install inside an IP4X cabinet or barrier if electrical parts are exposed.
 - 2) Install inside an IP2X cabinet or barrier if electrical parts are not exposed.
- It is necessary to install the inverter in appropriate method using an appropriate RFI filter to conform to the EMC directive. It is customer's responsibility to check whether the equipment, the inverter is installed in, conforms to EMC directive.

Conformity to Low Voltage Directive in Europe



Table 1-1 Applicable equipment and wire size for main circuit in Europe

Voltage	Application motor [HP]	Inverter type	Fuse/MCCB current rating [A]		Tightening torque [N*m]				Recommended wire size [mm ²]						
			With DCR	Without DCR	L1/R, L2/S, L3/T U, V, W P1, P (+), DB, N (-)	G	R0, T0	Control	L1/R, L2/S, L3/T (G)		U, V, W	R0, T0	P1, P (+)	P (+), DB, N (-)	Control
									With DCR	Without DCR					
3phase 230V system	1/4	FRNF25G11S-2UX	5	5	1.2	-	0.7	2.5 (2.5)	2.5	2.5	-	2.5	2.5	0.2 to 0.75	
	1/2	FRNF50G11S-2UX	5	5											
	1	FRN001G11S-2UX	5	10											
	2	FRN002G11S-2UX	10	15	1.8	-	0.7	2.5 (2.5)	2.5	2.5	-	2.5	2.5	0.2 to 0.75	
	3	FRN003G11S-2UX	10	15											
	5	FRN005G11S-2UX	20	30											
	7.5	FRN007P11S-2UX	30	40	3.5	-	0.7	6(6)	10(10)	4	2.5	4	2.5	0.2 to 0.75	
	7.5	FRN007G11S-2UX	30	40											
	10	FRN010P11S-2UX	40	60											
	10	FRN010G11S-2UX	50	100	5.8	-	0.7	10 (10)	16 (16)	6	2.5	6	10	2.5	0.2 to 0.75
	15	FRN015P11S-2UX													
	15	FRN015G11S-2UX													
	20	FRN020P11S-2UX	75	125	5.8	-	0.7	25 (16)	50 (25)	16	2.5	16	25	3.5	0.2 to 0.75
	20	FRN020G11S-2UX													
	25	FRN025P11S-2UX													
	25	FRN025G11S-2UX	100	175	13.5	-	0.7	35 (16)	25	35	2.5	35	35	5.5	0.2 to 0.75
	30	FRN030P11S-2UX													
	30	FRN030G11S-2UX													
	40	FRN040P11S-2UX	150	200	13.5	-	0.7	50 (25)	25 × 2 (25)	50	2.5	16 × 2	16 × 2	4	0.2 to 0.75
	40	FRN040G11S-2UX													
	50	FRN050P11S-2UX													
	50	FRN050G11S-2UX	175	250	27	13.5	0.7	16 × 2 (35)	35 × 2 (50)	25 × 2 70	2.5	25 × 2	95	6	0.2 to 0.75
	60	FRN060P11S-2UX													
	60	FRN060G11S-2UX													
	75	FRN075P11S-2UX	200	300	27	13.5	0.7	95 (50)	50 × 2 (50)	25 × 2	2.5	35 × 2	35 × 2	6	0.2 to 0.75
	75	FRN075G11S-2UX													
	100	FRN100P11S-2UX													
	100	FRN100G11S-2UX	250	350	48	27	0.7	35 × 2 (35)	70 × 2 (70)	35 × 2	2.5	50 × 2	10	0.2 to 0.75	
75	FRN075P11S-2UX														
75	FRN075G11S-2UX														
100	FRN100P11S-2UX	350	-	48	27	0.7	50 × 2	-	50 × 2	2.5	70 × 2	16	0.2 to 0.75		
100	FRN100G11S-2UX														
125	FRN125P11S-2UX														
125	FRN125G11S-2UX	400	-	48	27	0.7	185(95)	-	240	2.5	95 × 2	25	0.2 to 0.75		
125	FRN125G11S-2UX														
150	FRN150P11S-2UX														
150	FRN150G11S-2UX	500	-	48	27	0.7	240 (120)	-	70 × 2 300	2.5	120 × 2	25	0.2 to 0.75		
125	FRN125P11S-2UX														
125	FRN125G11S-2UX														
150	FRN150P11S-2UX	500	-	48	27	0.7	95 × 2 (95)	-	95 × 2	2.5	120 × 2	25	0.2 to 0.75		
150	FRN150G11S-2UX														

Note: The type of wire is 75°C (167°F) 600V Grade heat-resistant polyvinyl chloride insulated wires (PVC).

The above-mentioned wire size are the recommended size under the condition of the ambient temperature 50°C (122°F) or lower.

