

INVERTER

A510

START-UP AND INSTALLATION MANUAL

230V Class 1/3~ 0.75 - 2.2kW
1 - 3 HP

230V Class 3~ 3.7 - 110 kW
5 - 150 HP

460V Class 3~ 0.75 - 315 kW
1 - 425 HP

575/690V Class 3~ 0.75 - 200 kW
1 - 270 HP



■ Read all operating instructions before installing, connecting (wiring), operating, servicing, or inspecting the inverter.

■ Ensure that this manual is made available to the end user of the inverter.

■ Store this manual in a safe, convenient location.

■ The manual is subject to change without prior notice.

■ Refer to the A510 Instruction Manual (www.tecowestinghouse.com).

******STATEMENT******

Si Desea descargar el manual en espanol a este Link: www.tecowestinghouse.com

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The complete A510 Instruction can be found at www.tecowestinghouse.com

Preface

The A510 product is an inverter designed to control a three-phase induction motor. Please read this manual carefully to ensure correct operation, safety and to become familiar with the inverter functions.

The A510 inverter is an electrical / electronic product and must be installed and handled by qualified service personnel.

Improper handling may result in incorrect operation, shorter life cycle, or failure of this product as well as the motor.



All A510 documentation is subject to change without notice. Be sure to obtain the latest editions for use or visit our website at www.tecowestinghouse.com



Available Documentation:

1. A510 Start-up and Installation Manual
2. A510 Instruction Manual

Ensure you have sound knowledge of the device and familiarize yourself with all safety information and precautions before proceeding to operate the inverter.

Ensure you have sound knowledge of the inverter and familiarize yourself with all safety information and precautions before proceeding to operate the inverter.

Please pay close attention to the safety precautions indicated by the warning  and caution  symbol.

 Warning	Failure to ignore the information indicated by the warning symbol may result in death or serious injury.
 Caution	Failure to ignore the information indicated by the caution symbol may result in minor or moderate injury and/or substantial property damage.

Chapter 1 Safety Precautions

1.1 Before Supplying Power to the Inverter

Warning

- The main circuit must be correctly wired. For single phase supply use input terminals (R/L1, T/L3) and for three phase supply use input terminals (R/L1, S/L2, T/L3). Terminals U/T1, V/T2, W/T3 must only be used to connect the motor. Connecting the input supply to any of the U/T1, V/T2 or W/T3 terminals will cause damage to the inverter.

Caution

- To avoid the front cover from disengaging or other physical damage, do not carry the inverter by its cover. Support the unit by its heat sink when transporting. Improper handling can damage the inverter or injure personnel, and should be avoided.
- To avoid the risk of fire, do not install the inverter on or near flammable objects. Install on nonflammable objects such as metal surfaces.
- If several inverters are placed inside the same control panel, provide adequate ventilation to maintain the temperature below 40°C/104°F (50°C/122°F without a dust cover) to avoid overheating or fire.
- When removing or installing the digital operator, turn off the power first, and then follow the instructions in our instruction manual to avoid operator error or loss of display caused by faulty connections.

Warning

- This product is sold subject to IEC 61800-3. In a domestic environment this product may cause radio interference in which case the user may need to apply corrective measures.
- Motor over temperature protection is provided.

1.2 Wiring

Warning

- Always turn OFF the power supply before attempting inverter installation and wiring of the user terminals.
- Wiring must be performed by a qualified personnel / certified electrician.
- Make sure the inverter is properly grounded. (220V Class: Grounding impedance shall be less than 100Ω. 460V Class: Grounding impedance shall be less than 10Ω.)
- Make sure the inverter is properly grounded. It is required to disconnect the ground wire in the control board to avoid the sudden surge causing damage on electronic parts if it is improperly grounded.
- RCD is required to be in compliance with the protection norm of B-type leakage current.
- Please check and test emergency stop circuits after wiring. (Installer is responsible for the correct wiring.)
- Never touch any of the input or output power lines directly or allow any input or output power lines to come in contact with the inverter case.
- Do not perform a dielectric voltage withstand test (megger) on the inverter this will result in inverter damage to the semiconductor components.

Caution

- The line voltage applied must comply with the inverter's specified input voltage. (See product nameplate section 2.1)
- Connect braking resistor and braking unit to the designated terminals. (See power terminals section 3.10)
- Do not connect a braking resistor directly to the DC terminals P (+) and N (-), otherwise fire may result.
- Use wire gauge recommendations and torque specifications. See wire gauge and torque specification section 3.6)
- Never connect input power to the inverter output terminals U/T1, V/T2, W/T3.
- Do not connect a contactor or switch in series with the inverter and the motor.
- Do not connect a power factor correction capacitor or surge suppressor to the inverter output.
- Ensure the interference generated by the inverter and motor does not affect peripheral devices.

1.3 Before Operation

Warning

- Make sure the inverter capacity matches the parameters 13-00.
- Reduce the carrier frequency (parameter 11-01) if the cable from the inverter to the motor is greater than 80 ft (25m). A high-frequency current can be generated by stray capacitance between the cables and result in an overcurrent trip of the inverter, an increase in leakage current, or an inaccurate current readout.
- Be sure to install all covers before turning on power. Do not remove any of the covers while power to the inverter is on, otherwise electric shock may occur.
- Do not operate switches with wet hands, otherwise electric shock may result.
- Do not touch inverter terminals when energized even if inverter has stopped, otherwise electric shock may result.

1.4 Parameters Setting

Caution

- Do not connect a load to the motor while performing a rotational auto-tune.
- Make sure the motor can freely run and there is sufficient space around the motor when performing a rotational auto-tune.

1.5 Operation

Warning

- Be sure to install all covers before turning on power. Do not remove any of the covers while power to the inverter is on, otherwise electric shock may occur.
- Do not connect or disconnect the motor during operation. This will cause the inverter to trip and may cause damage to the inverter.
- Operations may start suddenly if an alarm or fault is reset with a run command active. Confirm that no run command is active upon resetting the alarm or fault, otherwise accidents may occur.
- Do not operate switches with wet hands, otherwise electric shock may result.
- It provides an independent external hardware emergency switch, which emergently shuts down the inverter output in the case of danger.

- If automatic restart after power recovery (parameter 07-00) is enabled, the inverter will start automatically after power is restored.
- Make sure it is safe to operate the inverter and motor before performing a rotational auto-tune.
- Do not touch inverter terminals when energized even if inverter has stopped, otherwise electric shock may result.
- Do not check signals on circuit boards while the inverter is running.
After the power is turned off, the cooling fan may continue to run for some time.

 **Caution**

- Do not touch heat-generating components such as heat sinks and braking resistors.
- Carefully check the performance of motor or machine before operating at high speed, otherwise Injury may result.
- Note the parameter settings related to the braking unit when applicable.
- Do not use the inverter braking function for mechanical holding, otherwise injury may result.
Do not check signals on circuit boards while the inverter is running.

1.6 Maintenance, Inspection and Replacement

 **Warning**

- Wait a minimum of five minutes after power has been turned OFF before starting an inspection. Also confirm that the charge light is OFF and that the DC bus voltage has dropped below 25Vdc.
- Never touch high voltage terminals in the inverter.
- Make sure power to the inverter is disconnected before disassembling the inverter.
- Only authorized personnel should perform maintenance, inspection, and replacement operations. (Take off metal jewelry such as watches and rings and use insulated tools.)

 **Caution**

- The Inverter can be used in an environment with a temperature range from 14° ~104(140) °F (-10~+40(60) °C) and relative humidity of 95% non-condensing.
- The inverter must be operated in a dust, gas, mist and moisture free environment.

1.7 Disposal of the Inverter

 **Caution**

- Please dispose of this unit with care as an industrial waste and according to your required local regulations.
- The capacitors of inverter main circuit and printed circuit board are considered as hazardous waste and must not be burned.
- The Plastic enclosure and parts of the inverter such as the top cover board will release harmful gases if burned.



Equipment containing electrical components may not be disposed of together with domestic waste. It must be separately collected with electrical and electronic waste according to local and currently valid legislation.

Chapter 2 Model Description

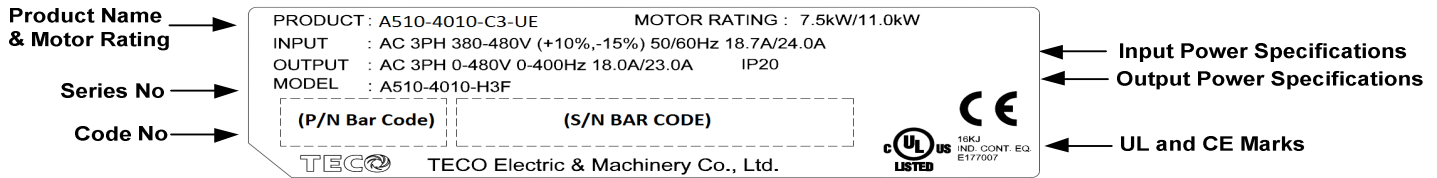
2.1 Nameplate Data

It is essential to verify the A510 inverter nameplate and make sure that the A510 inverter has the correct rating so it can be used in your application with the proper sized AC motor.

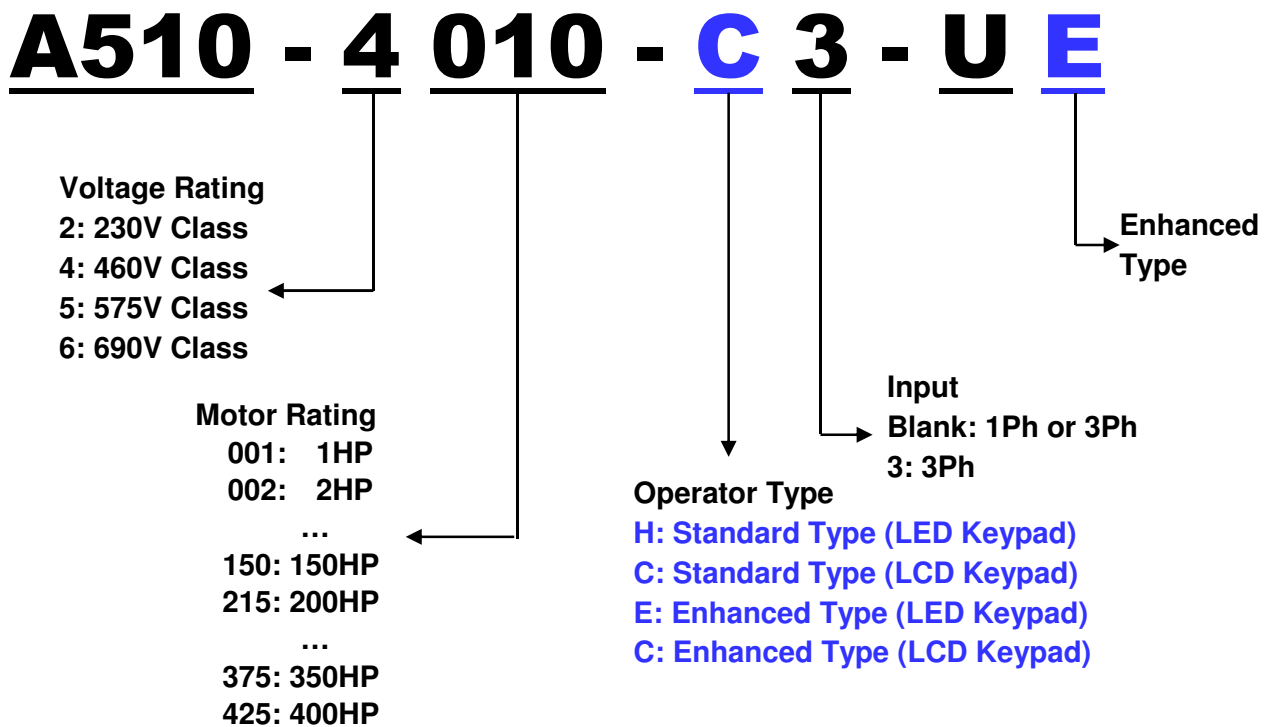
Unpack the A510 inverter and check the following:

- (1) The A510 inverter and start-up and installation manual are contained in the package.
- (2) The A510 inverter has not been damaged during transportation there should be no dents or parts missing.
- (3) The A510 inverter is the type you ordered. You can check the type and specifications on the main nameplate.
- (4) Check that the input voltage range meets the input power requirements.
- (5) Ensure that the motor HP matches the motor rating of the inverter.

HD: Heavy Duty (Constant Torque); ND: Normal Duty (Variable Torque) (1HP = 0.746 kW)



Model Identification



2.2 Inverter Models – Motor Power Rating (HD – Heavy Duty)

230V Class

Voltage	A510 Model	Applied Motor (HP)	Applied Motor (KW)	Filter	
				with	without
1ph/3ph, 200~240V +10%/-15% 50/60Hz	A510-2001-C-UE	1	0.75		⊙
	A510-2002-C-UE	2	1.5		⊙
	A510-2003-C-UE	3	2.2		⊙
3ph, 200~240V +10%/-15% 50/60Hz	A510-2005-C3-UE	5	3.7		⊙
	A510-2008-C3-UE	7.5	5.5		⊙
	A510-2010-C3-UE	10	7.5		⊙
	A510-2015-C3-UE	15	11		⊙
	A510-2020-C3-UE	20	15		⊙
	A510-2025-C3-UE	25	18.5		⊙
	A510-2030-C3-UE	30	22		⊙
	A510-2040-C3-UE	40	30		⊙
	A510-2050-C3-UE	50	37		⊙
	A510-2060-C3-UE	60	45		⊙
	A510-2075-C3-UE	75	55		⊙
	A510-2100-C3-UE	100	75		⊙
A510-2125-C3-UE	125	94		⊙	
A510-2150-C3-UE	150	112		⊙	

Short Circuit Rating: 230V Class: 100kA

460V Class

Voltage	A510 Model	Applied Motor (HP)	Applied Motor (KW)	Filter	
				with	without
3ph,380~480V +10%/-15% 50/60Hz	A510-4001-C3-UE	1	0.75		⊙
	A510-4002-C3-UE	2	1.5		⊙
	A510-4003-C3-UE	3	2.2		⊙
	A510-4005-C3-UE	5	3.7		⊙
	A510-4008-C3-UE	7.5	5.5		⊙
	A510-4010-C3-UE	10	7.5		⊙
	A510-4015-C3-UE	15	11		⊙
	A510-4020-C3-UE	20	15		⊙
	A510-4025-C3-UE	25	18.5		⊙
	A510-4030-C3-UE	30	22		⊙
	A510-4040-C3-UE	40	30		⊙
	A510-4050-C3-UE	50	37		⊙
	A510-4060-C3-UE	60	45		⊙
	A510-4075-C3-UE	75	55		⊙
	A510-4100-C3-UE	100	75		⊙
	A510-4125-C3-UE	125	94		⊙
	A510-4150-C3-UE	150	112		⊙
	A510-4215-C3-UE	200	160		⊙
	A510-4270-C3-UE	250	200		⊙
	A510-4300-C3-UE	300	220		⊙
A510-4375-C3-UE	350	280		⊙	
A510-4425-C3-UE	400	315		⊙	

Short Circuit Rating: 460V Class: 100kA

575/690V Class

Voltage	A510 Model	Applied Motor (HP)	Applied Motor (KW)	Filter	
				with	without
3ph, 500~600V +10%/-15% 50/60Hz	A510-5001-C3-UE	1	0.75		⊙
	A510-5002-C3-UE	2	1.5		⊙
	A510-5003-C3-UE	3	2.2		⊙
	A510-5005-C3-UE	5	3.7		⊙
	A510-5008-C3-UE	7.5	5.5		⊙
	A510-5010-C3-UE	10	7.5		⊙
3ph, 575~690V +10%/-15% 50/60Hz	A510-6015-C3-UE	15	11		⊙
	A510-6020-C3-UE	20	15		⊙
	A510-6025-C3-UE	25	18.5		⊙
	A510-6030-C3-UE	30	22		⊙
	A510-6040-C3-UE	40	30		⊙
	A510-6050-C3-UE	50	37		⊙
	A510-6060-C3-UE	60	45		⊙
	A510-6075-C3-UE	75	55		⊙
	A510-6100-C3-UE	100	75		⊙
	A510-6125-C3-UE	125	94		⊙
	A510-6150-C3-UE	150	112		⊙
	A510-6175-C3-UE	175	130		⊙
	A510-6215-C3-UE	215	160		⊙
	A510-6250-C3-UE	250	185		⊙
A510-6270-C3-UE	270	200		⊙	

Short Circuit Rating: 575/690V Class: 100kA

Chapter 3 Environment and Installation

3.1 Environment

The environment will directly affect the proper operation and the life span of the inverter. To ensure that the inverter will give maximum service life, please comply with the following environmental conditions:

Protection	
Protection Class	IP20/IP21/NEMA 1 or IP00
Operating Temperature	<p>IP20/IP21: -10°C - +40°C (14 -104 °F)</p> <p>IP00 or without cover: -10°C - +50°C (14-122 °F)</p> <p>Enhanced type frame 5 is 50°C without de-rating.</p> <p>The maximum operating temperature is 60°C, but it is required to derate 2% of current at each additional 1°C.</p> <p>If several inverters are placed in the same control panel, provide a heat removal means to maintain ambient temperatures</p>
Storage Temperature	-20°C - +70°C (-4 -158 °F)
Humidity	<p>95% non-condensing</p> <p>Relative humidity 5% to 95%, free of moisture.</p> <p>(Follow IEC60068-2-78 standard)</p>
Altitude	<p>Altitude: Below 1000 m (3281 ft.)</p> <p>It is required to derate 1% of current at each additional 100 m.</p> <p>The maximum altitude is 3000 m.</p>
Installation Site	Avoid exposure to rain or moisture.
	Avoid direct sunlight.
	Avoid oil mist and salinity.
	Avoid corrosive liquid and gas.
	Avoid dust, lint fibers, and small metal filings.
	Keep away from radioactive and flammable materials.
	Avoid electromagnetic interference (soldering machines, power machines).
	Avoid vibration (stamping, punching machines etc.). Add a vibration-proof pad if the situation cannot be avoided.
Shock	<p>Maximum acceleration: 1.0G (9.8m/s²), from 49.84 to 150 Hz</p> <p>Displacement amplitude : 0.3mm (peak value), from 10 to 49.84 Hz</p> <p>(Follow IEC60068-2-6 standard)</p>

3.2 Installation

When installing the inverter, ensure that inverter is installed in upright position (vertical direction) and there is adequate space around the unit to allow normal heat dissipation as per the following Fig. 3.2.1

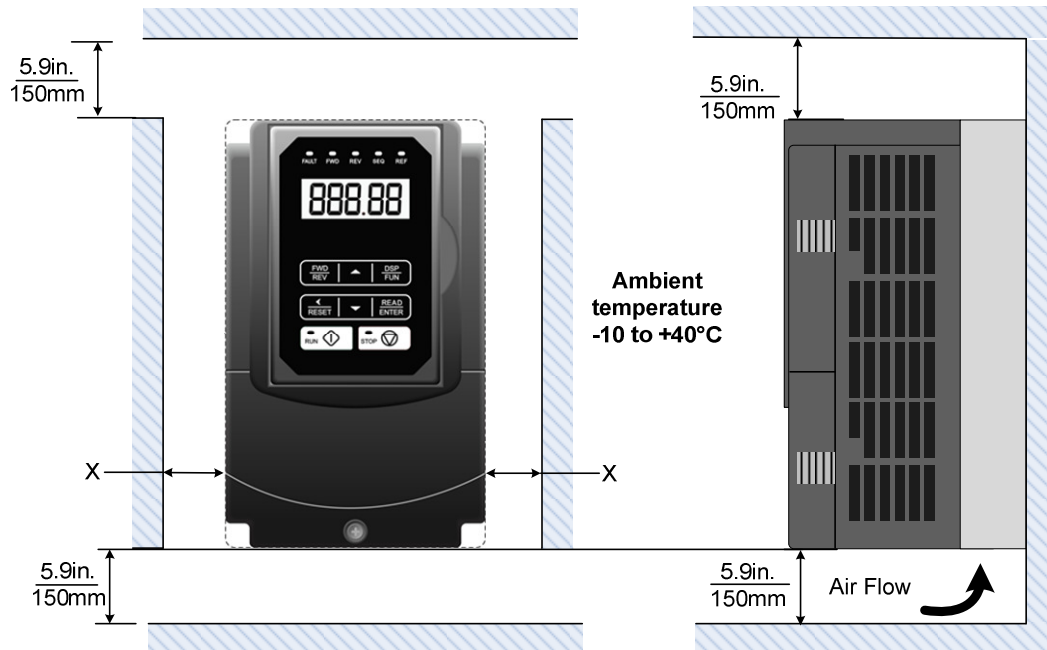


Fig 3.2.1: A510s Installation space

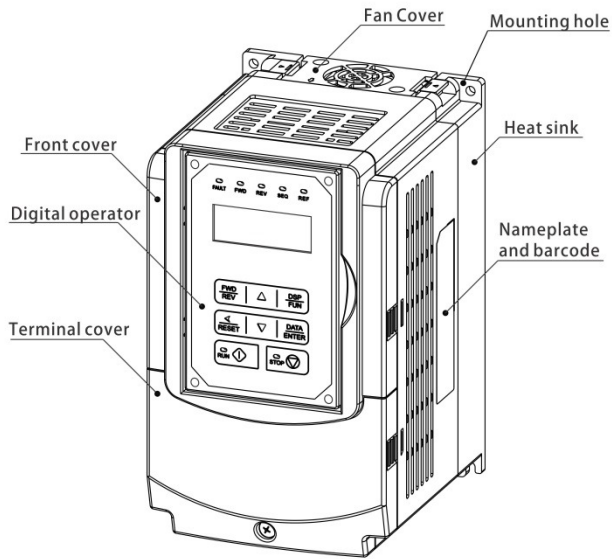
X = 1.18" (30mm) for inverter ratings up to 25HP

X = 1.96" (50mm) for inverter ratings 30HP or higher

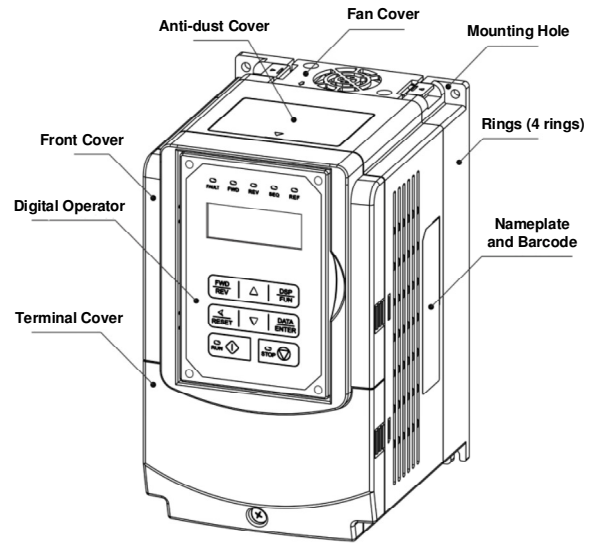
Important Note: The inverter heatsink temperature can reach up to 194°F / 90°C during operation; make sure to use insulation material rated for this temperature.

3.3 External View

(a) 200V 1 ~ 7.5 HP / 400V 1 ~ 7.5 HP / 575V 1~ 3 HP

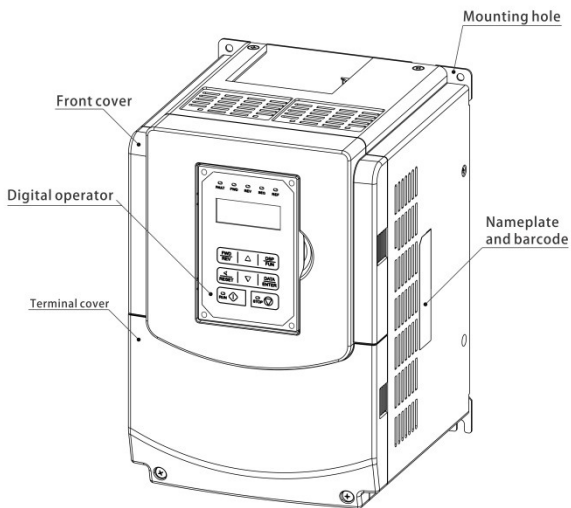


(Wall-mounted type, IEC IP20)

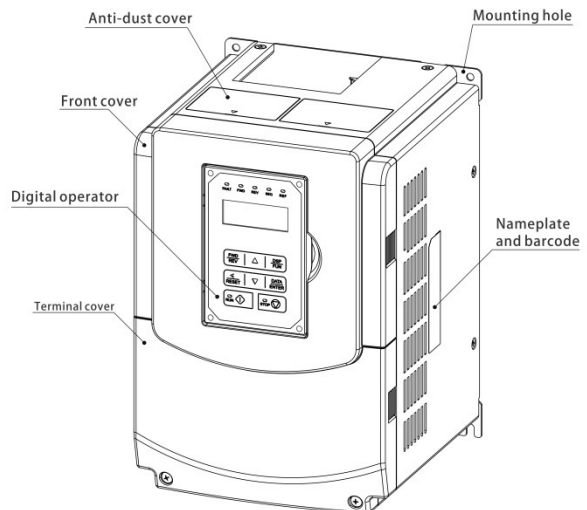


(Wall-mounted type, IEC IP20, NEMA1)

(b) 200V 10 ~ 25 HP / 400V 10 ~ 30 HP / 575V 5~10HP / 690V 15~40HP

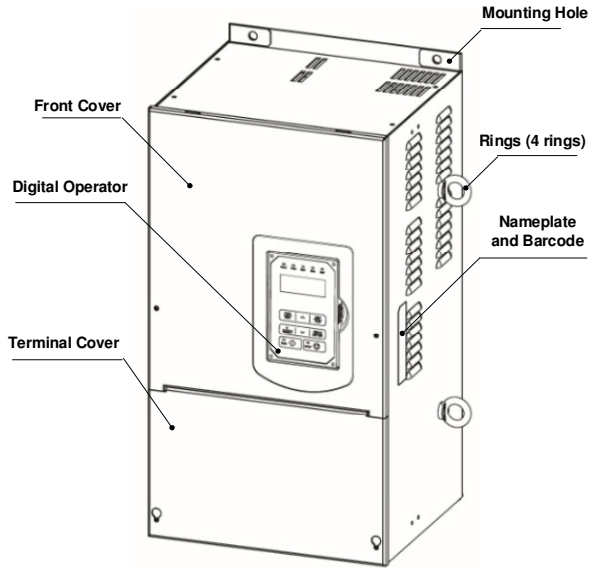


(Wall-mounted type, IEC IP20)



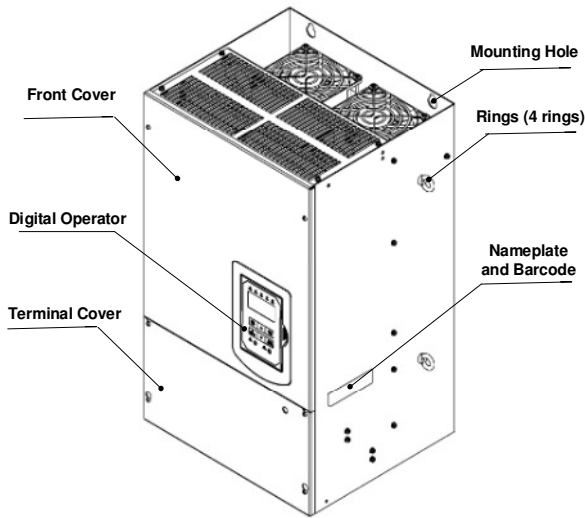
(Wall-mounted type, IEC IP20, NEMA1)

(c) 200V 30 ~ 40 HP / 400V 40 ~ 75 HP / 690V 50~75HP

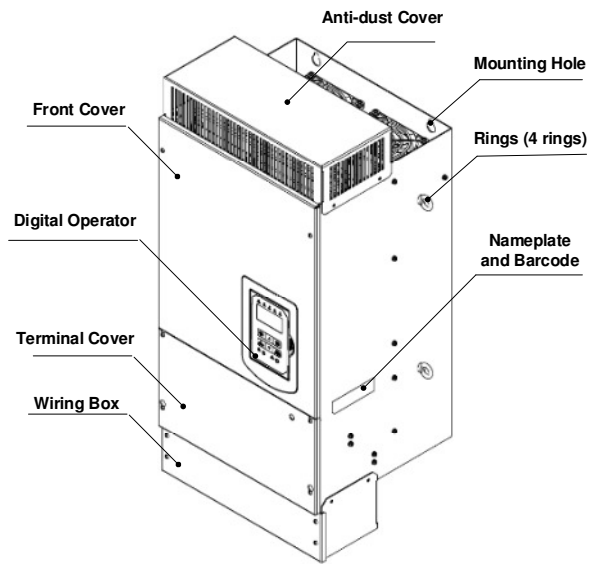


(Wall-mounted type, IEC IP20, NEMA1)

(d) 200V 50 ~ 100 HP / 400V 100 ~ 215 HP / 690V 100~270HP

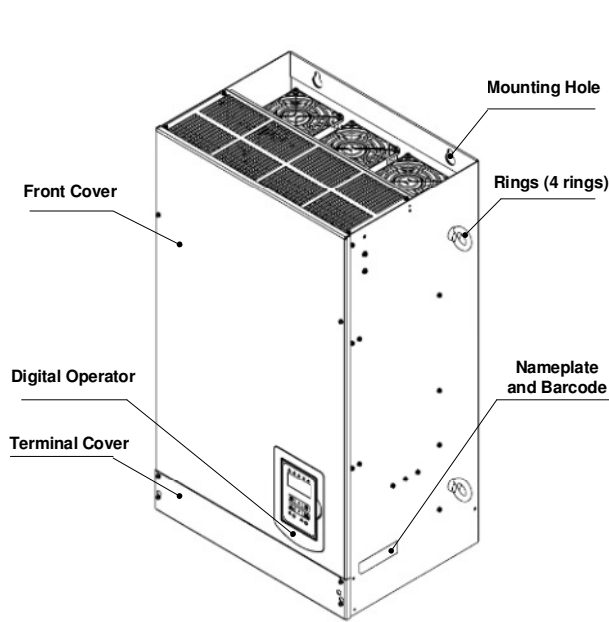


(Wall-mounted type, IEC IP00)

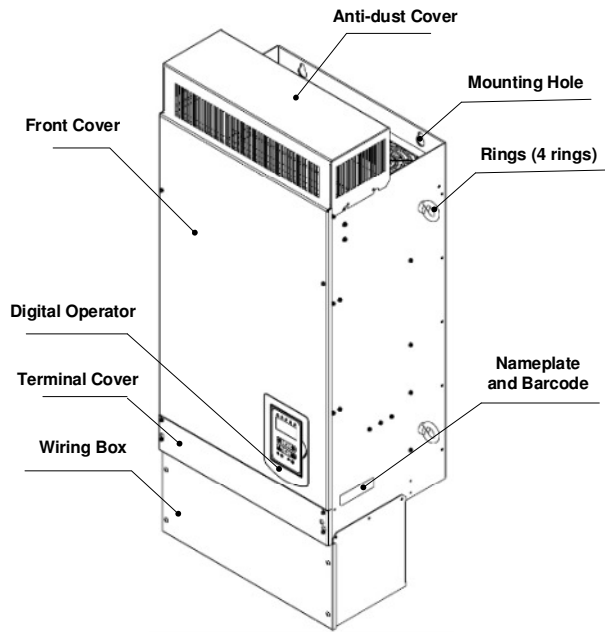


(Wall-mounted type, IEC IP20, NEMA1)

(e) 200V 125 ~ 150 HP / 400V 270 ~ 425 HP



(Wall-mounted type, IEC IP00)



(Wall-mounted type, IEC IP20, NEMA1)

3.4 Warning Labels

Important: Warning information located on the front cover must be read upon installation of the inverter.

⚠ WARNING / AVERTISSEMENT
 Risk of electrical shock. shut off main power and wait for 5 minutes before servicing.
 Risque de choc électrique. Couper l'alimentation principale et attendre 5 minutes avant l'entretien.
⚠ Hot surface. Risk of burn.
 Surface chaude. Risque de brûlure.
⚠ CAUTION / ATTENTION
 See manual before operation.
 Consultez le manuel avant l'opération.

(a) 200V: 1-7.5HP / 400V: 1-7.5HP /575V 1~ 3 HP

⚠ WARNING / AVERTISSEMENT
 Risk of electrical shock. shut off main power and wait for 5 minutes before servicing.
 Risque de choc électrique. Couper l'alimentation principale et attendre 5 minutes avant l'entretien.
⚠ CAUTION / ATTENTION
 See manual before operation.
 Consultez le manuel avant l'opération.

(b) 200V: 10HP / 400V: 10-20HP /575V 5~10HP

⚠ WARNING / AVERTISSEMENT
 Risk of electrical shock. shut off main power and wait for 15 minutes before servicing.
 Risque de choc électrique. Couper l'alimentation principale et attendre 15 minutes avant l'entretien.
⚠ CAUTION / ATTENTION
 See manual before operation.
 Consultez le manuel avant l'opération.

(c) 200V: 15-150HP / 400V: 20(F)-425HP/690V 15~270HP

3.5 Removing the Front Cover and Keypad

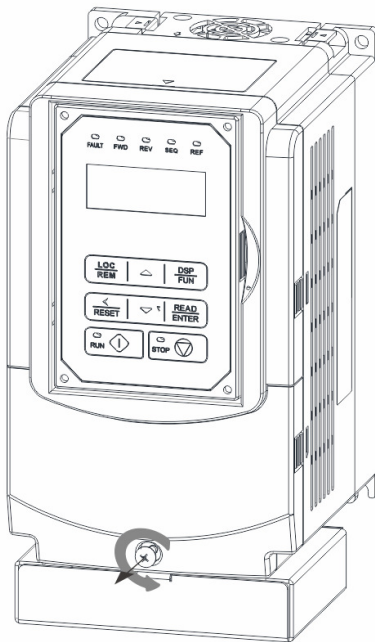


Caution

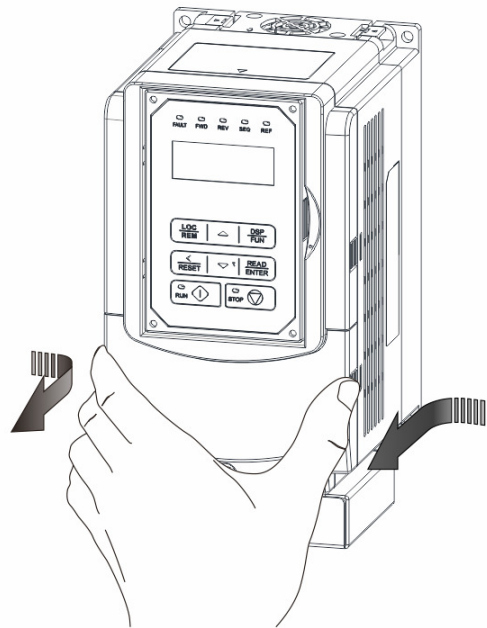
- Before making any wiring connections to the inverter the front cover needs to be removed.
- It is not required to remove the digital operator before making any wiring connections.
- Models 200V, 1 – 25 HP and 400V, 1 – 30 HP and 575V/690V 1 – 40 HP have a plastic cover. Loosen the screws and remove the cover to gain access to the terminals and make wiring connections. Place the plastic cover back and fasten screws when wiring connections have been made.
- Models 200V, 30 - 150HP and 400V, 40 - 425HP and 690V 50 - 270HP have a metal cover. Loosen the screws and remove the cover to gain access to the terminals and make wiring connections. Place the metal cover back and fasten screws when wiring connections have been made.

3.5.1 Without Built-in filter type (Standard Type)

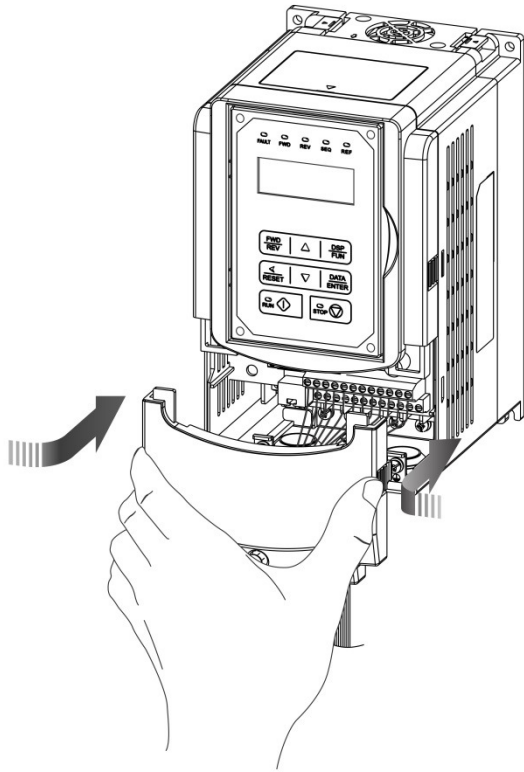
(a) 200V: 1 ~ 7.5 HP / 400V: 1 ~ 7.5 HP / 575V: 1~3HP



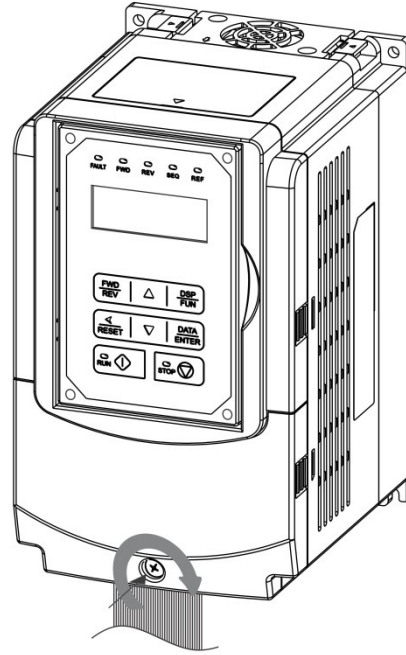
Step 1: Unscrew



Step 2: Remove cover

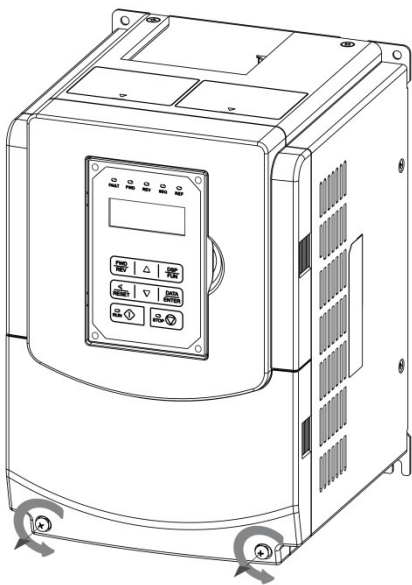


Step 3: Make wire connections and place cover back

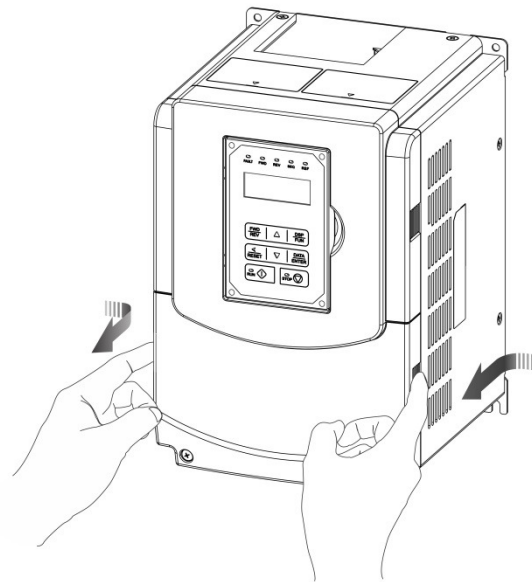


Step 4: Fasten screw

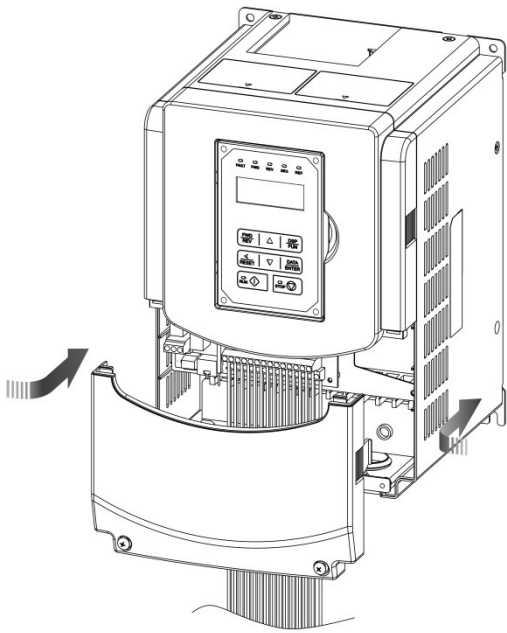
(b) 200V: 10 ~ 25 HP / 400V: 10 ~ 30 HP / 575V: 5~10HP/690V 15~40HP



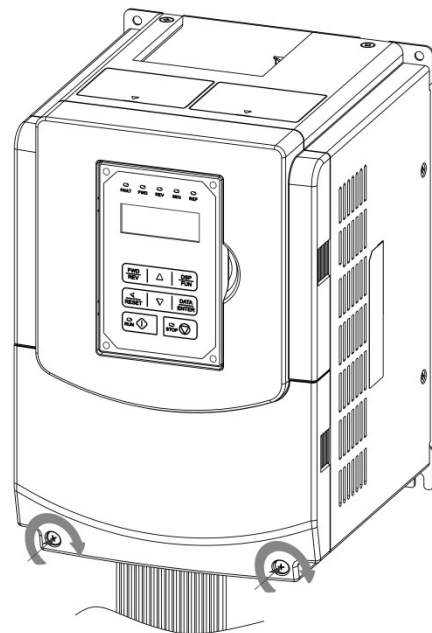
Step 1: Unscrew cover



Step 2: Remove cover

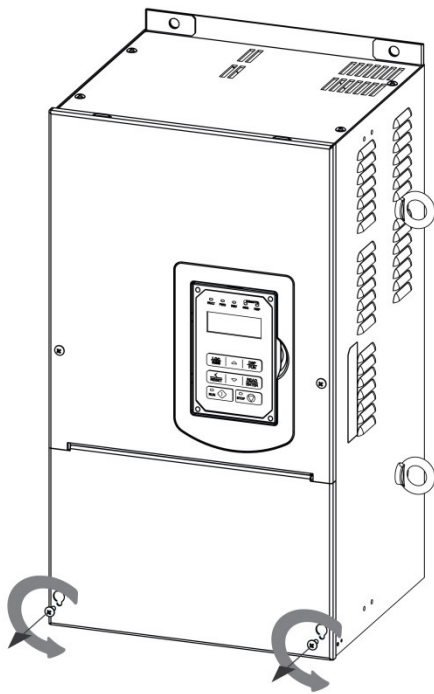


Step 3: Make wire connections and place cover back

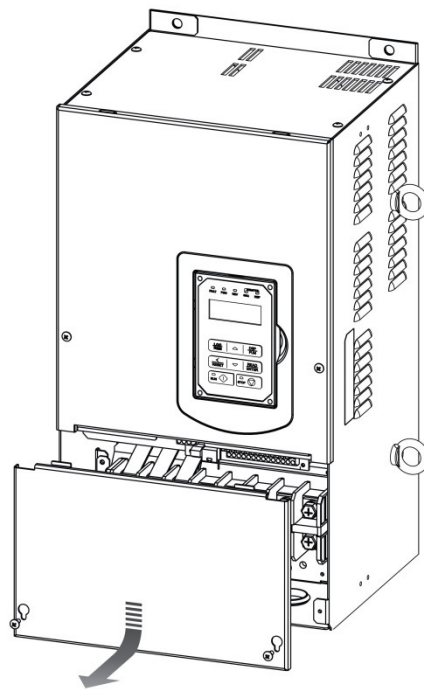


Step 4: Fasten screw

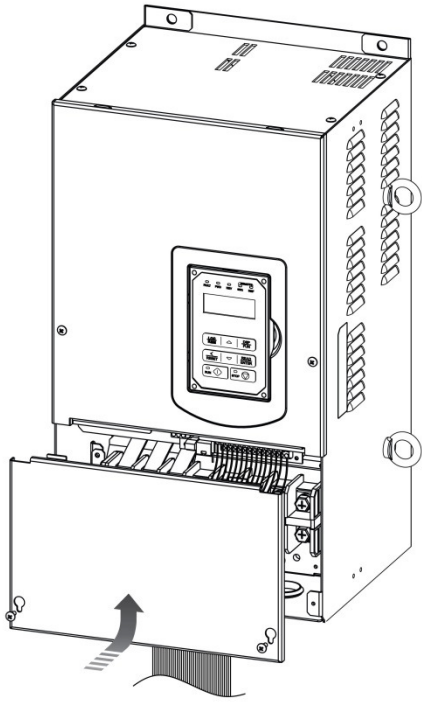
(c) 200V: 30 ~ 40 HP / 400V: 40 ~ 75 HP / 690V: 50~75HP (Chassis Type)



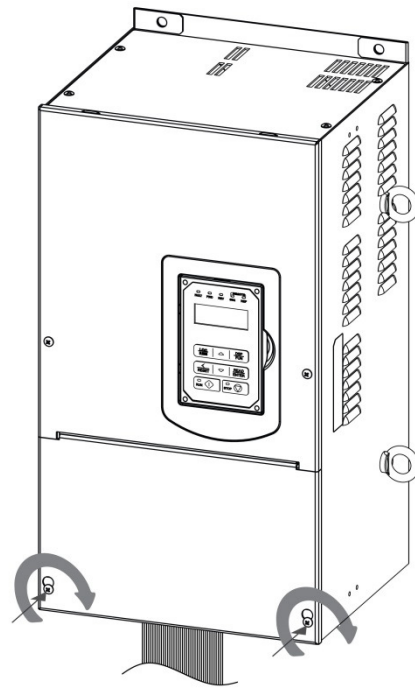
Step 1: Unscrew cover



Step 2: Remove cover

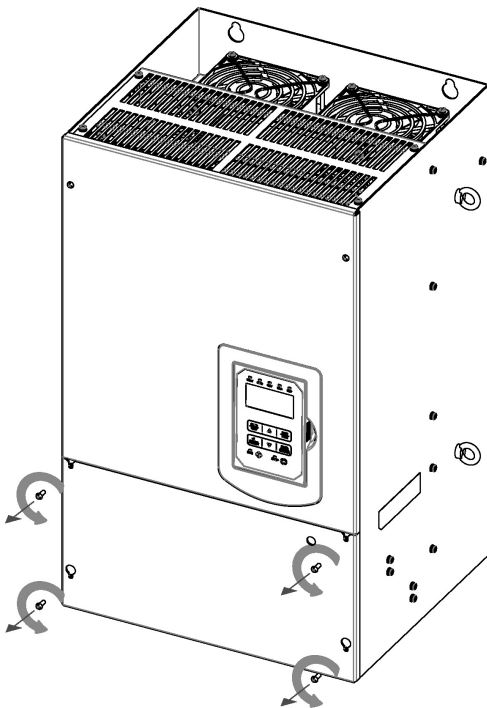


Step 3: Make wire connections and place cover back

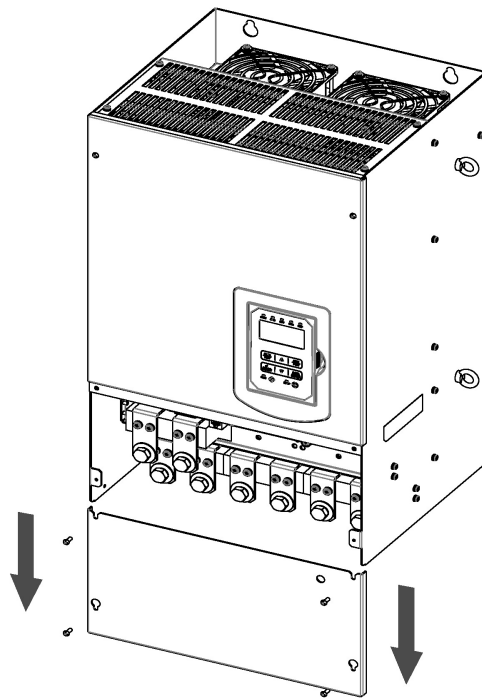


Step 4: Fasten screw

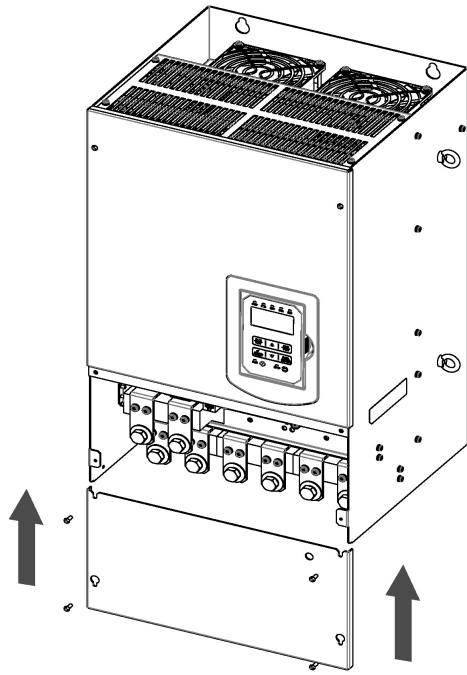
(d) 200V: 50 ~ 100 HP / 400V: 100 ~ 215 HP / 690V: 100~270HP (Chassis Type)



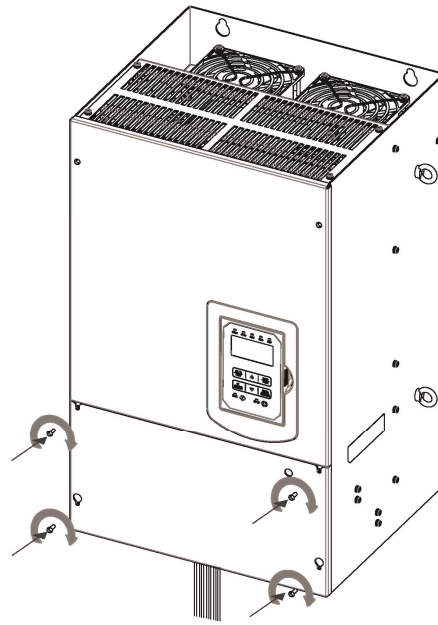
Step 1: Unscrew cover



Step 2: Remove cover

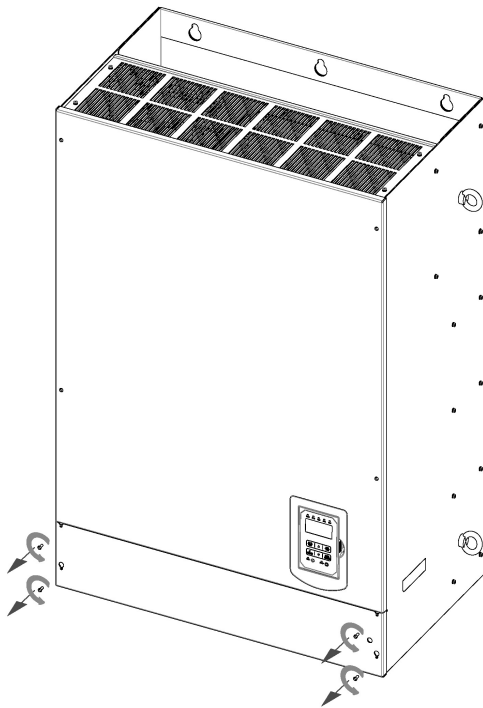


Step 3: Make wire connections and place cover back

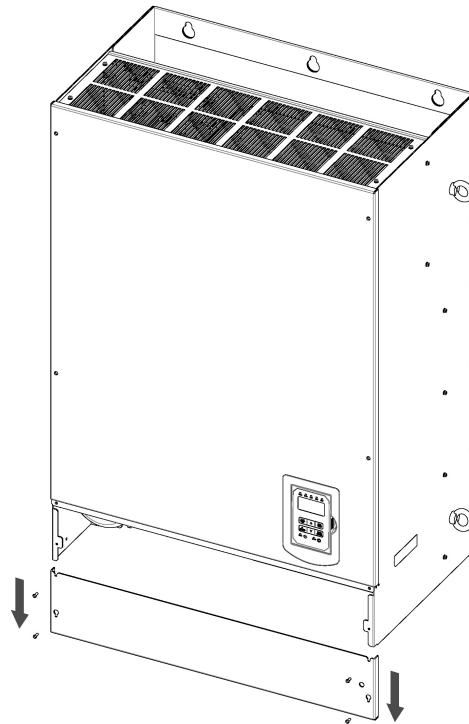


Step 4: Fasten screw

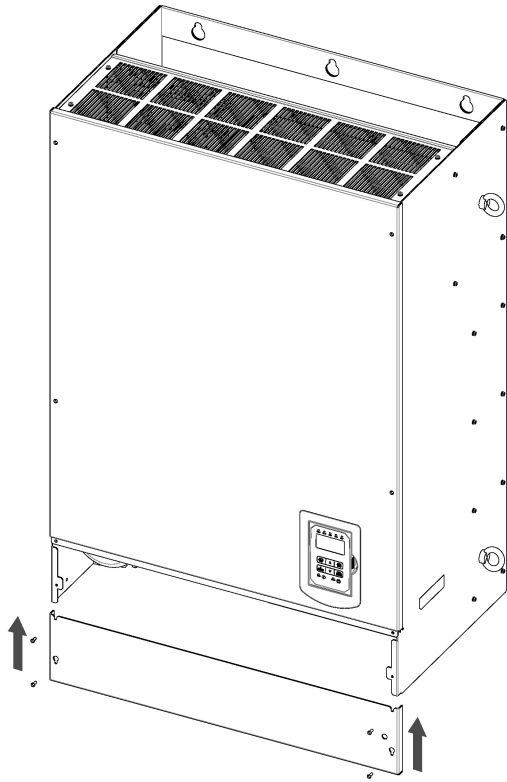
(e) 200V: 125 ~ 150 HP / 400V: 270 ~ 425 HP (Chassis Type)



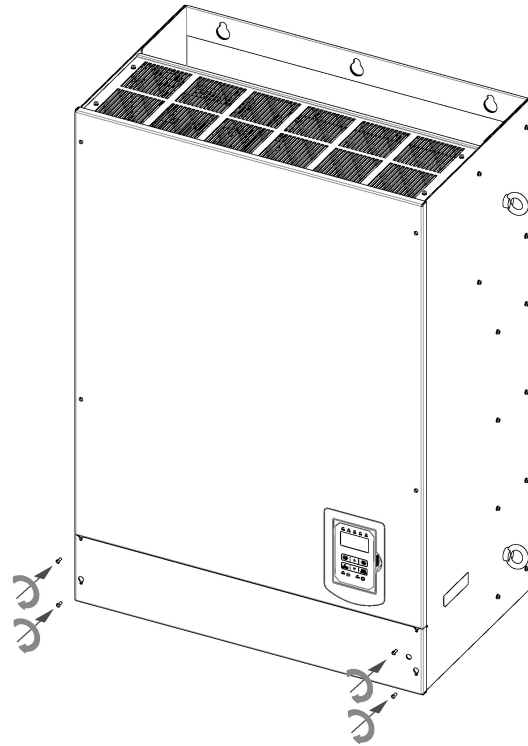
Step 1: Unscrew cover



Step 2: Remove cover

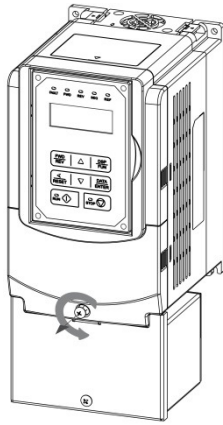


Step 3: Make wire connections and place cover back

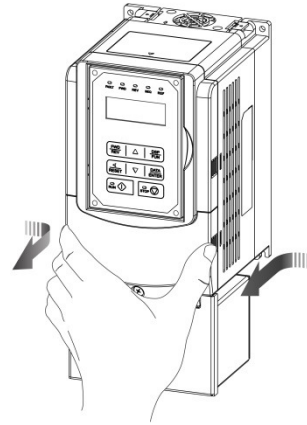


Step 4: Fasten screw

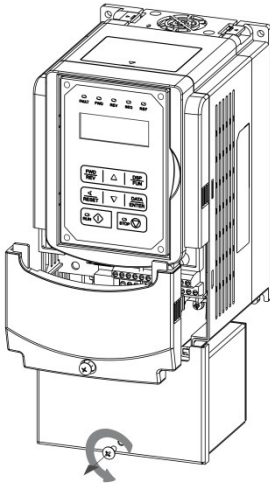
3.5.2 Built-in filter type (400V: 1 ~ 60 HP)



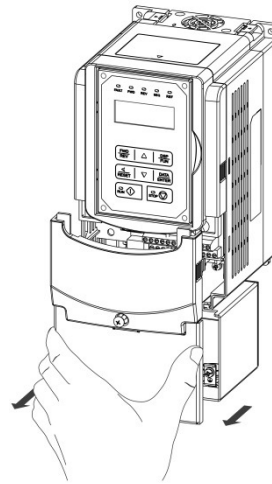
Step 1: Unscrew cover



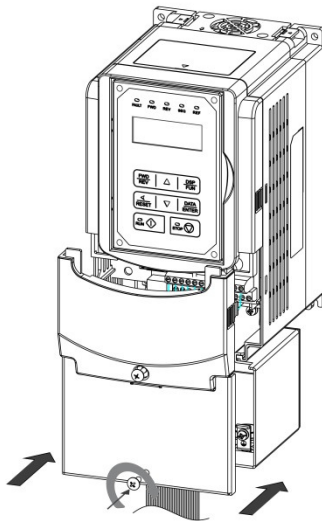
Step 2: Remove cover



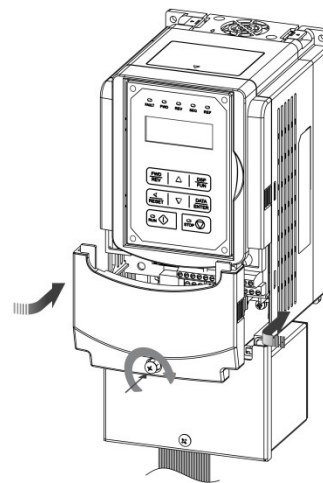
Step 3: Unscrew filter section



Step 4: Remove filter cover



Step 5: Make connections and place filter cover back



Step 6: Fasten screw

*****Filter Type Not Standard in US Market*****

3.6 Wire Gauges and Tightening Torque

To comply with UL standards, use UL approved copper wires (rated 75° C) and round crimp terminals (UL Listed products) as shown in table below when connecting to the main circuit terminals. TECO recommends using crimp terminals manufactured by NICHIFU Terminal Industry Co., Ltd and the terminal crimping tool recommended by the manufacturer for crimping terminals and the insulating sleeve.

Wire size mm ² (AWG)	Terminal screw size	Model of the round crimp terminal	Fastening torque kgf.cm (in.lbs)	Model of insulating sleeve	Model of crimp tool
0.75 (18)	M3.5	R1.25-3.5	8.2 to 10 (7.1 to 8.7)	TIC 1.25	NH 1
	M4	R1.25-4	12.2 to 14 (10.4 to 12.1)	TIC 1.25	NH 1
1.25 (16)	M3.5	R1.25-3.5	8.2 to 10 (7.1 to 8.7)	TIC 1.25	NH 1
	M4	R1.25-4	12.2 to 14 (10.4 to 12.1)	TIC 1.25	NH 1
2 (14)	M3.5	R2-3.5	8.2 to 10 (7.1 to 8.7)	TIC 2	NH 1 / 9
	M4	R2-4	12.2 to 14 (10.4 to 12.1)	TIC 2	NH 1 / 9
	M5	R2-5	22.1 to 24 (17.7 to 20.8)	TIC 2	NH 1 / 9
	M6	R2-6	25.5 to 30.0 (22.1 to 26.0)	TIC 2	NH 1 / 9
3.5 / 5.5 (12/10)	M4	R5.5-4	12.2 to 14 (10.4 to 12.1)	TIC 5.5	NH 1 / 9
	M5	R5.5-5	20.4 to 24 (17.7 to 20.8)	TIC 5.5	NH 1 / 9
	M6	R5.5-6	25.5 to 30.0 (22.1 to 26.0)	TIC 5.5	NH 1 / 9
	M8	R5.5-8	61.2 to 66.0 (53.0 to 57.2)	TIC 5.5	NH 1 / 9
8 (8)	M4	R8-4	12.2 to 14 (10.4 to 12.1)	TIC 8	NOP 60
	M5	R8-5	20.4 to 24 (17.7 to 20.8)	TIC 8	NOP 60
	M6	R8-6	25.5 to 30.0 (22.1 to 26.0)	TIC 8	NOP 60
	M8	R8-8	61.2 to 66.0 (53.0 to 57.2)	TIC 8	NOP 60
14 (6)	M4	R14-4	12.2 to 14 (10.4 to 12.1)	TIC 14	NH 1 / 9
	M5	R14-5	20.4 to 24 (17.7 to 20.8)	TIC 14	NH 1 / 9
	M6	R14-6	25.5 to 30.0 (22.1 to 26.0)	TIC 14	NH 1 / 9
	M8	R14-8	61.2 to 66.0 (53.0 to 57.2)	TIC 14	NH 1 / 9
22 (4)	M6	R22-6	25.5 to 30.0 (22.1 to 26.0)	TIC 22	NOP 60/ 150H
	M8	R22-8	61.2 to 66.0 (53.0 to 57.2)	TIC 22	NOP 60/ 150H
30 / 38 (3 / 2)	M6	R38-6	25.5 to 30.0 (22.1 to 26.0)	TIC 38	NOP 60/ 150H
	M8	R38-8	61.2 to 66.0 (53.0 to 57.2)	TIC 38	NOP 60/ 150H
50 / 60 (1/1/0)	M8	R60-8	61.2 to 66.0 (53.0 to 57.2)	TIC 60	NOP 60/ 150H
	M10	R60-10	102 to 120 (88.5 to 104)	TIC 60	NOP 150H
70 (2/0)	M8	R70-8	61.2 to 66.0 (53.0 to 57.2)	TIC 60	NOP 150H
	M10	R70-10	102 to 120 (88.5 to 104)	TIC 60	NOP 150H
80 (3/0)	M10	R80-10	102 to 120 (88.5 to 104)	TIC 80	NOP 150H
	M16	R80-16	255 to 280 (221 to 243)	TIC 80	NOP 150H
100 (4/0)	M10	R100-10	102 to 120 (88.5 to 104)	TIC 100	NOP 150H
	M12	R100-12	143 to 157 (124 to 136)	TIC 100	NOP 150H
	M16	R80-16	255 to 280 (221 to 243)	TIC 80	NOP 150H

3.7 Wiring Peripheral Power Devices



Caution

- After power is shut off to the inverter the capacitors will slowly discharge. Do NOT touch the inverter circuit or replace any components until the “CHARGE” indicator is off.
- Do NOT wire or connect/disconnect internal connectors of the inverter when the inverter is powered up or after power off but the “CHARGE” indicator is on.
- Do NOT connect inverter output U, V and W to the AC power source. This will result in damage to the inverter.
- The inverter must be properly grounded. Use terminal E to connect earth ground and comply with local standards.
- It is required to disconnect the ground wire in the control board if the inverter is not grounded.
- Do NOT perform a dielectric voltage withstand test (Megger) on the inverter this will result in inverter damage to the semiconductor components.
- Do NOT touch any of the components on the inverter control board to prevent damage to the inverter by static electricity.



Caution


- Refer to the recommended wire size table for the appropriate wire to use. The voltage between the power supply and the input terminals of the inverter may not exceed 2%.

Phase-to-phase voltage drop (V) = $\sqrt{3}$ × resistance of wire (Ω/km) × length of line (m) × current × 10⁻³.
(km=3280 x feet) / (m=3.28 x feet)
- Reduce the carrier frequency (parameter 11-01) if the cable from the inverter to the motor is over 25m (82ft). A high-frequency current can be generated by stray capacitance between the cables and result in an overcurrent trip of the inverter, an increase in leakage current, or an inaccurate current readout.
- To protect peripheral equipment, install fast acting fuses on the input side of the inverter. Refer to section 11.4 for additional information.



Power Supply

Power supply:

-  Make sure the correct voltage is applied to avoid damaging the inverter.

Molded Circuit Breaker




Molded-case circuit breaker (MCCB) or fused disconnect:


- A molded-case circuit breaker or fused disconnect must be installed between the AC source and the inverter that conforms to the rated voltage and current of the inverter to control the power and protect the inverter.

Magnetic Contactor

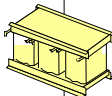


-  Do not use the circuit breaker as the run/stop switch for the inverter.

Ground fault detector / breaker:

-  Install a ground fault breaker to prevent problems caused by current leakage and to protect personnel. Select current range up to 200mA, and action time up to 0.1 second to prevent high frequency failure.

AC Reactor




Magnetic contactor:

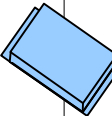
- Normal operations do not need a magnetic contactor. When performing functions such as external control and auto restart after power failure, or when using a brake controller, install a magnetic contactor.

Fast Acting Fuse



-  Do not use the magnetic contactor as the run/stop switch for the inverter.

Input Noise Filter



AC line reactor for power quality:

- When inverters are supplied by a high capacity power source (> 600KVA), an AC reactor can be connected to improve the power factor.

Install Fast Acting Fuse:

- To protect peripheral equipment, install fast acting fuses in accordance with the specifications in section 11.4 for peripheral devices.

A510 Inverter



Input Noise filter:

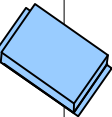
- A filter must be installed when there are inductive loads affecting the inverter. The inverter meets EN55011 Class A, category C3 when the TECO special filter is used. See section 11.3 for peripheral devices.


Ground


Inverter:

- Output terminals T1, T2, and T3 are connected to U, V, and W terminals of the motor. If the motor runs in reverse while the inverter is set to run forward, swap any two terminals connections for T1, T2, and T3.

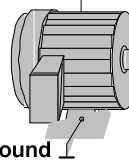
Output Noise Filter



-  To avoid damaging the inverter, do not connect the output terminals T1, T2, and T3 to AC input power.

-  Connect the ground terminal properly. (230V class: Rg <100Ω; 460V class: Rg <10Ω.)

Induction Motor



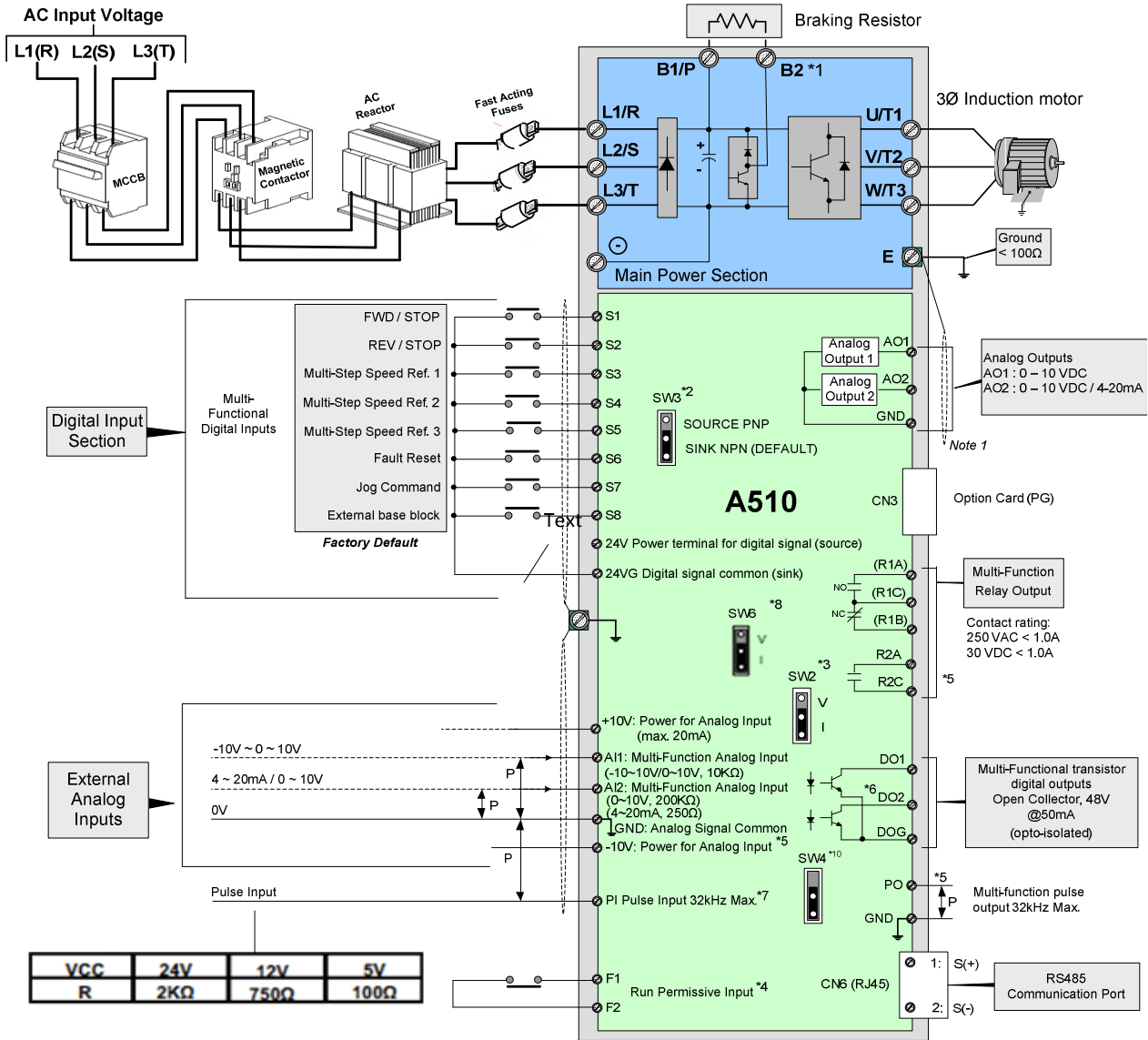
Output Noise filter:

- An output noise filter may reduce system interference and induced noise.

Motor:

- If the inverter drives multiple motors the output rated current of the inverter must be greater than the total current of all the motors.

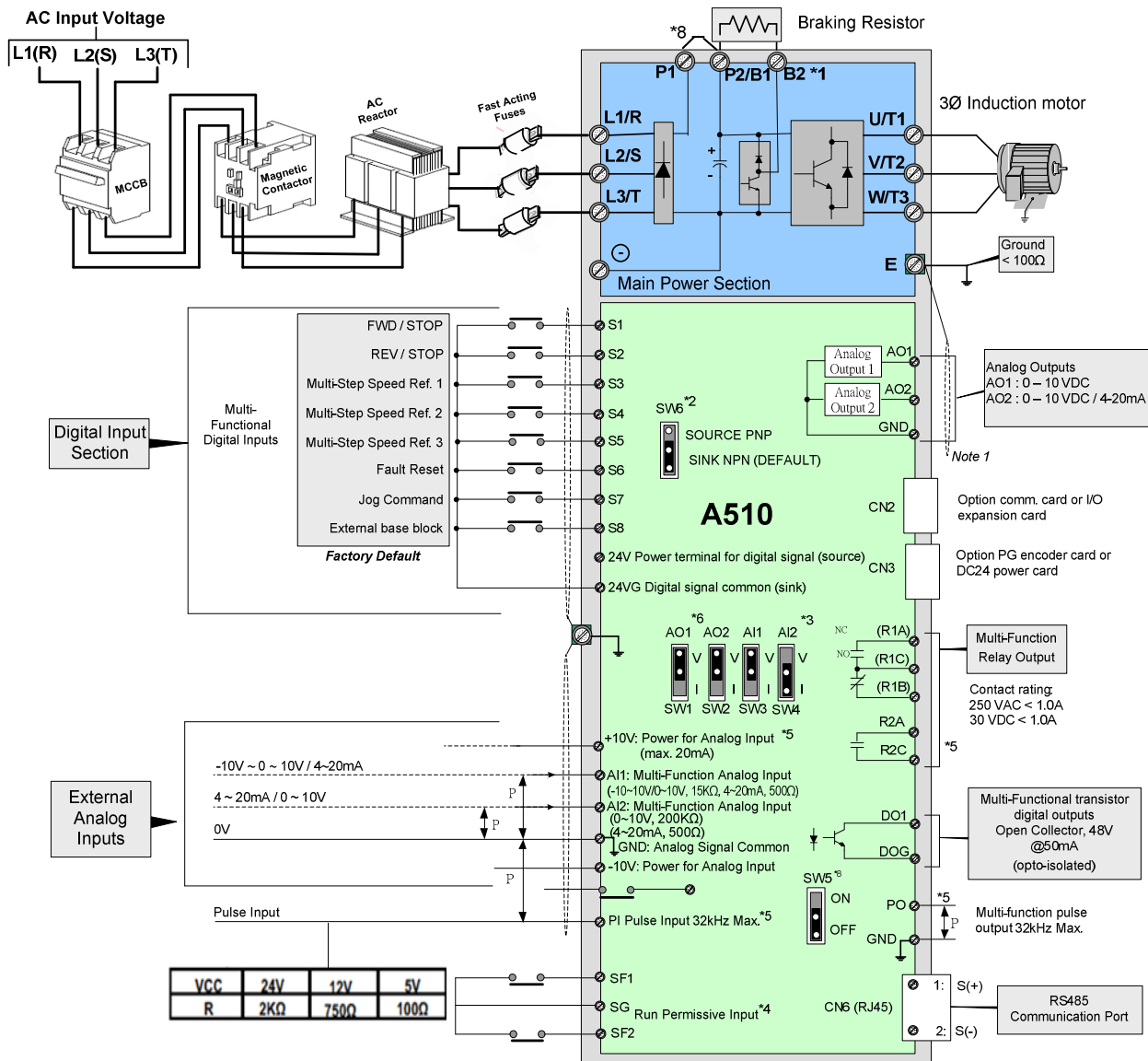
3.8.1 General Wiring Diagram (For U Type)



Notes:

- *1: Models 230V 1 ~ 25HP and 460V 1 ~ 40HP or lower ratings have a built-in braking transistor. To use this braking transistor a braking resistor can be connected between B1 and B2.
- *2: Use SW3 to select between Sink (NPN, with 24VG common) or Source (PNP, with +24V common) for multi-function digital input terminals S1~S8.
- *3: Use SW2 to switch between voltage (0~10V) and current (4~20mA) input for Multi-function analog input 2 (AI2). Besides please also check parameter 04-00 for proper setting.
- *4: Run Permissive input F1 and F2 is a normally closed input. This input should be closed to enable the inverter output. To activate this input remove the jumper wire between F1 and F2.
- *5: Models 230V 3HP and 460V 5HP and higher ratings include terminals -10V, S(+), S(-), R2A-R2C and PO-GND.
- *6: 230V 2HP and 460V 3HP and lower ratings include terminal DO2.
- *7: When using the open collector for pulse input, it doesn't need resistance because of built-in pull-up resistance.
- *8: AO2 default setting is 0~+10V.
- *9: Both 230V class 50HP~150HP and 460V class 100HP~425HP have built-in DC reactors.
- *10: It need turn on the switch for the terminal resistor RS485 in the last inverter when many inverters in parallel connection. Please refer to Appendix A (Communication Addendum)

3.8.2 General Wiring Diagram (For UE Type)

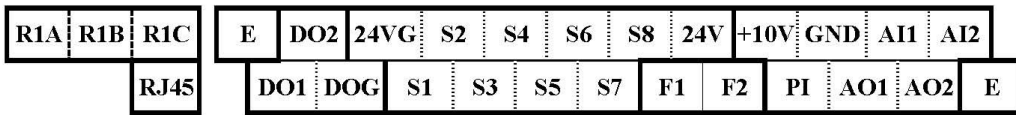


Notes:

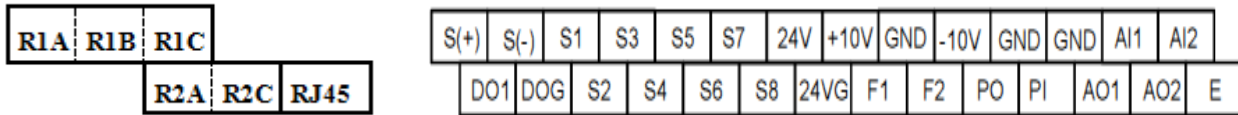
- *1: Models 230V 1 ~ 25HP and 460V 1 ~ 30HP or lower ratings have a built-in braking transistor. To use this braking transistor a braking resistor can be connected between B1 and B2.
- *2: Use SW6 to select between Sink (NPN, with 24VG common) or Source (PNP, with +24V common) for multi-function digital input terminals S1~S8.
- *3: Use SW3/SW4 to switch between voltage (0~10V) and current (4~20mA) input for Multi-function analog input 2 (AI2). Besides please also check parameter 04-00 for proper setting.
- *4: Run Permissive input SF1 and SF2 is a normally closed input. This input should be closed to enable the inverter output. To activate this input remove the jumper wire between SF1/ SF2 and SG.
- *5: When using the open collector for pulse input, it doesn't need resistance because of built-in pull-up resistance.
- *6: AO1/AO2 default setting is 0~+10V.
- *7: Both 230V class 50HP~150HP and 460V class 100HP~425HP have built-in DC reactors.
- *8: It need turn on the switch for the terminal resistor RS485 in the last inverter when many inverters in parallel connection.

3.9.1 User (Control) Terminals (For U Type)

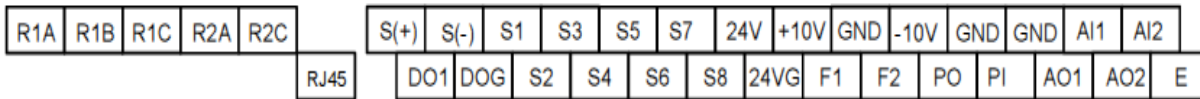
230V: 1 ~ 2 HP, 460V: 1 ~ 3HP



230V: 3 ~ 40 HP, 460V: 5 ~ 75HP, 575V:1~10HP, 690V: 15~75HP



230V: 50 ~ 150 HP, 460V: 100 ~ 425HP, 690V: 100~270HP



Description of User Terminals

Type	Terminal	Terminal Function	Signal Level / Information
Digital input signal	S1	2-wire forward/ stop (default) * 1	Signal Level 24 VDC (photo isolated) Maximum current: 8mA Maximum voltage: 30 Vdc Input impedance: 4.22kΩ
	S2	2-wire reversal/ stop (default) * 1	
	S3	Multi-speed/ position setting command 1 (default) * 1	
	S4	Multi-speed/ position setting command 2 (default) * 1	
	S5	Multi-speed/ position setting command 3 (default) * 1	
	S6	Fault reset (default) * 1	
	S7	JOG frequency command (default) * 1	
	S8	External B.B.(Base Block) stop (coast to stop) (default) * 1	
24V Power supply	24V	Digital signal SOURCE point (SW3 switched to SOURCE)	±15%, Max. output current: 250mA (The sum of all loads connected)
	24VG	Common terminal of Digital signals Common point of digital signal SINK (SW3 switched to SINK)	
Analog input signal	+10V	Power for external speed potentiometer	+10V (Max. current , 20mA)
	-10V	Only above 230V 3HP/ 460V 5HP (include) support this terminal function	-10V (Max. current , 20mA)
	AI1	Multi-function analog input for speed reference (0-10V input)/(-10V~10V input)	From 0 to +10V, From -10V to +10V Input impedance : 20KΩ Resolution: 11bit + 1
	AI2	Multi-function analog input terminals *2, can use SW2 to switch voltage or current input (0~10V)/(4-20mA)	From 0 to +10V, Input impedance: 200KΩ From 4 to 20 mA Input impedance: 250KΩ Resolution: 11bit + 1
	GND	Analog signal ground terminal	----
	E	Shielding wire's connecting terminal (Ground)	----
Analog output signal	AO1	Multi-function analog output terminals *2 (0~10V output)	From 0 to 10V, From 4 to 20mA (Load < 500Ω) PWM Frequency: 10KHz
	AO2	Multi-function analog output terminals *2. can use SW6 to switch voltage or current input (0~10V / 4-20mA output)	
	GND	Analog signals ground terminal	
Pulse output signal	PO	Pulse output, Band width 32KHz, only above 230V 3HP/ 460V 5HP (include) support this terminal function.	Max. Frequency: 32KHz Open Collector output
	GND	Analog signals ground terminal	----

Type	Terminal	Terminal Function	Signal Level / Information
Pulse input signal	PI	Pulse command input, Bandwidth: 32KHz	L: from 0.0 to 0.5V H: from 4.0 to 13.2V Max. Frequency: 0 - 32KHz Built-in pull-up resistance. When open collector input is used, it is not required to connect resistance.
	GND	Analog signals ground terminal	----
Digital output	DO1	Multi-function(open collector transistor) output *1	48Vdc, 2mA ~50mA Open-collector output
	DO2 230V:1-2HP 460V:1-3HP		
	DOG	Open collector transistor digital ground	
Relay output	R1A	Relay A contact (multi-function output terminal)	Rating: 250Vac, 10 mA ~ 1A 30Vdc, 10 mA ~ 1A
	R1B		
	R1C	Relay B contact (multi-function output terminal) Relay contact common terminal, With the same functions as DO1/DO2	
	R2A-R2C 230V:over 3HP 460V:over 5HP	With the same functions as DO1/DO2	
Run Permissive Input	F1	On: normal operation. Off: stop.	24Vdc, 8mA, pull-up
	F2	(Jumper wired between F1 and F2 has to be removed by using external contact to stop.)	24V Ground
RS-485 port	S (+)	RS485/ Modbus communication protocol	Differential input and output
	S (-)		
Grounding	E (G)	Grounding to earth Shield the connecting terminal	----

Notes:

*1:Multi-function digital input/ output can be referred to in this manual.

- Group 03: External Terminals Digital Input / Output Function Group.

*2:Multi-function analog input/ output can be referred to in this manual..

- Group 04 - External Terminal Analog Signal Input (Output) Function Group.

3.9.2 User (Control) Terminals (For UE type)

230V: 1 ~ 2 HP, 460V: 1 ~ 3HP

R1A	R1B	R1C	R2A	R2C	S(+)	S(-)	S1	S3	S5	S7	24V	24VG	+10V	-10V	GND	GND	AI1	AI2
RJ45					DO1	DOG	S2	S4	S6	S8	SF1	SG	SF2	PO	PI	AO1	AO2	E

230V: 3 ~ 40 HP, 460V: 5 ~ 75HP

R1A	R1B	R1C	S(+)	S(-)	S1	S3	S5	S7	24V	24VG	+10V	-10V	GND	GND	AI1	AI2
R2A	R2C	RJ45	DO1	DOG	S2	S4	S6	S8	SF1	SG	SF2	PO	PI	AO1	AO2	E

230V: 50 ~ 150 HP, 460V: 100 ~ 425HP

R2A	R2C	R1A	R1B	R1C	RJ45	S(+)	S(-)	S1	S3	S5	S7	24V	24VG	+10V	-10V	GND	GND	AI1	AI2
						DO1	DOG	S2	S4	S6	S8	SF1	SG	SF2	PO	PI	AO1	AO2	E

Description of User Terminals

Type	Terminal	Terminal Function	Signal Level / Information
Digital input signal	S1	2-wire forward/ stop (default) ^{*1}	Signal Level 24 VDC (photo isolated) Maximum current: 8mA Maximum voltage: 30 Vdc Input impedance: 4.22kΩ
	S2	2-wire reversal/ stop (default) ^{*1}	
	S3	Multi-speed/ position setting command 1 (default) ^{*1}	
	S4	Multi-speed/ position setting command 2 (default) ^{*1}	
	S5	Multi-speed/ position setting command 3 (default) ^{*1}	
	S6	Fault reset (default) ^{*1}	
	S7	JOG frequency command (default) ^{*1}	
	S8	External B.B.(Base Block) stop (coast to stop) (default) ^{*1}	
24V Power supply	24V	Digital signal SOURCE point (SW6 switched to SOURCE)	±15%, Max. output current: 250mA (The sum of all loads connected)
	24VG	Common terminal of Digital signals Common point of digital signal SINK (SW6 switched to SINK)	
Analog input signal	+10V	Positive power for external speed potentiometer	+10V (Max. current , 20mA)
	-10V	Negative power for external speed potentiometer	-10V (Max. current , 20mA)
	AI1	Multi-function analog input terminals ^{*2} , can use SW3 to switch voltage or current input (-10V~10V)/(4-20mA)	From 0 to +10V, From -10V to +10V Input impedance : 500KΩ From 4 to 20 mA Input impedance : 500KΩ Resolution: 11bit + 1
	AI2	Multi-function analog input terminals ^{*2} , can use SW4 to switch voltage or current input (0~10V)/(4-20mA)	From 0 to +10V, Input impedance: 900KΩ From 4 to 20 mA Input impedance: 250Ω Resolution: 11bit + 1
	GND	Analog signal ground terminal	----
	E	Shielding wire's connecting terminal (Ground)	----
Analog output signal	AO1	Multi-function analog output terminals ^{*2} . can use SW1 to switch voltage or current input (0~10V / 4-20mA output)	From 0 to 10V, From 4 to 20mA (Load < 500Ω) PWM Frequency: 10KHz
	AO2	Multi-function analog output terminals ^{*2} . can use SW2 to switch voltage or current input (0~10V /	

Type	Terminal	Terminal Function	Signal Level / Information
		4-20mA output)	
	GND	Analog signals ground terminal	
Pulse output signal	PO	Bandwidth: 32KHz	Max. Frequency: 32KHz Open Collector output
	GND	Analog signals ground terminal	----
Pulse input signal	PI	Pulse command input, Bandwidth: 32KHz	L: from 0.0 to 0.5V H: from 4.0 to 13.2V Max. Frequency: 0 - 32KHz Built-in pull-up resistance. When open collector input is used, it is not required to connect resistance.
	GND	Analog signals ground terminal	----
Digital output	DO1	Multi-function(open collector transistor) output ^{*1}	48Vdc, 2mA ~50mA Open-collector output
	DOG	Open collector transistor digital ground	
Relay output	R1A	Relay A contact (multi-function output terminal)	Rating: 250Vac, 10 mA ~ 1A 30Vdc, 10 mA ~ 1A
	R1B	Relay B contact (multi-function output terminal)	
	R1C	Relay contact common terminal, With the same functions as DO1	
	R2A-R2C	Relay A contact (multi-function output terminal) Relay B contact (multi-function output terminal) Relay contact common terminal, With the same functions as DO1	Rating: 250Vac, 10 mA ~ 1A 30Vdc, 10 mA ~ 1A
Run Permissive Input	SF1 SF2	On: normal operation. Off: stop. (Jumper wired between SF1/ SF2 and SG has to be removed by using external contact to stop.)	24Vdc, 8mA, pull-up
	SG	Safety command common terminal	24Vdc
	S (+) S (-)	RS485/ Modbus communication protocol	Differential input and output
Grounding	E (G)	Grounding to earth Shield the connecting terminal	----


Notes:

*1:Multi-function digital input/ output can be referred to in our instruction manual.

- Group 03: External Terminals Digital Input / Output Function Group.

*2:Multi-function analog input/ output can be referred to in our instruction manual..

- Group 04 - External Terminal Analog Signal Input (Output) Function Group.

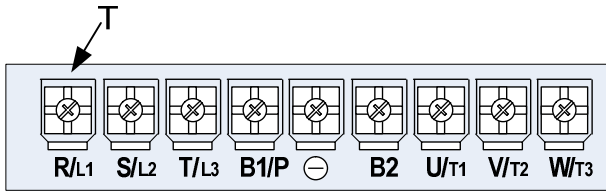
 **Caution**

- Maximum output current capacity for terminal 10V is 20mA.
- Multi-function analog output AO1 and AO2 are used for an analog output meter. Do not use these outputs for feedback control.
- Control board's 24V and ±10V are to be used for internal control only, Do not use the internal power-supply to power external devices.

3.10.1 Power Terminals (For U type)

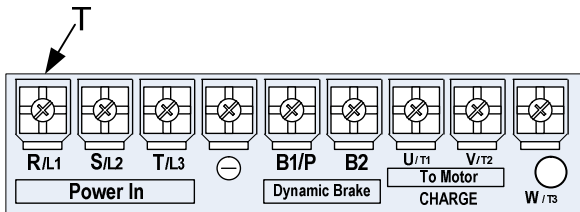
Terminal	230V: 1 ~ 25HP 460V: 1 ~ 40HP 575V: 1 ~ 10HP 690V: 15 ~ 40HP	230V: 30 ~ 150HP 460V: 50 ~ 425HP 690V: 50 ~ 270HP
R/L1	Input Power Supply (For single phase use terminals R/L1 and S/L2)	
S/L2		
T/L3		
B1 / P	B1 / P – B2: external braking resistor	-
B2		
⊖	-	⊕ - ⊖: Connect braking module
⊕	-	
U/T1	Inverter output	
V/T2		
W/T3		
E	Ground terminal	

230V: 1 ~ 2HP, 460V: 1 ~ 3HP



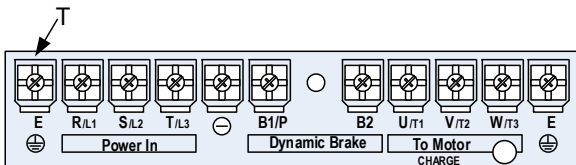
Terminal screw size	
T	⊖
M4	M4

230V: 3 ~ 7.5HP, 460V: 5 ~ 7.5HP, 575V: 1~3HP



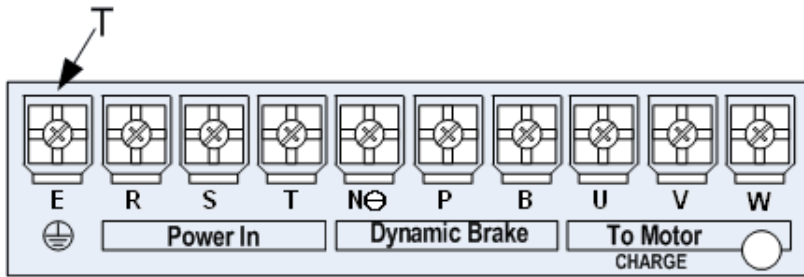
Terminal screw size	
T	⊖
M4	M4

230V: 10HP, 460V: 10 ~ 15HP



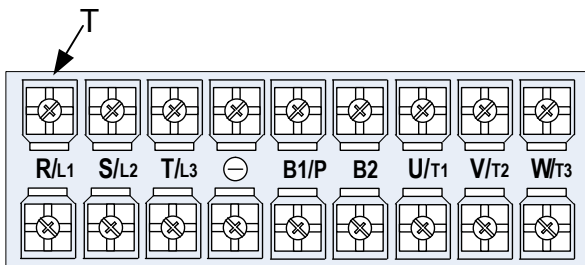
Terminal screw size	
T	⊖
M6	M6

575V: 5~10HP



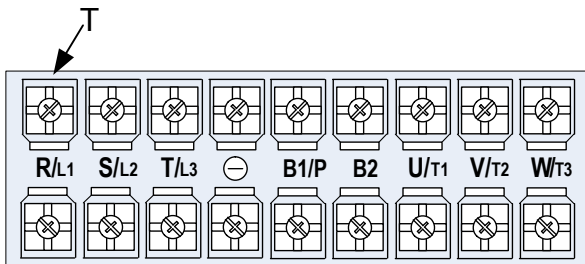
Terminal screw size	
T	⊕
M6	M6

460V: 20HP (Frame 3)



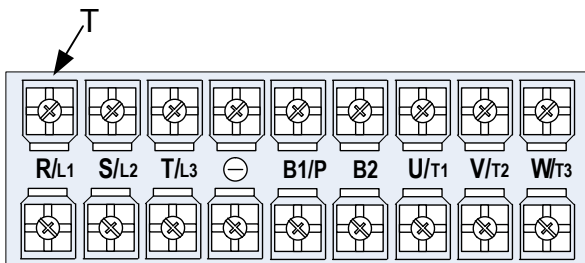
Terminal screw size	
T	⊕
M6	M5

230V: 15~25HP, 460V: 20 ~ 30HP, 690V: 15~40HP



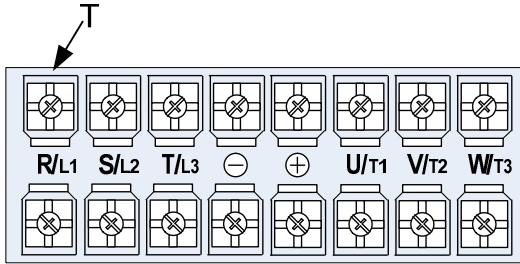
Terminal screw size	
T	⊕
M6	M6

460V: 40HP



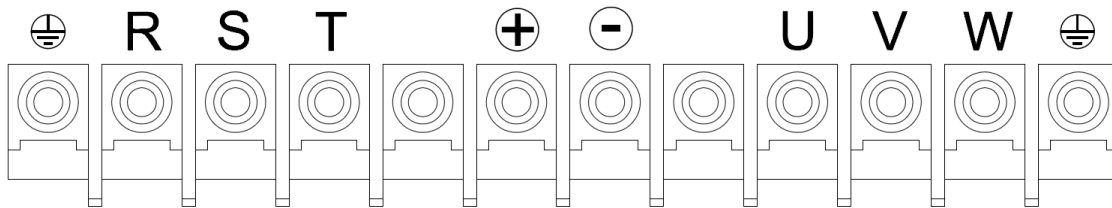
Terminal screw size	
T	⊕
M6	M8

230V: 30 ~40HP, 460V: 50 ~ 75HP



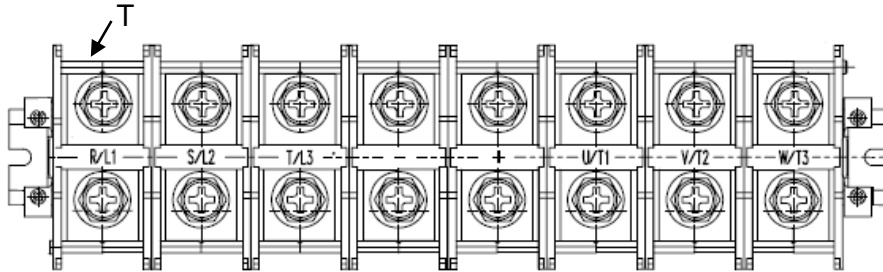
Terminal screw size	
T	⊕
M8	M8

690V: 50~75HP



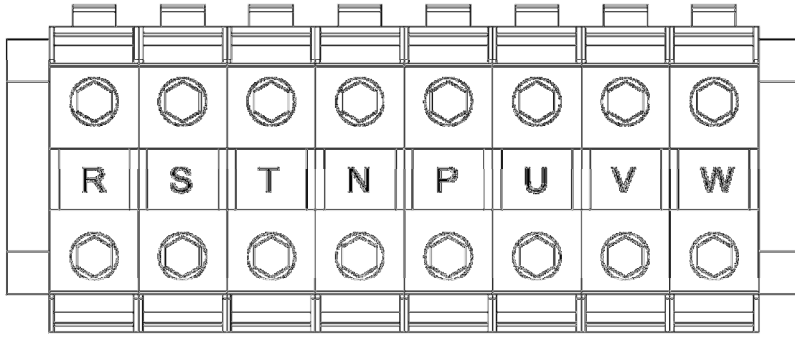
Terminal screw size	
T	⊕
M6	M6

230V: 50~60HP, 460V: 100HP



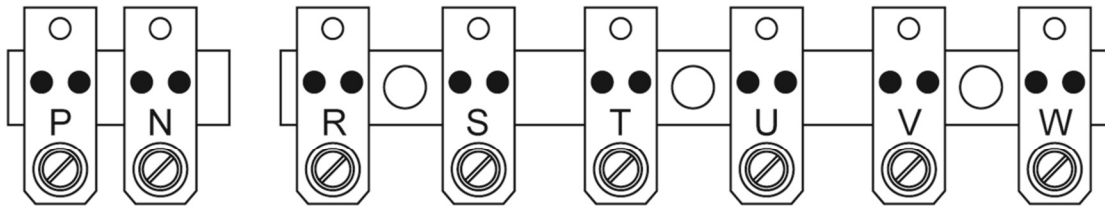
Terminal screw size		
Power supply	T	⊕
230V 50-60HP/ 460V 100HP	M10	M10

690V: 100~150HP



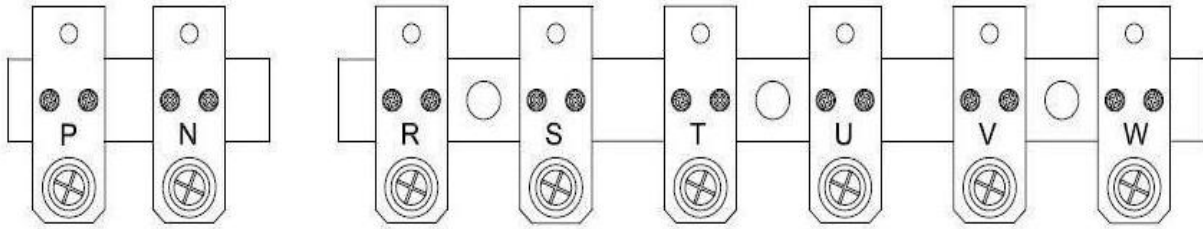
Power supply	
690V 100~150HP	M10

460V : 125HP



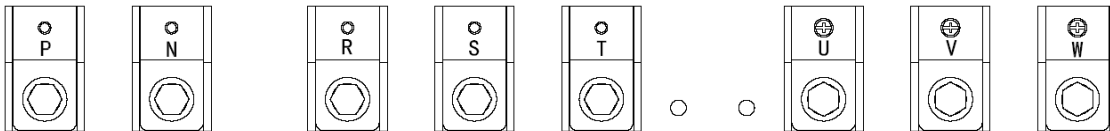
Terminal screw size	
T	
M10	M10

230V: 75~100HP, 460V: 150~215HP, 690V: 175~270HP



Terminal screw size	
T	⊕
M10	M10

230V: 125~150HP, 460V: 270~425HP



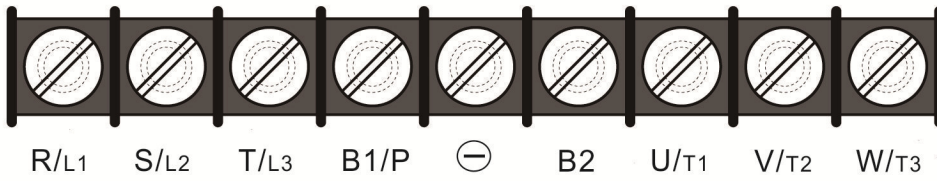
Terminal screw size	
T	⊕
M12	M10

Notes: For wire gauges and screw torques, please refer to the table in section 3.6.