Conformity to Low Voltage Directive in Europe



Table 1-2 Applicable equipment and wire size for main circuit in Europe

Voltage	Application motor [HP]	Inverter type	Fuse/MCCB current rating [A]		Tightening torque [N*m]				Recommended wire size [mm ²]						
			With DCR	Without DCR	L1/R, L2/S, L3/T U, V, W P1, P (+), DB, N (-)	G	R0, T0	Control	L1/R, L2/S, L3/T (G)		U, V, W	R0, T0	P1, P (+)	P (+), DB, N (-)	Control
									With DCR	Without DCR					
3phase 460V system	1/2	FRNF50G11S-4UX	5	5	1.2				0.7	2.5 (2.5)	2.5	-	2.5	-	-
	1	FRN001G11S-4UX	5	5	1.2										
	2	FRN002G11S-4UX	5	10	1.8										
	3	FRN003G11S-4UX	10	15	1.8										
	5	FRN005G11S-4UX	10	15	3.5										
	7.5	FRN007P11S-4UX	15	20	3.5										
	7.5	FRN007G11S-4UX	15	20	3.5										
	10	FRN010P11S-4UX	20	30	3.5										
	10	FRN010G11S-4UX	20	30	3.5										
	15	FRN015P11S-4UX	30	40	5.8										
	15	FRN015G11S-4UX	30	40	5.8										
	20	FRN020P11S-4UX	40	50	5.8										
	20	FRN020G11S-4UX	40	50	5.8										
	25	FRN025P11S-4UX	40	60	5.8										
	25	FRN025G11S-4UX	40	60	5.8										
	30	FRN030P11S-4UX	50	75	5.8										
	30	FRN030G11S-4UX	50	75	5.8										
	40	FRN040P11S-4UX	75	100	13.5										
	40	FRN040G11S-4UX	75	100	13.5										
	50	FRN050P11S-4UX	100	125	13.5										
	50	FRN050G11S-4UX	100	125	13.5										
	60	FRN060P11S-4UX	100	150	13.5										
	60	FRN060G11S-4UX	100	150	13.5										
	75	FRN075P11S-4UX	125	175	13.5										
	75	FRN075G11S-4UX	125	175	13.5										
	100	FRN100P11S-4UX	175	-	13.5										
	100	FRN100G11S-4UX	175	-	13.5										
	125	FRN125P11S-4UX	200	-	27										
	125	FRN125G11S-4UX	200	-	27										
	150	FRN150P11S-4UX	225	-	27										
	150	FRN150G11S-4UX	225	-	27										
	200	FRN200P11S-4UX	300	-	27										
	200	FRN200G11S-4UX	300	-	27										
	250	FRN250P11S-4UX	350	-	27										
	250	FRN250G11S-4UX	350	-	27										
	300	FRN300P11S-4UX	400	-	27										
	300	FRN300G11S-4UX	400	-	27										
	350	FRN350P11S-4UX	500	-	27										
	350	FRN350G11S-4UX	500	-	27										
	400	FRN400P11S-4UX	600	-	27										
400	FRN400G11S-4UX	600	-	27											
450	FRN450P11S-4UX	700	-	27											
450	FRN450G11S-4UX	700	-	27											
500	FRN500P11S-4UX	800	-	27											
500	FRN500G11S-4UX	800	-	27											
600	FRN600P11S-4UX	1,000	-	27											
600	FRN600G11S-4UX	1,000	-	27											
700	FRN700P11S-4UX	1,000	-	27											
800	FRN800P11S-4UX	1,200	-	27											

Note: The type of wire is 75°C (167°F) 600V Grade heat-resistant polyvinyl chloride insulated wires (PVC).

The above-mentioned wire size are the recommended size under the condition of the ambient temperature 50°C (122°F) or lower.

Compliance with UL/cUL standards [Applicable to products with UL/cUL mark]