3.10.2 Power Terminals (For UE type)

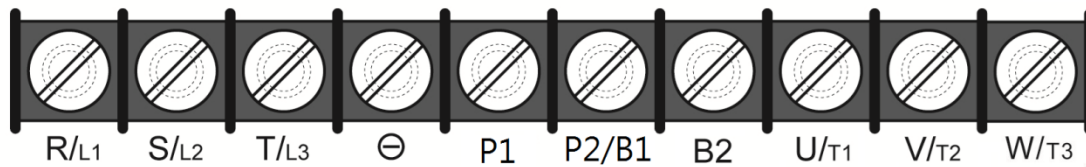
Terminal	230V: 1 ~ 30HP 460V: 1 ~ 75HP	230V: 40 ~ 150HP 460V: 50 ~ 425HP
R/L1	Input Power Supply (For single phase use terminals R/L1 and S/L2)	
S/L2		
T/L3		
P2/B1	P2/B1 – B2: external braking resistor	-
B2		
⊕	P1 – P2/B1: external DCL (For frame 2~5)	⊕ - ⊖: Connect braking module
P1		
U/T1	Inverter output	
V/T2		
W/T3		
E	Ground terminal	

230V : 1 ~ 2HP , 460V : 1 ~ 3HP



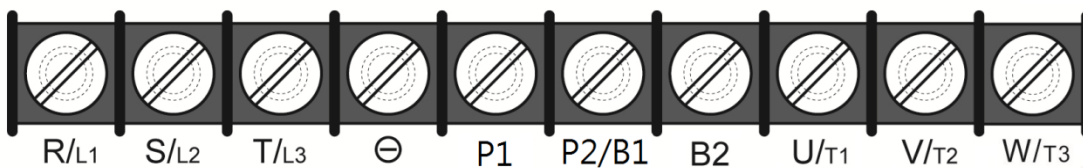
Terminal screw size	
T	
M4	M4

230V : 3 ~ 7.5HP , 460V : 5 ~ 7.5HP



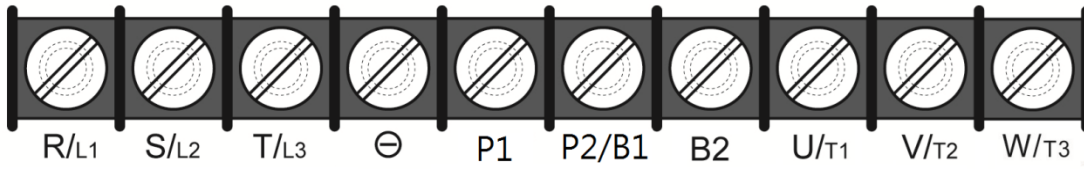
Terminal screw size	
T	
M4	M4

230V : 10HP , 460V : 10 ~ 20HP



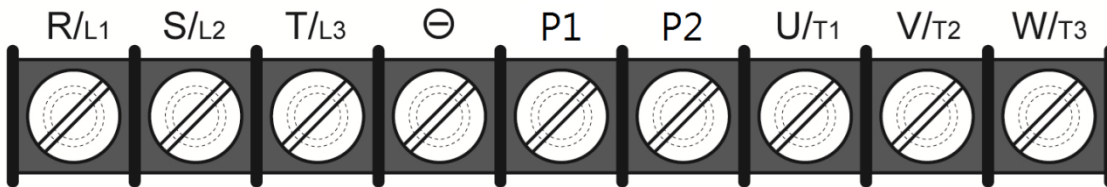
Terminal screw size	
T	
M6	M6

230V : 15~25HP , 460V : 25 ~ 30HP



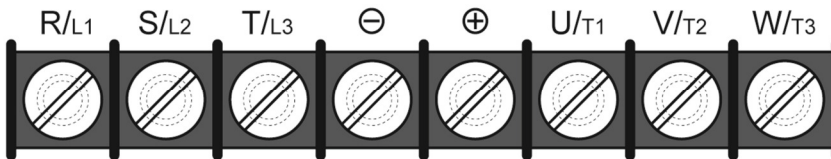
Terminal screw size	
T	
M6	M6

230V : 30 ~40HP , 460V : 40 ~ 75HP



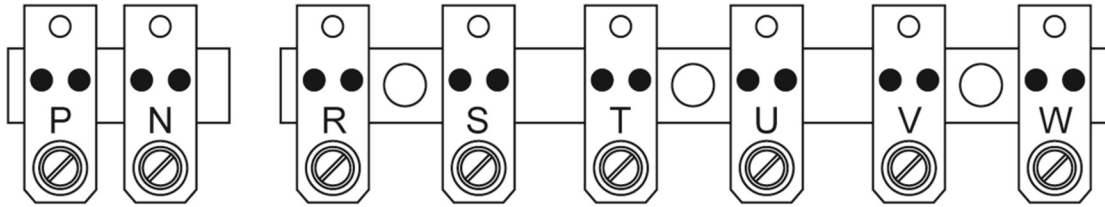
Terminal screw size	
T	
M8	M8

230V : 50~60HP, 460V : 100HP



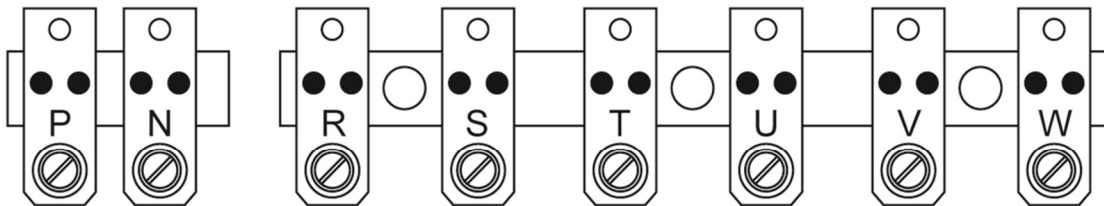
Terminal screw size	
T	
M10	M10

460V : 125HP



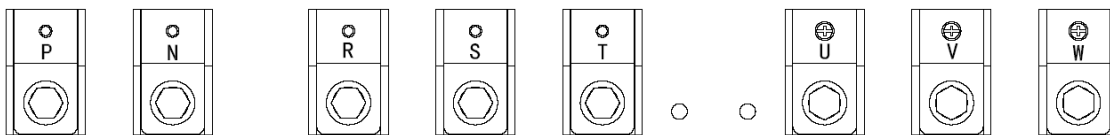
Terminal screw size	
T	
M10	M10

230V : 75~100HP, 460V : 150~215HP



Terminal screw size	
T	
M10	M10

230V : 125~150HP, 460V : 270~425HP

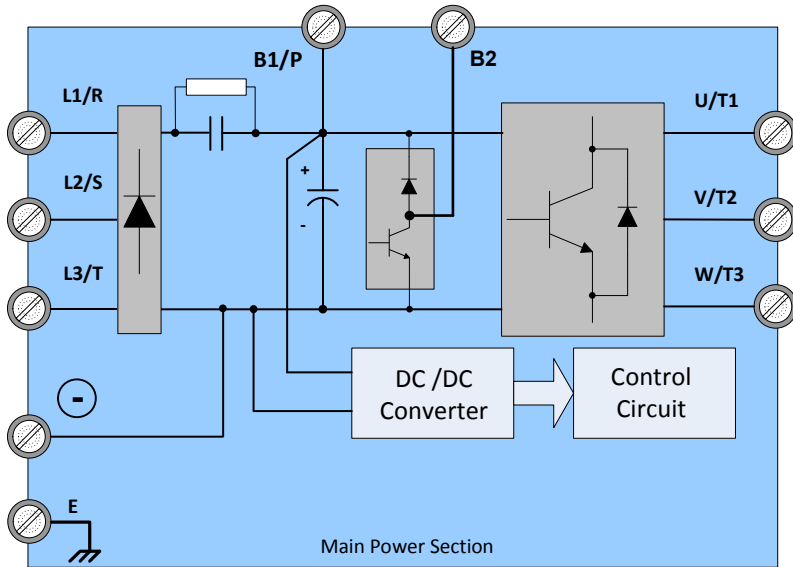


Terminal screw size	
T	
M12	M10

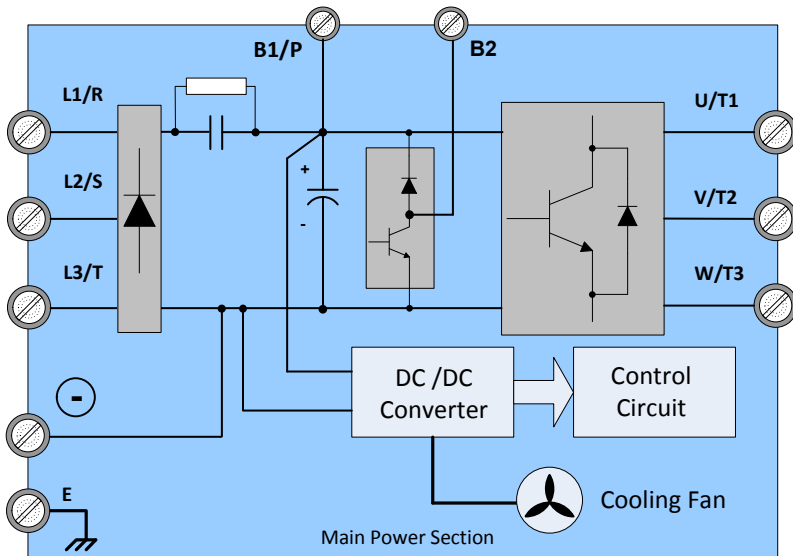
3.11 Input / Output Power Section Block Diagram

The following diagrams 1 - 8 show the basic configuration of the power sections for the range of horsepower and input voltages. This is shown for reference only and is not a detailed depiction.

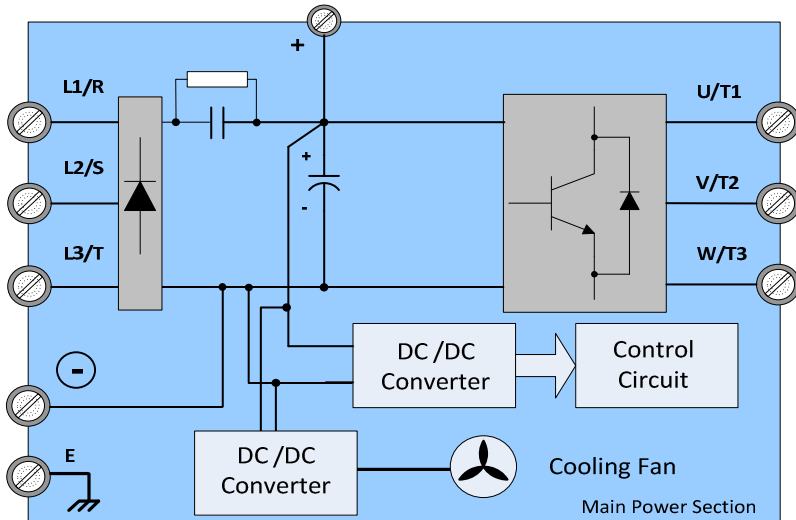
1: 230V: 1 HP / 460V: 1 ~ 2 HP



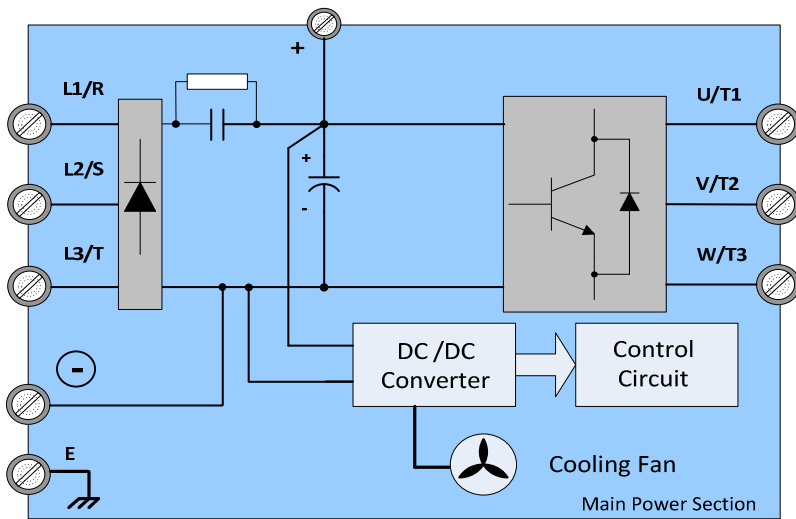
2: 230V: 2 ~ 25 HP / 460V: 3 ~ 40 HP (U Type) / 460V: 3 ~ 30 HP (UE Type)
575V: 1~10HP / 690V: 15~40HP



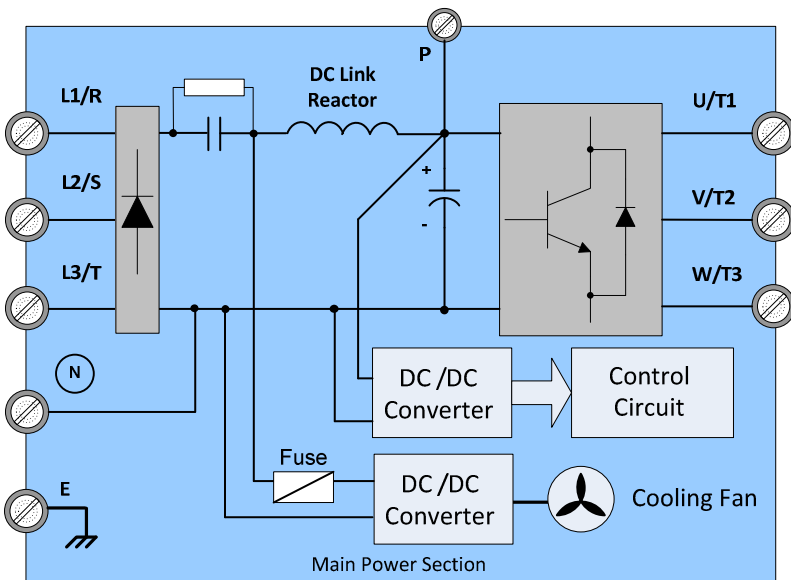
3: 230V: 30 ~ 40 HP / 460V: 50 ~ 75 HP (U Type) /460V: 40 ~ 75 HP (UE Type)



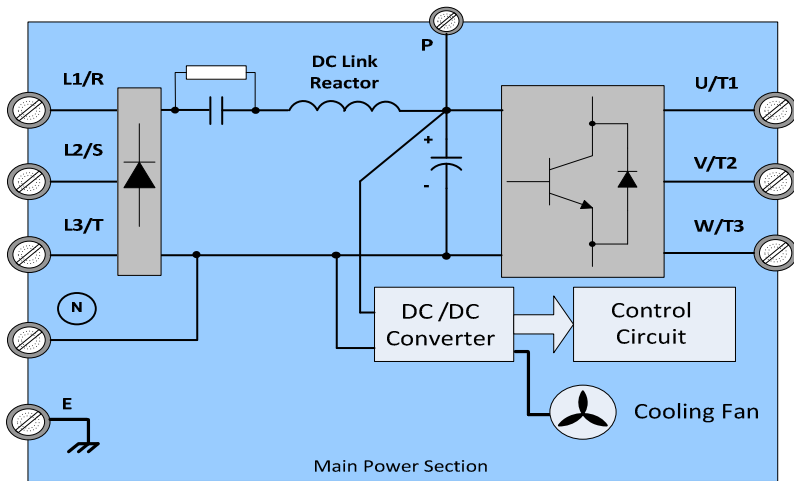
4: 690V: 50~75HP



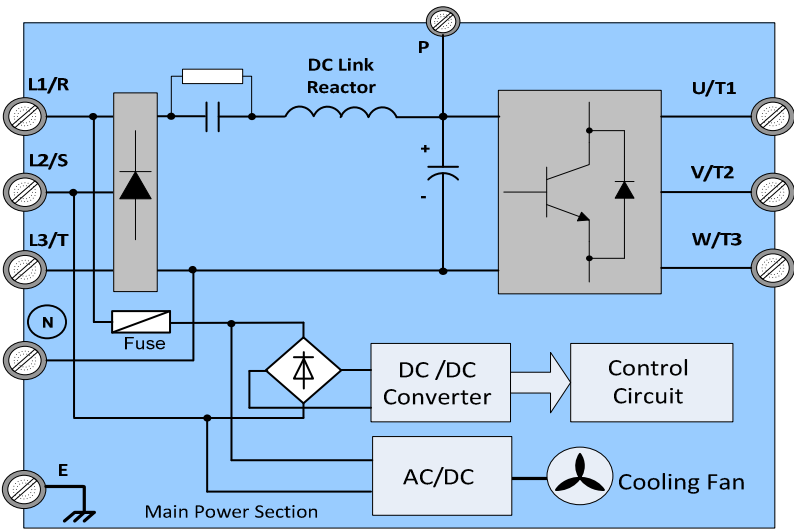
5: 230V: 50 ~ 60 HP / 460V: 100 ~ 215 HP



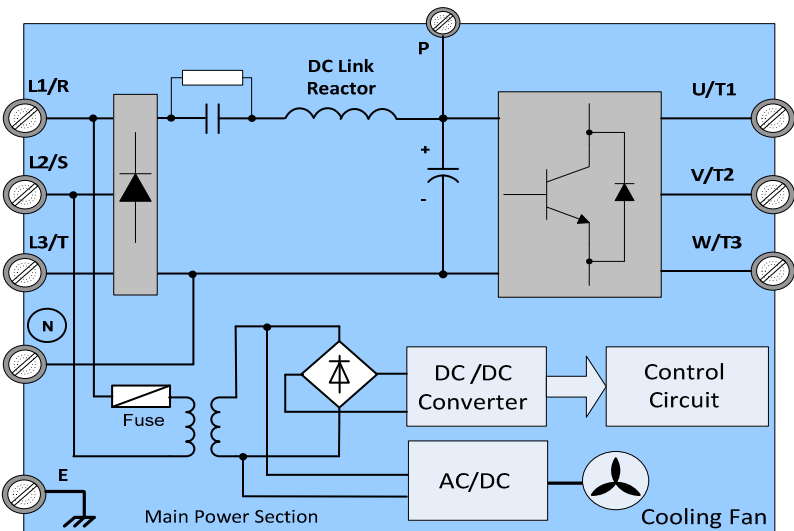
6: 690V: 100~150HP



7: 230V: 75, 100 HP, 125, 150 HP



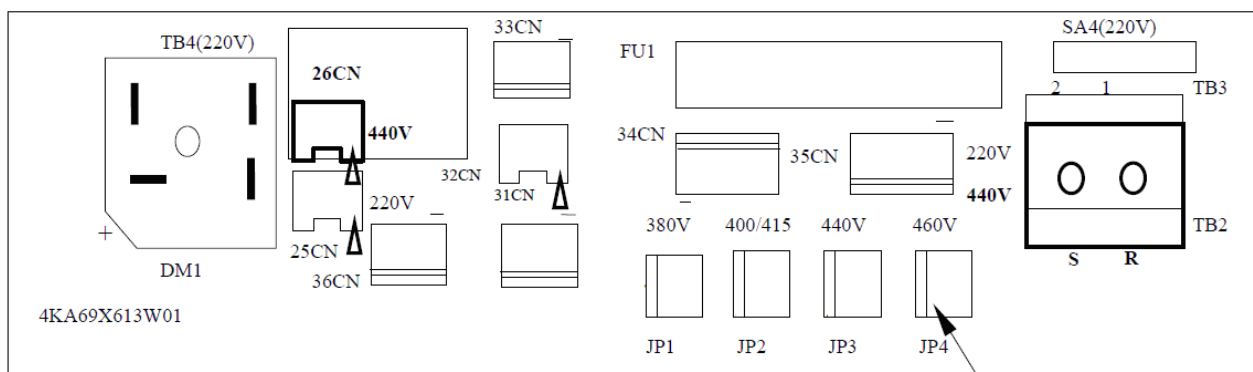
8: 460V: 270HP, 300HP, 375HP, 425 HP / 690V: 175~270HP



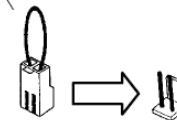
3.11.1 Cooling Fan Supply Voltage Selection (460V class)

The inverter input voltage range of the A510 460V class models ranges from 380 to 480Vac. In these models the cooling fan is directly powered from the power supply. Inverter models A510-4215(F8)/ 4270/ 4300/ 4375/ 4425 requires the user to select the correct jumper position based on the inverter input voltage ("460V" is the default position for these models). Please select the correct position according to the input voltage. If the voltage setting is too low, the cooling fan will not provide adequate cooling for the inverter resulting in an over-heat error. If the input voltage is greater than 460Vac, select the "460V" position.

(1) 460V: 270HP~425HP

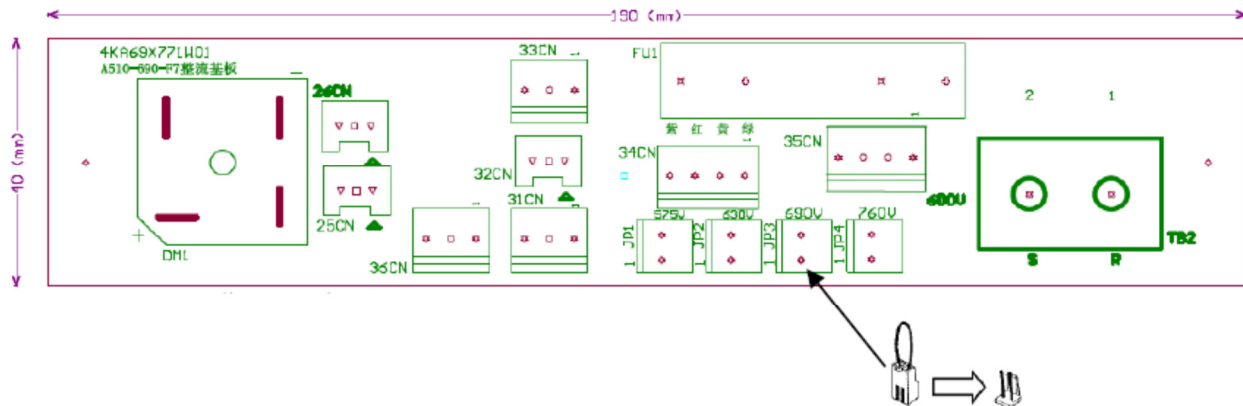


For example, input voltage is 460 Vac, jumper pin needs to put in "460V" position.



The inverter input voltage range of the A510 600V class models ranges from 575 to 690Vac. In these models the cooling fan is directly powered from the power supply. Inverter models A510-6175~6270 requires the user to select the correct jumper position based on the inverter input voltage ("690V" is the default position for these models). Please select the correct position according to the input voltage. If the voltage setting is too low, the cooling fan will not provide adequate cooling for the inverter resulting in an over-heat error. If the input voltage is greater than 690Vac, select the "690V" position.


(2) 690V: 175HP~270HP



Input voltage range Vac	Voltage selection board position
510 ~ 600	575V
601 ~ 660	630V
661 ~ 720	690V
721 ~ 759	760V

3.12 Inverter Wiring

Wiring Precautions

 Danger	<ul style="list-style-type: none">• Do NOT remove any protective covers or attempt any wiring while input power is applied. Connect all wiring before applying input power. When making wiring changes after power up, remove input power and wait a minimum of five minutes after power has been turned off before starting. Also confirm that the charge lamp is off and that DC voltage between terminals B1/P or (+) and (-) does not exceed 25V, otherwise electric shock may result.• Only authorized personnel should work on the equipment. (Take off metal jewelry such as watches and rings and use insulated tools.), otherwise electric shock or injury may result.
---	---

(A) Power input terminals

1. The Input power supply voltage can be connected in any phase sequence to power input terminals R/L1, S/L2, or T/L3 on the terminal block.
2. DO NOT connect the AC input power source to the output terminals U/T1, V/T2 and W/T3.
3. Connect the output terminals U/T1, V/T2, W/T3 to motor lead wires U/T1, V/T2, and W/T3, respectively.
4. Check that the motor rotates forward with the forward run source. If it does not, swap any 2 of the output cables to change motor direction.
5. DO NOT connect phase correcting capacitors or LC/RC noise filter to the output circuit.

(B) Grounding

1. Connect the ground terminal (E) to ground having a resistance of less than 100Ω.
2. Do not share the ground wire with other devices, such as welding machines or power tools.
3. Always use a ground wire that complies with the local codes and standards for electrical equipment and minimize the length of ground wire.
4. When using more than one inverter, be careful not to loop the ground wire, as shown below in Fig. 3.12.1.

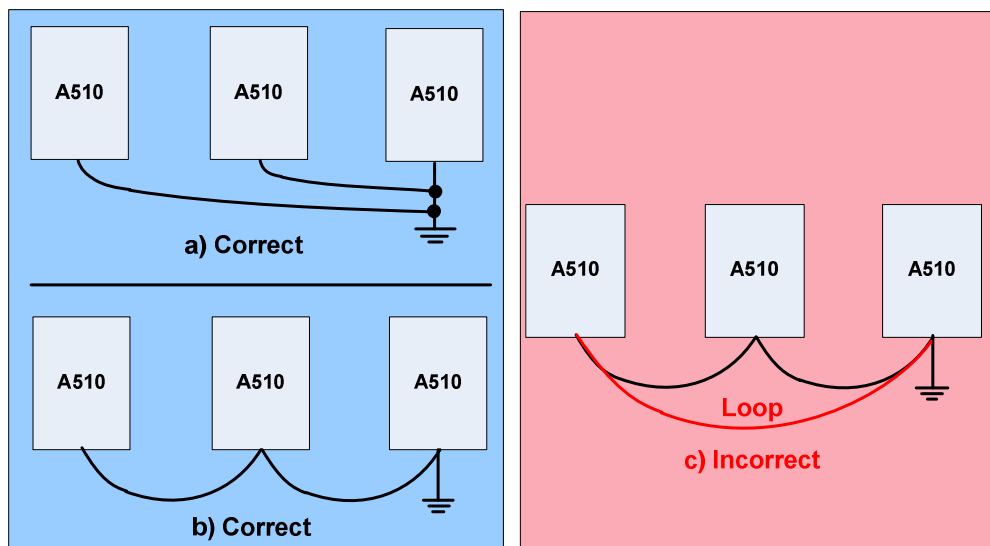


Fig. 3.12.1 Inverter Grounding

3.13 Input Power and Motor Cable Length

The length of the cables between the input power source and /or the motor and inverter can cause a significant phase to phase voltage reduction due to the voltage drop across the cables. The wire size shown in Tables 3.16.1 is based on a maximum voltage drop of 2%. If this value is exceeded, a wire size having larger diameter may be needed. To calculate phase to phase voltage drop, apply the following formula:

$$\text{Phase-to-phase voltage drop (V)} = \sqrt{3} \times \text{resistance of wire } (\Omega/\text{km}) \times \text{length of line (m)} \times \text{current (A)} \times 10^{-3}.$$

(km=3280 x feet)

(m=3.28 x feet)

3.14 Cable Length vs. Carrier Frequency

The allowable setting of the PWM carrier frequency is also determined by motor cable length and is specified in the following Table 3.14.1.

Table 3.14.1 Cable Length vs. Carrier Frequency

Cable length between the inverter and Motor in m (ft.).	< 30m (100)	30 – 50 (100 – 165)	50 – 100 (166 - 328)	≥ 100 (329)
Recommended carrier frequency allowed Parameter 11-01	16kHz (max)	10 kHz (max)	5 kHz (max)	2 kHz (max)

3.15 Installing an AC Line Reactor

If the inverter is connected to a large-capacity power source (600kVA or more), install an optional AC reactor on the input side of the inverter. This also improves the power factor on the power supply side.

3.16 Power Input Wire Size, NFB and MCB Part Numbers

The following table shows the recommended wire size, molded case circuit breakers and magnetic contactors for each of the A510 models. It depends on the application whether or not to install a circuit breaker. The NFB must be installed between the input power supply and the inverter input (R/L1, S/L2, T/L3).

Note: When using a ground protection make sure the current setting is above 200mA and trip delay time is 0.1 sec or higher.

Table 3.16.1 Wiring instrument for 230V/460V class

Power	A510 Model			wire diameter (mm ²)			NFB ⁴	MC ⁴
	horse power (HP) ^{*1}	Rated KVA HD/ND	Rated current (A) HD/ND	Main circuit ^{*2}	Grounding line E(G)	Control line ^{*3}		
230V 1 Ø / 3 Ø	1HP	1.9/2.3	5/6	2~5.5	2~5.5	0.5~2	TO-50EC(15A)	CU-11
	2HP	3/3.7	8/9.6	2~5.5	3.5~5.5	0.5~2	TO-50EC(20A)	CU-11
	3HP	4.2/4.6	11/12	3.5~5.5	3.5~5.5	0.5~2	TO-50EC(30A)	CU-11
230V 3 Ø	5HP	6.7/8.4	17.5/22	5.5	5.5	0.5~2	TO-50EC(30A)	CU-16
	7.5HP	9.5/11.4	25/30	8	5.5~8	0.5~2	TO-100S(50A)	CU-18
	10HP	12.6/16.0	33/42	8	5.5~8	0.5~2	TO-100S(50A)	CU-25
	15HP	17.9/21.3	47/56	14	8	0.5~2	TO-100S(100A)	CU-50
	20HP	22.9/26.3	60/69	22	8	0.5~2	TO-100S(100A)	CU-65
	25HP	27.8/30.1	73/80	22	14	0.5~2	TO-225S(100A)	CU-80
	30HP	32.4/41.9	85/110	38	14	0.5~2	TO-225S(150A)	CN-100
	40HP	43.8/52.6	115/138	60	22	0.5~2	TO-225S(175A)	CN-125
	50HP	55.3/64.4	145/169	80	22	0.5~2	TO-225S(200A)	CN-150
	60HP	68.6/76.2	180/200	100	22	0.5~2	TO-225S(225A)	CN-180
	75HP	81.9/95.3	215/250	150	22	0.5~2	TO-400S(300A)	CN-300
	100HP	108/118.9	283/312	200	38	0.5~2	TO-400S(400A)	CN-300
	125HP	132/137.2	346/400	300	38	0.5~2	TO-400S(400A)	SK-400
150HP	158/172	415/450	250*2P	50	0.5~2	TO-800S(800A)	SK-600	
460V 3 Ø	1HP	2.6/3.1	3.4/4.1	2~5.5	2~5.5	0.5~2	TO-50EC(15A)	CU-11
	2HP	3.2/4.1	4.2/5.4	2~5.5	3.5~5.5	0.5~2	TO-50EC(15A)	CU-11
	3HP	4.2/5.3	5.5/6.9	2~5.5	3.5~5.5	0.5~2	TO-50EC(15A)	CU-11
	5HP	7/9.2	9.2/12.1	2~5.5	3.5~5.5	0.5~2	TO-50EC(15A)	CU-18
	7.5HP	11.3/13.3	14.8/17.5	3.5~5.5	3.5~5.5	0.5~2	TO-50EC(20A)	CU-18
	10HP	13.7/17.5	18/23	5.5	5.5	0.5~2	TO-50EC(30A)	CU-25
	15HP	18.3/23.6	24/31	8	8	0.5~2	TO-100S(50A)	CU-25
	20HP	23.6/29.0	31/38	8	8	0.5~2	TO-100S(50A)	CU-35
	25HP	29.7/33.5	39/44	8	8	0.5~2	TO-100S(50A)	CU-50
	30HP	34.3/44.2	45/58	14	8	0.5~2	TO-100S(75A)	CU-50
	40HP	45.7/55.6	60/73	22	8	0.5~2	TO-100S(100A)	CU-65
	50HP	57.2/67.1	75/88	22	14	0.5~2	TO-100S(100A)	CU-80
	60HP	69.3/78.5	91/103	38	14	0.5~2	TO-225S(150A)	CN-100
	75HP	89.9/111	118/145	60	22	0.5~2	TO-225S(175A)	CN-125
	100HP	114/128	150/168	80	22	0.5~2	TO-225S(225A)	CN-150
125HP	137/159	180/208	150	22	0.5~2	TO-400S(300A)	CN-300	
150HP	165/191	216/250	150	22	0.5~2	TO-400S(300A)	CN-300	

A510 Model				wire diameter (mm ²)			NFB ^{*4}	MC ^{*4}
Power	horse power (HP) ^{*1}	Rated KVA HD/ND	Rated current (A) HD/ND	Main circuit ^{*2}	Grounding line E(G)	Control line ^{*3}		
	175HP	198/226	260/296	200	30	0.5~2	TO-400S(400A)	CN-300
	215HP	225/250	295/328	250	30	0.5~2	TO-400S(400A)	CN-300
	270HP	290/332	380/435	300	38	0.5~2	TO-400S(400A)	SK-400
	300HP	343/393	450/515	250*2P	50	0.5~2	TO-800S(800A)	SK-600 (800A)
	375HP	400/446	523/585	250*2P	50	0.5~2	TE-1000(1000A)	SK-600 (800A)
	425HP	446/446	585/585	250*2P	50	0.5~2	TE-1000(1000A)	SK-600 (800A)
575V 3 Ø	1HP	1.7/3.0	1.7/3.0	2~5.5	2~5.5	0.5~2	TO-50EC(15A)	CU-11
	2HP	3/4.2	3/4.2	2~5.5	2~5.5	0.5~2	TO-50EC(15A)	CU-11
	3HP	4.2/5.8	4.2/5.8	2~5.5	3.5~5.5	0.5~2	TO-50EC(15A)	CU-11
	5HP	6.6/8.8	6.6/8.8	2~5.5	3.5~5.5	0.5~2	TO-50EC(15A)	CU-11
	7.5HP	9.9/12.1	9.9/12.2	3.5~5.5	3.5~5.5	0.5~2	TO-50EC(15A)	CU-18
	10HP	11.4/14.4	11.4/14.5	3.5~5.5	5.5	0.5~2	TO-50EC(20A)	CU-25
575~690V 3 Ø	15HP	17.9/22.7	15/19	5.5	8	0.5~2	TO-50EC(30A)	CU-25
	20HP	22.7/26.3	19/22	8	8	0.5~2	TO-50EC(30A)	CU-35
	25HP	26.3/32.3	22/27	8	8	0.5~2	TO-100S(50A)	CU-35
	30HP	32.3/40.6	27/34	8	8	0.5~2	TO-100S(50A)	CU-50
	40HP	40.6/50.2	34/42	8	8	0.5~2	TO-100S(50A)	CU-50
	50HP	50.2/62.1	42/52	14	8	0.5~2	TO-100S(75A)	CU-65
	60HP	64.5/74.1	54/62	14	14	0.5~2	TO-100S(100A)	CU-80
	75HP	74.1/95.6	62/80	22	14	0.5~2	TO-225S(150A)	CN-100
	100HP	103/118	86/99	38	22	0.5~2	TO-225S(150A)	CN-125
	125HP	114/149	99/125	60	38	0.5~2	TO-225S(175A)	CN-150
	150HP	157/175	131/147	60	60	0.5~2	TO-225S(175A)	CN-150
	175HP	176/194	147/163	80	60	0.5~2	TO-225S(225A)	CN-300
	215HP	195/253	163/212	150	80	0.5~2	TO-225S(225A)	CN-300
	250HP	230/258	192/216	150	150	0.5~2	TO-400S(400A)	CN-300
270HP	258/294	216/246	150	150	0.5~2	TO-400S(400A)	CN-300	

*1: Constant torque rating.

*2: The main circuit terminals: R/L1, S/L2, T/L3, U/T1, V/T2, W/T3, B1 / P, B2, ⊖, ⊕

*3: Control line is the terminal wire on the control board.

*4: The NFB and MCB listed in the table are of TECO product numbers, products with same rated specification of other brands may be used. To reduce electrical noise interference, ensure that a RC surge absorber (R: 10Ω/5W, C: 0.1μf/1000VDC) is added to both sides of MCB coil.

3.17 Control Circuit Wiring

- (1) Separate the wiring for control circuit terminals from main circuit wiring for terminals (R/L1, S/L2, T/L3, U/T1, V/T2, W/T3).
- (2) Separate the wiring for control circuit terminals R1A-R1B-R1C (or R2A, R2C) (Relay outputs) from wiring for terminals ① - ③, A01, A02, GND, DO1, DO2, DOG, +10V, (-10V), AI1, AI2 and GND wiring.
- (3) Use shielded twisted-pair cables (#24 - #14 AWG / 0.5 - 2 mm²) shown in Fig. 3.17.1 for control circuits to minimize noise problems. The maximum wiring distance should not exceed 50m (165 ft).

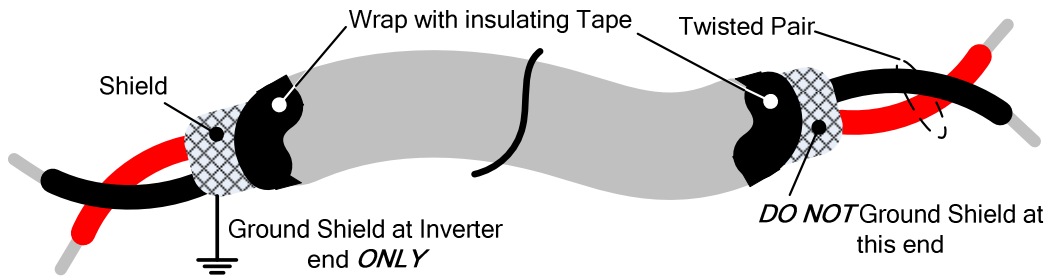


Fig. 3.17.1 Shielded Twisted-Pair

- (4) When the digital multi-function output terminals (DO1, DO2) are connected to an external relay, a freewheeling diode should be connected across the relay coil to prevent an inductive voltage spike from damaging the output circuitry as shown in Fig. 3.17.2 below.

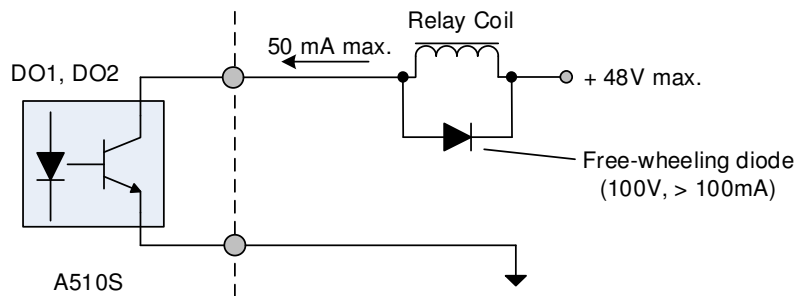


Fig. 3.17.2 Photo-Coupler Connected to an External Relay

- (5) In Section 3.8 the control boards referenced have a jumper SW3 that can select the digital input to terminals ① - ⑧ to be set for SINK or SOURCE. The following Fig. 3.17.3 (a.) – (d.) shows examples for the various SINK / Source interfaces.

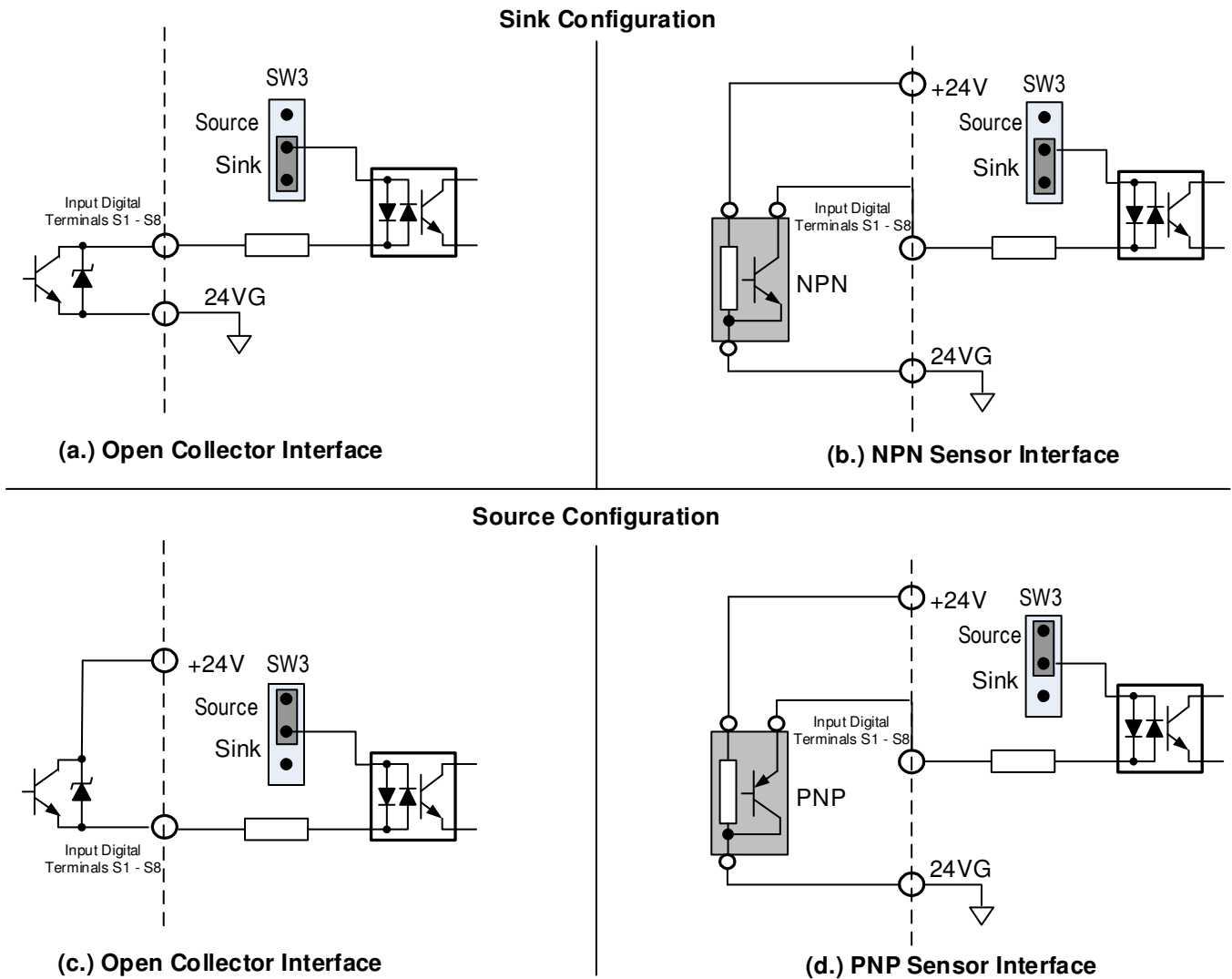


Fig. 3.17.3 Sink / Source Configurations

3.18 Inverter Specifications

Basic Specifications 230V class

Inverter capacity (HP)		1	2	3	5	7.5	10	15	20	25	
Output rated	Heavy Duty type H.D. (150%/1min)	Rated output Capacity (KVA)	1.9	3	4.2	6.7	9.5	12.6	17.9	22.9	27.8
		Rated output current (A)	5	8	11	17.5	25	33	47	60	73
		Maximum applicable motor ¹ HP (KW)	1 (0.75)	2 (1.5)	3 (2.2)	5 (3.7)	7.5 (5.5)	10 (7.5)	15 (11)	20 (15)	25 (18.5)
		Motor rated current (A) ¹	3.4	6.1	8.7	13.5	20.1	25.1	36.7	50.3	62.9
	Normal Duty type N.D. (120%/1min)	Rated output Capacity (KVA)	2.3	3.7	4.6	8.4	11.4	16.0	21.3	26.3	30.1
		Rated output current (A)	6	9.6	12	22	30	42	56	69	80
		Maximum applicable motor ¹ HP (KW)	2 (1.5)	3 (2.2)	5 (3.7)	7.5 (5.5)	10 (7.5)	15 (11)	20 (15)	25 (18.5)	30 (22)
		Motor rated current (A) ¹	6.1	8.7	13.5	20.1	25.1	36.7	50.3	62.9	72.9
	The maximum output voltage (V)		3-phase, 200V ~ 240V								
	The maximum output frequency (Hz)		Based on parameter setting 0.1~599.0 Hz								
Power	Rated voltage, frequency		Single/3-phase 200V~240V, 50/60Hz			3-phase 200V~240V, 50/60Hz					
	Allowable voltage fluctuation		-15% ~ +10%								
	Allowable frequency fluctuation		±5%								

Inverter capacity (HP)		30	40	50	60	75	100	125	150		
Output rated	Heavy Duty type H.D. (150%/1min)	Rated output Capacity (KVA)	32.4	43.8	55.3	68.6	81.9	108	132	158	
		Rated output current (A)	85	115	145	180	215	283	346	415	
		Maximum applicable motor ¹ HP (KW)	30 (22)	40 (30)	50 (37)	60 (45)	75 (55)	100 (75)	125 (90)	150 (110)	
		Motor rated current (A) ¹	72.9	96.7	124	143.5	183.5	230	272	344	
	Normal Duty type N.D. (120%/1min)	Rated output Capacity (KVA)	41.9	52.6	64.4	76.2	95.3	118.9	152.4	172	
		Rated output current (A)	110	138	169	200	250	312	400	450	
		Maximum applicable motor ¹ HP (KW)	40 (30)	50 (37)	60 (45)	75 (55)	100 (75)	125 (90)	150 (110)	175 (130)	
		Motor rated current (A) ¹	96.7	124	143.5	183.5	230	272	344	370	
	The maximum output voltage (V)		3-phase, 200V ~ 240V								
	The maximum output frequency (Hz)		Based on parameter setting 0.1~599.0 Hz								
Power	Rated voltage, frequency		Single/3-phase 200V~240V, 50/60Hz			3-phase 200V~240V, 50/60Hz					
	Allowable voltage fluctuation		-15% ~ +10%								
	Allowable frequency fluctuation		±5%								

Basic Specifications 460V class

Inverter capacity (HP)		1	2	3	5	7.5	10	15	20	25	30	
Output rated	Heavy Duty type H.D. (150%/1min)	Rated output Capacity (KVA)	2.6	3.2	4.2	7	11.3	13.7	18.3	23.6	29.7	34.3
		Rated output current (A)	3.4	4.2	5.5	9.2	14.8	18	24	31	39	45
		Maximum applicable motor ¹ HP (KW)	1 (0.75)	2 (1.5)	3 (2.2)	5 (3.7)	7.5 (5.5)	10 (7.5)	15 (11)	20 (15)	25 (18.5)	30 (22)
		Motor rated current (A) ¹	1.7	3.1	4.2	7	10.1	12.6	18.6	24.8	31.1	36.3
	Normal Duty type N.D. (120%/1min)	Rated output Capacity (KVA)	3.1	4.1	5.3	9.2	13.3	17.5	23.6	29.0	33.5	44.2
		Rated output current (A)	4.1	5.4	6.9	12.1	17.5	23	31	38	44	58
		Maximum applicable motor ¹ HP (KW)	2 (1.5)	3 (2.2)	5 (3.7)	7.5 (5.5)	10 (7.5)	15 (11)	20 (15)	25 (18.5)	30 (22)	40 (30)
		Motor rated current (A) ¹	3.1	4.2	7	10.1	12.6	18.6	24.8	31.1	36.3	48.7
	The maximum output voltage (V)		3-phase 380V~ 480V									
	The maximum output frequency (Hz)		Based on parameter setting 0.1~599.0 Hz									
Power	Rated voltage, frequency		3-phase 380V ~ 480V, 50/60Hz									
	Allowable voltage fluctuation		-15% ~ +10%									
	Allowable frequency fluctuation		±5%									

Inverter capacity (HP)		40	50	60	75	100	125	150	175	215	
Output rated	Heavy Duty type H.D. (150%/1min)	Rated output Capacity (KVA)	45.7	57.2	69.3	89.9	114	137	165	198	225
		Rated output current (A)	60	75	91	118	150	180	216	260	295
		Maximum applicable motor ¹ HP (KW)	40 (30)	50 (37)	60 (45)	75 (55)	100 (75)	125 (90)	150 (110)	175 (132)	215 (160)
		Motor rated current (A) ¹	48.7	59	70.5	88	114	145	175	205	248
	Normal Duty type N.D. (120%/1min)	Rated output Capacity (KVA)	55.6	67.1	78.5	111	128	159	191	226	250
		Rated output current (A)	73	88	103	145	168	208	250	296	328
		Maximum applicable motor ¹ HP (KW)	50 (37)	60 (45)	75 (55)	100 (75)	125 (90)	150 (110)	175 (132)	215 (160)	250 (185)
		Motor rated current (A) ¹	59	70.5	88	114	145	175	205	248	270
	The maximum output voltage (V)		3-phase 380V~480V								
	The maximum output frequency (Hz)		Based on parameter setting 0.1~599.0 Hz								
Power	Rated voltage, frequency		3-phase 380V ~ 480V, 50/60Hz								
	Allowable voltage fluctuation		-15% ~ +10%								
	Allowable frequency fluctuation		±5%								

Inverter capacity (HP)			270	300	375	425	
Output rated	Heavy Duty type H.D. (150%/1min)	Rated Output capacity (KVA)	290	343	400	446	
		Rated output current (A)	380	450	523	585	
		Maximum applicable motor ¹ HP (KW)	270 (200)	300 (220)	375 (280)	425 (315)	
		Motor rated current (A) ¹	300	348	465	500	
	Normal Duty type N.D. (120%/1min)	Rated Output capacity (KVA)	332	393	446	446	
		Rated output current (A)	435	515	585	585	
		Maximum applicable motor ¹ HP (KW)	300 (220)	335 (250)	425 (315)	425 (315)	
		Motor rated current (A) ¹	348	465	500	615	
	The maximum output voltage (V)			3-phase 380V~480V			
	The maximum output frequency (Hz)			Based on parameter setting 0.1~ 599.0 Hz			
Power	Rated voltage, frequency			3-phase 380V ~ 480V, 50/60Hz			
	Allowable voltage fluctuation			-15% ~ +10%			
	Allowable frequency fluctuation			±5%			

Basic Specifications 575/690V class

Inverter capacity (HP)			1	2	3	5	7.5	10	15	20	25	30	
Output rated	Rated output Capacity (KVA)		1.7	3.0	4.2	6.6	9.9	11.4	17.9	22.7	26.3	32.3	
	Heavy Duty type H.D. (150%/1min)	Rated output current (A)	1.7	3.0	4.2	6.6	9.9	11.4	15	19	22	27	
		Maximum applicable motor ¹ HP (KW) for 575v	1 (0.75)	2 (1.5)	3 (2.2)	5 (3.7)	7.5 (5.5)	10 (7.5)	10 (7.5)	15 (11)	20 (15)	25 (18.5)	
		Maximum applicable motor ¹ HP (KW) for 690v	1 (0.75)	2 (1.5)	3 (2.2)	5 (3.7)	7.5 (5.5)	10 (7.5)	15 (11)	20 (15)	25 (18.5)	30 (22)	
	Rated output Capacity (KVA)		3.0	4.2	5.8	8.8	12.2	14.5	22.7	26.3	32.3	40.6	
	Normal Duty type N.D. (120%/1min)	Rated output current (A)	3.0	4.2	5.8	8.8	12.2	14.5	19	22	27	34	
		Maximum applicable motor ¹ HP (KW) for 575v	2 (1.5)	3 (2.2)	5 (3)	7.5 (5.5)	10 (7.5)	15 (11)	15 (11)	20 (15)	25 (18.5)	30 (22)	
		Maximum applicable motor ¹ HP (KW) for 690v	-	-	-	-	-	-	20 (15)	25 (18.5)	30 (22)	40 (30)	
	The maximum output voltage (V)			3-phase 575/690V									
	The maximum output frequency (Hz)			Based on parameter setting 0.1~599.0 Hz									
Power	Rated voltage, frequency			3-phase 500~600V, 50/60Hz					3-phase 575~690V, 50/60Hz				
	Allowable voltage fluctuation			-15% ~ +10%									
	Allowable frequency fluctuation			±5%									

Inverter capacity (HP)		40	50	60	75	100	125	150	175	215	250	270	
Output rated	Rated output Capacity (KVA)	40.6	50.2	64.5	74.1	103	114	157	176	195	230	258	
	Heavy Duty type H.D. (150%/1min)	Rated output current (A)	34	42	54	62	86	99	131	147	163	192	216
		Maximum applicable motor *1HP (KW) for 575v	30 (22)	40 (30)	50 (37)	60 (45)	75 (55)	100 (75)	125 (90)	150 (110)	150 (110)	200 (150)	200 (150)
		Maximum applicable motor *1HP (KW) for 690v	40 (30)	50 (37)	60 (45)	75 (55)	100 (75)	125 (90)	150 (110)	175 (132)	215 (160)	250 (185)	270 (202)
	Rated output Capacity (KVA)	50.2	64.5	74.1	95.6	114	149	176	195	253	258	294	
	Normal Duty type N.D. (120%/1min)	Rated output current (A)	42	52	62	80	99	125	147	163	212	216	246
		Maximum applicable motor *1HP (KW) for 575v	40 (30)	50 (37)	60 (45)	75 (55)	100 (75)	125 (90)	150 (110)	150 (110)	200 (150)	200 (150)	250 (185)
		Maximum applicable motor *1HP (KW) for 690v	50 (37)	60 (45)	75 (55)	100 (75)	125 (90)	150 (110)	175 (132)	215 (160)	250 (185)	270 (202)	335 (251)
	The maximum output voltage (V)		3-phase 575/690V										
	The maximum output frequency (Hz)		Based on parameter setting 0.1~599.0 Hz										
Power	Rated voltage, frequency	3-phase 575~690v, 50/60Hz											
	Allowable voltage fluctuation	-15% ~ +10%											
	Allowable frequency fluctuation	±5%											

*1: Take TECO standard 4-pole induction motor as the base.

*2: A510 model is designed to use in heavy duty conditions, the factory setting is the HD (Heavy Duty type) mode.

*3: The overload capacity of A510 model HD (Heavy Duty) is 150% / 1min, 200% / 2sec. See the table below for the carrier frequency default setting and range.

*4: The overload capacity of A510 model ND (Normal Duty) is 120%/1min, carrier range: 2 KHz ~ 16 KHz, the default setting is 2 KHz. The default setting is 1.5 KHz for 575/690v inverter that over 215hp

*5: If it is greater than default carrier frequency, you need to adjust the load current based on the de-rating curve.

Inverter Voltage and Capacity		HD mode	HD mode
230V class	460V class	carrier frequency range	carrier frequency factory setting
1~20HP	1~30HP	2~16KHz	8KHz
25HP	-	2~12KHz	6KHz
30~40HP	40~50HP	2~12KHz (*6)	5KHz
50~100HP	60~175HP	2~10KHz (*6)	5KHz
	125HP	2~10KHz	4KHz
125~150HP	215HP	2~8KHz	3KHz
	270-375HP	2~5KHz	5KHz
	425HP	2~5KHz	4KHz
		2~5KHz	2KHz

Inverter Voltage and Capacity		HD mode	HD mode
575V class	690V class	carrier frequency range	carrier frequency factory setting
1~10HP	-	1.5~16KHz	8KHz
15~75HP	15~75HP	1.5~8KHz	4KHz
100~150HP	100~150HP	1.5~6KHz	3KHz
175~270HP	175~270HP	1.5~4KHz	2KHz

*6: If control mode (00-00) is set to 2 (SLV mode) and maximum frequency (01-02) is larger than 80Hz, the carrier frequency range is 2~8 KHz.

The following table shows maximum output frequency for each control mode.

Duty Cycle	Control mode	Other settings	Maximum output frequency
Heavy Duty (00-27=0)	V/F V/F + PG SLV2	maximum frequency set to 599Hz	599Hz
	SLV	230V 1~10HP, 460V 1~15HP	150Hz
		230V 15~25HP, 460V 20HP	110Hz
		460V 25~30HP	100Hz
		230V 30~100HP, 460V 40~215HP, carrier (11-01) is set as 8K or below 8K	100Hz
		230V 125~150HP, 460V 220~425HP, carrier (11-01) is set as 5K or below 5K	
		230V 30~100HP, 460V 40~175HP, carrier (11-01) is above 8K	80Hz
	SV	unlimited	599Hz
	PMSV	unlimited	Twice of Base frequency
PMSLV	unlimited	599Hz	
Normal Duty (00-27=1)	V/F V/F + PG	maximum frequency set to 120Hz	120Hz
	SLV /SV PMSV/ PMSLV SLV2	No normal duty mode	-

General Specifications

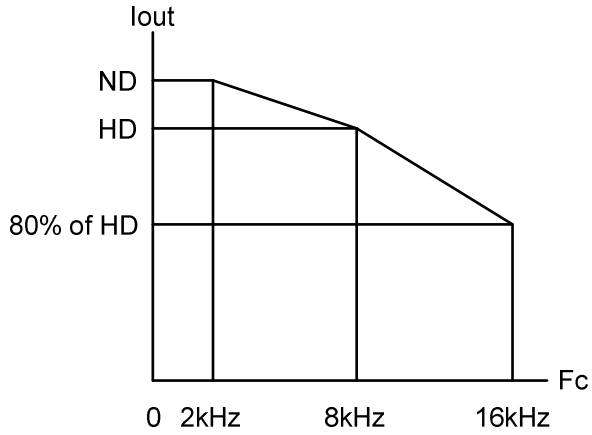
Control characteristics	Operation mode	LCD keypad with parameter copy function (Optional Seven-segment display * 5 + LED keypad)
	Control mode	V/F, V/F+PG, SLV, SV, PMSV, PMSLV, SLV2* with space vector PWM mode
	Frequency control range	0.1Hz~599.0Hz
	Output frequency accuracy (Temperature change)	Digital references: $\pm 0.01\%$ (-10 to +40°C) Analog references: $\pm 0.1\%$ (25°C $\pm 10^\circ\text{C}$)
	Speed control accuracy	$\pm 0.1\%$ (vector control(SV)), $\pm 0.5\%$ (vector control / open-loop)
	Frequency setting resolution	Digital references: 0.01Hz, Analog references: 0.03Hz/60Hz (If the maximum output frequency of motor is over 300HZ,the frequency resolution is changed to 0.1Hz)
	Output frequency resolution	0.01Hz (If the maximum output frequency of motor is over 300HZ,the frequency resolution is changed to 0.1Hz)
	Inverter overload	Rated output current 150%/1 min, 200%/2sec (HD mode), 120%/1 min (ND mode) Factory 150%/1 min, 200%/2sec
	Frequency setting signal	0 to +10VDC / 4 to 20mA or -10V to +10VDC and pulse input command frequency
	Acceleration / deceleration time	0.0 - 6000.0 second (separately set acceleration and deceleration time)
	Voltage, frequency characteristics	Custom V/f curve based on parameters
	Braking torque	About 20%
	Main control functions	Auto-tuning, Zero Servo, torque control, position control, Droop, Soft-PWM, over-voltage protection, dynamic braking, speed search, frequency traversing, instantaneous power fault restart, PID control, automatic torque compensation, automatic speed regulation, RS-485 communication standard, speed feedback control, simple PLC function, 2 sets of analog outputs, safety switch.
Other functions		
Protection functions	Accumulated power-on / run time, 30 sets of fault history records and latest fault record state, energy-saving function setting, single phase protection, smart braking, DC braking, Dwell, S curve acceleration and deceleration, Up / Down operation, MODBUS protocol, pulse output, engineering units, SINK / SOURCE digital inputs, RTC function (only for UE LCD type) .	
	Stall protection	Stall prevention level can be set independently in acceleration, deceleration and constant speed.
	Instantaneous over current (OC) and output short-circuit (SC) protection	Inverter stops when the output current exceeds 200% of the inverter rated current.
	Inverter overload Protection (OL2)	HD mode: If inverter rated current 150%/1 min., or 200%/2sec is exceeded inverter stops, factory default carrier frequency setting is 8~2KHz. ND mode: If inverter rated current 120%/1 min is exceeded inverter stops , factory default carrier frequency is 2KHz.
	Motor overload (OL1) protection	Electrical overload protection curve I ² T
	Over voltage(OV) protection	If the main circuit DC voltage rises over 410V (230V class) / 820V (460V class), and over 1050V (575V class) / 1230V (690V class),the motor stops running.
	Under voltage (UV)	If the main circuit DC voltage falls below 190V (230V class) / 380V (460V class),and 546V (575/690V class), the motor stops running.
	Automatic restart after instantaneous power fault	Power fault exceeds 15ms. Automatic restart function available after instantaneous power fault in 2sec.
	Overheat protection(OH)	Uses temperature sensor for protection.
	Ground Fault protection(GF)	Use current sensor for protection.
	DC bus charge indicator	When main circuit DC voltage $\geq 50\text{V}$, the CHARGE LED turns on.
	Input phase loss protection (IPL)	If the IPL is detected the motor stops automatically.
	Output phase loss protection (OPL)	If the OPL is detected the motor stops automatically.
	Short-circuit current rating (SCCR)	Per UL 508C, the drive is suitable for use on a circuit capable of delivering not more than 100KA symmetrical amperes (rms) when protected by fuses given in the fuse table

Environment Specification	Location	Indoor (protected from corrosive gases and dust).
	Ambient temperature	-10~+40°C (14°F~104°F) (IP20/IP21), -10~+50°C (14°F~122°F) (IP00 or top anti-dust cover removed); with de-rating, its maximum operation temperature is 60°C (140°F) (UE type frame 5 is 50°C without de-rating)
	Storage temperature	-20~+70°C (-4°F~+158°F)
	Humidity	95%RH or less (no condensation)
	Altitude and vibration	Altitude of 1000m (3181ft) or below ; 1.0G, in compliance with IEC 60068-2-6
	Pollution degree	Meet IEC 60721-3-3 Class 3C2
Communication function		RS-485 standard (MODBUS RTU / ASCII protocol) (RJ45 & S(+), S(-) terminal)
PLC function		Built-in
EMI protection		The built-in noise filter complies with EN61800-3 available for inverters 460V 60HP or below.
EMS protection		EN61800-3
Certification	CE	EN61800-3 (CE & RE) EN61800-5-1 (LVD)
	UL	UL508C

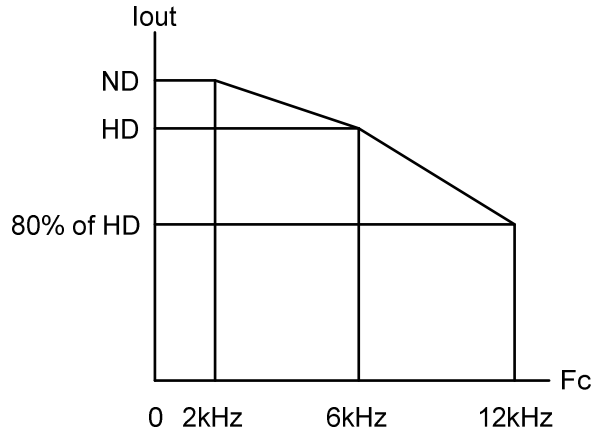
3.19 Inverter Derating Based on Carrier Frequency

230V Models

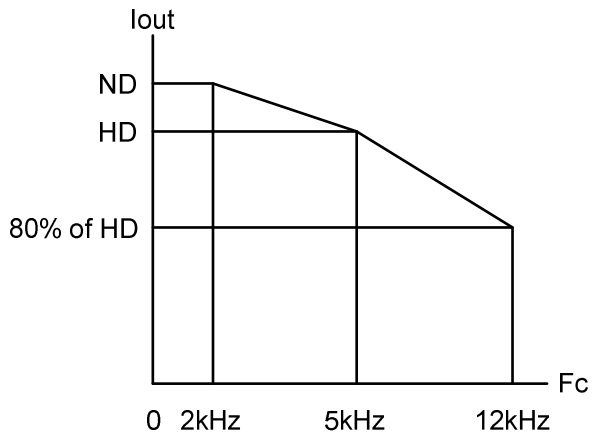
1 - 20 HP



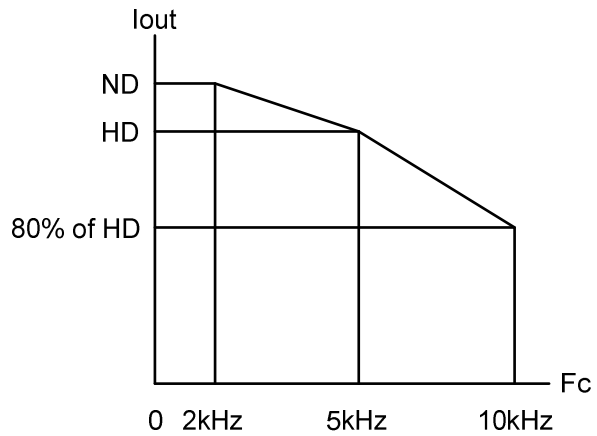
25 HP



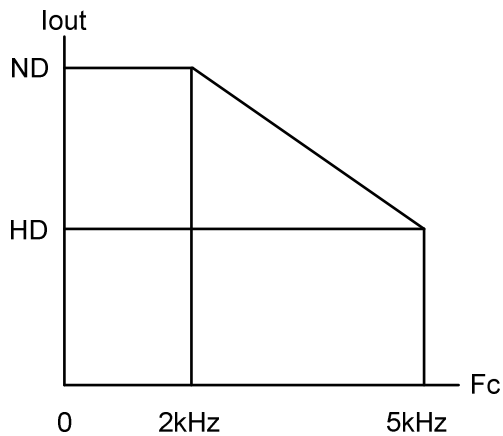
30 - 40 HP



50 - 100 HP

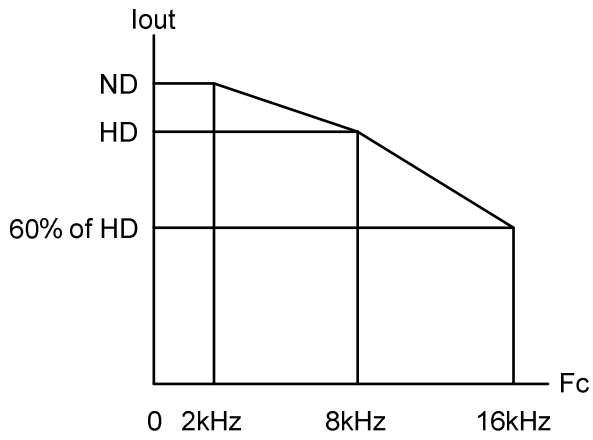


125 - 150 HP

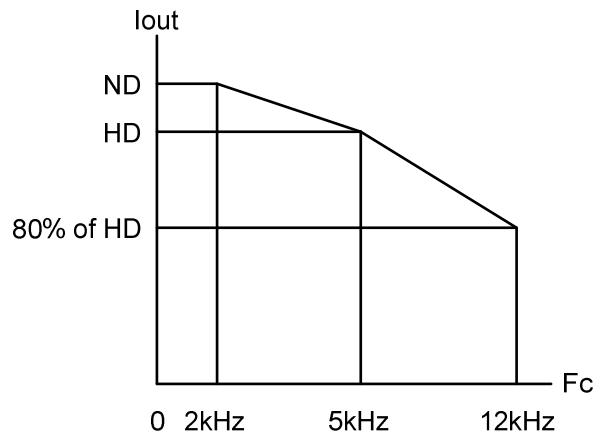


460V Models

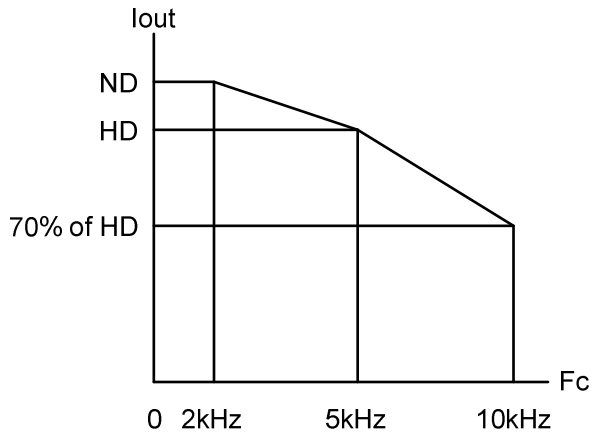
1 - 30 HP



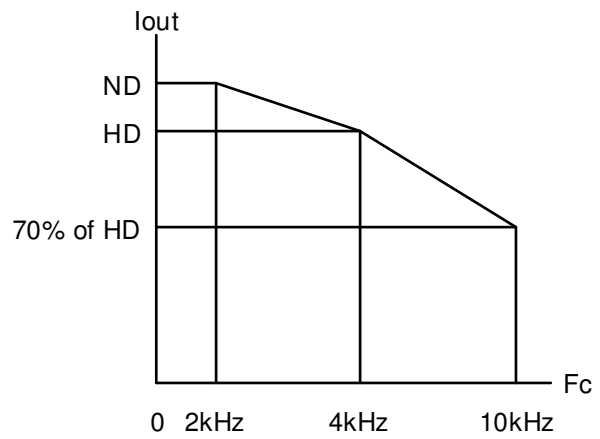
40 - 50 HP



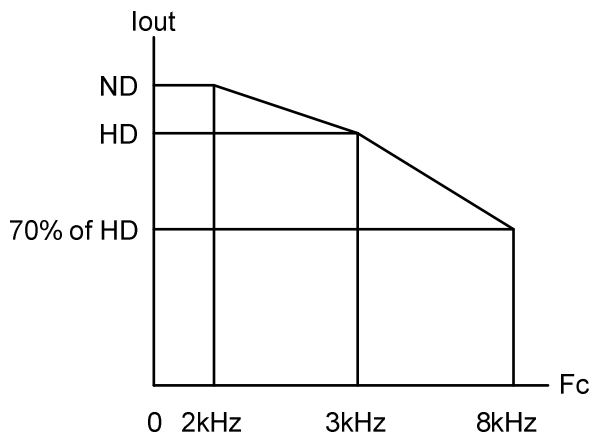
60 - 100 HP & 150-175HP



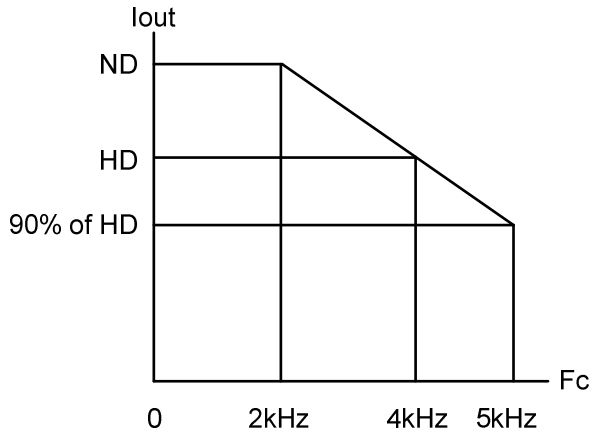
125 HP



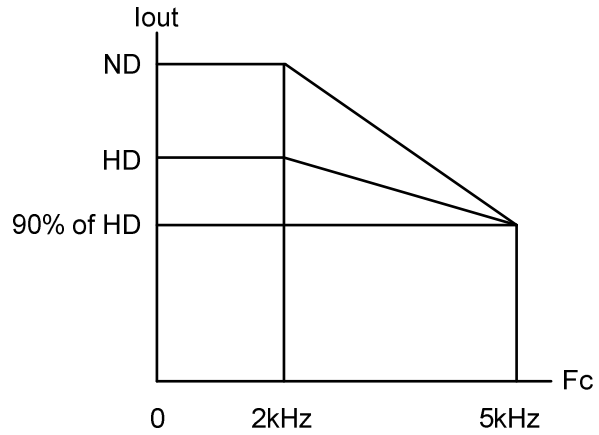
215 HP



215HP(Note) - 375 HP



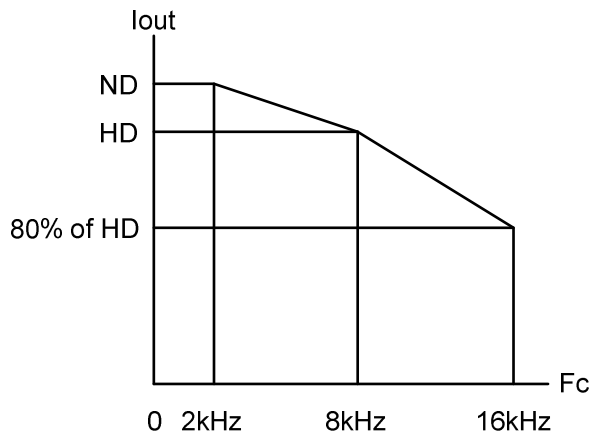
425 HP



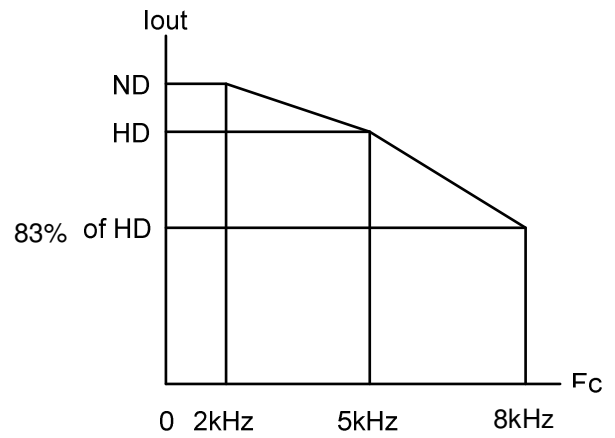
Note: The spec. please refer to Chapter 3.18, the rated current is 330/370A.

575/690V Models

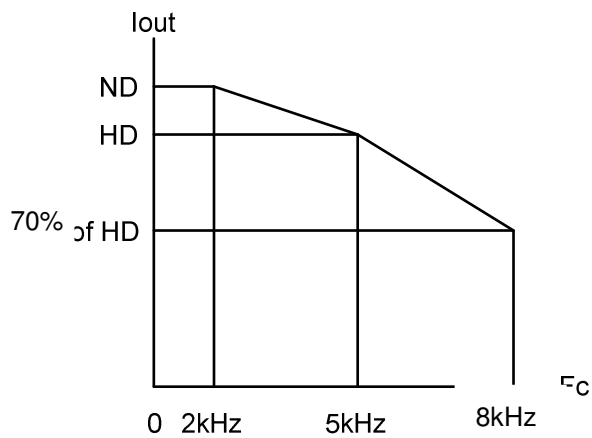
575V 1 - 10 HP



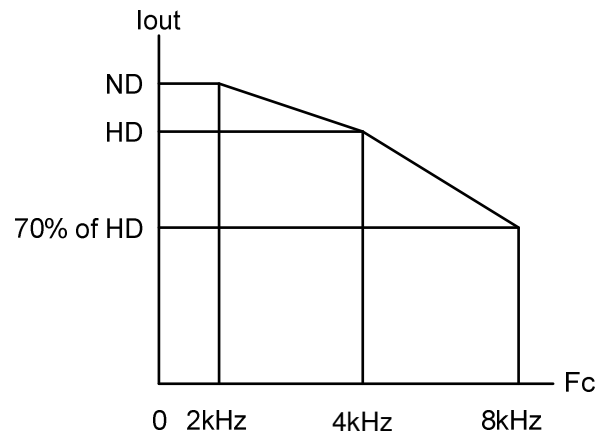
575/690V 15 - 30 HP



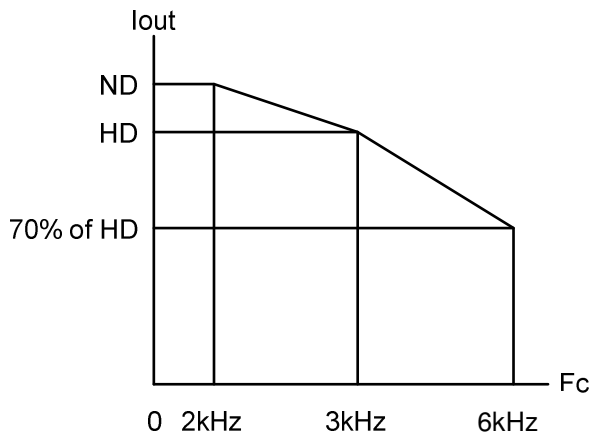
575/690V 40 - 60 HP



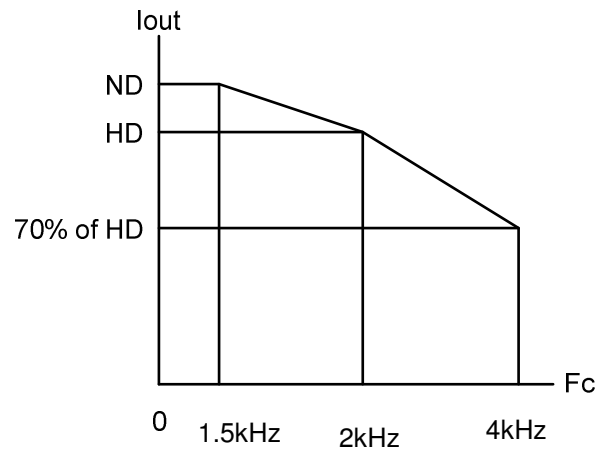
575/690V 75HP



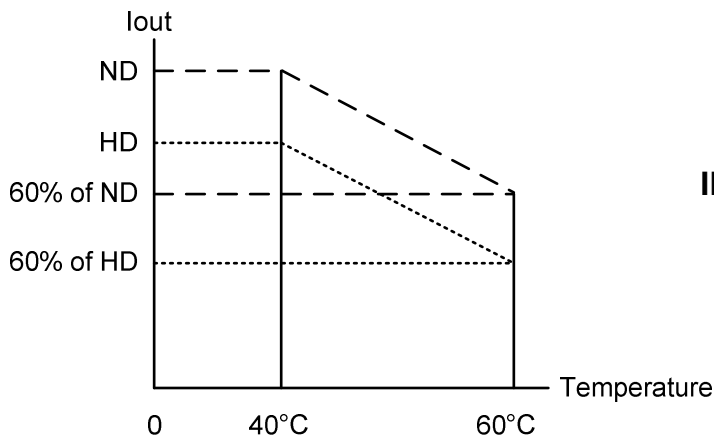
575/690V 100 - 150 HP



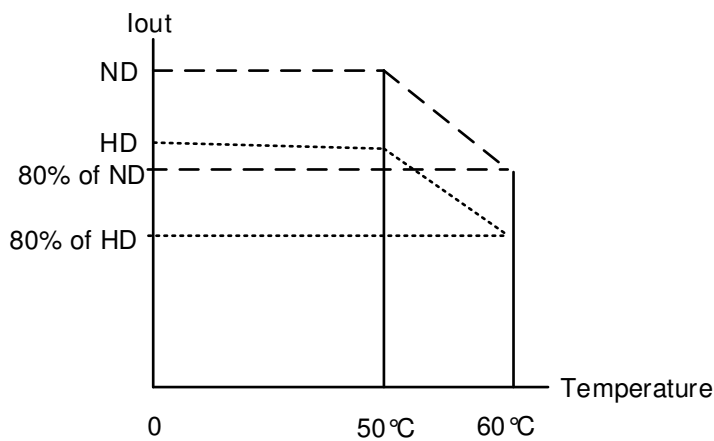
575/690V 175 - 270 HP



3.20 Inverter Derating Based on Temperature



IP20



IP00

◆ Capacitor reforming Guide after long storage

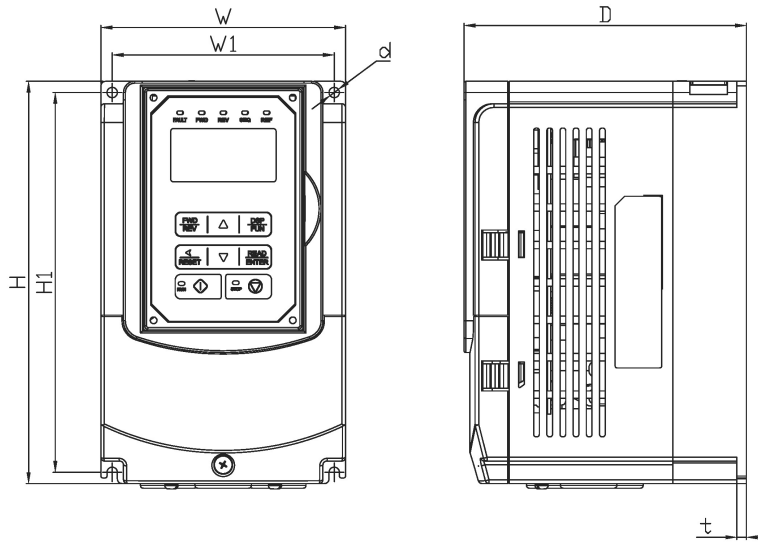
For correct performance of this product after long storage before use it is important that Inverter Capacitors are reformed according to the guide below:

Storage time	Procedure to re-apply voltage
≤ 1 year	Apply rated voltage(*1) of inverter in the normal way
Between 1-2 years	Apply rated voltage of inverter to the product for one hour
≥ 2 years	Use a variable AC power supply to 1. Connecting 25% of inverter rated voltage for 30 minutes. 2. Connecting 50% of inverter rated voltage for 30 minutes. 3. Connecting 75% of inverter rated voltage for 30 minutes. 4. Connecting 100% of inverter rated voltage for 210 minutes. Once the procedures completed, inverter just can be used normally.

*1 : Rated voltage: please connects rated voltage according to model label of inverter.

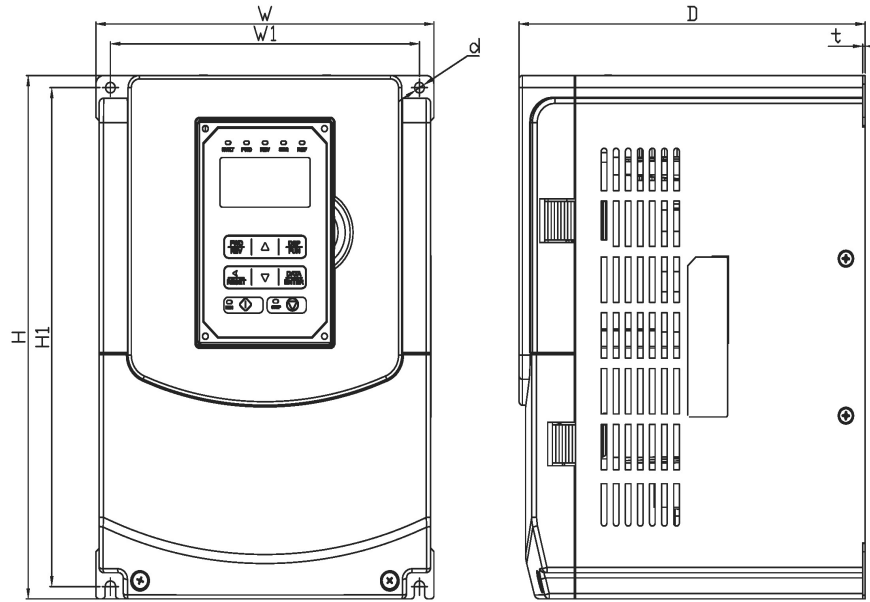
3.21 Inverter Dimensions

(a) 230V: 1 – 7.5HP / 460V: 1 - 7.5HP/ 575V:1-3HP (IP20/NEMA1)



Inverter Model	Dimensions in mm (inch)							Net Weight in kg (lbs)
	W	H	D	W1	H1	t	d	
A510-2001-C-UE	130 (5.12)	215 (8.46)	150 (5.91)	118 (4.65)	203 (7.99)	5 (0.20)	M5	2.2 (4.9)
A510-2002-C-UE	130 (5.12)	215 (8.46)	150 (5.91)	118 (4.65)	203 (7.99)	5 (0.20)	M5	2.2 (4.9)
A510-2003-C-UE	140 (5.51)	279 (10.98)	177 (6.97)	122 (4.80)	267 (10.51)	7 (0.28)	M6	3.8 (8.4)
A510-2005-C3-UE	140 (5.51)	279 (10.98)	177 (6.97)	122 (4.80)	267 (10.51)	7 (0.28)	M6	3.8 (8.4)
A510-2008-C3-UE	140 (5.51)	279 (10.98)	177 (6.97)	122 (4.80)	267 (10.51)	7 (0.28)	M6	3.8 (8.4)
A510-4001-C3-UE	130 (5.12)	215 (8.46)	150 (5.91)	118 (4.65)	203 (7.99)	5 (0.20)	M5	2.2 (4.9)
A510-4002-C3-UE	130 (5.12)	215 (8.46)	150 (5.91)	118 (4.65)	203 (7.99)	5 (0.20)	M5	2.2 (4.9)
A510-4003-C3-UE	130 (5.12)	215 (8.46)	150 (5.91)	118 (4.65)	203 (7.99)	5 (0.20)	M5	2.2 (4.9)
A510-4005-C3-UE	140 (5.51)	279 (10.98)	177 (6.97)	122 (4.80)	267 (10.51)	7 (0.28)	M6	3.8 (8.4)
A510-4008-C3-UE	140 (5.51)	279 (10.98)	177 (6.97)	122 (4.80)	267 (10.51)	7 (0.28)	M6	3.8 (8.4)
A510-5001-C3-UE	140 (5.51)	279 (10.98)	177 (6.97)	122 (4.80)	267 (10.51)	7 (0.28)	M6	3.8 (8.4)
A510-5002-C3-UE	140 (5.51)	279 (10.98)	177 (6.97)	122 (4.80)	267 (10.51)	7 (0.28)	M6	3.8 (8.4)
A510-5003-C3-UE	140 (5.51)	279 (10.98)	177 (6.97)	122 (4.80)	267 (10.51)	7 (0.28)	M6	3.8 (8.4)

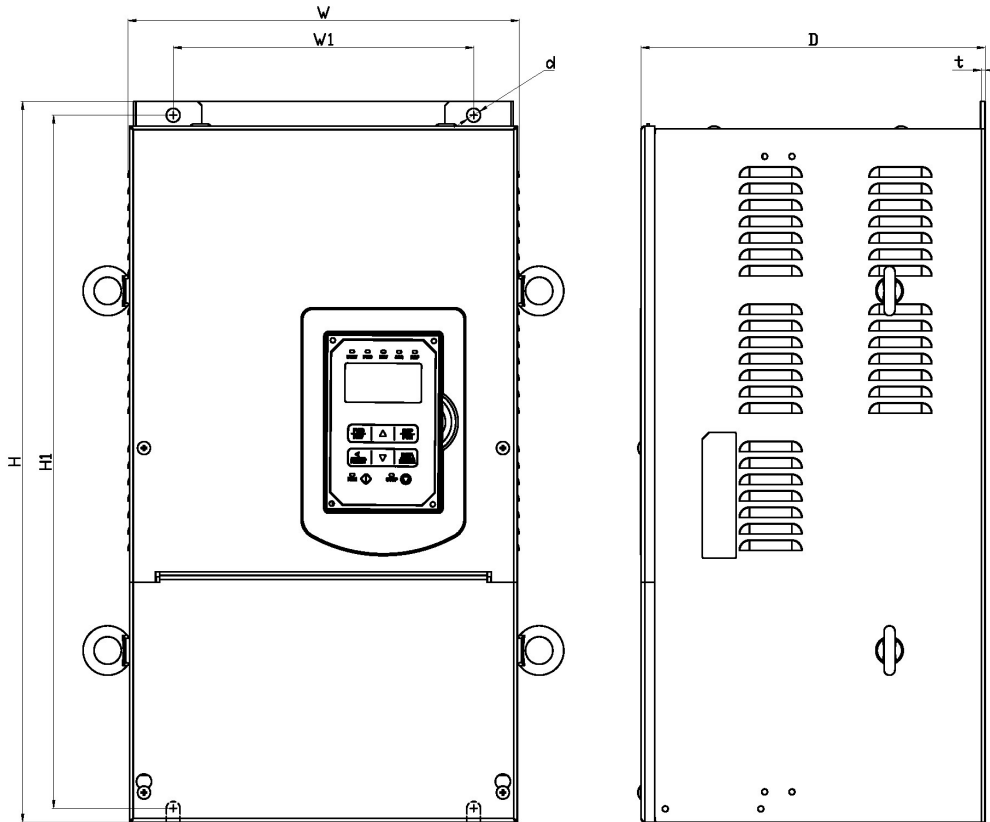
(b) 230V: 10 - 25HP / 460V: 10 - 30HP / 575V: 5~10HP / 690V: 15~40HP (IP20/NEMA1)



Inverter Model	Dimensions in mm (inch)							Net Weight in kg (lbs)
	W	H	D	W1	H1	t	d	
A510-2010-C3-UE	210 (8.27)	300 (11.81)	215 (8.46)	192 (7.56)	286 (11.26)	1.6 (0.06)	M6	6.2 (13.67)
A510-2015-C3-UE	265 (10.43)	360 (14.17)	225 (8.86)	245 (9.65)	340 (13.39)	1.6 (0.06)	M8	10 (22.05)
A510-2020-C3-UE	265 (10.43)	360 (14.17)	225 (8.86)	245 (9.65)	340 (13.39)	1.6 (0.06)	M8	10 (22.05)
A510-2025-C3-UE	265 (10.43)	360 (14.17)	225 (8.86)	245 (9.65)	340 (13.39)	1.6 (0.06)	M8	10 (22.05)
A510-4010-C3-UE	210 (8.27)	300 (11.81)	215 (8.46)	192 (7.56)	286 (11.26)	1.6 (0.06)	M6	6.2 (13.67)
A510-4015-C3-UE	210 (8.27)	300 (11.81)	215 (8.46)	192 (7.56)	286 (11.26)	1.6 (0.06)	M6	6.2 (13.67)
A510-4020-C3-UE	210 (8.27)	300 (11.81)	215 (8.46)	192 (7.56)	286 (11.26)	1.6 (0.06)	M6	6.2 (13.67)
A510-4025-C3-UE	265 (10.43)	360 (14.17)	225 (8.86)	245 (9.65)	340 (13.39)	1.6 (0.06)	M8	10 (22.05)
A510-4030-C3-UE	265 (10.43)	360 (14.17)	225 (8.86)	245 (9.65)	340 (13.39)	1.6 (0.06)	M8	10 (22.05)
A510-5005-C3-UE	210 (8.27)	300 (11.81)	215 (8.46)	192 (7.56)	286 (11.26)	1.6 (0.06)	M6	6.2 (13.67)
A510-5008-C3-UE	210 (8.27)	300 (11.81)	215 (8.46)	192 (7.56)	286 (11.26)	1.6 (0.06)	M6	6.2 (13.67)
A510-5010-C3-UE	210 (8.27)	300 (11.81)	215 (8.46)	192 (7.56)	286 (11.26)	1.6 (0.06)	M6	6.2 (13.67)
A510-6015-C3-UE	265 (10.43)	360 (14.17)	225 (8.86)	245 (9.65)	340 (13.39)	1.6 (0.06)	M8	10 (22.05)

Inverter Model	Dimensions in mm (inch)							Net Weight in kg (lbs)
	W	H	D	W1	H1	t	d	
A510-6020-C3-UE	265 (10.43)	360 (14.17)	225 (8.86)	245 (9.65)	340 (13.39)	1.6 (0.06)	M8	10 (22.05)
A510-6025-C3-UE	265 (10.43)	360 (14.17)	225 (8.86)	245 (9.65)	340 (13.39)	1.6 (0.06)	M8	10 (22.05)
A510-6030-C3-UE	265 (10.43)	360 (14.17)	225 (8.86)	245 (9.65)	340 (13.39)	1.6 (0.06)	M8	10 (22.05)
A510-6040-C3-UE	265 (10.43)	360 (14.17)	225 (8.86)	245 (9.65)	340 (13.39)	1.6 (0.06)	M8	10 (22.05)

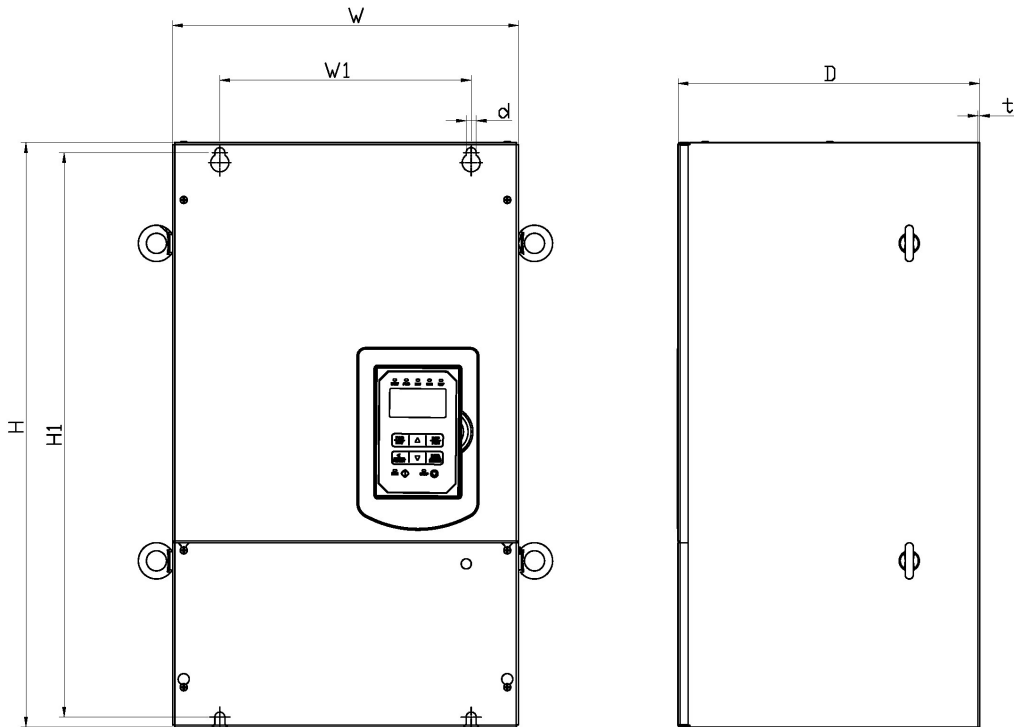
(c) 230V: 30 - 40HP / 460V: 40 - 75HP / 690V 50~75HP (IP20/NEMA1)



Inverter Model	Dimensions in mm (inch)							Net Weight in kg (lbs)
	W	H	D	W1	H1	t	d	
A510-2030-C3-UE	286.5 (11.28)	525 (20.67)	Note	220 (8.66)	505 (19.88)	3.3 (0.13)	M8	24 (52.91)
A510-2040-C3-UE	286.5 (11.28)	525 (20.67)		220 (8.66)	505 (19.88)	3.3 (0.13)	M8	24 (52.91)
A510-4040-C3-UE	286.5 (11.28)	525 (20.67)		220 (8.66)	505 (19.88)	3.3 (0.13)	M8	24 (52.91)
A510-4050-C3-UE	286.5 (11.28)	525 (20.67)		220 (8.66)	505 (19.88)	3.3 (0.13)	M8	24 (52.91)
A510-4060-C3-UE	286.5 (11.28)	525 (20.67)		220 (8.66)	505 (19.88)	3.3 (0.13)	M8	24 (52.91)
A510-4075-C3-UE	286.5 (11.28)	525 (20.67)		220 (8.66)	505 (19.88)	3.3 (0.13)	M8	24 (52.91)
A510-6050-C3-UE	286.5 (11.28)	525 (20.67)		220 (8.66)	505 (19.88)	3.3 (0.13)	M8	24 (52.91)
A510-6060-C3-UE	286.5 (11.28)	525 (20.67)		220 (8.66)	505 (19.88)	3.3 (0.13)	M8	24 (52.91)
A510-6075-C3-UE	286.5 (11.28)	525 (20.67)		220 (8.66)	505 (19.88)	3.3 (0.13)	M8	24 (52.91)

Note: U Type is 252mm (9.92 inch), UE Type is 272mm (10.70 inch)

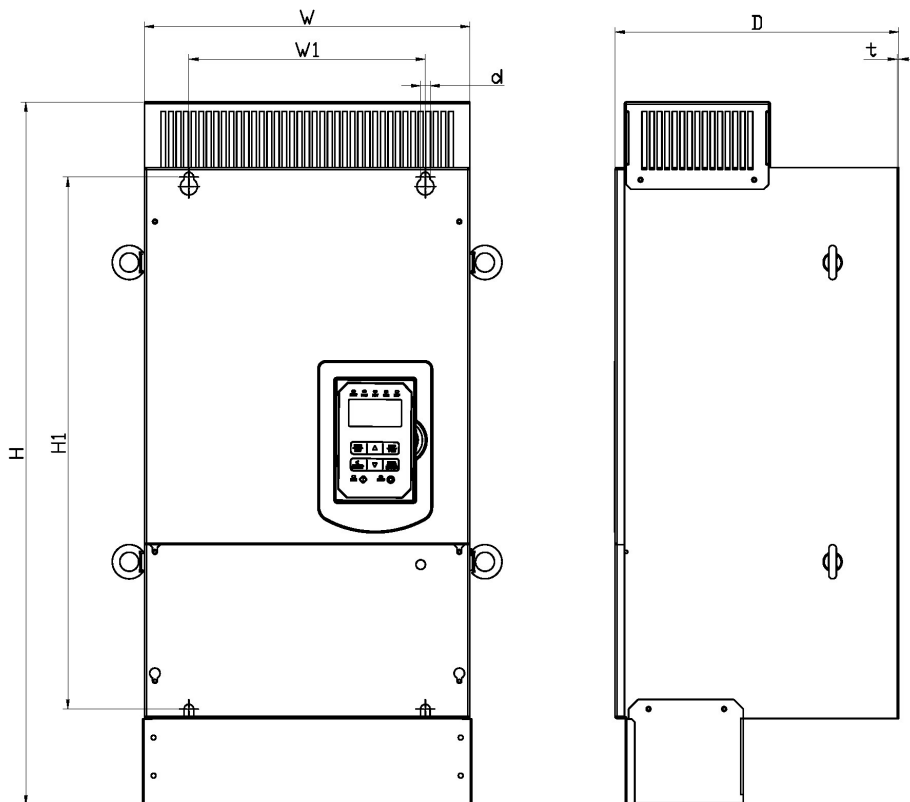
230V: 50 - 100HP / 460V: 100 - 215HP / 690V: 100~270HP (IP00)



Inverter Model	Dimensions in mm (inch)							Net Weight in kg (lbs)
	W	H	D	W1	H1	t	d	
A510-2050-C3-UE	344 (13.54)	580 (22.83)	300 (11.81)	250 (9.84)	560 (22.05)	1.6 (0.06)	M8	40 (88.18)
A510-2060-C3-UE	344 (13.54)	580 (22.83)	300 (11.81)	250 (9.84)	560 (22.05)	1.6 (0.06)	M8	40 (88.18)
A510-2075-C3-UE	459 (18.07)	790 (31.10)	324.5 (12.78)	320 (12.60)	760 (29.92)	1.6 (0.06)	M10	74 (163.14)
A510-2100-C3-UE	459 (18.07)	790 (31.10)	324.5 (12.78)	320 (12.60)	760 (29.92)	1.6 (0.06)	M10	74 (163.14)
A510-4100-C3-UE	344 (13.54)	580 (22.83)	300 (11.81)	250 (9.84)	560 (22.05)	1.6 (0.06)	M8	40 (88.18)
A510-4125-C3-UE	344 (13.54)	580 (22.83)	300 (11.81)	250 (9.84)	560 (22.05)	1.6 (0.06)	M8	40 (88.18)
A510-4150-C3-UE	459 (18.07)	790 (31.10)	324.5 (12.78)	320 (12.60)	760 (29.92)	1.6 (0.06)	M10	74 (163.14)
A510-4215-C3-UE	459 (18.07)	790 (31.10)	324.5 (12.78)	320 (12.60)	760 (29.92)	1.6 (0.06)	M10	74 (163.14)
A510-6100-C3-UE	344 (13.54)	580 (22.83)	300 (11.81)	250 (9.84)	560 (22.05)	1.6 (0.06)	M8	40 (88.18)
A510-6125-C3-UE	344 (13.54)	580 (22.83)	300 (11.81)	250 (9.84)	560 (22.05)	1.6 (0.06)	M8	40 (88.18)

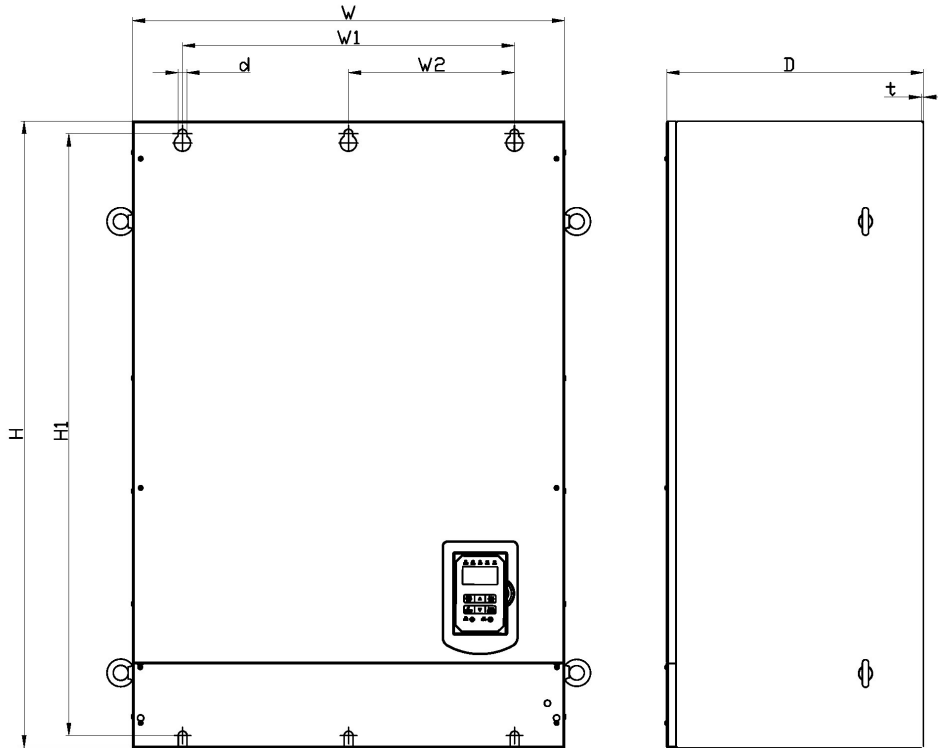
A510-6150-C3-UE	344 (13.54)	580 (22.83)	300 (11.81)	250 (9.84)	560 (22.05)	1.6 (0.06)	M8	40 (88.18)
A510-6175-C3-UE	459 (18.07)	790 (31.10)	324.5 (12.78)	320 (12.60)	760 (29.92)	1.6 (0.06)	M10	74 (163.14)
A510-6215-C3-UE	459 (18.07)	790 (31.10)	324.5 (12.78)	320 (12.60)	760 (29.92)	1.6 (0.06)	M10	74 (163.14)
A510-6250-C3-UE	459 (18.07)	790 (31.10)	324.5 (12.78)	320 (12.60)	760 (29.92)	1.6 (0.06)	M10	74 (163.14)
A510-6270-C3-UE	459 (18.07)	790 (31.10)	324.5 (12.78)	320 (12.60)	760 (29.92)	1.6 (0.06)	M10	74 (163.14)

(d) 230V: 50 - 100HP / 460V: 100 - 215HP/ 690V: 100~270HP (IP20/ NEMA1)



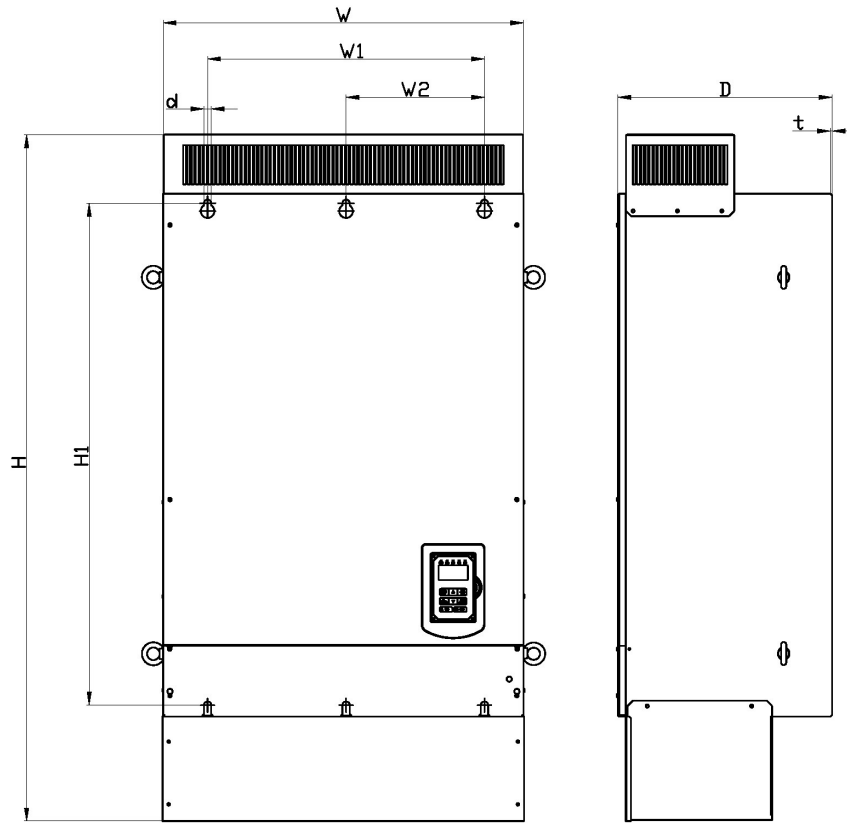
Inverter Model	Dimensions in mm (inch)							Net Weight in kg (lbs)
	W	H	D	W1	H1	t	d	
A510-2050-C3-UE	348.5 (13.72)	740 (29.13)	300 (11.81)	250 (9.84)	560 (22.05)	1.6 (0.06)	M8	44 (97.00)
A510-2060-C3-UE	348.5 (13.72)	740 (29.13)	300 (11.81)	250 (9.84)	560 (22.05)	1.6 (0.06)	M8	44 (97.00)
A510-2075-C3-UE	463.5 (18.25)	1105 (43.50)	324.5 (12.78)	320 (12.60)	760 (29.92)	1.6 (0.06)	M10	81 (178.57)
A510-2100-C3-UE	463.5 (18.25)	1105 (43.50)	324.5 (12.78)	320 (12.60)	760 (29.92)	1.6 (0.06)	M10	81 (178.57)
A510-4100-C3-UE	348.5 (13.72)	740 (29.13)	300 (11.81)	250 (9.84)	560 (22.05)	1.6 (0.06)	M8	44 (97.00)
A510-4125-C3-UE	348.5 (13.72)	740 (29.13)	300 (11.81)	250 (9.84)	560 (22.05)	1.6 (0.06)	M8	44 (97.00)
A510-4150-C3-UE	463.5 (18.25)	1105 (43.50)	324.5 (12.78)	320 (12.60)	760 (29.92)	1.6 (0.06)	M10	81 (178.57)
A510-4215-C3-UE	463.5 (18.25)	1105 (43.50)	324.5 (12.78)	320 (12.60)	760 (29.92)	1.6 (0.06)	M10	81 (178.57)
A510-6100-C3-U	348.5 (13.72)	740 (29.13)	300 (11.81)	250 (9.84)	560 (22.05)	1.6 (0.06)	M8	44 (97.00)
A510-6125-C3-UE	348.5 (13.72)	740 (29.13)	300 (11.81)	250 (9.84)	560 (22.05)	1.6 (0.06)	M8	44 (97.00)
A510-6150-C3-UE	348.5 (13.72)	740 (29.13)	300 (11.81)	250 (9.84)	560 (22.05)	1.6 (0.06)	M8	44 (97.00)
A510-6175-C3-UE	463.5 (18.25)	1105 (43.50)	324.5 (12.78)	320 (12.60)	760 (29.92)	1.6 (0.06)	M10	81 (178.57)
A510-6215-C3-UE	463.5 (18.25)	1105 (43.50)	324.5 (12.78)	320 (12.60)	760 (29.92)	1.6 (0.06)	M10	81 (178.57)
A510-6250-C3-UE	463.5 (18.25)	1105 (43.50)	324.5 (12.78)	320 (12.60)	760 (29.92)	1.6 (0.06)	M10	81 (178.57)
A510-6270-C3-UE	463.5 (18.25)	1105 (43.50)	324.5 (12.78)	320 (12.60)	760 (29.92)	1.6 (0.06)	M10	81 (178.57)