Tightening torque and wire range

Voltage	Inverter type	Required torque [lb-inch](N·m)			Wire range [AWG] (mm ²)																																		
	G11S/P11S	Main terminal	Auxiliary control-power	Control	L1/R,L2/S,L3/T U,V,W	Auxiliary control-power	Control																																
3-phase 230V	FRNF25G11S-2UX	10.6(1.2)	—	6.2(0.7)	16 (1.3)	—	24 (0.2)																																
	FRNF50G11S-2UX																																						
	FRN001G11S-2UX																																						
	FRN002G11S-2UX	15.9(1.8)			10.6(1.2)			6.2(0.7)	14 (2.1)	16(1.3)	24 (0.2)																												
	FRN003G11S-2UX																																						
	FRN005G11S-2UX																																						
	FRN007G11S-2UX	31.0(3.5)			10.6(1.2)			6.2(0.7)	8 (8.4)	16(1.3)	24 (0.2)																												
	FRN007,010P11S-2UX																																						
	FRN010G11S-2UX																																						
	FRN015P11S-2UX	51.3(5.8)			10.6(1.2)			6.2(0.7)	6 (13.3)	16(1.3)	24 (0.2)																												
	FRN015G11S-2UX																																						
	FRN020P11S-2UX																																						
	FRN020G11S-2UX	119(13.5)			10.6(1.2)			6.2(0.7)	4 (21.2)	16(1.3)	24 (0.2)																												
	FRN025P11S-2UX																																						
	FRN025G11S-2UX																																						
	FRN030P11S-2UX	239(27)			10.6(1.2)			6.2(0.7)	2 (33.6)	16(1.3)	24 (0.2)																												
	FRN030G11S-2UX																																						
	FRN040G11S/P11S-2UX																																						
	FRN050P11S-2UX	425(48)			10.6(1.2)			6.2(0.7)	1 (42.4)	16(1.3)	24 (0.2)																												
	FRN050G11S-2UX																																						
FRN060G11S/P11S-2UX																																							
FRN075G11S/P11S-2UX	239(27)	10.6(1.2)	6.2(0.7)	2X2 (33.6X2)	16(1.3)	24 (0.2)																																	
FRN100P11S-2UX																																							
FRN100G11S-2UX																																							
FRN125G11S/P11S-2UX	425(48)	10.6(1.2)	6.2(0.7)	1X2(42.4X2)	16(1.3)	24 (0.2)																																	
FRN150P11S-2UX																																							
FRN150G11S-2UX																																							
FRN150P11S-2UX	425(48)	10.6(1.2)	6.2(0.7)	250X2(127X2)	16(1.3)	24 (0.2)																																	
FRN150G11S-2UX																																							
FRN150P11S-2UX																																							
3-phase 460V	FRNF50G11S-4UX	10.6(1.2)	—	6.2(0.7)	16 (1.3)	—	24 (0.2)																																
	FRN001G11S-4UX																																						
	FRN002G11S-4UX																																						
	FRN003G11S-4UX	15.9(1.8)			10.6(1.2)			6.2(0.7)	14 (2.1)	16(1.3)	24 (0.2)																												
	FRN005G11S-4UX																																						
	FRN007G11S-4UX																																						
	FRN007,010P11S-4UX	31.0(3.5)							10.6(1.2)			6.2(0.7)	12 (3.3)	16(1.3)	24 (0.2)																								
	FRN010G11S-4UX																																						
	FRN015P11S-4UX																																						
	FRN015G11S-4UX	119(13.5)											10.6(1.2)			6.2(0.7)	10 (5.3)	16(1.3)	24 (0.2)																				
	FRN020P11S-4UX																																						
	FRN020G11S-4UX																																						
	FRN025P11S-4UX	239(27)															10.6(1.2)			6.2(0.7)	8 (8.4)	16(1.3)	24 (0.2)																
	FRN025G11S-4UX																																						
	FRN030P11S-4UX																																						
	FRN030G11S-4UX	425(48)																			10.6(1.2)			6.2(0.7)	6 (13.3)	16(1.3)	24 (0.2)												
	FRN040G11S/P11S-4UX																																						
	FRN050G11S/P11S-4UX																																						
	FRN060G11S/P11S-4UX	239(27)																							10.6(1.2)			6.2(0.7)	4 (21.2)	16(1.3)	24 (0.2)								
	FRN075G11S/P11S-4UX																																						
	FRN100P11S-4UX																																						
	FRN100G11S-4UX	425(48)																											10.6(1.2)			6.2(0.7)	2 (33.6)	16(1.3)	24 (0.2)				
	FRN125G11S/P11S-4UX																																						
	FRN150G11S/P11S-4UX																																						
	FRN200P11S-4UX	425(48)																															10.6(1.2)			6.2(0.7)	1(42.4)	16(1.3)	24 (0.2)
	FRN200G11S-4UX																																						
	FRN250G11S/P11S-4UX																																						
	FRN300P11S-4UX	425(48)																																			10.6(1.2)		
FRN300G11S-4UX																																							
FRN350G11S/P11S-4UX																																							
FRN400G11S/P11S-4UX	425(48)	10.6(1.2)	6.2(0.7)	2X2 (33.6X2)		16(1.3)	24 (0.2)																																
FRN450P11S-4UX																																							
FRN450G11S-4UX																																							
FRN500G11S/P11S-4UX	425(48)			10.6(1.2)	6.2(0.7)			2X2 (33.6X2)		16(1.3)	24 (0.2)																												
FRN600G11S/P11S-4UX																																							
FRN700P11S-4UX																																							
FRN800P11S-4UX	425(48)							10.6(1.2)	6.2(0.7)			4/0(107.2)		16(1.3)	24 (0.2)																								
FRN800P11S-4UX																																							
FRN800P11S-4UX																																							
FRN800P11S-4UX	425(48)											10.6(1.2)	6.2(0.7)			1X2(42.4X2)		16(1.3)	24 (0.2)																				
FRN800P11S-4UX																																							
FRN800P11S-4UX																																							
FRN800P11S-4UX	425(48)															10.6(1.2)	6.2(0.7)			2/0X2(67.4X2)		16(1.3)	24 (0.2)																
FRN800P11S-4UX																																							
FRN800P11S-4UX																																							
FRN800P11S-4UX	425(48)																			10.6(1.2)	6.2(0.7)			3/0X2(85X2)		16(1.3)	24 (0.2)												
FRN800P11S-4UX																																							
FRN800P11S-4UX																																							
FRN800P11S-4UX	425(48)																							10.6(1.2)	6.2(0.7)			4/0X2(107.2X2)		16(1.3)	24 (0.2)								
FRN800P11S-4UX																																							
FRN800P11S-4UX																																							
FRN800P11S-4UX	425(48)																											10.6(1.2)	6.2(0.7)			300X2(152X2)		16(1.3)	24 (0.2)				
FRN800P11S-4UX																																							
FRN800P11S-4UX																																							
FRN800P11S-4UX	425(48)																															10.6(1.2)	6.2(0.7)			350X2(177X2)		16(1.3)	24 (0.2)
FRN800P11S-4UX																																							
FRN800P11S-4UX																																							
FRN800P11S-4UX	425(48)																																			10.6(1.2)	6.2(0.7)		
FRN800P11S-4UX																																							
FRN800P11S-4UX																																							
FRN800P11S-4UX	425(48)	10.6(1.2)	6.2(0.7)			600X2(304X2)	16(1.3)																																
FRN800P11S-4UX																																							
FRN800P11S-4UX																																							
FRN800P11S-4UX	425(48)			10.6(1.2)	6.2(0.7)	300X3(152X3)				16(1.3)	24 (0.2)																												
FRN800P11S-4UX																																							
FRN800P11S-4UX																																							
FRN800P11S-4UX	425(48)					10.6(1.2)		6.2(0.7)	400X3(203X3)					16(1.3)	24 (0.2)																								
FRN800P11S-4UX																																							
FRN800P11S-4UX																																							
FRN800P11S-4UX	425(48)								10.6(1.2)			6.2(0.7)	500X3(253X3)					16(1.3)	24 (0.2)																				
FRN800P11S-4UX																																							
FRN800P11S-4UX																																							
FRN800P11S-4UX	425(48)												10.6(1.2)			6.2(0.7)	600X3(304X3)					16(1.3)	24 (0.2)																
FRN800P11S-4UX																																							
FRN800P11S-4UX																																							

Use the following power supply to the inverter

Inverter Model	Maximum input voltage	Input source current
FRNF25G11S-2UX ~ FRN125G11S-2UX	AC240V	Not more than 100,000A
FRN007P11S-2UX ~ FRN150P11S-2UX	AC240V	
FRNF50G11S-4UX ~ FRN600G11S-4UX	AC480V	
FRN007P11S-4UX ~ FRN800P11S-4UX	AC480V	

Compliance with UL/cUL standards [Applicable to products with UL/cUL mark]

CAUTION

- [CAUTION] Hazard of electrical shock. Disconnect incoming power before working on this control.
- [CAUTION] Dangerous voltage exists until charge lights is off.
- [WARNING]
- More than one live parts inside the inverter.
- Type1 "INDOOR USE ONLY"
The inverter is approved as a part used inside a panel. Install it inside a panel.
- Suitable for use on a circuit capable of delivering not more than 100,000rms symmetrical amperes.
- Use 60/75C copper wire only.
- A Class2 circuit wired with class1 wire.
- Field wiring connection must be made by a UL Listed and CSA Certified closed-loop terminal connector sized for the wire gauge involved. Connector must be fixed using the crimp tool specified by the connector manufacturer.
- Connect the power supply to main power supply terminals via the Molded-case circuit breaker (MCCB) or a ground fault circuit interrupter (GFCI) to apply the UL Listing Mark.
(See Instruction Manual basic connection diagram Fig.2-3-1).
- In case of using auxiliary control-power input (R0, T0), connect it referring to Basic connection diagram Fig.2-3-1.
- Solid state motor overload protection is provided in each model.

General instructions

Although figures in this manual may show the inverter with covers and safety screens removed for explanation purposes, do not operate the device until all such covers and screens have been replaced.

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