(e) 230V: 125 - 150HP / 460V: 215HP - 425HP (IP00)



Inverter Model	Dimensions in mm (inch)								Net Weight in kg (lbs)
	W	H	D	W1	W2	H1	t	d	
A510-2125-C3-UE	690 (27.17)	1000 (39.37)	410 (16.14)	530 (20.87)	265 (10.43)	960 (37.80)	1.6 (0.06)	M12	184 (405.65)
A510-2150-C3-UE	690 (27.17)	1000 (39.37)	410 (16.14)	530 (20.87)	265 (10.43)	960 (37.80)	1.6 (0.06)	M12	184 (405.65)
A510-4270-C3-UE	690 (27.17)	1000 (39.37)	410 (16.14)	530 (20.87)	265 (10.43)	960 (37.80)	1.6 (0.06)	M12	184 (405.65)
A510-4300-C3-UE	690 (27.17)	1000 (39.37)	410 (16.14)	530 (20.87)	265 (10.43)	960 (37.80)	1.6 (0.06)	M12	184 (405.65)
A510-4375-C3-UE	690 (27.17)	1000 (39.37)	410 (16.14)	530 (20.87)	265 (10.43)	960 (37.80)	1.6 (0.06)	M12	184 (405.65)
A510-4425-C3-UE	690 (27.17)	1000 (39.37)	410 (16.14)	530 (20.87)	265 (10.43)	960 (37.80)	1.6 (0.06)	M12	184 (405.65)

(f) 230V: 125 - 150HP / 460V: 215HP - 425HP (IP20/NEMA1)



Inverter Model	Dimensions in mm (inch)								Net Weight in kg (lbs)
	W	H	D	W1	W2	H1	t	d	
A510-2125-C3-UE	692 (27.24)	1313 (51.69)	410 (16.14)	530 (20.87)	265 (10.43)	960 (37.80)	1.6 (0.06)	M12	194 (427.70)
A510-2150-C3-UE	692 (27.24)	1313 (51.69)	410 (16.14)	530 (20.87)	265 (10.43)	960 (37.80)	1.6 (0.06)	M12	194 (427.70)
A510-4270-C3-UE	692 (27.24)	1313 (51.69)	410 (16.14)	530 (20.87)	265 (10.43)	960 (37.80)	1.6 (0.06)	M12	194 (427.70)
A510-4300-C3-UE	692 (27.24)	1313 (51.69)	410 (16.14)	530 (20.87)	265 (10.43)	960 (37.80)	1.6 (0.06)	M12	194 (427.70)
A510-4375-C3-UE	692 (27.24)	1313 (51.69)	410 (16.14)	530 (20.87)	265 (10.43)	960 (37.80)	1.6 (0.06)	M12	194 (427.70)
A510-4425-C3-UE	692 (27.24)	1313 (51.69)	410 (16.14)	530 (20.87)	265 (10.43)	960 (37.80)	1.6 (0.06)	M12	194 (427.70)

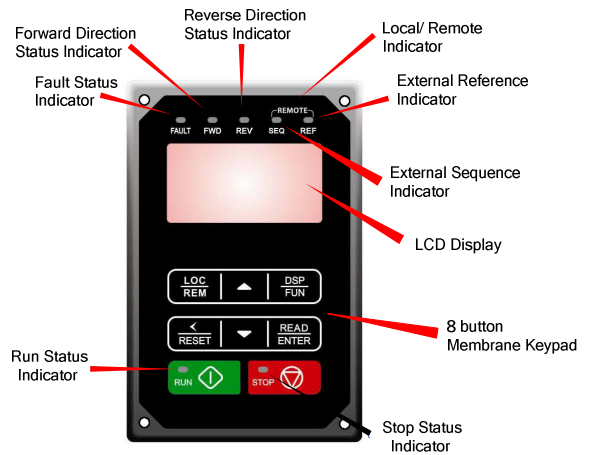
Chapter 4 Keypad and Programming Functions

4.1 LCD Keypad

4.1.1 Keypad Display and Keys



(U Type)



(UE Type)

DISPLAY	Description
LCD Display	Monitor inverter signals, view / edit parameters, fault / alarm display.
LED INDICATORS	
FAULT	LED ON when a fault or alarm is active.
FWD	LED ON when inverter is running in forward direction, flashing when stopping.
REV	On when inverter is running in reverse direction, flashing when stopping.
SEQ	LED ON when RUN command is from the external control terminals or from serial communication
REF	LED ON when Frequency Reference command is from the external control terminals or from serial communication

KEYS (8)	Description
RUN	RUN Inverter in Local Mode
STOP	STOP Inverter
▲	Parameter navigation Up, Increase parameter or reference value
▼	Parameter navigation down, decrease parameter or reference value
FWD/REV (U Type)	Used to switch between Forward and Reverse direction
LOC/REM (UE Type)	Used to switch between Local Mode and Remote Mode REMOTE Mode: Set by parameters, controlled by control circuit terminals, communication or other ways. LOCAL Mode: Controlled by operator. It displays REMOTE Mode at power-up. Users can switch between LOCAL and REMOTE Mode if they press LOC/ REM keys when the inverter stops. Parameter of 23-41 can determine if LOC/REM keys are enabled or not.
DSP/FUN	Used to scroll to next screen Frequency screen →Function selection→Monitor parameter
◀ / RESET	Selects active seven segment digit for editing with the ▲▼ keys Used to reset fault condition.
READ / ENTER	Used to read and save the value of the active parameter

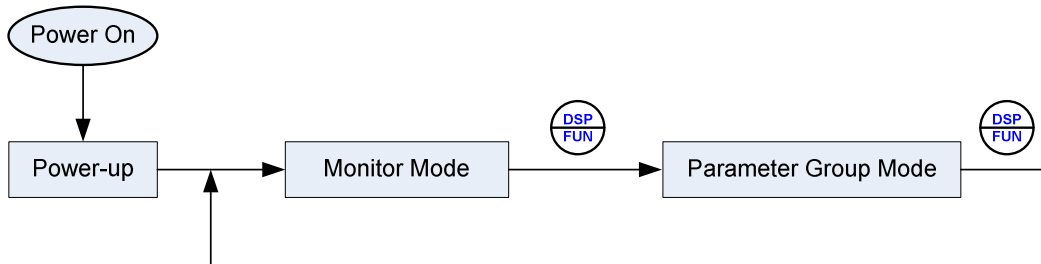
Auto-Repeat Keys

Holding the ▲UP or ▼DOWN key for a longer period of time will initiate the auto-repeat function resulting in the value of the selected digit to automatically increase or decrease.

4.1.2 Keypad Menu Structure

Main Menu

The A510 inverter main menu consists of two main groups (modes). The DSP/FUN key is used to switch between the monitor mode and the parameter group mode.



Mode	Description
Monitor Mode	View inverter status, signals and fault data.
Parameter Group Mode	Access to available parameter groups.

All the available parameter groups are listed in the Parameter Group Mode use the up and down keys to select a group and press Read/Enter key to access its parameters.

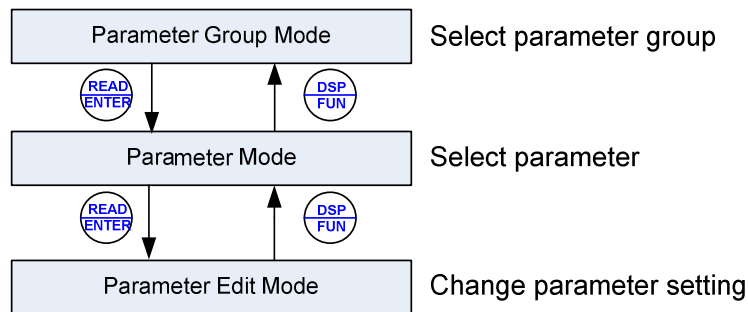


Fig. 4.1.2.1 Parameter Group Structure

Notes:

- Always perform an auto-tune on the motor before operating the inverter in vector control (sensorless vector or flux vector). Auto-tuning mode will not be displayed when the inverter is running or when a fault is active.
- To scroll through the available modes, parameter groups or parameter list press and hold the up or down key.

Monitor Mode

In monitor mode inverter signals can be monitored such as output frequency, output current and output voltage, etc...) as well as fault information and fault trace. See Fig 4.2.2.2 for keypad navigation.

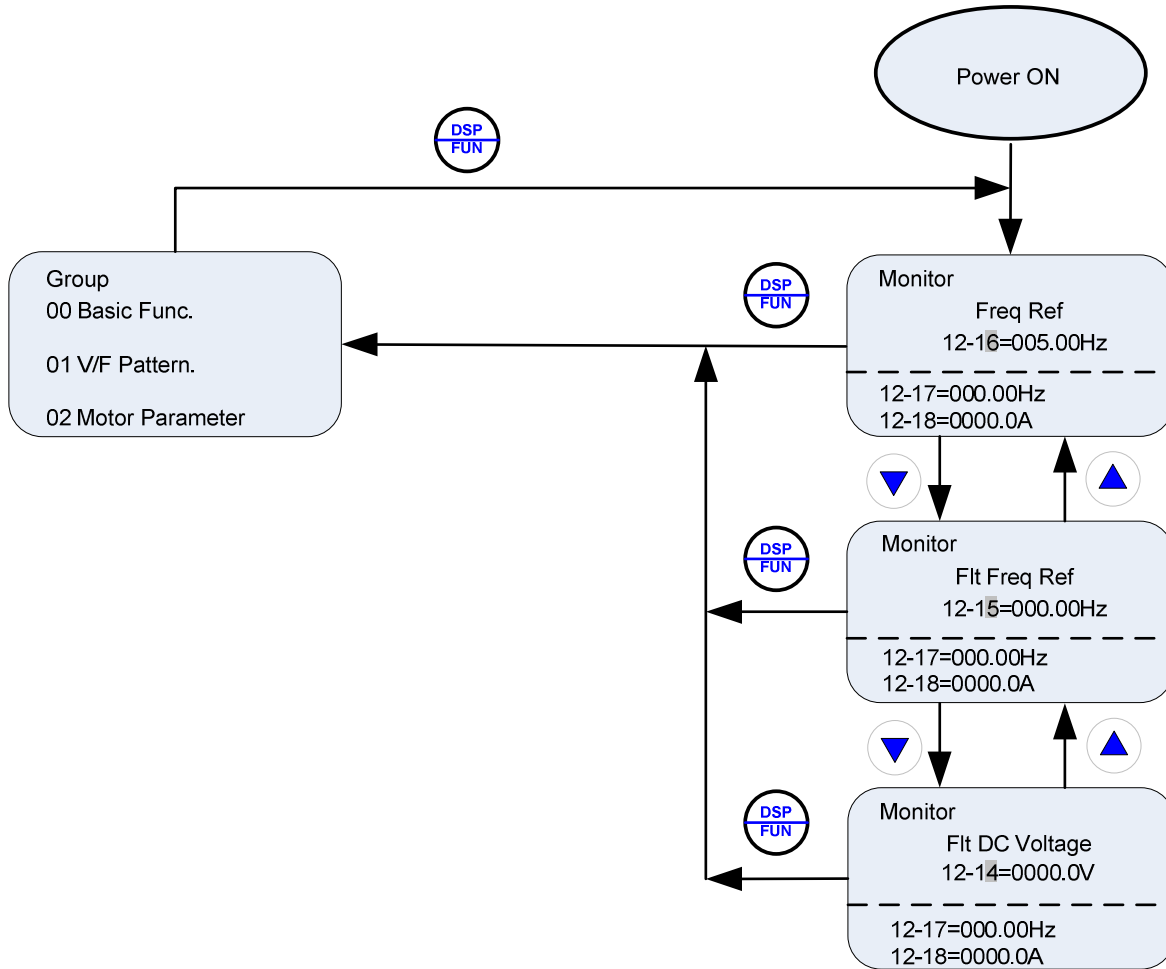


Fig 4.1.2.2 Monitor Mode

Note:

- To scroll through the available monitor parameter list, press and hold the ▲ (up) or ▼ (down) key.

Programming Mode

In programming mode inverter parameters can be read or changed. See Fig 4.1.2.3 for keypad navigation.

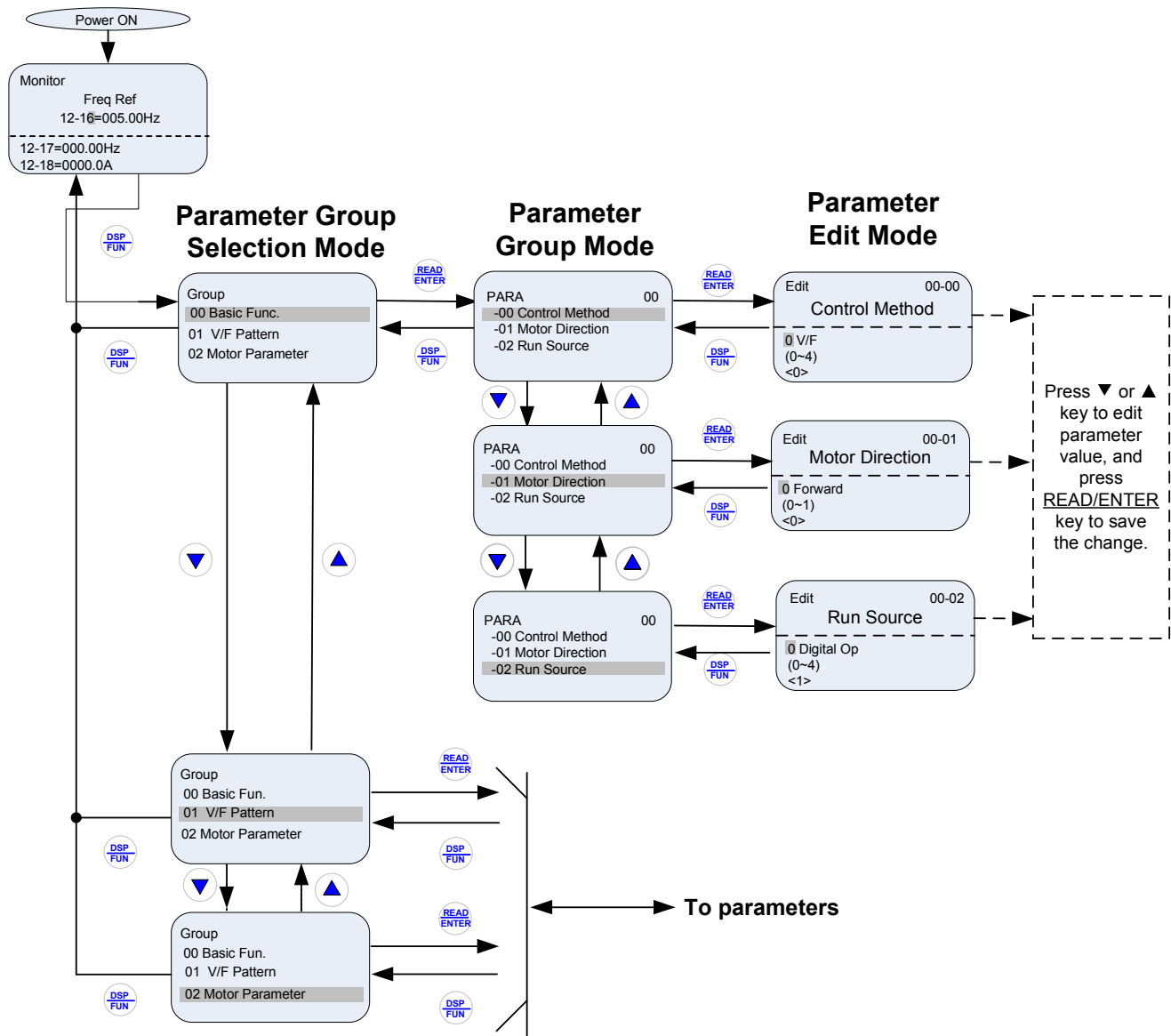


Fig 4.1.2.3 Programming Mode

Notes:

- The parameters values can be changed from the Edit screen with the up, down and < / RESET shift key.
- To save a parameter press the READ/ENTER key.
- Refer to section 4.4 for parameter details.
- Press the ▲ (up) or ▼ (down) key to scroll parameter groups or parameter list.

Auto-tuning Mode

In the auto-tuning mode motor parameters can be calculated and set automatically based on the selected control mode. See Fig 4.1.2.4 for keypad navigation.

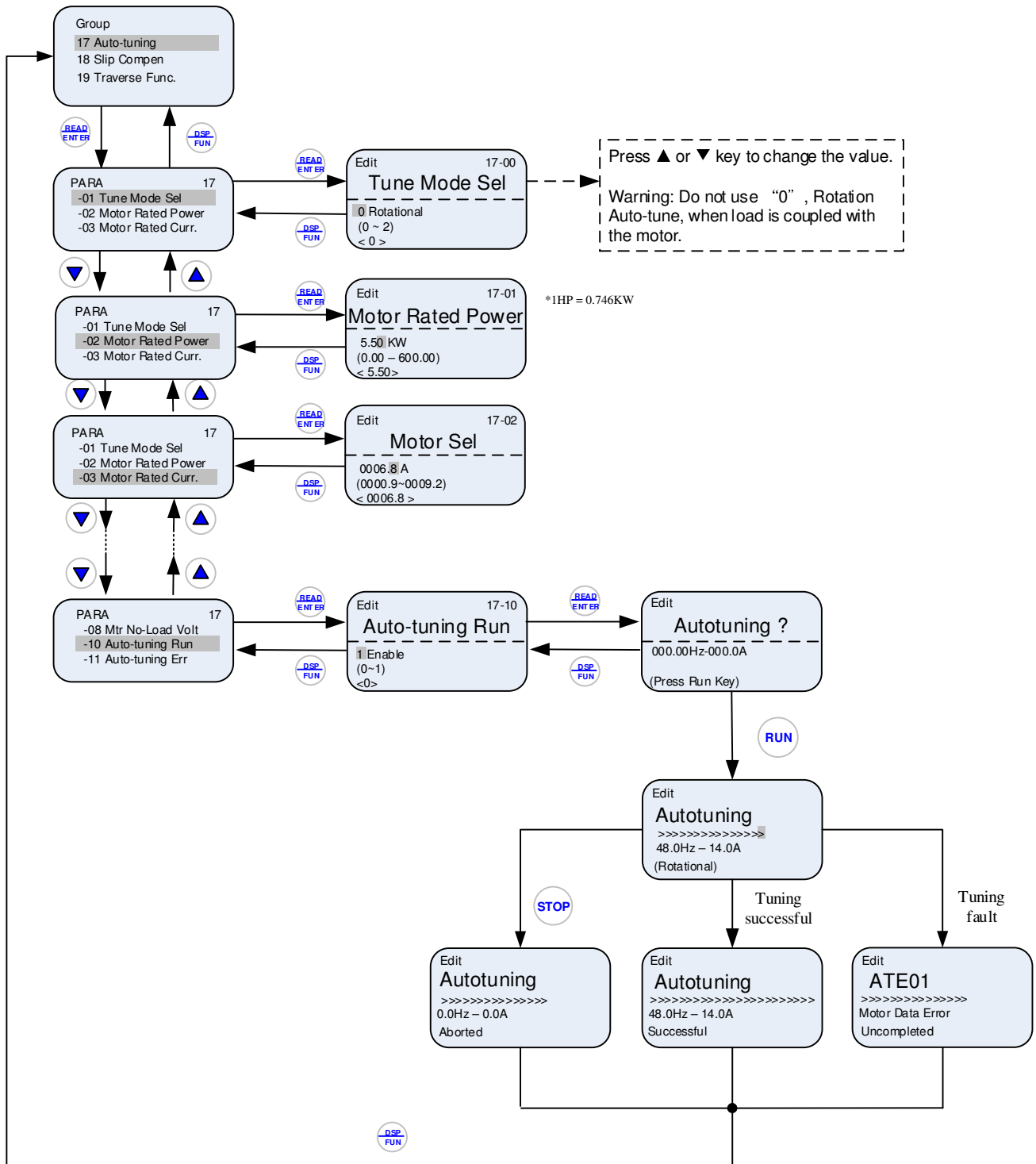


Fig 4.1.2.4 Auto-tuning Mode

Notes:

- Set correct motor parameters by referring to motor nameplate.
- Refer to section 4.4 for parameter details.

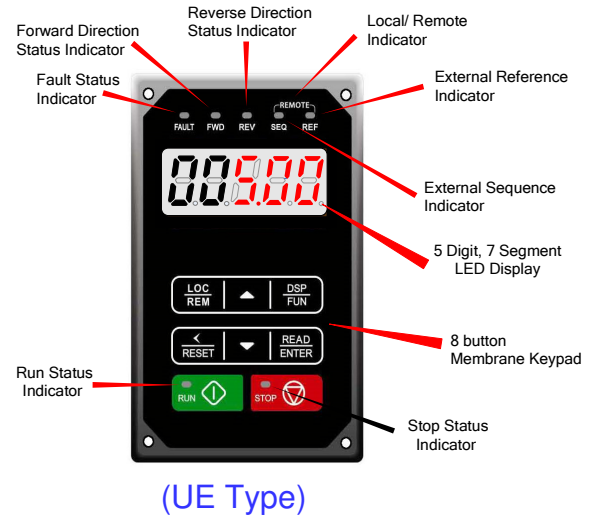
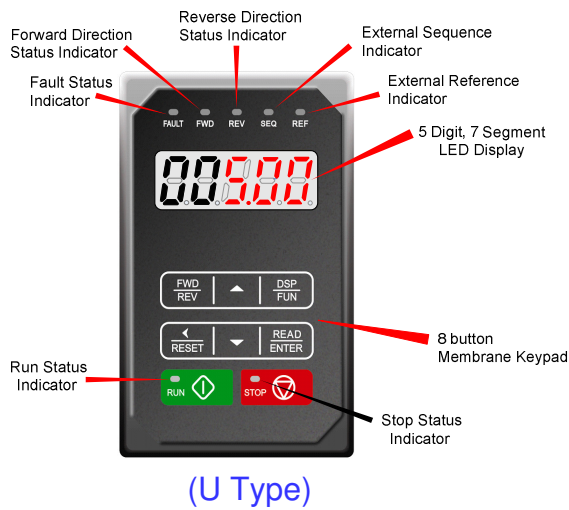
4.1.2 Notes:

1. Use the up and down keys to scroll through the auto-tuning parameter list. Depending on the selected control mode in parameter 00-00, part of auto-tuning parameters will not be accessible. (Refer to the Auto-tuning Group 17 parameters).
2. After entering the motor nameplate rated output power (17-01), rated current (17-02), rated voltage (17-03), rated frequency (17-04), rated speed (17-05) and number of motor poles (17-06), select the automatic tuning mode and press the RUN key to perform the auto-tuning operation. When auto-tuning is successful the calculated motor parameters will be saved into parameter group 02 (motor parameter).
3.
 - (a) "Rotational" will be displayed during rotational auto-tuning (17-00=0) and the motor will rotate during auto-tuning. Ensure that it is safe to operate the motor before pressing the RUN key.
 - (b) "Stationary" will be displayed during stationary auto-tuning (17-00=1), the motor shaft does not rotate.
 - (c) "R1 Tuning" will be displayed during stationary auto-tuning (17-00=2), the motor shaft does not rotate.
 - (d) The RUN LED (in the upper left corner of the RUN key) will be lit during auto-tuning.
 - (e) The LCD display shows ">>>" or "Atund" during the auto-tuning process.
4. Press the STOP key on the keypad to abort the auto-tuning operation.
5. In case of an auto-tuning fault, a fault message and the uncompleted message are displayed on the keypad. The RUN LED will be flashing and the motor will coast to stop. (Refer to section 10.4 for the Auto-tuning Faults.) The auto-tuning fault can be cleared by pressing the RESET key after which the keypad displays the auto-tuning mode again.

All motor parameters (group 02 through group 17 parameters) will revert back to their factory settings if a fault occurs. The motor data must be entered again before re-starting auto-tuning. The keypad shows ">>>" during an auto-tuning fault.
6. Upon successful completion of an auto-tune, the RUN LED will turn off. Press the DSP/FUN key to return to the main menu to select the next operation. The auto-tuning procedure takes approximately 50 seconds.

4.2 LED Keypad

4.2.1 Keypad Display and Keys



DISPLAY	Description
5 Digit LED Display	Monitor inverter signals, view / edit parameters, fault / alarm display.
LED INDICATORS	
FAULT	LED ON when a fault or alarm is active.
FWD	LED ON when inverter is running in forward direction, flashing when stopping.
REV	On when inverter is running in reverse direction, flashing when stopping.
SEQ	LED ON when RUN command is from the external control terminals or from serial communication
REF	LED ON when Frequency Reference command is from the external control terminals or from serial communication

KEYS (8)	Description
RUN	RUN Inverter in Local Mode
STOP	STOP Inverter
▲	Parameter navigation Up, Increase parameter or reference value
▼	Parameter navigation down, decrease parameter or reference value
FWD/REV (U Type)	Used to switch between Forward and Reverse direction
LOC/REM (UE Type)	Used to switch between Local Mode and Remote Mode REMOTE Mode: Set by parameters, controlled by control circuit terminals, communication or other ways. LOCAL Mode: Controlled by operator. It displays REMOTE Mode at power-up. Users can switch between LOCAL and REMOTE Mode if they press LOC/ REM keys when the inverter stops. Parameter of 23-41 can determine if LOC/REM keys are enabled or not.
DSP/FUN	Used to scroll to next screen Frequency screen →Function selection→Monitor parameter
◀ / RESET	Selects active seven segment digit for editing with the ▲ ▼ keys Used to reset fault condition.
READ / ENTER	Used to read and save the value of the active parameter

Auto-Repeat Keys

Holding the ▲UP or ▼DOWN key for a longer period of time will initiate the auto-repeat function resulting in the value of the selected digit to automatically increase or decrease.

4.3 Parameters

Parameter group	Group Name
Group 00	Basic Parameters
Group 01	V/F Control Parameters
Group 02	IM Motor Parameters
Group 03	External Digital Input and Output Parameters
Group 04	External Analog Input and Output Parameters
Group 05	Multi-Speed Parameters
Group 06	Automatic Program Operation Parameters
Group 07	Start /Stop Parameters
Group 08	Protection Parameters
Group 09	Communication Parameters
Group 10	PID Parameters
Group 11	Auxiliary Parameters
Group 12	Monitoring Parameters
Group 13	Maintenance Parameters
Group 14	PLC Parameters
Group 15	PLC Monitoring Parameters
Group 16	LCD Parameters
Group 17	Automatic Tuning Parameters
Group 18	Slip Compensation Parameters
Group 19	Wobble Frequency Parameters
Group 20	Speed Control Parameters
Group 21	Torque And Position Control Parameters
Group 22	PM Motor Parameters

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Parameter Attribute		
*1	Parameters can be changed during run operation.	Note1: New added or modified parameters in software V1.00 Note2: New added or modified parameters in software V1.01 Note3: New added or modified parameters in software V1.01 Note4: New added or modified parameters in software V1.01 Note5: New added or displayed parameters in software V1.01, when 00-32=8 Note6: Parameter edit available for software V1.01 above Note7: New added or modified parameters in software V1.02
*2	Reserved	
*3	Parameter will not reset to default during a factory reset (initialization).	
*4	Read-only parameter	
*5	Parameter will be displayed in being coupled with the option card.	
*6	Parameter will be displayed only in LED keypad.	
*7	Parameter will be displayed only in LCD keypad.	
*8	When 13-08 setting is changed, the value will be also changed.	
*9	For UE type only.	
*10	Only available after I/O expansion card installed	

Group 00: Basic Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute	
					V/F	V/F+PG	SLV	SV	PM SV	PM SLV	SLV2		
00-00	Control Mode Selection	0: V/F	0	-	○	○	○	○	○	○	○	○	*3
		1: V/F+PG											
		2: SLV											
		3: SV											
		4: PMSV											
		5: PMSLV											
6: SLV2													
00-01	Motor's Rotation Direction	0: Forward	0	-	○	○	○	○	○	○	○	○	*1
		1: Reverse											
00-02	Main Run Command Source Selection	0: Keypad	0	-	○	○	○	○	○	○	○	○	
		1: External Terminal (Control Circuit)											
		2: Communication Control (RS-485)											
		3: PLC											
00-03	Alternative Run Command Selection	0: Keypad	2 (Note4)	-	○	○	○	○	○	○	○	○	
		1: External Terminal (Control Circuit)											
		2: Communication Control (RS-485)											
		3: PLC											
00-04	Language	0: English	0	-	○	○	○	○	○	○	○	○	*7
		1: Simplified Chinese											
		2: Traditional Chinese											
		3: Turkish											
00-05	Main Frequency Command Source Selection	0: Keypad	0	-	○	○	○	○	○	○	○	○	
		1: External Terminal (Analog 1)											
		2: Terminal Command UP/DOWN											
		3: Communication Control (RS-485)											
		4: Pulse Input											
		5: Reserved											
		6: Reserved											
		7: AI2 Auxiliary Frequency											
		8: Manual Pulse Generator (MPG) ^{Note4}											
00-06	Alternative Frequency Source Selection	0: Keypad	3 (Note4)	-	○	○	○	○	○	○	○	○	
		1: External Terminal (Analog 1)											
		2: Terminal Command UP/DOWN											
		3: Communication Control (RS-485)											

Group 00: Basic Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode						Attribute	
					V/F	V/F+PG	SLV	SV	PM SV	PM SLV		SLV2
		4: Pulse Input										
		5: Reserved										
		6: Reserved										
		7: AI2 Auxiliary Frequency										
00-07	Main and Alternative Frequency Command Modes	0: Main Frequency	0	-	○	○	○	○	○	○	○	○
		1: Main frequency + Alternative Frequency										
00-08	Communication Frequency Command Range	0.00~599.00	0.00	Hz	○	○	○	○	○	○	○	
00-09	Communication Frequency Command Memory Selection	0: Don't save when power supply is off. (00-08)	0	-	○	○	○	○	○	-		
		1: Save when power is off. (00-08)										
00-10	Minimum frequency detection	0: Show warning if lower than minimum frequency	0	-	○	○	○	○	○	○	○	○
		1: Run as minimum frequency if lower than minimum frequency										
00-11	PID Lower Limit of Frequency Selection	0: PID Sleep Limit is Lower Limit of Frequency	0	-	○	○	○	○	○	○	○	○
		1: PID Sleep Limit is 0Hz										
00-12	Upper limit Frequency	0.1~109.0	100.0	%	○	○	○	○	○	○	○	
00-13	Lower limit Frequency	0.0~109.0	0.0	%	○	○	○	○	○	○	○	
00-14	Acceleration Time ₁	0.1~6000.0	*	s	○	○	○	○	○	○	○	*1
00-15	Deceleration Time ₁	0.1~6000.0	*	s	○	○	○	○	○	○	○	*1
00-16	Acceleration Time ₂	0.1~6000.0	*	s	○	○	○	○	○	○	○	*1
00-17	Deceleration Time ₂	0.1~6000.0	*	s	○	○	○	○	○	○	○	*1
00-18	Jog Frequency****	0.00~599.00	6.00	Hz	○	○	○	○	○	○	○	*1
00-19	Jog Acceleration Time	0.1~0600.0	-	s	○	○	○	○	○	○	○	*1
00-20	Jog Deceleration Time	0.1~0600.0	-	s	○	○	○	○	○	○	○	*1
00-21	Acceleration time ₃	0.1~6000.0	*	s	○	○	○	○	○	○	○	*1

Group 00: Basic Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F+PG	SLV	SV	PM SV	PM SLV	SLV2	
00-22	Deceleration time ₃	0.1~6000.0	*	s	○	○	○	○	○	○	○	*1
00-23	Acceleration time ₄	0.1~6000.0	*	s	○	○	○	○	○	○	○	*1
00-24	Deceleration time ₄	0.1~6000.0	*	s	○	○	○	○	○	○	○	*1
00-25	Switch-Over Frequency of Acc/Dec Time 1 and Time 4	0.00~599.00	0.0	Hz	○	○	○	○	○	○	○	
00-26	Emergency Stop Time	0.1~6000.0	5.0	s	○	○	○	○	○	○	○	
00-27	HD/ND Mode Selection ***	0: HD (Heavy Duty Mode)	0	-	○	○	○	○	○	○	○	*3
		1: ND (Normal Duty Mode)					X	X	X	X	X	
00-28	Command Characteristic selection of master frequency	0: Positive Characteristic (0~10V/4~20mA is corresponding to 0~100%)	0	-	○	○	○	○	○	○	○	
		1: Negative Characteristic (0~10V/4~20mA is corresponding to 100~0%)										
00-29	Zero-Speed Operation Selection	0: Operation Based on Frequency Command	0	-	X	X	X	○	○	X	X	
		1: Stop										
		2: Operation Based on the Lowest Frequency										
		3: Zero-Speed Operation										
00-30 00-31	Reserved											
00-32	Application Selection Presets**	0: General	0	-	○	○	○	○	○	○	○	
		1: Reserved										
		2: Conveyor										
		3: Exhaust Fan										
		4: Reserved										
		5: Compressor										
		6: Hoist**										
		7: Crane**										
8: Manual Pulse Generator (MPG) ^{Note4}												
00-33	Modified Parameters (only for LCD keypad)	0:Disable	0	-	○	○	○	○	○	○	○	*7
		1:Enable										

Group 00: Basic Parameters												
Code	Parameter Name	Setting Range	Default	Unit	Control mode						Attribute	
					V/F	V/F+PG	SLV	SV	PM SV	PM SLV		SLV2
00-34 ~ 00-40	Reserved											
00-41	User parameter 0	Set 13-06 = 1, start user parameter. The setting range is 00-01 ~22-31, but except 00-41~00-56 and group 17 (only for LCD keypad)	00-41	-	○	○	○	○	○	○	○	*7
00-42	User parameter 1		00-42	-	○	○	○	○	○	○	○	*7
00-43	User parameter 2		00-43	-	○	○	○	○	○	○	○	*7
00-44	User parameter 3		00-44	-	○	○	○	○	○	○	○	*7
00-45	User parameter 4		00-45	-	○	○	○	○	○	○	○	*7
00-46	User parameter 5		00-46	-	○	○	○	○	○	○	○	*7
00-47	User parameter 6		00-47	-	○	○	○	○	○	○	○	*7
00-48	User parameter 7		00-48	-	○	○	○	○	○	○	○	*7
00-49	User parameter 8		00-49	-	○	○	○	○	○	○	○	*7
00-50	User parameter 9		00-50	-	○	○	○	○	○	○	○	*7
00-51	User parameter 10		00-51	-	○	○	○	○	○	○	○	*7
00-52	User parameter 11		00-52	-	○	○	○	○	○	○	○	*7
00-53	User parameter 12		00-53	-	○	○	○	○	○	○	○	*7
00-54	User parameter 13		00-54	-	○	○	○	○	○	○	○	*7
00-55	User parameter 14		00-55	-	○	○	○	○	○	○	○	*7
00-56	User parameter 15	00-56	-	○	○	○	○	○	○	○	*7	
00-57	SV High Speed Mode	0: SV High Speed Mode1	0	-	X	X	X	○	X	X	X	
		1: SV High Speed Mode2										

*: Refer to the following attachment 1.

** : Before to set up 00-32 Application, it should do initialized setting (parameter 13-08) first. When setting 00-32, the I/O port function changed automatically. To avoid accident, be sure to confirm the I/O port signal of inverter and external terminal control.

*** If parameter 00-27 is set to ND mode, group 02 motor 1 parameter will automatically adjust to more than 1 class of it.

If parameter 00-27 is set to HD mode, group 02 motor 1 parameter will automatically adjust to the same class of it.

It is suggested that parameter 00-27 be set first before motor performs auto-tuning because the parameter will make the motor parameter automatically be changed.

**** If the maximum output frequency of motor is over 300HZ, the frequency resolution is changed to 0.1Hz.

Group 01: V/F Control Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F+PG	SLV	SV	PM SV	PM SLV	SLV2	
01-00	V/F Curve Selection	0~FF	F	-	O	O	X	X	X	X	O	*3
01-01	Reserved											
01-02	Maximum Output Frequency of Motor 1	4.8~599.0	50.0/60.0	Hz	O	O	O	O	O	O	O	*8
01-03	Maximum Output Voltage of Motor 1	230V: 0.1~255.0	-	V	O	O	X	X	X	X	O	*8
		460V: 0.2~510.0	-									
		575V: 0.1~670.0	-									
		690V: 0.1~804.0	-									
01-04	Middle Output Frequency 2 of Motor 1	0.0~599.0	0.0	Hz	O	O	X	X	X	X	O	
01-05	Middle Output Voltage 2 of Motor 1	230V: 0.0~255.0	0.0	V	O	O	X	X	X	X	O	*8
		460V: 0.0~510.0										
		575V: 0.0~670.0										
		690V: 0.0~804.0										
01-06	Middle Output Frequency 1 of Motor 1	0.0~599.0	3.0	Hz	O	O	X	X	X	X	O	
01-07	Middle Output Voltage 1 of Motor 1	230V: 0.0~255.0	*	V	O	O	X	X	X	X	O	*8
		460V: 0.0~510.0										
		575V: 0.0~670.0										
		690V: 0.0~804.0										
01-08	Minimum Output Frequency of Motor 1	0.0~599.0	VF:1.5	Hz	O	O	O	O	O	O	O	
			VF+PG: 1.5									
			SLV: 0.6									
			SV:0.1									
			PMSV: 0.1									
			PMSLV: 9.0									
			SLV2: 1.0									
01-09	Minimum Output Voltage of Motor 1	230V: 0.0~255.0	8.3	V	O	O	X	X	X	X	O	*8
		460V: 0.0~510.0	15.0									
		575V: 0.0~670.0										
		690V: 0.0~804.0										
01-10	Torque Compensation Gain	0.0~2.0	0.5	-	O	O	X	X	X	X	O	*1

Group 01: V/F Control Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
01-11	Selection of Torque Compensation Mode	0: Torque Compensation Mode 0	0	-	O	O	X	X	X	X	X	
		1: Torque Compensation Mode 1										
01-12	Base Frequency of Motor 1	4.8~599.0	50.0/60.0	Hz	O	O	O	O	O	O	O	*8
01-13	Base Output Voltage of Motor 1	230V: 0.0~255.0	-	V	O	O	X	X	X	X	O	*8
		460V: 0.0~510.0	-									
		575V: 0.0~670.0	-									
		690V: 0.0~804.0	-									
01-14	Input Voltage Setting	230V: 155.0~255.0	-	V	O	O	O	O	O	O	O	*8
		460V: 310.0~510.0	-									
		575V: 540.0~670.0	-									
		690V: 648.0~804.0	-									
01-15	Torque Compensation Time	0~10000	200	ms	O	O	X	X	X	X	O	
01-16	Maximum Output Frequency of Motor 2	4.8~599.0	50.0/60.0	Hz	O	X	X	X	X	X	X	*8
01-17	Maximum Output Voltage of Motor 2	230V: 0.1~255.0	-	V	O	X	X	X	X	X	X	*8
		460V: 0.2~510.0	-									
		575V: 0.1~670.0	-									
		690V: 0.1~804.0	-									
01-18	Middle Output Frequency 2 of Motor 2	0.0~599.0	0.0	Hz	O	X	X	X	X	X	X	
01-19	Middle Output Voltage 2 of Motor 2	230V: 0.0~255.0	0.0	V	O	X	X	X	X	X	X	
		460V: 0.0~510.0										
		575V: 0.0~670.0										
		690V: 0.0~804.0										
01-20	Middle Output Frequency 1 of Motor 2	0.0~599.0	3.0	Hz	O	X	X	X	X	X	X	
01-21	Middle Output Voltage 1 of Motor 2	230V: 0.0~255.0	KVA	V	O	X	X	X	X	X	X	
		460V: 0.0~510.0										
		575V: 0.0~670.0										
		690V: 0.0~804.0										
01-22	Minimum Output Frequency of Motor 2	0.0~599.0	1.5	Hz	O	X	X	X	X	X	X	
01-23	Minimum Output Voltage of Motor 2	230V: 0.0~255.0	KVA	V	O	X	X	X	X	X	X	
		460V: 0.0~510.0										
		575V: 0.0~670.0										
		690V: 0.0~804.0										
01-24	Base Frequency	4.8~599.0	50.0/	Hz	O	X	X	X	X	X	X	*8

Group 01: V/F Control Parameters												
Code	Parameter Name	Setting Range	Default	Unit	Control mode						Attribute	
					V/F	V/F+PG	SLV	SV	PM SV	PM SLV		SLV2
	of Motor 2		60.0									
01-25	Base Output Voltage of Motor 2	200V: 0.0~255.0	-	V	O	X	X	X	X	X	X	*8
		400V: 0.0~510.0	-									
		575V: 0.0~670.0	-									
		690V: 0.0~804.0	-									
01-26	V/F Curve Selection of Motor 2	0~FF	F	-	O	X	X	X	X	X	X	*3

KVA: The default value of this parameter will be changed by different capacities of inverter.

Group 02: IM Motor Parameters												
Code	Parameter Name	Setting Range	Default	Unit	Control mode						Attribute	
					V/F	V/F+PG	SLV	SV	PM SV	PM SLV		SLV2
02-00	No-Load Current of Motor1	0.01~600.00	-	A	O	X	X	X	X	X	O	
02-01	Rated Current of Motor1	Modes of V/F, V/F+PG are 10%~200% of inverter's rated current. Modes of SLV, SV are 25%~200% of inverter's rated current.	-	A	O	O	O	O	X	X	O	
02-02	Reserved											
02-03	Rated Rotation Speed of Motor1	0~60000	-	Rpm	O	O	O	O	X	X	O	
02-04	Rated Voltage of Motor1	230V: 50.0~240.0	-	V	O	O	O	O	X	X	O	*8
		460V: 100.0~480.0	-									
		575V: 150.0~670.0	-									
		690V: 200.0~804.0	-									
02-05	Rated Power of Motor1	0.01~600.00	-	kW	O	O	O	O	X	X	O	
02-06	Rated Frequency of Motor1	4.8~599.0	50.0/ 60.0	Hz	O	O	O	O	X	X	O	*8
02-07	Poles of Motor 1	2~16(Even)	4	-	O	O	O	O	X	X	O	
02-08	Reserved											
02-09	Excitation Current of Motor 1	15%~70% of Motor Rated Current	-	%	X	X	O	O	X	X	X	
02-10	Core Saturation Coefficient 1 of Motor 1	1~100	-	%	X	X	O	O	X	X	X	
02-11	Core Saturation	1~100	-	%	X	X	O	O	X	X	X	

Group 02: IM Motor Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute	
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2		
	Coefficient 2 of Motor 1												
02-12	Core Saturation Coefficient 3 of Motor 1	80~300	-	%	X	X	O	O	X	X	X		
02-13	Core loss of Motor 1	0.0~15.0	-	%	O	O	X	X	X	X	O		
02-14	Reserved												
02-15	Resistance between Wires of Motor 1	0.001~60.000	-	Ω	O	O	O	O	X	X	O		
02-16	Reserved												
02-17													
02-18													
02-19	No-Load Voltage of Motor 1	230V: 50~240	-	V	X	X	O	O	X	X	X		
		460V: 100~480	-										
		575V: 420~600	-										
		690V: 504~720	-										
02-20	No-Load Current of Motor 2	0.01~600.00	-	A	O	X	X	X	X	X	X		
02-21	Rated Current of Motor 2	10%~200% of inverter's rated current	-	A	O	X	X	X	X	X	X		
02-22	Rated Rotation Speed of Motor 2	0~60000	-	Rpm	O	X	X	X	X	X	X		
02-23	Rated Voltage of Motor 2	230V: 50.0~240.0	-	V	O	X	X	X	X	X	X	*8	
		460V: 100.0~480.0	-										
		575V: 150.0~670.0	-										
		690V: 200.0~804.0	-										
02-24	Rated Power of Motor 2	0.01~600.00	-	kW	O	X	X	X	X	X	X		
02-25	Rated Frequency of Motor 2	4.8~599.0	50.0/ 60.0	Hz	O	X	X	X	X	X	X	*8	
02-26	Poles of Motor 2	2~16 (Even)	4	-	O	X	X	X	X	X	X		
02-27 ~ 02-31	Reserved												
02-32	Resistance between Wires of Motor 2	0.001~60.000	-	Ω	O	X	X	X	X	X	X		
02-33	Proportion of Motor 1 Leakage Inductance	0.1~15.0	3.7	%	X	X	O	O	X	X	X		
02-34	Motor 1 Slip Frequency	0.10~20.00	2.48	Hz	X	X	O	O	X	X	X		

Group 02: IM Motor Parameters												
Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
02-35 ~ 02-36	Reserved											
02-37	Motor Mechanical Loss	0.0~10.0	4.0	%	X	X	X	O	O	X	X	

Group 03: External Digital Input and Output Parameters												
Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
03-00	Multi-Function Terminal Function Setting-S1	0: 2-Wire Sequence (ON: Forward Run Command)	0	-	O	O	O	O	O	O	O	
		1: 2-Wire Sequence (ON: Reverse Run Command)			O	O	O	O	O	O		
		2: Multi-Speed/Position Setting Command 1			O	O	O	O	O	O		
		3: Multi-Speed/Position Setting Command 2			O	O	O	O	O	O		
		4: Multi-Speed/Position Setting Command 3			O	O	O	O	O	O		
		5: Multi-Speed/Position Setting Command 4			O	O	O	O	O	O		
		6: Forward Jog Run Command			O	O	O	O	O	O		
03-01	Multi-Function Terminal Function Setting-S2	7: Reverse Jog Run Command	1	-	O	O	O	O	O	O	O	
		8: UP Frequency Increasing Command			O	O	O	O	O	O		
		9: DOWN Frequency Decreasing Command			O	O	O	O	O	O		
		10: Acceleration/Deceleration Time Selection 1			O	O	O	O	O	O		
		11: Inhibit Acceleration/Deceleration Command			O	O	O	O	O	O		
		12: Main/ Alternative Run Switch Function			O	O	O	O	O	O		
		13: Main/ Alternative Frequency Switch Function			O	O	O	O	O	O		
03-02	Multi-Function Terminal	14: Emergency Stop (decelerate to zero and stop)	2	-	O	O	O	O	O	O	O	

Group 03: External Digital Input and Output Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	Attribute
03-03	Function Setting-S3	15: External Baseblock Command (rotation freely to stop)	3	-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		16: PID Control Disable			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		17: Fault Reset (RESET)			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		18: Reserved			-	-	-	-	-	-		
		19: Speed Search 1 (from the maximum frequency)			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
		20: Manual Energy Saving Function			<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
03-03	Multi-Function Terminal Function Setting-S4	21: PID Integral Reset	3	-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		22~23 : Reserved			-	-	-	-	-	-		
		24: PLC Input			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		25: External Fault			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		26: 3-Wire Sequence (Forward/Reverse command)			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		27: Local/ Remote Selection			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
03-04	Multi-Function Terminal Function Setting-S5	28: Remote Mode Selection	4	-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		29: Jog Frequency Selection			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		30: Acceleration/ Deceleration Time Selection 2			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		31: Inverter Overheating Warning			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		32: Sync Command			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		33: DC Braking			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
		34: Speed Search 2 (from the frequency command)			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
		35: Timing Function Input			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		36: PID Soft Start Disable			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
03-05	Multi-Function Terminal Function Setting-S6	37: Traversing Operation	17	-	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
		38: Upper Deviation of Traverse Operation			<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
		39: Lower Deviation of Traverse Operation			<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
		40: Switching between Motor 1/Motor 2			<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
		41: PID Sleep			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		42: PG Disable			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
		43: PG Integral Reset			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
03-06	Multi-Function	44: Mode Switching	29*	-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	

Group 03: External Digital Input and Output Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute	
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2		
	Terminal Function Setting-S7	between Speed and Torque											
		45: Negative Torque Command			X	X	X	O	O	X	X		
		46: Zero-Servo Command			X	X	X	O	O	X	X		
		47: Fire mode(Forced Operation mode)			O	O	O	O	O	O	O		
		48: KEB Acceleration			O	O	X	X	X	X	O		
		49: Parameters Writing Allowable			O	O	O	O	O	O	O		
		50: Unattended Start Protection (USP)			O	O	O	O	O	O	O		
03-07	Multi-Function Terminal Function Setting-S8	51: Mode Switching between Speed and Position	15	-	X	X	X	O	O	X	X		
		52: Multi Position Reference Enable			X	X	X	O	O	X	X		
		53: 2-Wire Self Holding Mode (Stop Command)			O	O	O	O	O	O	O		
		54~57: Reserved			-	-	-	-	-	-	-		
		58: Safety Function			O	O	O	O	O	O	O		
		59~61: Reserved			-	-	-	-	-	-	-		
		62: EPS Function			O	O	O	O	O	O	O		
		63~64: Reserved			-	-	-	-	-	-	-		
		65: Short-circuit braking			X	X	X	X	X	O	X	Note1	
		66: PID Disabled 2			O	O	O	O	O	O	O	Note4	
		67: Manual Pulse Generator Mode Switch			O	X	X	X	X	X	X	Note4	
		68: External Fault 2			O	O	O	O	O	O	O	Note4	
69: External Overload	O	O	O	O	O	O	O	Note4					
03-08	(S1~S8) DI Scan Time	0: Scan Time 4ms 1: Scan Time 8ms	1	-	O	O	O	O	O	O			
03-09	Multi-Function Terminal S1-S4 Type Selection	xxx0b: S1 A Contact xxx1b: S1 B Contact	0000b	-	O	O	O	O	O	O	O		
		xx0xb: S2 A Contact xx1xb: S2 B Contact											
		x0xxb: S3 A Contact x1xxb: S3 B Contact											
		0xxxb: S4 A Contact 1xxxb: S4 B Contact											
03-10	Multi-Function Terminal S5-S8 Type Selection	xxx0b: S5 A Contact xxx1b: S5 B Contact	0000b	-	O	O	O	O	O	O	O		
		xx0xb: S6 A Contact xx1xb: S6 B Contact											
		x0xxb: S7 A Contact x1xxb: S7 B Contact											
		0xxxb: S8 A Contact											

Group 03: External Digital Input and Output Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute				
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2					
03-11	Relay (R1A-R1C) Output	1xxxb: S8 B Contact	0 (Note4)	-												
		0: During Running			○	○	○	○	○	○	○					
		1: Fault Contact Output			○	○	○	○	○	○	○					
		2: Frequency Agree			○	○	○	○	○	○	○					
		3: Setting Frequency Agree			○	○	○	○	○	○	○					
		4: Frequency Detection 1 (≧03-13+03-14)			○	○	○	○	○	○	○					
		5: Frequency Detection 2 (≦ 03-13+03-14)			○	○	○	○	○	○	○					
		6: Automatic Restart			○	○	○	○	○	○	○					
		7~8: Reserved			-	-	-	-	-	-	-					
		9: Baseblock			○	○	○	○	○	○	○					
		10~11: Reserved			-	-	-	-	-	-	-					
		12: Over-Torque Detection			○	○	○	○	○	○	○					
		13: Current Agree			○	○	○	○	○	○	○					
		14: Mechanical Braking Control (03-17~18)			○	○	○	○	○	○	○					
		15~17: Reserved			-	-	-	-	-	-	-					
		18: PLC status			○	○	○	○	○	○	○					
		19: PLC Control Contact			○	○	○	○	○	○	○					
		03-12 (Note)			Relay (R2A-R2C) Output	20: Zero Speed	1 (Note4)	-	○	○	○	○	○	○	○	
						21: Inverter Ready			○	○	○	○	○	○	○	
22: Under Voltage Detection	○		○	○		○			○	○	○					
23: Source of Operation Command	○		○	○		○			○	○	○					
24: Source of Frequency Command	○		○	○		○			○	○	○					
25: Low Torque Detection	○		○	○		○			○	○	○					
26: Frequency Reference Missing	○		○	○		○			○	○	○					
27: Timing Function Output	○		○	○		○			○	○	○					
28: Traverse Operation UP Status	○		○	X		X			X	X	○					
29 : During Traverse Operation Status	○		○	X		X			X	X	○					
30 : Motor 2 Selection	○		○	○		○			○	○	○					
31: Zero Speed Servo Status (Position Mode)	X		X	X		○			○	X	X					
32: Communication Control Contacts	○		○	○		○			○	○	○					
33~36: Reserved	-		-	-		-			-	-	-					
37: PID Feedback Loss Detection Output	○	○	○	○	○	○	○									

Group 03: External Digital Input and Output Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
		38: Brake Release			X	X	O	O	O	X	X	
		39: Frequency Detection 1 (dedicated for Crane)			O	O	O	X	X	X	X	
		40: Frequency Output			O	O	O	O	O	X	X	
		41: Position Agree (Position Mode)			O	O	O	O	O	X	X	
		42~44: Reserved			-	-	-	-	-	-	-	
		45: PID sleep			O	O	O	O	O	O	O	
		46~49: Reserved			-	-	-	-	-	-	-	
		50: Frequency Detection 3 (\cong 03-44+03-45)			O	O	O	O	O	O	O	
		51: Frequency Detection 4 (\cong 03-44+03-45)			O	O	O	O	O	O	O	
		52: Frequency Detection 5 (\cong 03-46+03-47)			O	O	O	O	O	O	O	
		53: Frequency Detection 6 (\cong 03-46+03-47)			O	O	O	O	O	O	O	
		54: Turn on short-circuit braking			X	X	X	X	X	O	X	Note1
		57: Low Current Detection			O	O	O	O	O	O	O	Note2
		58: Frequency Deceleration Detection			O	O	O	O	O	O	O	Note4
		59: Over-Temperature Detection			O	O	O	O	O	O	O	Note4
03-13	Frequency Detection Level	0.0~599.0	0.0	Hz	O	O	O	O	O	O	O	
03-14	Frequency Detection Width	0.1~25.5	2.0	Hz	O	O	O	O	O	O	O	
03-15	Current Agree Level	0.1~999.9	0.1	A	O	O	O	O	O	O	O	
03-16	Delay Time of Current Agree Detection	0.1~10.0	0.1	s	O	O	O	O	O	O	O	
03-17	**Mechanical Braking Release Level	0.00~599.00	0.00	Hz	O	O	O	O	O	O	O	
03-18	**Mechanical Braking Level Set	0.00~599.00	0.00	Hz	O	O	O	O	O	O	O	
03-19	Relay (R1A-R2A) Type	xxx0b: R1 A Contact	0000b	-	O	O	O	O	O	O	O	
		xxx1b: R1 B Contact										
		xx0xb: R2 A Contact										
		xx1xb: R2 C Contact										
		0xxxb: R4 A Contact										*10
		1xxxb: R4 B Contact										
03-20	Relay (R4A-R4C) Output	Range and definition are the same as those of	2	-	O	O	O	O	O	O	O	*10

Group 03: External Digital Input and Output Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
		03-11, 03-12										
03-21	Photo-coupler Output Selection (DO2-DOG)	Range and definition are the same as those of 03-11, 03-12	3	-	○	○	○	○	○	○	○	*10
03-22	Reserved											
03-23	Reserved											
03-24	Reserved											
03-25	Reserved											
03-26	Reserved											
03-27	UP/DOWN Frequency Hold/Adjust Selection	0: Hold last set frequency when stopped	0	-	○	○	○	○	○	○	○	
		1: Set frequency to 0 when stopped										
		2: Allow speed changes from last set frequency when stopped										
		3: Refresh frequency at acceleration.										
03-28	Photo-coupler Output (DO1-DOG)	Range and definition are the same as those of 03-11, 03-12	0	-	○	○	○	○	○	○	○	
03-29	Photo-coupler Output Selection (DO1-DOG) (DO2-DOG)	xxx0b: Photo-coupler 1 A Contact xxx1b: Photo-coupler 1 B Contact	0000b	-	○	○	○	○	○	○	○	*10
		xx0xb: Photo-coupler 2 A Contact xx1xb: Photo-coupler 2 B Contact										
03-30	Selection of Pulse Input	0: General Pulse Input	0	-	○	○	○	○	○	○	○	
		1: PWM										
03-31	Scale of Pulse Input	Depending on the setting of 03-30 03-30 = 0: 50~32000Hz 03-30 = 1: 10~1000Hz	1000	Hz	○	○	○	○	○	○	○	*1
03-32	Pulse Input Gain	0.0~1000.0	100	%	○	○	○	○	○	○	○	*1
03-33	Pulse Input Bias	-100.0~100.0	0.0	%	○	○	○	○	○	○	○	*1
03-34	Filter Time of Pulse Input	0.00~2.00	0.1	Sec	○	○	○	○	○	○	○	*1

Group 03: External Digital Input and Output Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
03-35	Function Setting of Pulse Output	1: Frequency Command	2	-	O	O	O	O	O	O	O	*1
		2: Output Frequency										
		3: Output Frequency after Soft-Start										
		4: Motor Speed										
		5: PID Feedback										
		6: PID Input										
		7: PG Output (with PG card)										
03-36	Scale of Pulse Output	1~32000	1000	Hz	O	O	O	O	O	O	O	*1
03-37	Timer ON Delay (DIO)	0.0~6000.0	0.0	s	O	O	O	O	O	O	O	
03-38	Timer OFF Delay (DIO)	0.0~6000.0	0.0	s	O	O	O	O	O	O	O	
03-39	Reserved											
03-40	Up/Down Frequency Width Setting	0.00~5.00	0.00	Hz	O	O	O	O	O	O	O	
03-41	Torque Detection Level	0~150	10	%	X	X	O	O	O	X	X	
03-42	Brake Release Delay Time	0.00~65.00	0.00	s	X	X	O	O	O	X	X	
03-43	UP/DOWN Acceleration/Deceleration Selection	0: Acceleration/Deceleration Time 1	0	-	O	O	O	O	O	O	O	
		1: Acceleration/Deceleration Time 2										
03-44	Frequency Detection Level 2	0.0~599.0	0.0	Hz	O	O	O	O	O	O	O	
03-45	Frequency Detection Width 2	0.1~25.5	2.0	Hz	O	O	O	O	O	O	O	
03-46	Frequency Detection Level 3	0.0~599.0	0.0	Hz	O	O	O	O	O	O	O	
03-47	Frequency Detection Width 3	0.1~25.5	2.0	Hz	O	O	O	O	O	O	O	
03-48	Low Current Detection Level	0.0~999.9	0.1	A	O	O	O	O	O	O	O	Note2
03-49	Low Current Detection Delay Time	0.00~655.34 (Note4)	0.01	Sec	O	O	O	O	O	O	O	Note2
03-50	Frequency Detection Level 4	0.0~599.0	0.0	Hz	O	O	O	O	O	O	O	Note3
03-51	Frequency Detection Level 5	0.0~599.0	0.0	Hz	O	O	O	O	O	O	O	Note3
03-52	Frequency	0.0~599.0	0.0	Hz	O	O	O	O	O	O	O	Note3

Group 03: External Digital Input and Output Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
	Detection Level 6											
03-53	Current Agree Level 2	0.0~999.9	0.1	A	○	○	○	○	○	○	○	Note4

* 2-wire operation mode: 29; 3-wire operation mode: 26.

* If the maximum output frequency of motor is over 300HZ, the frequency resolution is changed to 0.1Hz

Note: For frame 1, the DO2 function is setting by 03-12.

Note: For standard UE type frame 1, the DO2 function is setting by 03-12.

Group 04: External Analog Input and Output Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute	
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2		
04-00	AI Input Signal Type	0: AI1:0~10V AI2:0~10V	1	-	○	○	○	○	○	○	○		
		1: AI1:0~10V AI2:4~20mA											
		2: AI1: -10~10V AI2: 0~10V											
		3: AI1: -10~10V AI2: 4~20mA											
		4: AI1: 4~20mA AI2: 0~10V											*9
		5: AI1: 4~20mA AI2: 4~20mA											*9
04-01	AI1 Signal Scanning and Filtering Time	0.00~2.00	0.03	s	○	○	○	○	○	○	○		
04-02	AI1 Gain	0.0~1000.0	100.0	%	○	○	○	○	○	○	○	*1	
04-03	AI1 Bias	-100.0~100.0	0	%	○	○	○	○	○	○	○	*1	
04-04	Negative AI	0: Disable	0	-	○	○	○	○	○	○	○	Note4	
		1: Enable											
04-05	AI2 Function Setting	0: Auxiliary Frequency	0	-	○	○	○	○	○	○	○		
		1: Frequency Reference Gain											
		2: Frequency Reference Bias											
		3: Output Voltage Bias											
		4: Coefficient of Acceleration and Deceleration Reduction											
		5: DC Braking Current											
		6: Over-Torque Detection Level											
		7: Stall Prevention Level During Running											

Group 04: External Analog Input and Output Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
		8: Frequency Lower Limit			O	O	O	O	O	O	O	
		9: Jump Frequency 4			O	O	O	O	O	O	O	
		10: Added to AI1			O	O	O	O	O	O	O	
		11: Positive torque limit			X	X	O	O	O	O	X	
		12: Negative torque limit			X	X	O	O	O	O	X	
		13: Regenerative Torque Limit			X	X	O	O	O	O	X	
		14: Positive / Negative Torque Limit			X	X	O	O	O	O	X	
		15: Torque Reference/ Torque Limit (in Speed Control)			X	X	X	O	O	X	X	
		16: Torque Compensation			X	X	O	O	O	X	X	
		17: PTC Overheat Protection			O	O	O	O	O	O	O	

Group 04: External Analog Input and Output Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SL V	SV	PM SV	PM SLV	SLV2	
04-06	AI2 Signal Scanning and Filtering Time	0.00~2.00	0.03	s	O	O	O	O	O	O	O	
04-07	AI2 Gain	0.0~1000.0	100.0	%	O	O	O	O	O	O	O	*1
04-08	AI2 Bias	-100.0~100.0	0	%	O	O	O	O	O	O	O	*1
04-09	AI Input Signal Type of I/O card	0: AI3:0~10V 1: AI3:-10~10V 2: AI3:4~20mA	0	-	O	O	O	O	O	O	O	*10
04-10	AI3 Function Setting	Range and definition are the same as those of 04-05	10	-	O	O	O	O	O	O	O	*10
04-11	AO1 Function Setting	0: Output Frequency	0	-	O	O	O	O	O	O	O	
		1: Frequency Command			O	O	O	O	O	O	O	
		2: Output Voltage			O	O	O	O	O	O	O	
		3: DC Voltage			O	O	O	O	O	O	O	
		4: Output Current			O	O	O	O	O	O	O	
		5: Output Power			O	O	O	O	O	O	O	
		6: Motor Speed			O	O	O	O	O	O	O	
		7: Output Power Factor			O	O	O	O	O	O	O	
		8: AI1 Input			O	O	O	O	O	O	O	
		9: AI2 Input			O	O	O	O	O	O	O	
		10: Torque Command			X	X	O	O	O	O	X	
		11: q-axis Current			X	X	O	O	O	O	X	
		12: d-axis Current			X	X	O	O	O	O	X	
		13: Speed Deviation			X	X	X	O	O	X	X	
		14: Reserved			-	-	-	-	-	-	-	
		15: ASR Output			X	O	X	O	O	X	X	
		16: Reserved			-	-	-	-	-	-	-	
		17: q-axis Voltage			X	X	O	O	O	O	X	
		18: d-axis Voltage			X	X	O	O	O	O	X	
		19~20: Reserved			-	-	-	-	-	-	-	
		21: PID Input			O	O	O	O	O	O	O	
		22: PID Output			O	O	O	O	O	O	O	
		23: PID Target Value			O	O	O	O	O	O	O	
		24: PID Feedback Value			O	O	O	O	O	O	O	
		25: Output Frequency of the Soft Starter			O	O	O	O	O	O	O	
		26: PG Feedback			X	O	X	O	O	X	X	
		27: Reserved			-	-	-	-	-	-	-	
		28: Communication control			O	O	O	O	O	O	O	
04-12	AO1 Gain	0.0~1000.0	100.0	%	O	O	O	O	O	O	O	*1
04-13	AO1 Bias	-100.0~100.0	0	%	O	O	O	O	O	O	O	*1

Group 04: External Analog Input and Output Parameters												
Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SL V	SV	PM SV	PM SLV	SLV2	
04-14	Reserved											
04-15	Reserved											
04-16	AO2 Function Setting	Range and definition are the same as those of 04-11.	3	-	○	○	○	○	○	○	○	
04-17	AO2 Gain	0.0~1000.0	100.0	%	○	○	○	○	○	○	○	*1
04-18	AO2 Bias	-100.0~100.0	0	%	○	○	○	○	○	-		*1
04-19	AO Output Signal Type	0: AO1 0~10V AO2 0~10V	0	-	○	○	○	○	○	○	○	
		1: AO1 0~10V AO2 4~20mA										
		2: AO1 4~20mA AO2 0~10V										
		3: AO1 4~20mA AO2 4~20mA										*9
04-20	Filter Time of AO Signal Scan	0.00~0.50	0.00	s	○	○	○	○	○	○	○	*1
04-21	AI3 Signal Scanning and Filtering Time	0.00~2.00	0.03	s	○	○	○	○	○	○	○	*10
04-22	AI3 Gain	0.0~1000.0	100.0	%	○	○	○	○	○	○	○	*10
04-23	AI3 Bias	-100.0~100.0	0	%	○	○	○	○	○	○	○	*10

Group 05: Multi-Speed Parameters												
Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
05-00	Acceleration and Deceleration Selection of Multi-Speed	0: Acceleration and deceleration time are set by 00-14 ~ 00-24	0	-	○	○	○	○	○	○	○	
		1: Acceleration and Deceleration Time are set by 05-17 ~ 05-48										
05-01	*Frequency Setting of Speed-Stage 0	0.00~599.00	5.00	Hz	○	○	○	○	○	○	○	*1
05-02	*Frequency Setting of Speed-Stage 1	0.00~599.00	5.00	Hz	○	○	○	○	○	○	○	*1
05-03	*Frequency Setting of Speed-Stage 2	0.00~599.00	10.00	Hz	○	○	○	○	○	○	○	*1
05-04	*Frequency Setting of Speed-Stage 3	0.00~599.00	20.00	Hz	○	○	○	○	○	○	○	*1
05-05	*Frequency Setting of Speed-Stage 4	0.00~599.00	30.00	Hz	○	○	○	○	○	○	○	*1

Group 05: Multi-Speed Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
05-06	*Frequency Setting of Speed-Stage 5	0.00~599.00	40.00	Hz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	*1
05-07	*Frequency Setting of Speed-Stage 6	0.00~599.00	50.00	Hz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	*1
05-08	*Frequency Setting of Speed-Stage 7	0.00~599.00	50.00	Hz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	*1
05-09	*Frequency Setting of Speed-Stage 8	0.00~599.00	5.00	Hz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	*1
05-10	*Frequency Setting of Speed-Stage 9	0.00~599.00	5.00	Hz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	*1
05-11	*Frequency Setting of Speed-Stage 10	0.00~599.00	5.00	Hz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	*1
05-12	*Frequency Setting of Speed-Stage 11	0.00~599.00	5.00	Hz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	*1
05-13	*Frequency Setting of Speed-Stage 12	0.00~599.00	5.00	Hz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	*1
05-14	*Frequency Setting of Speed-Stage 13	0.00~599.00	5.00	Hz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	*1
05-15	*Frequency Setting of Speed-Stage 14	0.00~599.00	5.00	Hz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	*1
05-16	*Frequency Setting of Speed-Stage 15	0.00~599.00	5.00	Hz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	*1
05-17	Acceleration Time Setting of Multi Speed 0	0.1~6000.0	10.0	s	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
05-18	Deceleration Time Setting of Multi Speed 0	0.1~6000.0	10.0	s	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
05-19	Acceleration Time Setting of Multi Speed 1	0.1~6000.0	10.0	s	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
05-20	Deceleration Time Setting of Multi Speed 1	0.1~6000.0	10.0	s	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
05-21	Acceleration Time Setting of Multi Speed 2	0.1~6000.0	10.0	s	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
05-22	Deceleration Time Setting of Multi Speed 2	0.1~6000.0	10.0	s	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
05-23	Acceleration Time Setting of Multi Speed 3	0.1~6000.0	10.0	s	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
05-24	Deceleration Time Setting of Multi Speed 3	0.1~6000.0	10.0	s	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
05-25	Acceleration Time Setting of Multi Speed 4	0.1~6000.0	10.0	s	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
05-26	Deceleration Time Setting of Multi Speed 4	0.1~6000.0	10.0	s	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

Group 05: Multi-Speed Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
05-27	Acceleration Time Setting of Multi Speed 5	0.1~6000.0	10.0	s	O	O	O	O	O	O	O	
05-28	Deceleration Time Setting of Multi Speed 5	0.1~6000.0	10.0	s	O	O	O	O	O	O	O	
05-29	Acceleration Time Setting of Multi Speed 6	0.1~6000.0	10.0	s	O	O	O	O	O	O	O	
05-30	Deceleration Time Setting of Multi Speed 6	0.1~6000.0	10.0	s	O	O	O	O	O	O	O	
05-31	Acceleration Time Setting of Multi Speed 7	0.1~6000.0	10.0	s	O	O	O	O	O	O	O	
05-32	Deceleration Time Setting of Multi Speed 7	0.1~6000.0	10.0	s	O	O	O	O	O	O	O	
05-33	Acceleration Time Setting of Multi Speed 8	0.1~6000.0	10.0	s	O	O	O	O	O	O	O	
05-34	Deceleration Time Setting of Multi Speed 8	0.1~6000.0	10.0	s	O	O	O	O	O	O	O	
05-35	Acceleration Time Setting of Multi Speed 9	0.1~6000.0	10.0	s	O	O	O	O	O	O	O	
05-36	Deceleration Time Setting of Multi Speed 9	0.1~6000.0	10.0	s	O	O	O	O	O	O	O	
05-37	Acceleration Time Setting of Multi Speed 10	0.1~6000.0	10.0	s	O	O	O	O	O	O	O	
05-38	Deceleration Time Setting of Multi Speed 10	0.1~6000.0	10.0	s	O	O	O	O	O	O	O	
05-39	Acceleration Time Setting of Multi Speed 11	0.1~6000.0	10.0	s	O	O	O	O	O	O	O	
05-40	Deceleration Time Setting of Multi Speed 11	0.1~6000.0	10.0	s	O	O	O	O	O	O	O	
05-41	Acceleration Time Setting of Multi Speed 12	0.1~6000.0	10.0	s	O	O	O	O	O	O	O	
05-42	Deceleration Time Setting of Multi Speed 12	0.1~6000.0	10.0	s	O	O	O	O	O	O	O	
05-43	Acceleration Time Setting of Multi Speed 13	0.1~6000.0	10.0	s	O	O	O	O	O	O	O	

Group 05: Multi-Speed Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
05-44	Deceleration Time Setting of Multi Speed 13	0.1~6000.0	10.0	s	○	○	○	○	○	○	○	
05-45	Acceleration Time Setting of Multi Speed 14	0.1~6000.0	10.0	s	○	○	○	○	○	○	○	
05-46	Deceleration Time Setting of Multi Speed 14	0.1~6000.0	10.0	s	○	○	○	○	○	○	○	
05-47	Acceleration Time Setting of Multi Speed 15	0.1~6000.0	10.0	s	○	○	○	○	○	○	○	
05-48	Deceleration Time Setting of Multi Speed 15	0.1~6000.0	10.0	s	○	○	○	○	○	○	○	

* If the maximum output frequency of motor is over 300HZ, the frequency resolution is changed to 0.1Hz

Group 06: Automatic Program Operation Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV 2	
06-00	Automatic Operation Mode Selection	0: Disable	0	-	○	○	○	X	X	X	○	
		1: Execute a single cycle operation mode. Restart speed is based on the previous stopped speed.										
		2: Execute continuous cycle operation mode. Restart speed is based on the previous stopped speed.										
		3: After the completion of a single cycle, the on-going operation speed is based on the speed of the last stage. Restart speed is based on the previous stopped speed.										
		4: Execute a single cycle operation mode. Restart speed will be based on the speed of stage 0.										
		5: Execute continuous cycle operation mode. Restart speed will be based on the speed of stage 0.										
		6: After the completion of a single cycle, the on-going operation speed is based on the speed of the last stage. Restart speed is based on the speed of stage 0.										
06-01	*Frequency Setting of Operation-Stage 1	0.00~599.00	5.00	Hz	○	○	○	X	X	X	○	*1
06-02	*Frequency Setting of Operation-Stage 2	0.00~599.00	10.00	Hz	○	○	○	X	X	X	○	*1
06-03	*Frequency Setting of Operation-Stage 3	0.00~599.00	20.00	Hz	○	○	○	X	X	X	○	*1
06-04	*Frequency Setting	0.00~599.00	30.00	Hz	○	○	○	X	X	X	○	*1

Group 06: Automatic Program Operation Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute	
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV 2		
	of Operation-Stage 4												
06-05	*Frequency Setting of Operation-Stage 5	0.00~599.00	40.00	Hz	O	O	O	X	X	X	O	*1	
06-06	*Frequency Setting of Operation-Stage 6	0.00~599.00	50.00	Hz	O	O	O	X	X	X	O	*1	
06-07	*Frequency Setting of Operation-Stage 7	0.00~599.00	50.00	Hz	O	O	O	X	X	X	O	*1	
06-08	*Frequency Setting of Operation-Stage 8	0.00~599.00	5.00	Hz	O	O	O	X	X	X	O	*1	
06-09	*Frequency Setting of Operation-Stage 9	0.00~599.00	5.00	Hz	O	O	O	X	X	X	O	*1	
06-10	*Frequency Setting of Operation-Stage 10	0.00~599.00	5.00	Hz	O	O	O	X	X	X	O	*1	
06-11	*Frequency Setting of Operation-Stage 11	0.00~599.00	5.00	Hz	O	O	O	X	X	X	O	*1	
06-12	*Frequency Setting of Operation-Stage 12	0.00~599.00	5.00	Hz	O	O	O	X	X	X	O	*1	
06-13	*Frequency Setting of Operation-Stage 13	0.00~599.00	5.00	Hz	O	O	O	X	X	X	O	*1	
06-14	*Frequency Setting of Operation-Stage 14	0.00~599.00	5.00	Hz	O	O	O	X	X	X	O	*1	
06-15	*Frequency Setting of Operation-Stage 15	0.00~599.00	5.00	Hz	O	O	O	X	X	X	O	*1	
06-16	Operation Time Setting of Speed-Stage 0	0.0~6000.0	0.0	s	O	O	O	X	X	X	O	*1	
06-17	Operation Time Setting of Speed-Stage 1	0.0~6000.0	0.0	s	O	O	O	X	X	X	O	*1	
06-18	Operation Time Setting of Speed-Stage 2	0.0~6000.0	0.0	s	O	O	O	X	X	X	O	*1	
06-19	Operation Time	0.0~6000.0	0.0	s	O	O	O	X	X	X	O	*1	

Group 06: Automatic Program Operation Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute	
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV 2		
	Setting of Speed-Stage 3												
06-20	Operation Time Setting of Speed-Stage 4	0.0~6000.0	0.0	s	O	O	O	X	X	X	O	*1	
06-21	Operation Time Setting of Speed-Stage 5	0.0~6000.0	0.0	s	O	O	O	X	X	X	O	*1	
06-22	Operation Time Setting of Speed-Stage 6	0.0~6000.0	0.0	s	O	O	O	X	X	X	O	*1	
06-23	Operation Time Setting of Speed-Stage 7	0.0~6000.0	0.0	s	O	O	O	X	X	X	O	*1	
06-24	Operation Time Setting of Speed-Stage 8	0.0~6000.0	0.0	s	O	O	O	X	X	X	O	*1	
06-25	Operation Time Setting of Speed-Stage 9	0.0~6000.0	0.0	s	O	O	O	X	X	X	O	*1	
06-26	Operation Time Setting of Speed-Stage 10	0.0~6000.0	0.0	s	O	O	O	X	X	X	O	*1	
06-27	Operation Time Setting of Speed-Stage 11	0.0~6000.0	0.0	s	O	O	O	X	X	X	O	*1	
06-28	Operation Time Setting of Speed-Stage 12	0.0~6000.0	0.0	s	O	O	O	X	X	X	O	*1	
06-29	Operation Time Setting of Speed-Stage 13	0.0~6000.0	0.0	s	O	O	O	X	X	X	O	*1	
06-30	Operation Time Setting of Speed-Stage 14	0.0~6000.0	0.0	s	O	O	O	X	X	X	O	*1	
06-31	Operation Time Setting of Speed-Stage 15	0.0~6000.0	0.0	s	O	O	O	X	X	X	O	*1	
06-32	Operation Direction Selection of Speed-Stage 0	0: Stop 1: Forward 2: Reverse	0	-	O	O	O	X	X	X	O		
06-33	Operation Direction Selection of Speed-Stage 1	0: Stop 1: Forward 2: Reverse	0	-	O	O	O	X	X	X	O		
06-34	Operation Direction Selection of Speed-Stage 2	0: Stop 1: Forward 2: Reverse	0	-	O	O	O	X	X	X	O		
06-35	Operation Direction Selection of Speed-Stage 3	0: Stop 1: Forward 2: Reverse	0	-	O	O	O	X	X	X	O		
06-36	Operation	0: Stop 1: Forward	0	-	O	O	O	X	X	X	O		

Group 06: Automatic Program Operation Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute	
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV 2		
	Direction Selection of Speed-Stage 4	2: Reverse											
06-37	Operation Direction Selection of Speed-Stage 5	0: Stop 1: Forward 2: Reverse	0	-	○	○	○	X	X	X	○		
06-38	Operation Direction Selection of Speed-Stage 6	0: Stop 1: Forward 2: Reverse	0	-	○	○	○	X	X	X	○		
06-39	Operation Direction Selection of Speed-Stage 7	0: Stop 1: Forward 2: Reverse	0	-	○	○	○	X	X	X	○		
06-40	Operation Direction Selection of Speed-Stage 8	0: Stop 1: Forward 2: Reverse	0	-	○	○	○	X	X	X	○		
06-41	Operation Direction Selection of Speed-Stage 9	0: Stop 1: Forward 2: Reverse	0	-	○	○	○	X	X	X	○		
06-42	Operation Direction Selection of Speed-Stage 10	0: Stop 1: Forward 2: Reverse	0	-	○	○	○	X	X	X	○		
06-43	Operation Direction Selection of Speed-Stage 11	0: Stop 1: Forward 2: Reverse	0	-	○	○	○	X	X	X	○		
06-44	Operation Direction Selection of Speed-Stage 12	0: Stop 1: Forward 2: Reverse	0	-	○	○	○	X	X	X	○		
06-45	Operation Direction Selection of Speed-Stage 13	0: Stop 1: Forward 2: Reverse	0	-	○	○	○	X	X	X	○		
06-46	Operation Direction Selection of Speed-Stage 14	0: Stop 1: Forward 2: Reverse	0	-	○	○	○	X	X	X	○		
06-47	Operation Direction Selection of Speed-Stage 15	0: Stop 1: Forward 2: Reverse	0	-	○	○	○	X	X	X	○		

* If the maximum output frequency of motor is over 300HZ, the frequency resolution is changed to 0.1Hz

Group 07: Start /Stop Parameters												
Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
07-00	Momentary Power Loss/Fault Restart Selection	0: Disable	0	-	O	O	O	O	X	O	O	
		1: Enable										
07-01	Fault Auto-Restart Time	0~7200	0	s	O	O	O	O	O	O	O	
07-02	Number of Fault Auto-Restart Attempts	0~10	0	-	O	O	O	O	O	O	O	
07-03	Reserved											
07-04	Direct Start at Power on	0: When the external run command is enabled, direct start at power up	1	-	O	O	O	O	O	O	O	
		1: When the external run command is enabled, unable to direct start at power-up.										
07-05	Delay of Direct Start at Power on	1.0~300.0	3.5	s	O	O	O	O	O	O	O	
07-06	DC Injection Braking Starting Frequency	0.0~10.0	0.5	Hz	O	O	O	O	O	O	O	
07-07	DC Injection Braking Current	0~100	50	%	O	O	O	X	X	O	O	
07-08	DC Injection Braking Time at Stop	0.00~100.00	0.50	s	O	O	O	O	O	O	O	
07-09	Stop Mode Selection	0: Deceleration to Stop	0	-	O	O	O	O	O	O	O	
		1: Coast to Stop							O	O		
		2: DC Braking Stop in All Fields							X	X		
		3: Coast to Stop with Timer							O	O		
07-10 ~ 07-12	Reserved											
07-13	Low Voltage Detection Level	230V: 150~300	190	V	O	O	O	O	O	O	O	
		460V: 250~600	380									
		575V: 500~600	546									
		690V: 500~600	546									
07-14	Pre-excitation Time	0.00~10.00	2.00	s	X	X	O	X	X	X	X	
07-15	Pre-excitation Level	50~200	100	%	X	X	O	X	X	X	X	
07-16	DC Injection Braking Time at Start	0.00~100.00	0.00	s	O	O	O	O	O	O	O	
07-17	Reserved											
07-18	Minimum Base block Time	0.1~5.0	-	Sec	O	O	O	O	X	O	O	
07-19	Direction-Detection Speed Search	0~100	50	%	O	X	O	X	X	X	O	

Group 07: Start /Stop Parameters												
Code	Parameter Name	Setting Range	Default	Unit	Control mode						Attribute	
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV		SLV2
	Operating Current											
07-20	Speed Search Operating Current	0~100	20	%	O	X	O	X	X	X	O	
07-21	Integral Time of Speed Searching	0.1~10.0	2.0	Sec	O	X	O	X	X	X	O	
07-22	Delay Time of Speed Searching	0.0~20.0	0.2	Sec	O	O	O	O	O	X	O	
07-23	Voltage Recovery Time	0.1~5.0	2.0	Sec	O	O	O	X	X	X	O	
07-24	Direction-Detection Speed Search Selection	0: Disable	1	-	O	O	O	X	X	X	O	
		1: Enable										
07-25	Low Voltage Detection Time	0.00~1.00	0.02	Sec	O	O	O	O	O	O	O	
07-26	Start-up Mode Selection of SLV Coast to Stop	0: Start with speed search	0	-	X	X	O	X	X	X	X	
		1: Normal start										
07-27	Start Selection after Fault during SLV Mode	0: Start with speed search	0	-	X	X	O	X	X	X	X	
		1: Normal start										
07-28	Start after External Base Block	0: Start with speed search	0	-	O	X	O	X	X	X	O	
		1: Normal start										
07-29	Run Command Selection at the Action of DC Braking	0: Not Allowable to Run	0	-	O	O	X	X	X	X	X	
		1: Allowable to Run										
07-30	Low Voltage Level Selection	0: Disable	0	-	O	O	O	O	O	O	O	
		1: Enable										
07-31	**Low Voltage Run Frequency	0.00~599.00	10.00	Hz	X	X	X	O	O	X	X	
07-32	Speed Search Mode Selection	0: Disable	0	-	O	O	O	O	X	O	X	
		1: Mode1: Execute a Speed Search at Power On										
		2: Execute a Speed Search each time										
07-33	Start Frequency of Speed Search Selection	0: Maximum Output Frequency of Motor	0	-	O	O	O	O	X	X	X	
		1: Frequency Command										
07-34	Short-circuit braking time at Start	0.00~100.00	0.00	Sec	X	X	X	X	X	O	X	Note1
07-35	Short-circuit braking time at Stop	0.00~100.00	0.50	Sec	X	X	X	X	X	O	X	Note1
07-36	Short-circuit braking current	0.0~200.0	100.0	%	X	X	X	X	X	O	X	Note1

Group 07: Start /Stop Parameters												
Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
	limited											
07-37 ~ 07-41	Reserved											
07-42	Voltage Limit Gain	0.0~50.0	0	%	X	X	O	O	X	X	X	Note2
07-43	Short-circuit Braking Time of PM Speed Search	0.00~100.00	0.00	Sec	X	X	X	X	X	O	X	Note3
07-44	DC Braking Time of PM Speed Search	0.00~100.00	0.00	Sec	X	X	X	X	X	O	X	Note3
07-45	STP2 Function Selection	0: STP2 Enable 1: STP2 Disable	0	-	O	O	O	O	O	O	O	Note4
07-46	DC Injection Current Limit	0~150	100	%	O	X	X	X	X	X	X	Note5

***07-13 Low Voltage Detection Level, it is enable when 07-30 Low Voltage Level Selection set 0 (Enable) and lower frequency limit set to 250V.This application is for Emergency power supply (EPS)**

****If the maximum output frequency of motor is over 300HZ, the frequency resolution is changed to 0.1Hz**

Group 08: Protection Parameters												
Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
08-00	Stall Prevention Function	xxx0b: Stall prevention is enabled in acceleration.	0000b	-	O	O	O	O	O	O	O	
		xxx1b: Stall prevention is disabled in acceleration.										
		xx0xb: Stall prevention is enabled in deceleration.										
		xx1xb: Stall prevention is disabled in deceleration.										
		x0xxb: Stall prevention is enabled in operation										
		x1xxb: Stall prevention is disabled in operation										
		0xxxb: Stall prevention in operation is based on deceleration time of speed-stage 1.										

Group 08: Protection Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute	
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2		
		1xxb: Stall prevention in operation is based on deceleration time of speed-stage 2.											
08-01	Stall Prevention Level in Acceleration	20~200	HD:150 ND:120	%	○	○	○	X	X	○	○		
08-02	Stall Prevention Level in Deceleration	230V: 330V~410V	385V	V	○	○	○	○	X	○	○		
		460V: 660V~820V	770V										
		575V: 900~1000	950V										
		690V: 1080~1200	1140V										
08-03	Stall Prevention Level in Operation	30~200	HD:160 ND:120	%	○	○	X	X	X	X	○		
08-04	Reserved												
08-05	Selection for Motor Overload Protection (OL1)	xxx0b: Overload Protection is disabled.	0101b	-	○	○	○	○	○	○	○	○	
		xxx1b: Overload Protection is enabled.											
		xx0xb: Cold Start of Motor Overload											
		xx1xb: Hot Start of Motor Overload											
		x0xb: Standard Motor											
		x1xb: Inverter Duty Motor											
		0xxb: Reserved											
		1xxb: Reserved											
08-06	Start-up Mode of Overload Protection Operation (OL1)	0: Stop Output after Overload Protection	0	-	○	○	○	○	○	○	○		
		1: Continuous Operation after Overload Protection.											
08-07	Motor Overload (OL1) Protection Level	0: Motor Overload (OL1) Protection 0	0	-	○	○	○	○	○	○	○	○	Note2
		1: Motor Overload (OL1) Protection 1											
		2: Motor Overload (OL1) Protection 2											
08-08	Automatic Voltage Regulation (AVR)	0: Enable	0	-	○	○	○	○	○	○	○		
		1: Disable											
08-09	Selection of Input	0: Disable	0	-	○	○	○	○	○	○	○		

Group 08: Protection Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute	
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2		
	Phase Loss Protection	1: Enable											
08-10	Selection of Output Phase Loss Protection	0: Disable	0	-	○	○	○	○	○	○	○		
		1: Enable											
08-11 08-12	Reserved												
08-13	Selection of Over-Torque Detection	0: Over-Torque Detection is Disabled.	0	-	○	○	○	○	○	○	○	○	
		1: Start to Detect when Reaching the Set Frequency.											
		2: Start to Detect when the Operation is Begun.											
08-14	Selection of Over-Torque Operation	0: Deceleration to Stop when Over Torque is Detected.	0	-	○	○	○	○	○	○	○	○	
		1: Display Warning when Over Torque is Detected. Go on Operation.											
		2: Coast to Stop when Over Torque is Detected											
08-15	Level of Over-Torque Detection	0~300	150	%	○	○	○	○	○	○	○	○	
08-16	Time of Over-Torque Detection	0.0~10.0	0.1	Sec	○	○	○	○	○	○	○	○	
08-17	Selection of Low-Torque Detection	0: Low-Torque Detection is Disabled.	0	-	○	○	○	○	○	○	○	○	
		1: Start to Detect when Reaching the Set Frequency.											
		2: Start to Detect when the Operation is Begun.											
08-18	Selection of Low-Torque Operation	0: Deceleration to Stop when Low Torque is Detected.	0	-	○	○	○	○	○	○	○	○	
		1: Display Warning when Low Torque is Detected. Go on Operation.											
		2: Coast to Stop when Low Torque is Detected											
08-19	Level of Low-Torque	0~300	30	%	○	○	○	○	○	○	○	○	

Group 08: Protection Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
	Detection											
08-20	Time of Low-Torque Detection	0.0~10.0	0.1	Sec	O	O	O	O	O	O	O	
08-21	Limit of Stall Prevention in Acc over Base Speed	1~100	50	%	O	O	O	X	X	O	O	
08-22	Stall Prevention Detection Time in Operation	2~100	100	ms	O	O	O	X	X	O	O	
08-23	Ground Fault (GF) Selection	0: Disable	0	-	O	O	O	O	O	O	O	
		1: Enable										
08-24	External Fault Operation Selection	0: Deceleration to Stop	0	-	O	O	O	O	O	O	O	
		1: Coast to Stop										
		2: Continuous Operation										
08-25	Detection Selection of External Fault	0: Immediately Detect when the Power is Supplied.	0	-	O	O	O	O	O	O	O	
		1: Start to Detect when the Operation is Started.										
08-26 ~ 08-29	Reserved											
08-30	Run Permissive Function Selection	0: Deceleration to Stop	0	-	O	O	O	O	O	O	O	
		1: Coast to Stop										
08-31 ~ 08-34	Reserved											
08-35	Motor Overheating Fault Selection	0: Disable	0	-	O	O	O	O	O	O	O	
		1: Deceleration to Stop										
		2: Free Run to top										
		3: Continue Running										
08-36	PTC Input Filter Time Constant	0.00 ~ 5.00	2.00	Sec	O	O	O	O	O	O	O	
08-37	Fan Control Function	0: Start in operation	0		O	O	O	O	O	O	O	
		1: Permanent Start										
		2: Start in high temperature (Note)										
08-38	Delay Time of Fan Off	0~600	60	s	O	O	O	O	O	O	O	
08-39	Delay Time of Motor Overheat Protection	1~300	60	sec	O	O	O	O	O	O	O	
08-40	Motor2	20~200	HD:150	%	O	O	O	X	X	O	O	

Group 08: Protection Parameters												
Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F+PG	SLV	SV	PM SV	PM SLV	SLV2	
	Acceleration Stall Prevention Level		ND:120									
08-41	Motor2 Acceleration Stall Prevention Limit	1~100	50	%	O	O	O	X	X	O	O	
08-42	PTC Protection Level	0.1~10.0V	0.7	V	O	O	O	O	O	O	O	
08-43	PTC Restart Level	0.1~10.0V	0.3	V	O	O	O	O	O	O	O	
08-44	PTC Warning Level	0.1~10.0V	0.5	V	O	O	O	O	O	O	O	
08-45	Reserved											
08-46	Temperature Agree Level	0~254°C	0	° C	O	O	O	O	O	O	O	Note4
08-47	Temperature Reset Level	0~254°C	0	° C	O	O	O	O	O	O	O	Note4
08-48	Selection of Fire Mode	0: Disable 1: Enable	0	-	O	O	O	O	O	O	O	Note4
08-49	Multi-Function Input Terminal Status of Fire Mode	0 : Reset after Power Off 1 : Reset after Terminal Removed	0	-	O	O	O	O	O	O	O	Note4
08-50	Multi-Function Terminal Status of Fire Mode	XXX0b: S6 A contact XXX1b: S6 B contact	0000b	-	O	O	O	O	O	O	O	Note4
08-51	Motor Speed Setting Source of Fire Mode	0 : Fire Mode Speed (08-52) 1 : PID Control 2 : AI2	0	-	O	O	O	O	O	O	O	Note4
08-52	Motor Speed of Fire Mode	0.00~100.00	100.00	%	O	O	O	O	O	O	O	Note4
08-53	PID Detection Level of Fire Mode	0~100	0	%	O	O	O	O	O	O	O	Note4
08-54	Delay Time of Fire Mode PID Loss	0.0~10.0	1.0	s	O	O	O	O	O	O	O	Note4
08-55	PID Feedback Loss Detection Selection of Fire Mode	0 : Keep Running 1 : Fire Mode Speed (08-52) 2 : Maximum Output Frequency (01-02)	1	-	O	O	O	O	O	O	O	Note4
08-56	Detection Level of Fire Mode AI2 Signal	0.0~100.0	80.0	%	O	O	O	O	O	O	O	Note4
08-57	Delay Time of Fire	0.0~10.0	1.0	s	O	O	O	O	O	O	O	Note4

Group 08: Protection Parameters												
Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
	Mode AI2 Signal Loss											
08-58	Selection of Fire Mode AI2 Signal Loss	0: Keep Running 1: Fire Mode Speed (08-52) 2: Maximum Output Frequency (01-02)	1	-	○	○	○	○	○	○	○	Note4
08-59	Fire Mode Motor Direction	0: Forward 1: Reverse	0	-	○	○	○	○	○	○	○	Note4
08-60	Fire Mode Password	00000~65534	0	-	○	○	○	○	○	○	○	Note4

Note: Models of 230V 50HP and 460V 100HP and above don't have this function.

Group 09: Communication Parameters												
Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
09-00	INV Communication Station Address	1~31	1	-	○	○	○	○	○	○	○	*3
09-01	Communication Mode Selection	0: MODBUS	0		○	○	○	○	○	○	○	*3
09-02	Baud Rate Setting (bps)	0: 1200	4	-	○	○	○	○	○	○	○	*3
		1: 2400										
		2: 4800										
		3: 9600										
		4: 19200										
5: 38400												
09-03	Stop Bit Selection	0: 1 Stop Bit	0	-	○	○	○	○	○	○	○	*3
		1: 2 Stop Bit										
09-04	Parity Selection	0: No Parity	0	-	○	○	○	○	○	○	○	*3
		1: Even Bit										
		2: Odd Bit										
09-05	Communication Data Bit Selection	0: 8 Bit Data	0	-	○	○	○	○	○	○	○	*3
		1: 7 Bit Data										
09-06	Communication Error Detection Time	0.0~25.5	0.0	S	○	○	○	○	○	○	○	*3
09-07	Fault Stop Selection	0: Deceleration to Stop Based on Deceleration Time 1 when Communication Fault Occurs.	3	-	○	○	○	○	○	○	○	*3
		1: Coast to Stop when Communication Fault										

Group 09: Communication Parameters												
Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
		Occurs.										
		2: Deceleration to Stop Based on Deceleration Time 2 when Communication Fault Occurs.										
		3: Keep Operating when Communication Fault Occurs.										
09-08	Comm. Fault Tolerance Count	1~20	1	-	○	○	○	○	○	○	○	*3
09-09	Waiting Time	5~65	5	ms	○	○	○	○	○	○	○	*3
09-10	Reserved											

* Parameter 09 is not affected by parameter 13-08 (Restore Factory Setting)

Group 10: PID Parameters												
Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
10-00	PID Target Value Source Setting	1: AI1 given	1	-	○	○	○	○	○	○	○	
		2: AI2 given										
		3: PI given										
		4:10-02/12-28 given										
		5: Reserved										
		6: Reserved										
10-01	PID Feedback Value Source Setting	1: AI1 given	2	-	○	○	○	○	○	○	○	
		2: AI2 given										
		3: PI given										
10-02	PID Target Value	0.00~100.00	0.00	%	○	○	○	○	○	○	○	*1
10-03	PID Control Mode	xxx0b: PID Disable	0000b	-	○	○	○	○	○	○	○	
		xxx1b: PID Enable										
		xx0xb: PID Positive Characteristic										
		xx1xb: PID Negative Characteristic										
		x0xxb: PID Error Value of D Control										
		x1xxb: PID Feedback Value of D Ctrl										
		0xxxb: PID Output										
		1xxxb: PID Output + Frequency Command										
10-04	Feedback Gain	0.01~10.00	1.00	-	○	○	○	○	○	○	○	*1
10-05	Proportional Gain (P)	0.00~10.00	1.00	-	○	○	○	○	○	○	○	*1
10-06	Integral Time (I)	0.00~100.00	1.00	s	○	○	○	○	○	○	○	*1

Group 10: PID Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
10-07	Differential Time (D)	0.00~10.00	0.00	s	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	*1
10-08	AI1 Frequency Limit	0.00~599.00	0	Hz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Note2
10-09	PID Bias	-100.0~100.0	0	%	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	*1
10-10	PID Output Delay Time	0.00~10.00	0.00	s	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	*1
10-11	PID Feedback Loss Detection Selection	0: Disable	0	-	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		1: Warning										
		2: Fault										
10-12	PID Feedback Loss Det. Lev.	0~100	0	%	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
10-13	PID Feedback Loss Det. Time	0.0~10.0	1.0	s	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
10-14	PID Integral Limit	0.0~100.0	100.0	%	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	*1
10-15	PID Trim Mode	0~2	0	-	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Note2
10-16	PID Trim Scale	0~100	100	%	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Note2
10-17	*Start Frequency of PID Sleep	0.00~599.00	0.00	Hz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
10-18	Delay Time of PID Sleep	0.0~255.5	0.0	s	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
10-19	*Frequency of PID Waking up	0.00~599.00	0.00	Hz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
10-20	Delay Time of PID Waking up	0.0~255.5	0.0	s	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
10-21 ~ 10-22	Reserved											
10-23	PID Output Limit	0.00~100.0	100.0	%	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	*1
10-24	PID Output Gain	0.0~25.0	1.0	-	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
10-25	PID Reversal Output Selection	0: No Allowing Reversal Output	0	-	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		1: Allow Reversal Output										
10-26	PID Target Acceleration/Deceleration Time	0.0~25.5	0.0	s	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
10-27	PID Feedback Display Bias	0~9999	0	-	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
10-28	Reserved											
10-29	PID Sleep Selection	0: Disable	1	-	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		1: Enable										
		2: set by DI										
10-30	Upper Limit of PID Target	0.0 ~ 100.0	100.0	%	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
10-31	Lower Limit of PID Target	0.0 ~ 100.0	0.0	%	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
10-32	Reserved											
10-33	Maximum Value of	1 ~ 10000	999	-	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

Group 10: PID Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
	PID Feedback											
10-34	PID Decimal Width	0 ~ 4	1		○	○	○	○	○	○	○	
10-35	PID Unit	0: %	0		○	○	○	○	○	○	○	*7
		1: FPM										
		2: CFM										
		3: SPI										
		4: GPH										
		5: GPM										
		6: IN										
		7: FT										
		8: /s										
		9: /m										
		10: /h										
		11: °F										
		12: inW										
		13: HP										
		14: m/s										
		15: MPM										
		16: CMM										
		17: W										
		18: KW										
		19: m										
		20: °C										
		21: RPM										
		22: Bar										
		23: Pa										
		24: KPa										
10-36	Proportional Gain 2 (P)	0.00~10.00	3.00	-	○	○	○	○	○	○	○	Note2
10-37	Integral Time 2 (I)	0.00~100.00	0.50	Sec	○	○	○	○	○	○	○	Note2
10-38	Differential Time 2 (D)	0.00~10.00	0.00	Sec	○	○	○	○	○	○	○	Note2
10-39	*Output Frequency Setting of PID Disconnection	00.00~599.00	30.00	Hz	○	○	○	○	○	○	○	
10-40	Selection of PID Sleep Compensation Frequency	0: Disable	0		○	○	○	○	○	○	○	
		1: Enable										
10-41	PID Mode Switch	0: General PID	0	-	○	○	○	○	○	○	○	Note2
		1: D Type PID										
10-42	Reserved											

Group 10: PID Parameters												
Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
~ 10-46												
10-47	Proportional Gain 3(P)	0.00~10.00	1.00		○	○	○	○	○	○	○	Note4
10-48	Integral Time 3(I)	0.00~100.00	1.00	Sec	○	○	○	○	○	○	○	Note4
10-49	Differential Time 3(D)	0.00~10.00	0.00	Sec	○	○	○	○	○	○	○	Note4

* If the maximum output frequency of motor is over 300HZ, the frequency resolution is changed to 0.1Hz

Group 11: Auxiliary Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute	
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2		
11-00	Direction Lock Selection	0: Allow Forward and Reverse Rotation	0	-	O	O	O	O	O	O	O	O	
		1: Only Allow Forward Rotation											
		2: Only Allow Reverse Rotation											
11-01	Carrier frequency	0: Carrier Output Frequency Tuning 1~16: 1~16KHz	*	-	O	O	O	O	O	O	O	O	*1
11-02	Soft PWM Function Selection	0: Disable	0	-	O	O	O	O	O	O	O	O	
		1: Soft PWM 1 enables											
		2: Soft PWM 2 enables											
11-03	Automatic carrier lowering selection	0: Disable	0	-	O	O	X	X	X	X	O	O	
		1: Enable											
11-04	S-curve Time Setting at the Start of Acceleration	0.00~2.50	0.20	s	O	O	O	O	O	O	O	O	
11-05	S-curve Time Setting at the Stop of Acceleration	0.00~2.50	0.20	s	O	O	O	O	O	O	O	O	
11-06	S-curve Time Setting at the Start of Deceleration	0.00~2.50	0.20	s	O	O	O	O	O	O	O	O	
11-07	S-curve Time Setting at the Stop of Deceleration	0.00~2.50	0.20	s	O	O	O	O	O	O	O	O	
11-08	Jump Frequency 1	0.0~599.0	0.0	Hz	O	O	O	O	O	O	O	O	
11-09	Jump Frequency 2	0.0~599.0	0.0	Hz	O	O	O	O	O	O	O	O	
11-10	Jump Frequency 3	0.0~599.0	0.0	Hz	O	O	O	O	O	O	O	O	
11-11	Jump Frequency Width	0.0~25.5	1.0	Hz	O	O	O	O	O	O	O	O	
11-12	Manual Energy Saving Gain	0~100	80	%	O	O	X	X	X	X	X	X	
11-13	Automatic Return Time	0~120	60	Sec	O	O	O	O	O	O	O	O	*1
11-14 ~ 11-17	Reserved												
11-18	Manual Energy Saving Frequency	0.0~599.0	0.00	Hz	O	O	X	X	X	X	X	X	
11-19	Automatic Energy Saving Function	0: Automatic energy saving is disabled.	0	-	O	X	X	X	X	X	X	X	
		1: Automatic energy saving is enabled.											
11-20	Filter Time of Automatic Energy Saving	0~200	140	ms	O	X	X	X	X	X	X	X	
11-21	Voltage Upper Limit of Energy	0~100	100	%	O	X	X	X	X	X	X	X	

Group 11: Auxiliary Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute	
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2		
	Saving Tuning												
11-22	Adjustment Time of Automatic Energy Saving	0~5000	20	ms	O	X	X	X	X	X	X	X	*1
11-23	Detection Level of Automatic Energy Saving	0~100	10	%	O	X	X	X	X	X	X	X	
11-24	Coefficient of Automatic Energy Saving	0.00~655.34 (Note4)	-	-	O	X	X	X	X	X	X	X	
11-25 ~ 11-27	Reserved												
11-28	Frequency Gain of Over Voltage Prevention 2	1~200	100	%	O	O	X	X	X	X	X	X	
11-29	Auto De-rating Selection	0: Disable	0	-	O	X	X	X	X	X	X	O	
		1: Enable											
11-30	Variable Carrier Frequency Max. Limit	2~16	-	KHz	O	O	X	X	X	X	O		
11-31	Variable Carrier Frequency Min. Limit	1~16	-	KHz	O	O	X	X	X	X	O		
11-32	Variable Carrier Frequency Proportional Gain	00~99	00	-	O	O	X	X	X	X	O		
11-33	DC Voltage Filter Rise Amount	0.1~10.0	0.1	Vdc	O	O	X	X	X	X	X	X	*1
11-34	DC Voltage Filter Fall Amount	0.1~10.0	5.0	Vdc	O	O	X	X	X	X	X	X	*1
11-35	DC Voltage Filter Dead band Level	0.0~99.0	10.0	Vdc	O	O	X	X	X	X	X	X	*1
11-36	Frequency Gain of OV Prevention	0.000~1.000	0.050	-	O	O	X	X	X	X	X	X	*1
11-37	**Frequency Limit of OV Prevention	0.00~599.00	5.00	Hz	O	O	X	X	X	X	X	X	
11-38	Deceleration Start Voltage of OV Prevention	230V: 200~400V	300	V	O	O	X	X	X	X	X	X	
		460V: 400~800V	700										
		575V: 500~1000V	900										
		690V: 600~1200V	1080										
11-39	Deceleration Stop Voltage of OV Prevention	230V: 300~400V	350	V	O	O	X	X	X	X	X	X	
		460V: 600~800V	750										
		575V: 500~1000V	950										
		690V: 600~1200V	1140										
11-40	OV Prevention Selection	0: Disable	0	-	O	O	X	X	X	X	X	X	
		1: OV Prevention Mode 1											
		2: OV Prevention Mode 2											
		3: OV Prevention Mode 3											

Group 11: Auxiliary Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute	
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2		
11-41	Selection of Reference Frequency Disappearance Detection	0: Decelerate to Stop when Reference Frequency Disappears	0	-	O	O	O	O	O	O	O	O	
		1: Operation is set by Parameter 11-42 when Reference Frequency Disappears											
11-42	Disappearance Level of Reference Frequency	0.0~100.0	80.0	%	O	O	O	O	O	O	O	O	
11-43	Hold Frequency at Start	0.0~599.0	0.0	Hz	O	O	O	O	O	O	O	O	
11-44	Frequency Hold Time at Start	0.0~10.0	0.0	s	O	O	O	O	O	O	O	O	
11-45	Hold Frequency at Stop	0.0~599.0	0.0	Hz	O	O	O	O	O	O	O	O	
11-46	Frequency Hold Time at Stop	0.0~10.0	0.0	s	O	O	O	O	O	O	O	O	
11-47	KEB Deceleration Time	0.0~25.5	0.0	s	O	O	X	X	X	X	O	O	*1
11-48	KEB Detection Level	230V: 190~210	200	V	O	O	X	X	X	X	X	O	
		460V: 380~420	400										
		575V: 540~570	555										
		690V: 540~684	555										
11-49	Zero-servo Gain	0.01~5.00	1.00	-	X	X	X	O	O	X	X		
11-50	Zero-servo Count	0~4096	12	-	X	X	X	O	O	X	X		
11-51	Braking Selection of Zero Speed	0: Disable	0	-	O	X	X	X	X	X	X	O	
		1: Enable											
11-52	Droop Control Level	0.0~100.0%	0.0	%	X	X	O (Note4)	O	O	O (Note4)	X	X	*1
11-53	Droop Control Delay	0.01~2.00	0.2	s	X	X	O (Note4)	O	O	O (Note4)	X	X	*1
11-54	Initialization of Cumulative Energy	0: Do not Clear Cumulative Energy	0	-	O	O	O	O	O	O	O	O	*1
		1: Clear Cumulative Energy											
11-55	STOP Key Selection	0: Stop Key is Disabled when the Operation Command is not Provided by Operator.	1	-	O	O	O	O	O	O	O	O	
		1: Stop Key is Enabled when the Operation Command is not Provided by Operator.											

Group 11: Auxiliary Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute	
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2		
11-56	UP/DOWN Selection	0: When UP/DOWN in Keypad is Disabled, it will be Enabled if Pressing ENTER after Frequency Modification.	0	-	O	O	O	O	O	O	O	O	
		1: When UP/DOWN in Keypad is Enabled, it will be Enabled upon Frequency Modification.											
11-57	Reserved												
11-58	Record Reference Frequency	0: Disable	0	-	O	O	O	O	O	O	O	O	*1
		1: Enable											
11-59	Gain of Preventing Oscillation	0.00~2.50	*		O	O	X	X	X	X	O		
11-60	Upper Limit of Preventing Oscillation	0~100	*	%	O	O	X	X	X	X	O		
11-61	Time Parameter of Preventing Oscillation	0~100	0		O	O	X	X	X	X	O		
11-62	Selection of Preventing Oscillation	0: Mode1	1		O	O	X	X	X	X	O		
		1: Mode2											
		2: Mode3											
11-63	Strong Magnetic Selection	0: Disable	1		X	X	O	O	X	X	X		
		1: Enable											
11-64	Acceleration Speed Gain Adjustment	0.1~10.0	1.0	-	O	X	X	X	X	X	O		
11-65	Target Main Circuit Voltage	230V: 200V~400V	370	-	O	X	X	X	X	X	O		
		460V: 400V~800V	740										
		575V: 520V~1040V	962										
		690V: 624V~1248V	1154										
11-66	2 Phase/ 3 Phase PWM Switch Frequency	6.00~60.00	20	Hz	X	X	O	O	X	X	O	Note2	
11-67	Soft PWM 2 Frequency Range	0~12000	0	Hz	X	X	O	O	O	O	X	Note2	
11-68	Soft PWM 2 Switch Frequency	6.00~60.00	20	Hz	X	X	O	O	O	O	X	Note2	
11-69	Gain of Preventing Oscillation 3	0.00~200.00	5.00	%	O	O	X	X	X	X	X	Note1	
11-70	Upper Limit of	0.01~100.00	5.00	%	O	O	X	X	X	X	X	Note1	

Group 11: Auxiliary Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute	
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2		
	Preventing Oscillation 3												
11-71	Time Parameter of Preventing Oscillation 3	0~30000	100	ms	O	O	X	X	X	X	X	Note1	
11-72	Gain of Preventing Oscillation for switch frequency 1	0.01~300.00	30.00	Hz	O	O	X	X	X	X	X	Note1	
11-73	Gain of Preventing Oscillation for switch frequency 2	0.01~300.00	50.00	Hz	O	O	X	X	X	X	X	Note1	
11-76	Droop Frequency Level 1	0.00~599.00	0.00	Hz	X	X	O	O	O	O	X	Note4	
11-77	Droop Frequency Level 2	0.00~599.00	0.00	Hz	X	X	O	O	O	O	X	Note4	
11-78	Droop Torque Offset Value	0.00~100.00	0.00	%	X	X	O	O	O	O	X	Note4	

*: Refer to the attachment 1.

** If the maximum output frequency of motor is over 300HZ, the frequency resolution is changed to 0.1Hz

Note: The parameter of 11-01 can be changed during run operation, the range is 1~16KHz.

Group 12: Monitoring Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute	
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2		
12-00	Display Screen Selection (LED)	00000~77777 From the leftmost bit, it displays the screen when press DSP key in order. 0:no display 1: Output Current 2: Output Voltage 3: DC Bus Voltage 4: Heatsink Temperature* 5: PID Feedback 6: AI1 Value 7: AI2 Value	00321 (Note4)	-		○	○	○	○	○	○	○	*1 *6
12-01	PID Feedback Display Mode (LED)	0: Display the Feedback Value by Integer (xxx)	0			○	○	○	○	○	○	○	*6
		1: Display the Feedback Value by the Value with One Decimal Place (xx.x)											
		2: Display the Feedback Value by the Value with Two Decimal Places (x.xx)											
12-02	PID Feedback Display Unit Setting (LED)	0: xxxxx (no unit)	0			○	○	○	○	○	○	○	*6
		1: xxxPb (pressure)											
		2: xxxFL (flow)											
12-03	Line Speed Display (LED)	0~60000	1500/ 1800	RPM		○	○	○	○	○	○	○	*6
12-04	Modes of Line Speed Display (LED)	0: Display Inverter Output Frequency	0	-		○	○	○	○	○	○	○	*1 *6
		1: Display Line Speed with integer (xxxxx)											
		2: Display Line Speed with the First Decimal Place (xxxx.x)											
		3: Display Line Speed with the Second Decimal Place (xxx.xx)											
		4: Display Line Speed with the Third Decimal Place (xx.xxx)											

Group 12: Monitoring Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
12-20	DC Voltage (Vdc)	Display the current DC voltage	-	V	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
12-21	Output Power (kw)	Display the current output power	-	kW	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
12-22	Motor's Rotation Speed (rpm)	Display motor's current rotation speed in VF/SLV mode Motor's rotation speed = output frequency x(120/motor's pole number) In PG/SV mode, motor's rotation speed is calculated by feedback frequency. Max limit is 65535	-	rpm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
12-23	Output Power Factor (Pfo)	Display the current output power factor	-	-	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
12-24	Control Mode	Display control mode 0: VF 1: PG 2: SLV 3: SV 4: PSV 5: PMSLV 6: SLV2	-	-	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
12-25	AI1 Input	Display the current AI1 input (-10V corresponds to -100%, 10V corresponds to 100%,)	-	%	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
12-26	AI2 Input	Display the current AI2 input (0V or 4mA corresponds to 0%, 10V or 20mA corresponds to 100%)	-	%	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
12-27	Motor Torque	Display the current torque command (100% corresponds to motor torque)	-	%	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="checkbox"/>	
12-28	Motor Torque Current (Iq)	Display the current q-axis current	-	%	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="checkbox"/>	
12-29	Motor Excitation Current (Id)	Display the current d-axis current	-	%	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="checkbox"/>	
12-30	ASR Deviation	Display deviation of speed controller (speed command - speed feedback) (100% corresponds to the maximum frequency set by 01-02)	-	%	<input checked="" type="checkbox"/>	<input type="radio"/>	<input checked="" type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	

Group 12: Monitoring Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
12-31	Reserved											
12-32	ASR Output	Display output value of speed controller (100% corresponds to the maximum frequency set by 01-02)	-	%	X	O	X	O	O	X	X	
12-33	PG Feedback	Display feedback's speed value of speed controller (100% corresponds to the maximum frequency set by 01-02)	-	%	X	O	X	O	O	X	X	
12-34	PG Pulse Number	Display PG pulse number of speed controller	-	Pulse	X	O	X	O	O	X	X	Note4
12-35	Zero-servo Pulse Number	When display SV position mode, the position error pulse number of the zero speed servo (the pulse number of a circle is four times of set values of 20-27)	-	Pulse	X	X	X	O	O	X	X	
12-36	PID Input	Display input error of the PID controller (PID target value - PID feedback) (100% corresponds to the maximum frequency set by 01-02 or 01-16)	-	%	O	O	O	O	O	O	O	
12-37	PID Output	Display output of the PID controller (100% corresponds to the maximum frequency set by 01-02 or 01-16)	-	%	O	O	O	O	O	O	O	
12-38	PID Setting	Display the target value of the PID controller (100% corresponds to the maximum frequency set by 01-02 or 01-16)	-	%	O	O	O	O	O	O	O	
12-39	PID Feedback	Display the feedback value of the PID controller (100% corresponds to the maximum frequency set by 01-02 or 01-16)	-	%	O	O	O	O	O	O	O	
12-40	Reserved											
12-41	Heatsink Temperature*	Display the heatsink temperature of IGBT temperature**	*	°C	O	O	O	O	O	O	O	

Group 12: Monitoring Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
12-42	RS-485 Error Code		-	-	○	○	○	○	○	○	○	
12-43	Inverter Status		-	-	○	○	○	○	○	○	○	
12-44	Pulse Input Frequency	Display the frequency value of pulse input	-	Hz	○	○	○	○	○	○	○	
12-45	Recent Fault Message	Display current fault message	-	-	○	○	○	○	○	○	○	
12-46	Previous Fault Message	Display previous fault message	-	-	○	○	○	○	○	○	○	
12-47	Previous Two Fault Messages	Display previous two fault messages	-	-	○	○	○	○	○	○	○	
12-48	Previous Three Fault Messages	Display previous three fault messages	-	-	○	○	○	○	○	○	○	
12-49	Previous Four Fault Messages	Display previous four fault messages	-	-	○	○	○	○	○	○	○	
12-50	DIO Status of Current Fault	Display the DI/DO status of current fault Description is similar to 12-05	-	-	○	○	○	○	○	○	○	
12-51	Inverter Status of Current Fault	Display the inverter status of current fault Description is similar to 12-43	-	-	○	○	○	○	○	○	○	
12-52	Trip Time 1 of Current Fault	Display the operation time of current fault, 12-53 is the days, while 12-52 is the remaining hours.	-	Hr	○	○	○	○	○	○	○	
12-53	Trip Time 2 of Current Fault		-	day	○	○	○	○	○	○	○	
12-54	Frequency Command of Previous Fault	Display frequency command of previous fault	-	Hz	○	○	○	○	○	○	○	
12-55	Output Frequency of Previous Fault	Display output frequency of previous fault	-	Hz	○	○	○	○	○	○	○	
12-56	Output Current of Previous Fault	Display output current of previous fault	-	A	○	○	○	○	○	○	○	
12-57	Output Voltage of Previous Fault	Display output voltage of previous fault	-	V	○	○	○	○	○	○	○	
12-58	DC Voltage of Previous Fault	Display DC voltage of previous fault	-	V	○	○	○	○	○	○	○	

Group 12: Monitoring Parameters												
Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
12-59	DIO Status of Previous Fault	Display DI/DO status of previous fault Description is similar to 12-05	-	-	○	○	○	○	○	○	○	
12-60	Inverter Status of Previous Fault	Display inverter status of previous fault Description is similar to 12-43	-	-	○	○	○	○	○	○	○	
12-61	Trip Time 1 of Last Fault	Display the operation time of last time's fault, 12-62 is the days, while 12-61 is the remaining hours.	-	Hr	○	○	○	○	○	○	○	
12-62	Trip Time 2 of Last Fault		-	day	○	○	○	○	○	○	○	
12-63	Recent Warning Messages	Display the recent warning messages	-	-	○	○	○	○	○	○	○	
12-64	Previous Warning Message	Display the previous warning message	-	-	○	○	○	○	○	○	○	
12-65	Motor Start Angle	0~360	-	-	X	X	X	X	○	X	X	
12-66	Encoder Angle	0~360	-	-	X	○	X	○	○	X	X	
12-67	Cumulative Energy (KWHr)	0.0 ~ 999.9		KWHr	○	○	○	○	○	○	○	
12-68	Cumulative Energy (MWHr)	0 ~ 60000		MWHr	○	○	○	○	○	○	○	
12-69 ~ 12-75	Reserved											
12-76	No-Load Voltage Output	0.0~600.0	-	V	X	X	○	X	X	X	X	
12-77	Reserved											
12-78	Z-Phase Bias Value	-9999~9999	-	Pulse	X	X	X	○	○	X	X	
12-79	Pulse Input Percentage	0.0~100.0	-	%	○	○	○	○	○	○	○	
12-80	A11 Frequency Command	0.0~599.0	0	Hz	○	○	○	○	○	○	○	Note2
12-81	Reserved											
12-82	Motor Load	0~200.0	-	%	○	○	○	○	○	○	○	Note4
12-85	A13 Input	Display the current A13 input (-10V corresponds to -100%, 10V corresponds to 100%)	-	%	○	○	○	○	○	○	○	*10

*: Refer to the following attachment 1

** A510 230V 50HP (and the above) and 460V 100HP (and the above) don't support heatsink temperature display function.

Group 13: Maintenance Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
13-00	Inverter Capacity Selection	----	-	-	○	○	○	○	○	○	○	*4
13-01	Software Version	0.00-9.99	-	-	○	○	○	○	○	○	○	*4
13-02	Clear Cumulative Operation Hours	0: Disable to Clear Cumulative Operation Hours	0	-	○	○	○	○	○	○	○	*1
		1: Clear Cumulative Operation Hours										
13-03	Cumulative Operation Hours 1	0~23	-	hr	○	○	○	○	○	○	○	*4
13-04	Cumulative Operation Hours 2	0~65534 (Note4)	-	day	○	○	○	○	○	○	○	*4
13-05	Selection of Cumulative Operation Time	0: Cumulative time in power on	0	-	○	○	○	○	○	○	○	*1
		1: Cumulative time in operation										
13-06	Parameters Locked	0: Parameters are read-only except 13-06 and main frequency	2	-	○	○	○	○	○	○	○	*1
		1: User defined parameters										
		2: All Parameters are Writable										
13-07	Parameter Password Function	00000~65534	00000	-	○	○	○	○	○	○	○	Note2
13-08	Restore Factory Setting	0: No initialization	-	-	○	○	○	○	○	○	○	
		2: 2 wire initialization (60Hz)(230/460V/690V)										
		3: 3 wire initialization (60Hz)(230/460V/690V)										
		4: 2 wire initialization (50Hz)(230/415V)										
		5: 3 wire initialization (50Hz)(230/415V)										
		6: 2 wire initialization (50Hz)(200/380V/575V)										
		7: 3 wire initialization (50Hz)(200/380V/575V)										
		8: PLC initialization										
		9: 2 wire Initialization (60Hz)(230/460V)										
		10: 3 wire Initialization (60Hz)(230/460V)										
		11: 2 wire Initialization										

Group 13: Maintenance Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
		(60Hz)(230/400V)										
		12: 3 wire Initialization (60Hz)(230/400V)										
		13: 2 wire Initialization (50Hz)(230/400V)										
		14: 3 wire Initialization (50Hz)(230/400V)										
		15: 2 wire Initialization (50Hz)(220/380V) (Note4)										
		16: 3 wire Initialization (50Hz)(220/380V) (Note4)										
13-09	Fault History Clearance Function	0: No Clearing Fault History 1: Clear Fault History	0	-	○	○	○	○	○	○	○	*1
13-10	Parameter Password Function 2	0 ~ 9999	0		○	○	○	○	○	○	○	
13-11	C/B CPLD Ver.	0.00~9.99	-		○	○	○	○	○	○	○	
13-12	PG Card Id	0~255	0		○	○	○	○	○	○	○	*5
13-13	PG Card Ver.	0.00~9.99	-		○	○	○	○	○	○	○	*5
13-14	Fault Storage Selections	0: Fault Messages of Auto Restart are not saved. 1: Fault Messages of Auto Restart are saved.	0		○	○	○	○	○	○	○	
13-15	Reserved											
13-21	Last time Fault History	Exhibit Last time Fault History	-	-	○	○	○	○	○	○	○	Note1
13-22	Previous two Fault History	Exhibit Previous two Fault History	-	-	○	○	○	○	○	○	○	Note1
13-23	Previous three Fault History	Exhibit Previous three Fault History	-	-	○	○	○	○	○	○	○	Note1
13-24	Previous four Fault History	Exhibit Previous four Fault History	-	-	○	○	○	○	○	○	○	Note1
13-25	Previous five Fault History	Exhibit Previous five Fault History	-	-	○	○	○	○	○	○	○	Note1
13-26	Previous six Fault History	Exhibit Previous six Fault History	-	-	○	○	○	○	○	○	○	Note1
13-27	Previous seven Fault History	Exhibit Previous seven Fault History	-	-	○	○	○	○	○	○	○	Note1
13-28	Previous eight Fault History	Exhibit Previous eight Fault History	-	-	○	○	○	○	○	○	○	Note1

Group 13: Maintenance Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
13-29	Previous night Fault History	Exhibit Previous night Fault History	-	-	○	○	○	○	○	○	○	Note1
13-30	Previous ten Fault History	Exhibit Previous ten Fault History	-	-	○	○	○	○	○	○	○	Note1
13-31	Previous eleven Fault History	Exhibit Previous eleven Fault History	-	-	○	○	○	○	○	○	○	Note1
13-32	Previous twelve Fault History	Exhibit Previous twelve Fault History	-	-	○	○	○	○	○	○	○	Note1
13-33	Previous thirteen Fault History	Exhibit Previous thirteen Fault History	-	-	○	○	○	○	○	○	○	Note1
13-34	Previous fourteen Fault History	Exhibit Previous fourteen Fault History	-	-	○	○	○	○	○	○	○	Note1
13-35	Previous fifteen Fault History	Exhibit Previous fifteen Fault History	-	-	○	○	○	○	○	○	○	Note1
13-36	Previous sixteen Fault History	Exhibit Previous sixteen Fault History	-	-	○	○	○	○	○	○	○	Note1
13-37	Previous seventeen Fault History	Exhibit Previous seventeen Fault History	-	-	○	○	○	○	○	○	○	Note1
13-38	Previous eighteen Fault History	Exhibit Previous eighteen Fault History	-	-	○	○	○	○	○	○	○	Note1
13-39	Previous nineteen Fault History	Exhibit Previous nineteen Fault History	-	-	○	○	○	○	○	○	○	Note1
13-40	Previous twenty Fault History	Exhibit Previous twenty Fault History	-	-	○	○	○	○	○	○	○	Note1
13-41	Previous twenty one Fault History	Exhibit Previous twenty one Fault History	-	-	○	○	○	○	○	○	○	Note1
13-42	Previous twenty two Fault History	Exhibit Previous twenty two Fault History	-	-	○	○	○	○	○	○	○	Note1
13-43	Previous twenty three Fault History	Exhibit Previous twenty three Fault History	-	-	○	○	○	○	○	○	○	Note1
13-44	Previous twenty four Fault History	Exhibit Previous twenty four Fault History	-	-	○	○	○	○	○	○	○	Note1
13-45	Previous twenty five Fault History	Exhibit Previous twenty five Fault History	-	-	○	○	○	○	○	○	○	Note1
13-46	Previous twenty six Fault History	Exhibit Previous twenty six Fault History	-	-	○	○	○	○	○	○	○	Note1
13-47	Previous twenty seven Fault History	Exhibit Previous twenty seven Fault History	-	-	○	○	○	○	○	○	○	Note1
13-48	Previous twenty eight Fault History	Exhibit Previous twenty eight Fault History	-	-	○	○	○	○	○	○	○	Note1
13-49	Previous twenty nine Fault History	Exhibit Previous twenty nine Fault History	-	-	○	○	○	○	○	○	○	Note1

Group 13: Maintenance Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
13-50	Previous thirty Fault History	Exhibit Previous thirty Fault History	-	-	○	○	○	○	○	○	○	Note1

Note: Main frequency setting is 12-16 in LCD. It's equal to Frequency Setting of Speed-Stage 0 (05-01)

Group 14: PLC Setting Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
14-00	T1 Set Value 1	0~9999	0	-	○	○	○	○	○	○	○	Note6
14-01	T1 Set Value 2 (Mode 7)	0~9999	0	-	○	○	○	○	○	○	○	Note6
14-02	T2 Set Value 1	0~9999	0	-	○	○	○	○	○	○	○	Note6
14-03	T2 Set Value 2 (Mode 7)	0~9999	0	-	○	○	○	○	○	○	○	Note6
14-04	T3 Set Value 1	0~9999	0	-	○	○	○	○	○	○	○	Note6
14-05	T3 Set Value 2 (Mode 7)	0~9999	0	-	○	○	○	○	○	○	○	Note6
14-06	T4 Set Value 1	0~9999	0	-	○	○	○	○	○	○	○	Note6
14-07	T4 Set Value 2 (Mode 7)	0~9999	0	-	○	○	○	○	○	○	○	Note6
14-08	T5 Set Value 1	0~9999	0	-	○	○	○	○	○	○	○	Note6
14-09	T5 Set Value 2 (Mode 7)	0~9999	0	-	○	○	○	○	○	○	○	Note6
14-10	T6 Set Value 1	0~9999	0	-	○	○	○	○	○	○	○	Note6
14-11	T6 Set Value 2 (Mode 7)	0~9999	0	-	○	○	○	○	○	○	○	Note6
14-12	T7 Set Value 1	0~9999	0	-	○	○	○	○	○	○	○	Note6
14-13	T7 Set Value 2 (Mode 7)	0~9999	0	-	○	○	○	○	○	○	○	Note6
14-14	T8 Set Value 1	0~9999	0	-	○	○	○	○	○	○	○	Note6
14-15	T8 Set Value 2 (Mode 7)	0~9999	0	-	○	○	○	○	○	○	○	Note6
14-16	C1 Set Value	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	Note6
14-17	C2 Set Value	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	Note6
14-18	C3 Set Value	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	Note6
14-19	C4 Set Value	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	Note6
14-20	C5 Set Value	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	Note6
14-21	C6 Set Value	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	Note6
14-22	C7 Set Value	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	Note6
14-23	C8 Set Value	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	Note6
14-24	AS1 Set Value 1	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	Note6
14-25	AS1 Set Value 2	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	Note6
14-26	AS1 Set Value 3	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	Note6
14-27	AS2 Set Value 1	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	Note6
14-28	AS2 Set Value 2	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	Note6
14-29	AS2 Set Value 3	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	Note6
14-30	AS3 Set Value 1	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	Note6
14-31	AS3 Set Value 2	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	Note6
14-32	AS3 Set Value 3	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	Note6
14-33	AS4 Set Value 1	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	Note6
14-34	AS4 Set Value 2	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	Note6
14-35	AS4 Set Value 3	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	Note6
14-36	MD1 Set Value 1	0~65534 (Note4)	1	-	○	○	○	○	○	○	○	Note6

Group 14: PLC Setting Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
14-37	MD1 Set Value 2	0~65534 (Note4)	1	-	○	○	○	○	○	○	○	Note6
14-38	MD1 Set Value 3	0~65534 (Note4)	1	-	○	○	○	○	○	○	○	Note6
14-39	MD2 Set Value 1	0~65534 (Note4)	1	-	○	○	○	○	○	○	○	Note6
14-40	MD2 Set Value 2	0~65534 (Note4)	1	-	○	○	○	○	○	○	○	Note6
14-41	MD2 Set Value 3	0~65534 (Note4)	1	-	○	○	○	○	○	○	○	Note6
14-42	MD3 Set Value 1	0~65534 (Note4)	1	-	○	○	○	○	○	○	○	Note6
14-43	MD3 Set Value 2	0~65534 (Note4)	1	-	○	○	○	○	○	○	○	Note6
14-44	MD3 Set Value 3	0~65534 (Note4)	1	-	○	○	○	○	○	○	○	Note6
14-45	MD4 Set Value 1	0~65534 (Note4)	1	-	○	○	○	○	○	○	○	Note6
14-46	MD4 Set Value 2	0~65534 (Note4)	1	-	○	○	○	○	○	○	○	Note6
14-47	MD4 Set Value 3	0~65534 (Note4)	1	-	○	○	○	○	○	○	○	Note6

Group 15: PLC Monitoring Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F +PG	SLV	SV	PM SV	PM SLV	SLV2	
15-00	T1 Current Value1	0~9999	0	-	○	○	○	○	○	○	○	
15-01	T1 Current Value 2 (Mode7)	0~9999	0	-	○	○	○	○	○	○	○	
15-02	T2 Current Value 1	0~9999	0	-	○	○	○	○	○	○	○	
15-03	T2 Current Value 2 (Mode7)	0~9999	0	-	○	○	○	○	○	○	○	
15-04	T3 Current Value 1	0~9999	0	-	○	○	○	○	○	○	○	
15-05	T3 Current Value 2 (Mode7)	0~9999	0	-	○	○	○	○	○	○	○	
15-06	T4 Current Value 1	0~9999	0	-	○	○	○	○	○	○	○	
15-07	T4 Current Value 2 (Mode7)	0~9999	0	-	○	○	○	○	○	○	○	
15-08	T5 Current Value 1	0~9999	0	-	○	○	○	○	○	○	○	
15-09	T5 Current Value 2 (Mode7)	0~9999	0	-	○	○	○	○	○	○	○	
15-10	T6 Current Value 1	0~9999	0	-	○	○	○	○	○	○	○	
15-11	T6 Current Value 2 (Mode7)	0~9999	0	-	○	○	○	○	○	○	○	
15-12	T7 Current Value 1	0~9999	0	-	○	○	○	○	○	○	○	
15-13	T7 Current Value 2 (Mode7)	0~9999	0	-	○	○	○	○	○	○	○	
15-14	T8 Current Value 1	0~9999	0	-	○	○	○	○	○	○	○	
15-15	T8 Current Value 2 (Mode7)	0~9999	0	-	○	○	○	○	○	○	○	
15-16	C1 Current Value	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	
15-17	C2 Current Value	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	
15-18	C3 Current Value	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	

Group 15: PLC Monitoring Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F+PG	SLV	SV	PM SV	PM SLV	SLV2	
15-19	C4 Current Value	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	
15-20	C5 Current Value	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	
15-21	C6 Current Value	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	
15-22	C7 Current Value	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	
15-23	C8 Current Value	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	
15-24	AS1 Current Value	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	
15-25	AS2 Current Value	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	
15-26	AS3 Current Value	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	
15-27	AS4 Current Value	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	
15-28	MD1 Current Value	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	
15-29	MD2 Current Value	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	
15-30	MD3 Current Value	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	
15-31	MD4 Current Value	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	
15-32	TD Current Value	0~65534 (Note4)	0	-	○	○	○	○	○	○	○	

Group 16: LCD Function Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F+PG	SLV	SV	PM SV	PMS LV	SLV2	
16-00	Main Screen Monitoring	5~82 (Note4) when using LCD to operate, the monitored item displays in the first line. (default is frequency command)	16	-	○	○	○	○	○	○	○	*1
16-01	Sub-Screen Monitoring 1	5~82 (Note4) when using LCD to operate, the monitored item displays in the second line. (default is output frequency)	17	-	○	○	○	○	○	○	○	*1
16-02	Sub-Screen Monitoring 2	5~82 (Note4) when using LCD to operate, the monitored item displays in the third line. (default is output current)	18	-	○	○	○	○	○	○	○	*1
16-03	Display Unit	0~39999 Determine the display	0	-	○	○	○	○	○	○	○	

Group 16: LCD Function Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode						Attribute	
					V/F	V/F+P G	SLV	SV	PM SV	PMS LV		SLV2
		way and unit of frequency command										
		0: Frequency display unit is 0.01Hz										
		1: Frequency display unit is 0.01%										
		2: Frequency display unit is rpm.										
		3~39: Reserved										
		40~9999: Users specify the format, Input 0XXXX represents the display of XXXX at 100%.										
		10001~19999: Users specify the format; Input 1XXXX represents the display of XXX.X at 100%.										
		20001~29999: Users specify the format, Input 2XXXX represents the display of XX.XX at 100%.										
		30001~39999: Users specify the format, Input 3XXXX represents the display of X.XXX at 100%.										
16-04	Engineering Unit	0: without using engineering unit	0	-	○	○	○	○	○	○	○	
		1: FPM										
		2: CFM										
		3: PSI										
		4: GPH										
		5: GPM										
		6: IN										
		7: FT										
		8: /s										
		9: /m										
		10: /h										
		11: °F										
		12: inW										
		13: HP										
		14: m/s										
		15: MPM										
		16: CMM										
		17: W										

Group 16: LCD Function Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F+P G	SLV	SV	PM SV	PMS LV	SLV2	
		18: KW										
		19: m										
		20: °C										
		21: RPM										
		22: Bar										
		23: Pa										
		24: KPa										
16-05	LCD Backlight	0~7	5	-	0	0	0	0	0	0	0	*1
16-06	Reserved											
16-07	Copy Function Selection	0: Do not copy parameters	0	-	0	0	0	0	0	0	0	0
		1: Read inverter parameters and save to the operator.										
		2: Write the operator parameters to inverter.										
		3: Compare parameters of inverter and operator.										
16-08	Selection of Allowing Reading	0: Do not allow to read inverter parameters and save to the operator.	0	-	0	0	0	0	0	0	0	0
		1: Allow to read inverter parameters and save to the operator.										
16-09	Selection of Operator Removed (LCD)	0: Keep operating when LCD operator is removed.	0	-	0	0	0	0	0	0	0	*1
		1: Display fault when LCD operator is removed										
16-10	RTC Time Display Setting	0: Hide 1: Display	0	-	0	0	0	0	0	0	0	
16-11	RTC Date Setting	12.01.01 ~ 99.12.31	12.01.01	-	0	0	0	0	0	0	0	
16-12	RTC Time Setting	00:00 ~ 23:59	00:00	-	0	0	0	0	0	0	0	
16-13	RTC Timer Function	0: Disable 1: Enable 2: Set by DI	0	-	0	0	0	0	0	0	0	
16-14	P1 Start Time	00:00 ~ 23:59	08:00	-	0	0	0	0	0	0	0	
16-15	P1 Stop Time	00:00 ~ 23:59	18:00	-	0	0	0	0	0	0	0	
16-16	P1 Start Date	1:Mon, 2:Tue, 3:Wed,	1	-	0	0	0	0	0	0	0	

Group 16: LCD Function Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F+P G	SLV	SV	PM SV	PMS LV	SLV2	
16-17	P1 Stop Date	4:Thu,:5:Fri,:6:Sat, 7:Sun	5	-	○	○	○	○	○	○	○	
16-18	P2 Start Time	00:00 ~ 23:59	08:00	-	○	○	○	○	○	○	○	
16-19	P2 Stop Time	00:00 ~ 23:59	18:00	-	○	○	○	○	○	○	○	
16-20	P2 Start Date	1:Mon, 2:Tue, 3:Wed,	1	-	○	○	○	○	○	○	○	
16-21	P2 Stop Date	4:Thu,:5:Fri,:6:Sat, 7:Sun	5	-	○	○	○	○	○	○	○	
16-22	P3 Start Time	00:00 ~ 23:59	08:00	-	○	○	○	○	○	○	○	
16-23	P3 Stop Time	00:00 ~ 23:59	18:00	-	○	○	○	○	○	○	○	
16-24	P3 Start Date	1:Mon, 2:Tue, 3:Wed,	1	-	○	○	○	○	○	○	○	
16-25	P3 Stop Date	4:Thu,:5:Fri,:6:Sat, 7:Sun	5	-	○	○	○	○	○	○	○	
16-26	P4 Start Time	00:00 ~ 23:59	08:00	-	○	○	○	○	○	○	○	
16-27	P4 Stop Time	00:00 ~ 23:59	18:00	-	○	○	○	○	○	○	○	
16-28	P4 Start Date	1:Mon, 2:Tue, 3:Wed,	1	-	○	○	○	○	○	○	○	
16-29	P4 Stop Date	4:Thu,:5:Fri,:6:Sat, 7:Sun	5	-	○	○	○	○	○	○	○	
16-30	Selection of RTC Offset	0: Disable 1: Enable 2: Set by DI	0	-	○	○	○	○	○	○	○	
16-31	RTC Offset Time Setting	00:00 ~ 23:59	00:00	-	○	○	○	○	○	○	○	
16-32	Source of Timer 1	0: None, 1:P1, 2:P2, 3:P1+P2, 4:P3, 5:P1+P3, 6:P2+P3, 7:P1+P2+P3, 8:P4, 9:P1+P4, 10:P2+P4, 11:P1+P2+P4 12:P3+P4 13:P1+P3+P4, 14:P2+P3+P4 15:P1+P2+P3+P4, 16:Off, 17:Off+P1 18:Off+P2, 19:Off+P1+P2 20:Off+P3, 21:Off+P1+P3 22:Off+P2+P3 23:Off+P1+P2+P3 24:Off+P4 25:Off+P1+P4 26:Off+P2+P4 27:Off+P1+P2+P4 28:Off+P3+P4 29:Off+P1+P3+P4	1	-	○	○	○	○	○	○	○	
16-33	Source of Timer 2		2	-	○	○	○	○	○	○	○	
16-34	Source of Timer 3		4	-	○	○	○	○	○	○	○	
16-35	Source of Timer 4		8	-	○	○	○	○	○	○	○	

Group 16: LCD Function Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode						Attribute	
					V/F	V/F+P G	SLV	SV	PM SV	PMS LV		SLV2
		30:Off+P2+P3+P4 31:Off+P1+P2+P3+P4										
16-36	Selection of RTC Speed	0: Off 1: By Timer 1 2: By Timer 2 3: By Timer 3 4: By Timer 4 5: By Timer 1+2	0	-	○	○	○	○	○	○	○	
16-37	Selection of RTC Rotation Direction	xxx0b: RTC Run1 Forward Rotation xxx1b: RTC Run1 Reverse Rotation xx0xb: RTC Run2 Forward Rotation xx1xb: RTC Run2 Reverse Rotation x0xxb: RTC Run3 Forward Rotation x1xxb: RTC Run3 Reverse Rotation 0xxxb: RTC Run4 Forward Rotation 1xxxb: RTC Run4 Reverse Rotation	0000b	-	○	○	○	○	○	○	○	

Group 17: Automatic Tuning Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode						Attribute	
					V/F	V/F+PG	SLV	SV	PM SV	PMS LV		SLV2
17-00	Mode Selection of Automatic Tuning*	0: Rotation Auto-tuning	VF:2 VF+PG :2 SLV:6 SV:6 SLV2:6	-	O	O	O	O	X	X	O	
		1: Static Auto-tuning										
		2: Stator Resistance Measurement										
		3: Reserved										
		4: Loop Tuning										
		5: Rotation Auto-tuning Combination (item: 4+2+0)										
6: Static Auto-tuning Combination (item: 4+2+1)												
17-01	Motor Rated Output Power	0.00~600.00	KVA	KW	O	O	O	O	X	X	O	
17-02	Motor Rated Current	0.1~1200.0	KVA	A	O	O	O	O	X	X	O	
17-03	Motor Rated Voltage	200V: 50.0~240.0	-	V	O	O	O	O	X	X	O	
		400V: 100.0~480.0	-									
		575V:150.0~670.0	-									
		690V: 180.0~804.0	-									
17-04	Motor Rated Frequency	4.8~599.0	50.0/ 60.0	Hz	O	O	O	O	X	X	O	
17-05	Motor Rated Speed	0~24000	KVA	rpm	O	O	O	O	X	X	O	
17-06	Pole Number of Motor	2~16 (Even)	4	Pole	O	O	O	O	X	X	O	
17-07	PG Pulse Number	0~60000	1024	ppr	X	O	X	O	X	X	X	
17-08	Motor no-load Voltage	200V: 50~240	-	V	O	O	O	O	X	X	O	
		400V: 100~480										
		575V: 420~600										
		690V: 504~720										
17-09	Motor Excitation Current	0.01~600.00	-	A	X	X	O	O	X	X	X	■1
17-10	Automatic Tuning Start	0: Disable	0	-	O	O	O	O	X	X	O	
		1: Enable										
17-11	Error History of Automatic Tuning	0: No error	0	-	O	O	O	O	X	X	O	
		1: Motor data error										
		2: Stator resistance tuning error										
		3: Leakage induction tuning error										
		4: Rotor resistance tuning error										
		5: Mutual induction tuning error										
		6: Encoder error										
		7: DT Error										
		8: Motor's acceleration error										
		9: Warning										

Group 17: Automatic Tuning Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode						Attribute	
					V/F	V/F+PG	SLV	SV	PM SV	PMS LV		SLV2
17-12	Proportion of Motor Leakage Inductance	0.1~15.0	3.4	%	X	X	O	O	X	X	X	
17-13	Motor Slip Frequency	0.10~20.00	1.00	Hz	X	X	O	O	X	X	X	
17-14	Selection of Rotation Auto-tuning	0:VF Rotation Auto-tuning 1: Vector Rotation Auto-tuning	0	-	O	O	O	O	X	X	O	

KVA: The default value of this parameter will be changed by different capacities of inverter.

*****: The default value is 1 in VF/ VF+PG mode while the default value is 0 in SLV/ SV/ SLV2 mode.

*****: It is suggested that HD/ ND mode (00-27) and application presets (00-32) be selected first before motor performs auto-tuning.

Note: The value of mode selection of automatic tuning is 6 (Static Auto-tuning Combination). When do auto-tuning with no-load motor, it suggest select 17-00=5 (Rotation Auto-tuning Combination)

■1: It can be set when 17-00=1, 2, 6.

Group 18: Slip Compensation Parameters												
Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F+PG	SLV	SV	PM SV	PMS LV	SLV2	
18-00	Slip Compensation Gain at Low Speed.	0.00~2.50	VF:0.0 0	-	O	X	O	O	X	X	O	*1
			SLV*									
18-01	Slip Compensation Gain at High Speed.	-1.00~1.00	0.0	-	O	X	O	X	X	X	X	*1
18-02	Slip Compensation Limit	0~250	200	%	O	X	X	X	X	X	X	
18-03	Slip Compensation Filter Time	0.0~10.0	1.0	Sec	O	X	X	X	X	X	X	
18-04	Regenerative Slip Compensation Selection	0: Disable	0	-	O	X	X	X	X	X	X	
		1: Enable										
18-05	FOC Delay Time	1~1000	100	ms	X	X	O	X	X	X	X	
18-06	FOC Gain	0.00~2.00	0.1	-	X	X	O	X	X	X	X	

*: Refer to the following attachment 1.

Group 19: Wobble Frequency Parameters												
Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F+PG	SLV	SV	PM SV	PMS LV	SLV2	
19-00	Center Frequency of Wobble Frequency	5.00~100.00	20.00	%	O	O	X	X	X	X	O	*1
19-01	Amplitude of Wobble Frequency	0.1~20.0	10.0	%	O	O	X	X	X	X	O	*1
19-02	Jump Frequency of Wobble Frequency	0.0~50.0	0.0	%	O	O	X	X	X	X	O	*1
19-03	Jump Time of Wobble Frequency	0~50	0	ms	O	O	X	X	X	X	O	*1
19-04	Wobble Frequency Cycle	0.0~1000.0	10.0	Sec	O	O	X	X	X	X	O	*1
19-05	Wobble Frequency Ratio	0.1~10.0	1.0		O	O	X	X	X	X	O	*1
19-06	Upper Offset Amplitude of Wobble Frequency	0.0~20.0	0.0	%	O	O	X	X	X	X	O	*1
19-07	Lower Offset Amplitude of Wobble Frequency	0.0~20.0	0.0	%	O	O	X	X	X	X	O	*1

Group 20: Speed Control Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F+P G	SLV	SV	PM SV	PMS LV	SLV2	
20-00	ASR Gain 1	0.00~250.00	-	-	X	O	O	O	O	O	X	*1
20-01	ASR Integral Time 1	0.001~10.000	-	Sec	X	O	O	O	O	O	X	*1
20-02	ASR Gain 2	0.00~250.00	-	-	X	O	O	O	O	O	X	*1
20-03	ASR Integral Time 2	0.001~10.000	-	Sec	X	O	O	O	O	O	X	*1
20-04	ASR Integral Time Limit	0~300	200	%	X	X	O	O	O	O	X	
20-05	ASR Positive Limit	0.1 ~ 10.0	5.0	%	X	O	X	X	X	X	X	
20-06	ASR Negative Limit	0.1 ~ 10.0	1.0	%	X	O	X	X	X	X	X	
20-07	Selection of Acceleration and Deceleration of P/PI	0: PI speed control will be enabled only in constant speed. For the speed acceleration and deceleration, only use P control.	0	-	X	O	O	O	O	X	X	
		1: Speed control is enabled either in acceleration or deceleration.										
20-08	ASR Delay Time	0.000~0.500	0.004	Sec	O	X	O	O	O	O	X	Note5
20-09	Speed Observer Proportional (P) Gain1	0.00~2.55	0.61	-	X	X	O	X	X	X	X	*1
20-10	Speed Observer Integral(I) Time 1	0.01~10.00	0.05	Sec	X	X	O	X	X	X	X	*1
20-11	Speed Observer Proportional (P) Gain2	0.00~2.55	0.61	-	X	X	O	X	X	X	X	*1
20-12	Speed Observer Integral(I) Time 2	0.01~10.00	0.06	Sec	X	X	O	X	X	X	X	*1
20-13	Low-pass Filter Time Constant of Speed Feedback 1	1~1000	4	ms	X	X	O	X	X	X	X	
20-14	Low-pass Filter Time Constant of Speed Feedback 2	1~1000	30	ms	X	X	O	X	X	X	X	
20-15	ASR Gain Change Frequency 1	0.0~599.0	4.0	Hz	X	O	O	O	O	X	O	
20-16	ASR Gain Change Frequency 2	0.0~599.0	8.0	Hz	X	X	O	O	O	X	O	
20-17	Torque Compensation Gain at Low Speed	0.00~2.50	1.00	-	X	X	O	X	X	X	X	*1
20-18	Torque Compensation Gain at High Speed	-10~10	0	%	X	X	O	X	X	X	X	*1

Group 20: Speed Control Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode						Attribute	
					V/F	V/F+P G	SLV	SV	PM SV	PMS LV		SLV2
20-19	Over Speed (OS) Selection	0: Deceleration to stop	1		X	O	X	O	O	X	X	
		1: Coast to stop										
		2: Continue to operate										
20-20	Over Speed (OS) Detection Level	0~120	115	%	X	O	X	O	O	X	X	
20-21	Over Speed (OS) Detection Time	0.0~2.0	0.5	Sec	X	O	X	O	O	X	X	
20-22	Speed Deviation (DEV) Selection	0: Deceleration to Stop	2		X	O	X	O	O	X	X	
		1: Coast to Stop										
		2: Continue to Operate										
20-23	Speed Deviation (DEV) Detection Level	0~50	10	%	X	O	X	O	O	X	X	
20-24	Speed Deviation (DEV) Detection Time	0.0~10.0	0.5	Sec	X	O	X	O	O	X	X	
20-25	Selection of PG Open	0: Deceleration to Stop	1	-	X	O	X	O	O	X	X	
		1: Coast to Stop										
		2: Continue to Operate										
20-26	Detection Time of PG Open	0.0~10.0	2.0	Sec	X	O	X	O	O	X	X	
20-27	PG Pulse Number	0~9999	1024	ppr	O	O	X	O	O	X	X	Note5
20-28	Selection of PG Rotation Direction	0: Forward as Counter -Clockwise Rotation	0	-	O	O	X	O	O	X	X	Note5
		1: Forward as Clockwise Rotation										
20-29	PG Pulse Dividing Ratio	001~132	1	-	X	O	X	O	O	X	X	
20-30	PG Gear Ratio 1	1~1000	1	-	X	O	X	O	X	X	X	
20-31	PG Gear Ratio 2	1~1000	1	-	X	O	X	O	X	X	X	
20-32	Selection of Specific Encoder	0: None	0		X	X	X	O	O	X	X	
		1: Resolver										
20-33	Detection Level at Constant Speed	0.1~5.0	1.0		X	O	O	O	O	O	X	*1
20-34	Compensation Gain of Derating	0~25600	0		X	X	O	O	O	X	X	*1
20-35	Compensation Time of Derating	0~30000	100	ms	X	X	O	O	O	X	X	*1
20-36~ 20-42	Reserved											
20-43	MPG Speed Magnification Calculation	1~500	20		O	O	X	O	X	X	X	Note5
20-44	MPG Speed Command Limit	0.1~30.0	6.0	Hz	O	X	X	X	X	X	X	Note5

Group 21: Torque And Position Control Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F+P G	SLV	SV	PM SV	PMS LV	SLV2	
21-00	Torque Control Selection	0: Speed Control	0	-	X	X	X	O	O	X	X	
		1: Torque Control										
21-01	Filter Time of Torque Reference	0~1000	0	ms	X	X	X	O	O	X	X	
21-02	Speed Limit Selection	0: According to AI Input	0	-	X	X	X	O	O	X	X	
		1: According to the Set Value of 21-03										
		2: According to communication position input (2502H)										
21-03	Speed Limit Value	-120~120	0	%	X	X	X	O	O	X	X	*1
21-04	Speed Limit Bias	0~120	10	%	X	X	X	O	O	X	X	*1
21-05	Positive Torque Limit	0~300	*	%	X	X	O	O	O	O	X	
21-06	Negative Torque Limit	0~300	*	%	X	X	O	O	O	O	X	
21-07	Forward Regenerative Torque Limit	0~300	*	%	X	X	O	O	O	O	X	
21-08	Reversal Regenerative Torque Limit	0~300	*	%	X	X	O	O	O	O	X	
21-09	Maximum Frequency of Position Control	0.1~100.0	20.0	Hz	X	X	X	O	O	X	X	
21-10	The Command of Rotation Cycle Number of Section 0	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	
21-11	The Command of the Pulse Number of Section 0	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	
21-12	The Command of Rotation Cycle Number of Section 1	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	
21-13	The Command of the Pulse Number of Section 1	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	
21-14	The Command of Rotation Cycle Number of Section 2	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	
21-15	The Command of the Pulse Number of Section 2	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	
21-16	The Command of Rotation Cycle Number of Section	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	

Group 21: Torque And Position Control Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F+P G	SLV	SV	PM SV	PMS LV	SLV2	
	3											
21-17	The Command of the Pulse Number of Section 3	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	
21-18	The Command of Rotation Cycle Number of Section 4	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	
21-19	The Command of the Pulse Number of Section 4	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	
21-20	The Command of Rotation Cycle Number of Section 5	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	
21-21	The Command of the Pulse Number of Section 5	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	
21-22	The Command of Rotation Cycle Number of Section 6	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	
21-23	The Command of the Pulse Number of Section 6	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	
21-24	The Command of Rotation Cycle Number of Section 7	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	
21-25	The Command of the Pulse Number of Section 7	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	
21-26	The Command of the Pulse Number of Section 8	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	
21-27	The Command of Rotation Cycle Number of Section 8	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	
21-28	The Command of the Pulse Number of Section 9	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	
21-29	The Command of Rotation Cycle Number of Section 9	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	
21-30	The Command of Rotation Cycle Number of Section 10	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	
21-31	The Command of the Pulse Number	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	

Group 21: Torque And Position Control Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F+P G	SLV	SV	PM SV	PMS LV	SLV2	
	of Section 10											
21-32	The Command of Rotation Cycle Number of Section 11	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	
21-33	The Command of the Pulse Number of Section 11	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	
21-34	The Command of Rotation Cycle Number of Section 12	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	
21-35	The Command of the Pulse Number of Section 12	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	
21-36	The Command of Rotation Cycle Number of Section 13	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	
21-37	The Command of the Pulse Number of Section 13	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	
21-38	The Command of Rotation Cycle Number of Section 14	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	
21-39	The Command of the Pulse Number of Section 14	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	
21-40	The Command of Rotation Cycle Number of Section 15	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	
21-41	The Command of the Pulse Number of Section 15	-9999 ~ 9999	0	-	X	X	X	O	O	X	X	
21-42	Pos. Mode Sel	0: Switch to position mode when output frequency < 01-08.	0		X	X	X	O	O	X	X	
		1: Z Phase Locked Function										
21-43	Offset Angle	0 ~9999	0	Pulse	X	X	X	O	O	X	X	

* Refer to the following attachment 1.

Group 22: PM Motor Parameters												
Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F+P G	SLV	SV	PMS V	PM SLV	SLV2	
22-00	PM Motor Rated Power	0.00~600.00	KVA	kW	X	X	X	X	O	O	X	
22-01	PM Motor Rated Voltage	230V: 50.0~240.0 460V: 100.0~480.0	220.0 440.0	V	X	X	X	X	O	O	X	Note7
22-02	PM Motor Rated Current	25%~200% inverter's rated current	KVA	A	X	X	X	X	O	O	X	
22-03	PM Motor 's Pole Number	2~96	6	poles	X	X	X	X	O	O	X	
22-04	PM Motor's Rotation Speed	6~60000	1500	rpm	X	X	X	X	O	O	X	
22-05	PM Motor's Maximum Rotation Speed	6~60000	1500	rpm	X	X	X	X	O	O	X	
22-06	PM Motor Rated Frequency	4.8~599.0	75.0	Hz	X	X	X	X	O	O	X	
22-07	PM Type Selection	0:SPM 1:IPM	0		X	X	X	X	X	O	X	
22-08	PM Encoder Type	0: TAMAGAWA Non Wire-Saving Encoder	0		X	X	X	X	O	X	X	
		1: TAMAGAWA Wire-Saving Encoder										
		2: SUMTAK Wire-Saving Encoder										
		3: General Incremental Encoder										
		4: Sine Wave										
22-09	Reserved											
22-10	PM SLV Start Current	20% ~ 200% Motor Rated Current	80	%	X	X	X	X	X	O	X	
22-11	I/F Mode Start Frequency Switching Point	10 ~ 100 (Note 7)	10	%	X	X	X	X	X	O	X	
22-12 22-13	Reserved (Note4)											
22-14	Armature Resistance of PM Motor 0.001 ~ 30.000		1.000	Ω	X	X	X	X	X O	O	X	
22-15	D-axis Inductance of PM Motor	0.01 ~ 300.00	10.00	mH	X	X	X	X	O	O	X	
22-16	Q-axis Inductance of PM Motor	0.01 ~ 300.00	10.00	mH	X	X	X	X	O	O	X	
22-17	PM No-Load Voltage	200V: 0~200 400V: 0~400	150 300	V	X	X	X	X	O	O	X	Note7
22-18	Flux-Weakening Limit	0~100	0	%	X	X	X	X	O	O	X	
22-19	Reserved											

Group 22: PM Motor Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F+P G	SLV	SV	PMS V	PM SLV	SLV2	
22-20	Offset Angle of the Magnetic Pole and PG Origin	0~360	0	deg	X	X	X	X	O	X	X	*4
22-21	PM Motor Tuning	0: PM Motor Tuning is not Active.	0	-	X	X	X	X	O	O	X	
		1: Parameter Auto-tune (for PMSLV Tuning)										
		2: Magnetic Pole Alignment and Loop Adjustment (for PMSV Tuning)										
		3: Magnetic Pole Alignment										
22-22	Fault History of PM Motor Tuning	0. No Error	0	-	X	X	X	X	O	O	X	*4
		1. Static Magnetic Alignment Fault										
		2. Without PG Option Card										
		3. Rotation Pole Alignment is Forced to Stop										
		4. Error of Encoder Feedback Direction										
		5. Loop Adjustment is Time out										
		6. Encoder Error										
		7. Other Errors of Motor Tuning										
		8. Current Abnormity Occurs when Aligning Rotation Magnetic Pole.										
		9. Current Abnormity Occurs while Loop Adjustment.										
		10.Reserved										
11. Stator Resistance Measurement Timeout												
22-23 22-24	Reserved											
22-25	Detection Mode Selection of Initial Magnetic Pole	0: Upon the angle before stopping	2 (Note7)	-	X	X	X	X	O	O	X	
		1: Mode 1										
		2: Mode 2										
22-26	Estimator Mode	0~1 (in PMSLV mode)	0	-	X	X	X	X	X	O	X	
22-27	Voltage Command of Mode 2	5~120 (Note 7) (22-25=2 or 22-26=1 is enabled)	50	%	X	X	X	X	O	O	X	
22-28	Divider Ratio of	0~8 (Note 7) (22-25=2 or 22-26=1 is	2	-	X	X	X	X	O	O	X	

Group 22: PM Motor Parameters												
Code	Parameter Name	Setting Range	Default	Unit	Control mode							Attribute
					V/F	V/F+P G	SLV	SV	PMS V	PM SLV	SLV2	
	Mode 2	enabled)										
22-29	Flux-weakening Voltage Command Restriction	80~110 (Note 7) (related to parameter 22-18)	95	%	X	X	X	X	O	O	X	
22-30	SPM Speed Estimation Gain (Note7)	1~100	85	%	X	X	X	X	X	O	X	Note4
22-31	SPM Speed Estimation Filter Value (Note7)	1~2000	60	Hz	X	X	X	X	X	O	X	Note4
22-32	MTPA Selection	0: Disabled 1: Mode 1 2: Mode 2 3: Mode 3	2	-	X	X	X	X	O	O	X	Note7
22-33	MTPA Gain	0~400%	200	%	X	X	X	X	O	O	X	Note7
22-34	IPM Estimator Gain	0.1~500.0	30.0	-	X	X	X	X	X	O	X	Note7
22-35	IPM Estimator Compensation	0~300%	50	%	X	X	X	X	X	O	X	Note7

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4.4 Description Common of Parameters

00-00	Control mode selection
Range	0: V/F 1: V/F+PG 2: SLV 3: SV 4: PMSV 5: PMSLV 6: SLV2

The inverter offers the following control modes:

Value	Mode	Info	Application
0	V/F	V/F Control without PG	General Purpose Applications which do not require high precision speed control - Auto-tuning is not required.
1	V/F+PG	V/F Control with PG (speed compensation)	Closed loop speed control for General purpose applications that require better speed control than V/F mode without PG.
2	SLV	Sensorless Vector Control without PG	General Purpose Applications that require higher precision speed control and torque response without the use of an encoder.
3	SV	Closed Loop Vector Control with PG	General Purpose Applications that require high precision speed control and torque response with the use of an encoder.
4	PMSV	PM Vector Control with PG (Permanent Magnet Vector Control)	PM Motor Applications that require high precision speed control and torque response with the use of an encoder.
5	PMSLV	Sensorless Current Vector Control without PG (for Permanent magnet motor) °	Without PG Applications. Provide the requirements of high precision speed and torque
6	SLV2	Voltage vector control without PG	Without PG Applications. Vector control provides high speed rotation and the requirements of higher precision speed than V/F and torque.

00-00=0: V/F Mode

Select the required V/F curve (01-00) based on your motor and applications.

Perform a stationary auto-tune (17-00=2), if the motor cable is longer than 50m (165ft), see parameter 17-00 for details.

00-00=1: V/F with PG

Select the required V/F curve (01-00) based on your motor and applications. Set number of motor poles (02-08) and encoder feedback pulses (20-27); refer to parameter group 20 for PF feedback setup. Perform a stationary auto-tune (17-00=2) if the distance between the inverter and the motor more than 50m (165ft), refer to parameter group 17 for details on auto-tuning.

00-00=2: Sensorless Vector Control

Verify the inverter rating matches the motor rating. Perform rotational auto-tune to measure and store motor parameters for higher performance operation. Perform non-rotational auto-tune if it's not possible to rotate the motor during auto-tune. Refer to parameter group 17 for details on auto-tuning.

00-00=3: Closed Loop Vector Control

Verify the inverter rating matches the motor rating. Perform rotational auto-tune to measure and store motor parameters for higher performance operation. Perform non-rotational auto-tune if it's not possible to rotate the motor during auto-tune. Refer to parameter group 17 for details on auto-tuning.

00-00=4: PM Vector Control

Verify the inverter rating matches the motor rating. Set PM motor data in parameters 22-00 to 22-06 and encoder feedback pulses in parameter 20-27. Refer to parameter 22-21 for details on PM Motor tuning.

Select the appropriate motor rating and braking resistor based on your motor and applications. Please install the braking module in the models of 230V 30HP/ 460V 40HP/575V/690V 50HP or the above.

00-00=5: PM Sensorless Vector Control

Verify the inverter rating matches the motor rating. Perform rotational auto-tune to measure and store motor parameters for higher performance operation.

Perform auto-tuning before operation to enhance the performance of PMSLV mode. Refer to parameter 22-21 for the descriptions of PM motor tuning function.

Select the appropriate motor rating and braking resistor based on your motor and applications. Please install the braking module in the models of 230V 30HP/ 460V 40HP/575V/690V 50HP or the above.

00-00=6: SLV2 Vector Control

Verify the inverter rating matches the motor rating. Perform rotational auto-tune to measure and store motor parameters for higher performance operation.

Refer to parameter group 17 for the descriptions of motor parameter tuning function.

Select the required V/F curve (01-00) based on your motor and applications.

Note: Parameter 00-00 is excluded from initialization.

00-02	Run command selection
Range	0: Keypad control 1: External terminal control 2: Communication control 3: PLC

00-02=0: Keypad Control

Use the keypad to start and stop the inverter and set direction with the forward / reverse key). Refer to section 4-1 for details on the keypad.

00-02=1: External terminal control

External terminals are used to start and stop the inverter and select motor direction.

00- 03	Alternative RUN Command Selection
Range	0: Keypad control 1: External terminal control 2: Communication control 3: PLC

00-03=0: Keypad Control

Use the keypad to start and stop the inverter and set direction with the forward / reverse key). Refer to section 4-1 for details on the keypad.

00-03=1: External terminal control

External terminals are used to start and stop the inverter and select motor direction.

***It is required to be with multi-function digital input (12: main and alternative run switch function).**

The inverter can be operated in either 2-wire or 3-wire mode.

■ 2-wire operation

For 2-wire operation, set 03-00 (S1 terminal selection) to 0 and 03-01 (S2 terminal selection) to 1.

Terminal S1	Terminal S2	Operation
Open	Open	Stop Inverter / FWD Active
Closed	Open	Run Forward
Open	Closed	Run Reverse
Closed	Closed	Stop Inverter, Display EF9 Alarm after 500ms

Parameter 13-08 to 2, 4 or 6 for 2-wire program initialization, multi-function input terminal S1 is set to forward , operation/ stop, and S2 is set for reverse, operation / stop.

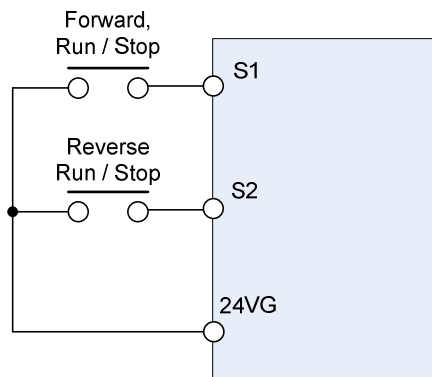


Figure 4.4.1 wiring example of 2-wire

■ 3-wire operation

For 3-wire operation set any of parameters 03-02 to 03-07 (terminal S3 ~ S8) to 26 to enable 3-wire operation in combination with S1 and S2 terminals set to run command and stop command.

Parameter 13-08 to 3, 5 or 7 for 3-wire program initialization, multi-function input terminal S1 is set to run operation, S2 for stop operation and S7 for forward/reverse command.

Note: Terminal S1 must be closed for a minimum of 50ms to activate operation.

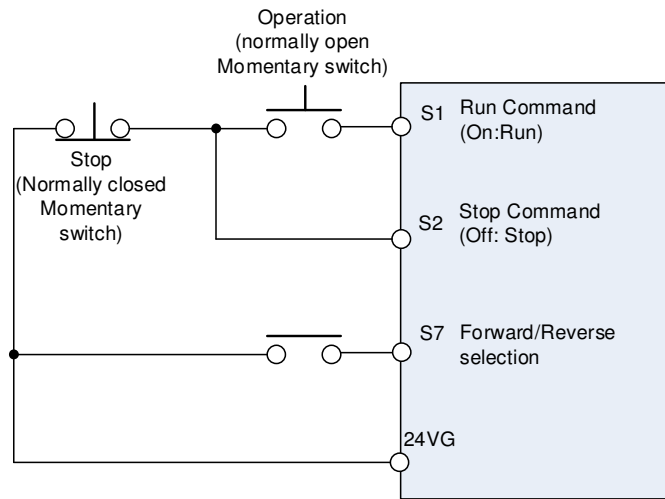


Figure 4.4.2 wiring example of 3-wire

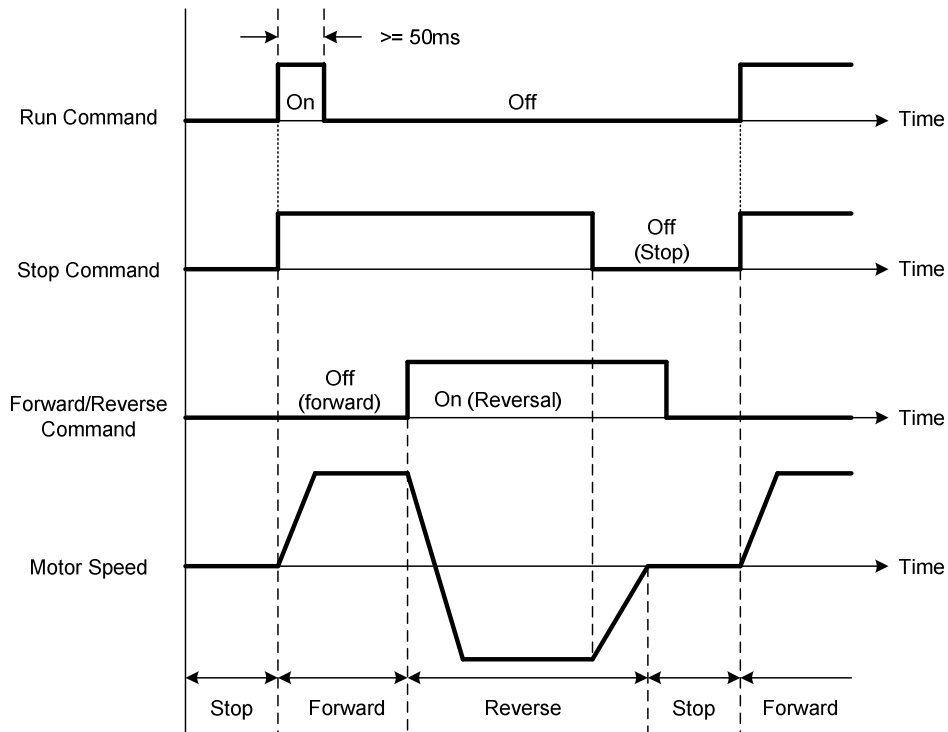
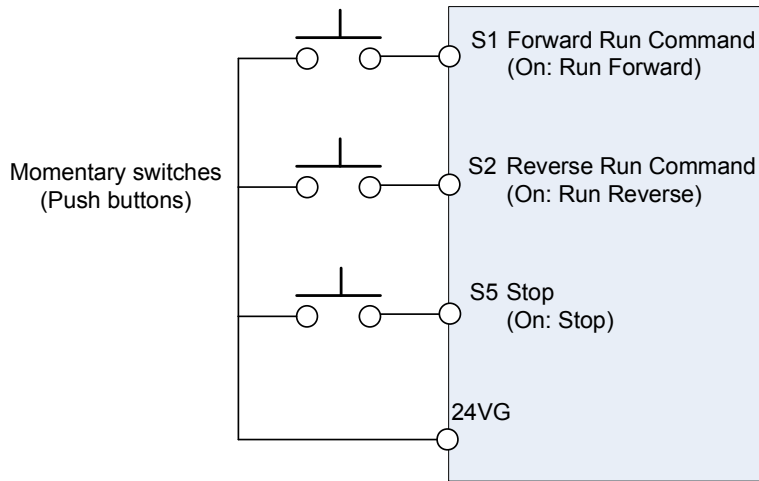


Figure 4.4.3 3-wire operation

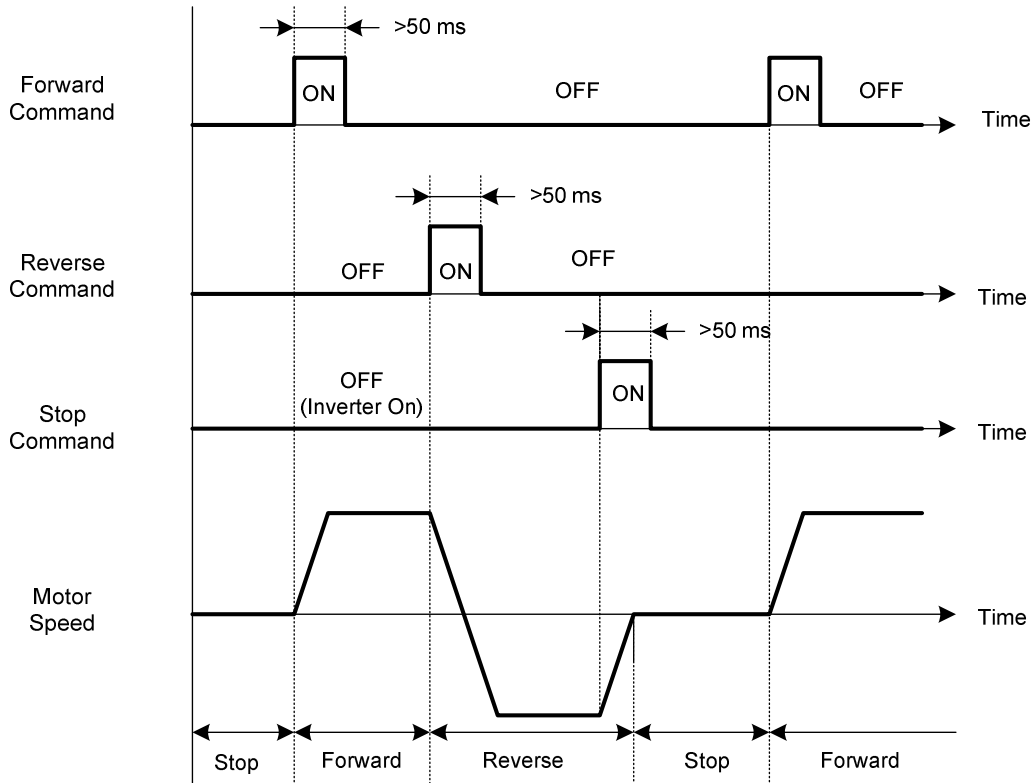
■ **2-wire operation with hold function**

To enable 2-wire operation with hold function, set any of parameters 03-02 to 03-07 (terminal S3 ~ S8) to 53. When this mode is enabled set terminal S1 (03-00=0) to forward and S2 (03-01=1) to reverse run command.



Note: Terminal S1, S2 and S5 must be closed for a minimum of 50ms to activate operation.

Note: The inverter will display SE2 error when input terminals S1-S8 is set to 53 and 26 simultaneously.



00-02=2: Communication control

The inverter is controlled by the RS-485 port. Refer to parameter group 9 for communication setup.

00-02=3: PLC control

The inverter is controlled by the inverter built-in PLC logic. Refer to section 4.5.

00-05	Main Frequency Command Source Selection
00-06	Alternative Frequency Source Selection
Range	0: Keypad 1: External control (analog) 2: Terminal UP / DOWN 3: Communication control 4: Pulse input 5: Reserved 6: Reserved 7: AI2 Auxiliary Frequency 8: Manual Pulse Generator (MPG) (only in parameter 00-05)

00-05/00-06= 0: Keypad

Use the digital operator to enter frequency reference or to set parameter 05-01 (frequency reference 1) as alternative frequency reference source. Refer to section 4.1.4 for details.

00-05/00-06= 1: External control (Analog Input)

Use analog reference from analog input AI1 or AI2 to set the frequency reference (as shown in Figure 4.4.4). Refer to parameters 04-00 to select the signal type.

AI1 – Analog Input 1	AI2 – Analog Input 2	04-00 Setting (Default = 1)	Dipswitch SW2 (U Type) or SW4 (UE Type) (Default 'V')
0 ~ 10V	0 ~ 10V	0	Set to 'V'
0 ~ 10V	4 ~ 20mA	1	Set to 'I'
-10 ~ 10V	0 ~ 10V	2	Set to 'V'
-10 ~ 10V	4 ~ 20mA	3	Set to 'I'
4 ~ 20mA	0 ~ 10V	4	Set to 'V'
4 ~ 20mA	4 ~ 20mA	5	Set to 'I'

Note: Set parameter 04-05 to 10 to add frequency reference using AI2 to AI1.

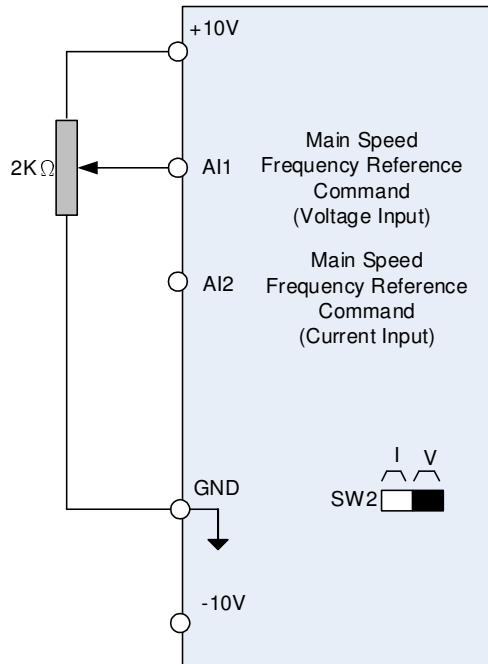


Figure 4.4.4 Analog input as main frequency reference command (For U type)

00-05/00-06= 2: Terminal UP / DOWN

The inverter accelerates with the UP command closed and decelerates with the DOWN command closed. Please refer to parameter 03-00 ~ 03-07 for additional information.

Note: To use this function both the UP and DOWN command have to be selected to any of the input terminals.

00-05/00-06= 3: Communication control

The frequency reference command is set via the RS-485 communication port using the MODBUS RTU protocol.

Refer to parameter group 9 for additional information.

00-05/00-06= 4: Pulse input

To use this function a pulse train input is required to be connected to the PI input and GND (see fig. 4.4.5).

Set parameter 03-30 to 0 to use the pulse input as frequency reference. Refer to parameters 03-31 to 03-34 for pulse input scaling.

PI input terminal, built-in resistance, is not required to connect the resistance if open collector input mode is used.

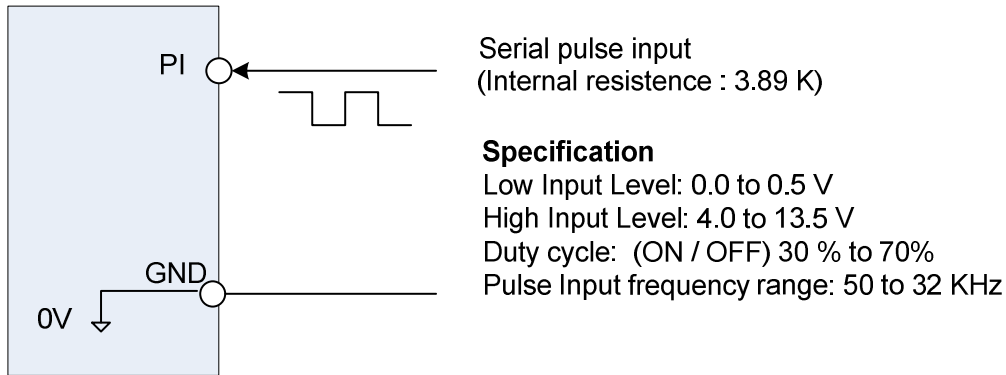


Figure 4.4.5 Frequency reference from pulse input

00-05/00-06= 7: AI2 Auxiliary Frequency

When 04-05 is set to 0 (auxiliary frequency), frequency command is provided by multi-function analog input AI2 and the maximum output frequency (01-02, Fmax) = 100%.

When 04-05 is not set to 0, the frequency is 0. Refer to the parameters of 03-00~03-07 for multi-speed descriptions.

00-05= 8: Manual Pulse Generator (MPG)

Frequency command depends on the manual pulse generator (MPG). The speed of MPG is multiplied by the speed magnification calculation (parameter 20-43) and limited by the speed command limit (parameter 20-44). The MPG command is required to be installed the induction motor PG card (JN5-PG-L or JN5-PG-O).

00- 07	Main and Alternative Frequency Command modes
Range	0: Main frequency 1: Main frequency + alternative frequency

When 00-07 is set to 0, the reference frequency is set by the main reference frequency selection of parameter 00-05. When 00-07 is set to 1 the reference frequency is sum of the main reference frequency (00-05) and alternative frequency (00-06).

Note: The inverter will display the SE1 error when 00-07 = 1 and parameter 00-05 and 00-06 are set to the same selection.

When parameter 00-06 is set to 0 (Keypad) the alternative frequency reference is set by parameter 05-01 (Frequency setting of speed-stage 0).

00-12	Upper Limit Frequency
Range	0.1~109.0 %

Set the maximum frequency reference as a percentage of the maximum output frequency. Maximum output frequency depends on motor selection.

Motor 1: Maximum frequency parameter 01-02.

Motor 2: Maximum frequency parameter 01-16.

00-13	Lower Limit Frequency
Range	0.0~109.0 %

Set the minimum frequency reference as a percentage of the maximum output frequency. Maximum output frequency depends on motor selection. Motor 1: Maximum frequency is set by parameter 01-02 and Motor 2 Maximum frequency is set by parameter 01-16.

Notes:

- When the frequency lower limit is set to a value greater than 0 and the inverter is started the output frequency will accelerate to the frequency lower limit with a minimum frequency defined by parameter 01-08 for motor 1 and parameter 01-22 for motor 2.
- Frequency upper limit has to greater or equal to the frequency lower limit otherwise the inverter will display a SE01 (Set range error).
- Frequency upper and lower limit is active for all frequency reference modes.

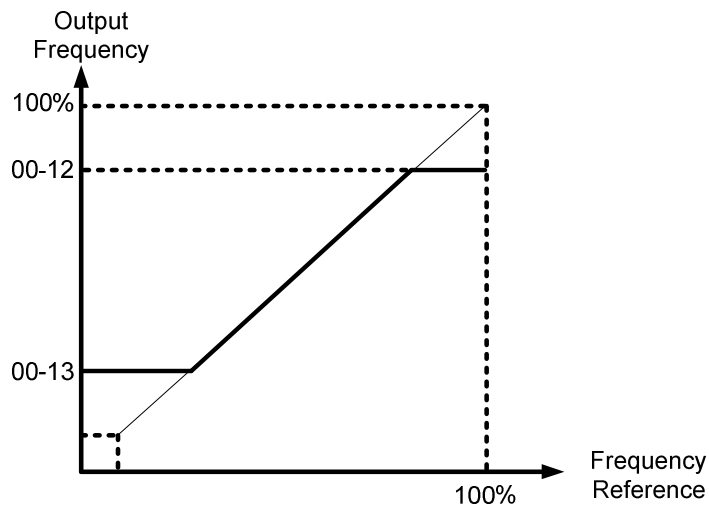


Figure 4.4.6 Frequency reference upper and lower limits

Note: The maximum frequency setting in the keypad is according to parameter 01-02 (Maximum Output Frequency) and 00-12 (Upper Frequency limit). The upper frequency limit is not over than 599Hz and AI frequency is 100% to parameter 01-02.

00-14	Acceleration time 1
Range	0.1~6000.0 Sec

00-15	Deceleration time 1
Range	0.1~6000.0 Sec

Acceleration time is the time required to accelerate from 0 to 100% of maximum output frequency.

Deceleration time is the time required to decelerate from 100 to 0% of maximum output frequency.

Motor 1: Maximum frequency is set by parameter 01-02 and Motor 2 Maximum frequency is set by parameter 01-16.

Note: Actual acceleration and deceleration times can be affected by the inverter driven load.

The default values for the acceleration, deceleration times are dependent on the inverter size.

Size		Acceleration / Deceleration Default Value
230V series	460V series	
1~10HP	1~15HP	10s
15~20HP	20~30HP	15s
30~150HP	40~425HP	20s

Size		Acceleration / Deceleration Default Value
575V series	1~3HP	
	5~10HP	20s
690V series	15~40HP	25s
	50~535HP	30s

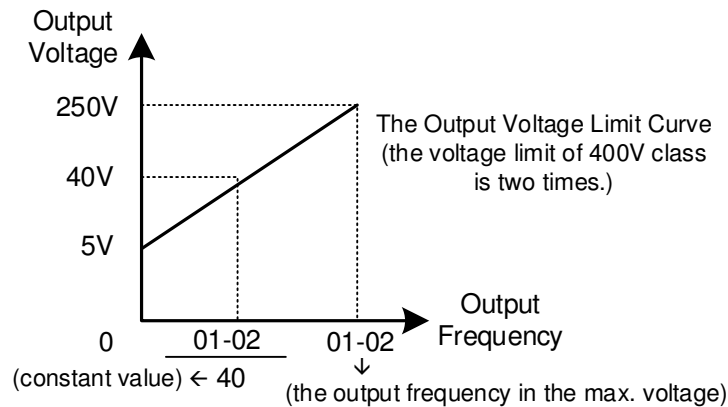
01-V/F Control Parameters

01-00	V/F curve selection
Range	0~FF

The V/F curve selection is enabled for V/F mode with or without PG or SLV2 mode. Make sure to set the inverter input voltage parameter 01-14.

There are three ways to set V/F curve:

- (1) 01-00 = 0 to E: choose any of the 15 predefined curves (0 to E).
- (2) 01-00 = 0F, use 01-02~01-09 and 01-12~01-13, with voltage limit.
- (3) 01-00 = FF: use 01-02~01-09 and 01-12~01-13, without voltage limit. Refer to the following figure.



The default parameters (01-02~01-09) are the same when 01-00 is set to F (default) and 01-00 is set to 1.

Parameters 01-02 to 01-13 are automatically set when any of the predefined V/F curves are selected.

Note: This parameter is not affected by the initialization parameter (13-08).

Consider the following items as the conditions for selecting a V/F pattern.

- (1) The voltage and frequency characteristic of motor.
- (2) The maximum speed of motor.

1 - 2HP V/F curve selection (460V)

Type	Specification	01-00	V/F curve	Type	Specification	01-00	V/F curve	
General application	50Hz	0		High Starting Torque†	Low Starting Torque	8		
		F (50Hz Default setting)	High Starting Torque		9			
	60Hz	1			Low Starting Torque	A		
		F (60Hz Default setting)	2			Low Starting Torque	B	
Variable Torque Characteristic	72Hz	3		Constant-power torque (Reducer)	90Hz	C		
	50Hz	Variable Torque 1	4			120Hz	D	
		Variable Torque 2	5			180Hz	E	
	60Hz	Variable Torque 3	6					
		Variable Torque 4	7					

3 - 30HP V/F curve selection (460V)

Type	Specification	01-00	V/F curve	Type	Specification	01-00	V/F curve	
General application	50Hz	0		High Starting Torque ⁺	Low Starting Torque	8		
		F (50Hz Default setting)	High Starting Torque		9			
	60Hz	1			Low Starting Torque	A		
		60Hz Saturati on	F (60Hz Default setting)		Low Starting Torque	B		
Variable Torque Characteristic	72Hz	3		Constant-power torque (Reducer)	90Hz	C		
		50Hz	4			120Hz	D	
	Variable Torque 1		5			180Hz	E	
	60Hz	6			Variable Torque 3	Variable Torque 2	6	7
		Variable Torque 4						

40HP and above V/F curve selection (460V)

Type	Specification	01-00	V/F curve	Type	Specification	01-00	V/F curve	
General application	50Hz	0		High Starting Torque ⁺	Low Starting Torque	8		
		F (50Hz Default setting)	High Starting Torque		9			
	60Hz	1			Low Starting Torque	A		
		F (60Hz Default setting)	2			Low Starting Torque	B	
Variable Torque Characteristic	72Hz	3		Constant-power torque (Reducer)	90Hz	C		
		50Hz	Variable Torque 1			4		120Hz
	Variable Torque 2		5			180Hz	E	
	60Hz	Variable Torque 3	6					
		Variable Torque 4	7					

01-02	Maximum output frequency of motor 1
Range	4.8~599.0 Hz

01-03	Maximum output voltage of motor 1
Range	200V: 0.1~255.0 V 400V: 0.2~510.0 V 575V: 0.1~670.0 V 690V: 0.1~804.0 V

01-04	Middle output frequency 2 of motor 1
Range	0.0~599.0 Hz

01-05	Middle output voltage 2 of motor 1
Range	200V: 0.0~255.0 V 400V: 0.0~510.0 V 575V: 0.0~670.0 V 690V: 0.0~804.0 V

01-06	Middle output frequency 1 of motor 1
Range	0.0~599.0 Hz

01-07	Middle output voltage 1 of motor 1
Range	200V: 0.0~255.0 V 400V: 0.0~510.0 V 575V: 0.0~670.0 V 690V: 0.0~804.0 V

01-08	Minimum output frequency of motor 1
Range	0.0~599.0 Hz

01-09	Minimum output voltage of the motor 1
Range	200V: 0.0~255.0 V 400V: 0.0~510.0 V 575V: 0.0~670.0 V 690V: 0.0~804.0 V

01-12	Base frequency of motor 1
Range	4.8~599.0 Hz

01-13	Base output voltage of motor 1
Range	200V: 0.0~255.0 V 400V: 0.0~510.0 V 575V: 0.0~670.0 V 690V: 0.0~804.0 V

V/F curve setting (01-02~01-09 and 01-12~01-13)

Select any of the predefined V/F curves setting '0' to 'E' that best matches your application and the load characteristic of your motor, choose a custom curve setting 'F' or 'FF' to set a custom curve.

Important:

Improper V/F curve selection can result in low motor torque or increased current due to excitation.

For low torque or high speed applications, the motor may overheat. Make sure to provide adequate cooling when operating the motor under these conditions for a longer period of time.

If the automatic torque boost function is enabled (parameter 01-10), the applied motor voltage will automatically change to provide adequate motor torque during start or operating at low frequency.

Custom V/F Curve Setting:

A custom curve selection allows users to set parameters 01-02 ~ 01-13 whereas a predefined curve selection does not.

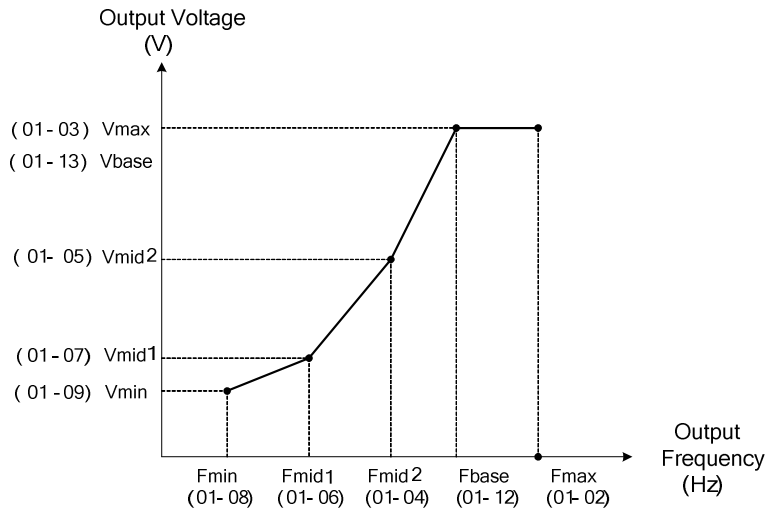


Figure 4.4.12 Custom V/F curve

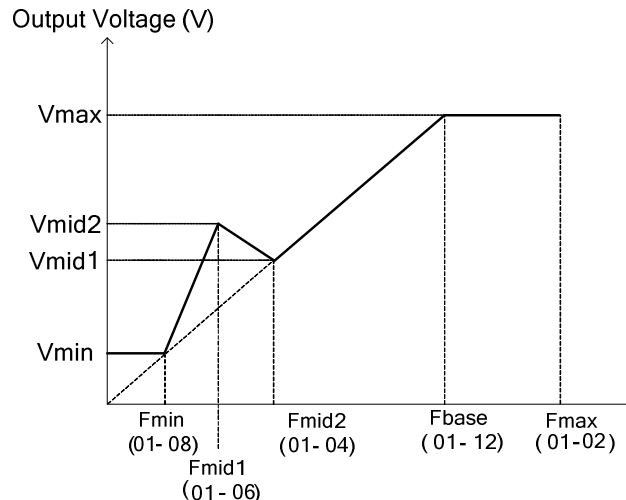


Figure 4.4.13 Torque boosting

When setting the frequency related parameters for a custom V/F curve values make sure that:

$$\begin{matrix} F_{\max} & \geq & F_{\text{base}} & > & F_{\text{mid2}} & > & F_{\text{mid1}} & > & F_{\min} \\ (01-02) & & (01-12) & & (01-04) & & (01-06) & & (01-08) \end{matrix}$$

The 'SE03' V/F curve tuning error is displayed when the frequency values are set incorrectly.

When 01-04 and 01-05 (or 01-18 and 01-19) are set to 0, the inverter ignores the set values of Fmid2 and Vmid2.

The voltage values for 01-02~01-09 are irrelevant.

The value for maximum output voltage of motor 1(01-03) and the value for base output voltage of motor 1(01-13) will depend on restore factory setting(13-08) to set the value of voltage.

When the control mode is changed parameter 00-00, 01-08 (F_{\min}) and 01-09 (V_{\min}) will automatically be changed to the default setting of the selected control mode.

SLV or SV Mode (Sensorless Vector or Sensor Vector Control)

Enter the motor data in parameter group 17 for SV and SLV control mode (00-00) and perform auto-tuning.

In the SV and SLV mode the V/F curve normally does not have to be re-adjusted after a successful auto-tune.

The maximum output frequency setting 01-02 (F_{\max}), base frequency 01-12 (F_{base}), minimum output frequency 01-08 (F_{\min}), maximum output voltage 01-03 (V_{\max}) or base output voltage 01-13 (V_{base}) can be adjusted but the voltage is automatically adjusted by the internal current controller.

Set the base frequency (01-12, F_{base}) to the motor rated frequency on the motor nameplate.

Perform the auto-tuning procedure after adjusting parameters 02-19 or 17-04 to reduce the voltage at no-load operation.

Motor jitter can be reduced by lowering the no-load voltage. Please note that lowering the no-load voltage increases the current at no-load.

*** The setting of V/F curve in SLV2 is the same as that in VF mode.**

02 - IM Motor Parameters

02- 00	No-load current of motor 1
Range	0.01~600.00 A
02- 01	Rated current of motor 1
Range	V/F and V/F+PG modes are 10%~200% of inverter's rated current. SLV, SV modes are 25%~200% of inverter's rated current.
02-03	Rated rotation speed of motor1
Range	0~60000 rpm
02- 04	Rated voltage of motor1
Range	200V: 50.0~240.0 V 400V: 100.0~480.0 V 575V: 150.0~670.0 V 690V: 200.0~804.0 V
02- 05	Rated power of motor 1
Range	0.01~600.00 KW
02-06	Rated frequency of motor 1
Range	4.8~599.0 Hz+
02-07	Pole of motor 1
Range	2~16

03- External Digital Input and Output Parameters

03-00	Multi-function terminal function setting – S1
03-01	Multi-function terminal function setting – S2
03-02	Multi-function terminal function setting – S3
03-03	Multi-function terminal function setting – S4
03-04	Multi-function terminal function setting – S5
03-05	Multi-function terminal function setting – S6
03-06	Multi-function terminal function setting – S7
03-07	Multi-function terminal function setting – S8
Range	<p>0: 2-Wire sequence (ON: Forward run command)</p> <p>1: 2-Wire sequence (ON: Reverse run command)</p> <p>2: Multi-speed/position setting command 1</p> <p>3: Multi-speed/position setting command 2</p> <p>4: Multi-speed/position setting command 3</p> <p>5: Multi-speed/position setting command 4</p> <p>6: Forward jog run command</p> <p>7: Reverse jog run command</p> <p>8: UP frequency increasing command</p> <p>9: DOWN frequency decreasing command</p> <p>10: Acceleration/deceleration time selection 1</p> <p>11: Inhibit Acceleration/deceleration Command</p> <p>12: Main/ Alternative Run Switch Function</p> <p>13: Main/ Alternative Frequency Switch Function</p> <p>14: Emergency stop (decelerate to zero and stop)</p> <p>15: External Baseblock Command(rotation freely to stop)</p> <p>16: PID control disable</p> <p>17: Fault reset (RESET)</p> <p>18: Reserved</p> <p>19: Speed Search 1 (from the maximum frequency)</p> <p>20: Manual energy saving function</p> <p>21: PID integral reset</p> <p>22~23: Reserved</p> <p>24: PLC input</p> <p>25: External fault</p> <p>26: 3-Wire sequence (Forward/Reverse command)</p> <p>27: Local/Remote selection</p> <p>28: Remote mode selection</p> <p>29: Jog frequency selection</p> <p>30: Acceleration/deceleration time selection 2</p> <p>31: Inverter overheating warning</p> <p>32: Sync command</p> <p>33: DC braking</p> <p>34: Speed Search 2 (from the frequency command)</p> <p>35: Time function input</p> <p>36: PID Soft start disabled</p> <p>37: Traversing operation</p> <p>38: Upper Deviation of traverse operation</p> <p>39: Lower Deviation of traverse operation</p>

- 40:** Switching between motor 1/motor 2
- 41:** PID Sleep
- 42:** PG disable
- 43:** PG integral reset
- 44:** Mode switching between speed and torque
- 45:** Negative torque command
- 46:** Zero-Servo Command
- 47:** Fire Mode (Forced Operation mode)
- 48:** KEB acceleration
- 49:** Parameter writing allowable
- 50:** Unattended Start Protection (USP)
- 51:** Mode switching between speed and position
- 52:** Multi Position Reference Enable
- 53:** 2-Wire Self Holding Mode (Stop Command)
- 54:** Reserved
- 55:** Reserved
- 56:** Reserved
- 57:** Reserved
- 58:** Safety Function
- 59:** Reserved
- 60:** Reserved
- 61:** Reserved
- 62:** EPS Function
- 63:** Reserved
- 64:** Reserved
- 65:** Short-circuit breaking
- 66:** PID Disabled 2
- 67:** Manual Pulse Generator Mode Switch
- 68:** External Fault 2
- 69:** External Overload

Refer to the multi-function digital input and related parameters in the following figure 4.4.16.

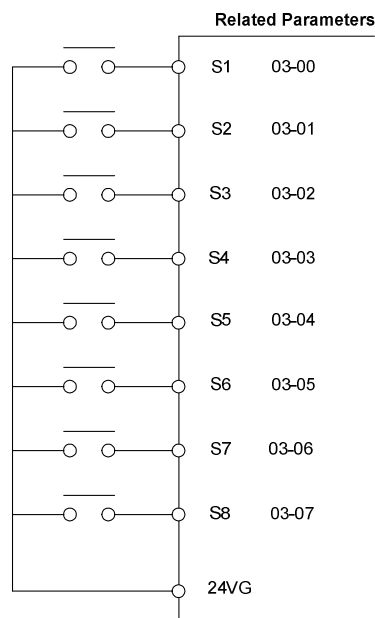


Figure 4.4.16 Multi-function digital input and related parameters

Table 4.4.27 Multi-function digital input setting (03-00 to 03-07) (“O”: Enable, “X”: Disable)

Value	Function		Description	Control mode						
	Name	LCD Display		V/F	V/F+PG	SLV	SV	PM SV	PM SLV	SLV 2
0	2-wire type (Forward operation)	2-Wire (FWD-RUN)	2- wire (ON : Forward operation command).	○	○	○	○	○	○	○
1	2-wire type (Reverse operation)	2-Wire (REV-RUN)	2- wire (ON : Reverse operation command).	○	○	○	○	○	○	○
2	Multi-speed/position setting command 1	Muti-Spd/Pos Ref 1	Multi-Speed Reference /Position Reference 1	○	○	○	○	○	○	○
3	Multi-speed/position setting command 2	Muti-Spd/Pos Ref 2	Multi-Speed Reference /Position Reference 2	○	○	○	○	○	○	○
4	Multi-speed/position setting command 3	Muti-Spd/Pos Ref 3	Multi-speed Reference /Position Reference 3	○	○	○	○	○	○	○
5	Multi-speed/position setting command 4	Muti-Spd/Pos Ref 4	Multi-speed Reference /Position Reference 4	○	○	○	○	○	○	○
6	Forward jog run command	FJOG	ON: Forward operation in jog mode (00-18).	○	○	○	○	○	○	○
7	Reverse jog run command	RJOG	ON: Reverse operation in jog mode (00-18).	○	○	○	○	○	○	○
8	UP frequency increasing command	UP command	ON: Command of output frequency increasing (only used by support of DOWN command).	○	○	○	○	○	○	○
9	DOWN frequency decreasing command	DOWN command	ON: Command of output frequency decreasing (only used by support of UP command).	○	○	○	○	○	○	○
10	Acceleration/deceleration time selection 1	Acc/Decel Time Selection 1	Acceleration/deceleration time selection command 1	○	○	○	○	○	○	○
11	Acceleration/deceleration Inhibition Command	ACC/DEC Inhibit	ON: Acceleration/ deceleration prohibition	○	○	○	○	○	○	○
12	Main/ Alternative Run Switch Function	Run Change Sel	Run Command Source is set in parameter of alternative frequency command (00-03)	○	○	○	○	○	○	○
13	Main/ Alternative Frequency Switch Function	Freq Change Sel	Frequency Command Source is set in parameter of alternative frequency command (00-06)	○	○	○	○	○	○	○
14	Emergency stop (decelerate to zero and stop)	E-Stop	ON: Emergency stop input	○	○	○	○	○	○	○
15	External baseblock command (rotation freely to stop)	Ext. BB	ON: Inverter base interdiction	○	○	○	○	○	○	○
16	PID control disabled	PID Disable	ON: PID control disabled	○	○	○	○	○	○	○
17	Fault reset	Fault Reset	Fault reset	○	○	○	○	○	○	○
18	Reserved	Reserved	Reserved	-	-	-	-	-	-	-
19	Speed Search 1 (from the maximum frequency)	Speed Search 1	ON: Search the speed from the maximum output frequency	○	○	○	○	○	X	○

Value	Function		Description	Control mode						
	Name	LCD Display		V/F	V/F+PG	SLV	SV	PM SV	PM SLV	SLV 2
20	Manual energy saving function	Energy saving	ON: Manual energy saving control is based on the settings of 11-12 and 11-18.	○	○	×	×	×	×	×
21	PID integral reset	PID I-Reset	ON: PID integral value reset	○	○	○	○	○	○	○
22	Reserved	Reserved	Reserved	-	-	-	-	-	-	-
23	Reserved	Reserved	Reserved	-	-	-	-	-	-	-
24	PLC input	PLC Input	ON: Digital PLC input	○	○	○	○	○	○	○
25	External fault	Ext. Fault	ON: External fault alarm	○	○	○	○	○	○	○
26	3-Wire sequence (Forward/Reverse command)	3-Wire (FWD/REV)	3-wire control (forward/reverse command). ON: Reverse; OFF: Forward. When the parameter is set to 26, terminal S1 and terminal will become operation command and stop command respectively, and their original functions will be closed.	○	○	○	○	○	○	○
27	Local/Remote selection	Local/Remote	ON: Local mode (via the digital operator) OFF: Frequency command and operation command will be determined according to the setting of parameter (00-02 and 00-05).	○	○	○	○	○	○	○
28	Remote mode selection	Remote Mode Sel	ON: RS-485 communication OFF: Control circuit terminal	○	○	○	○	○	○	○
29	Jog frequency Selection	JOG Freq sel	ON: Select jog frequency command	○	○	○	○	○	○	○
30	Acceleration/deceleration time selection 2	Acc/Decel Time Selection 2	Acceleration/ deceleration time selection command 2	○	○	○	○	○	○	○
31	Inverter overheating warning	Overheat Alarm	ON: Inverter overheat alarm (OH2) input (will display OH2)	○	○	○	○	○	○	○
32	Sync command	Sync Command	ON: Synchronous speed start OFF: Synchronous speed close (Start other frequency command).	○	○	○	○	○	○	○
33	DC braking	DC Brake Command	ON: Perform DC braking	○	○	○	○	×	×	○
34	Speed Search 2 (from the frequency command)	Speed Search 2	ON: Search speed from set frequency	○	○	○	○	×	○	○
35	Time function input	Time Input	.Set the time function at 03-33, 03-34 .Set the time function output at 03-11, 03-12	○	○	○	○	○	○	○
36	PID Soft start ineffective	PID SFS Disable	ON: PID slow-start off	○	○	○	○	○	○	○

Value	Function		Description	Control mode						
	Name	LCD Display		V/F	V/F+PG	SLV	SV	PM SV	PM SLV	SLV 2
37	Traversing operation	Wobble Run	ON: Frequency wobbling operation	○	○	×	×	×	×	○
38	Upper Deviation of traverse operation	Upper Dev Run	ON: Upper offset off frequency wobbling	○	○	×	×	×	×	○
39	Lower Deviation of traverse operation	Lower Dev Run	ON: Lower offset off frequency wobbling	○	○	×	×	×	×	○
40	Switching between motor 1/motor 2	Motor 2 Switch	ON: Start motor 2	○	○	○	○	○	○	○
41	PID Sleep	PID Sleep	ON: PID Sleep	○	○	○	○	○	○	○
42	PG disabled	PG disabled	ON: Speed control without PG	×	○	×	×	×	×	×
43	PG integral reset	I-Time Reset	ON: Integral value reset of speed control with PG	×	○	×	○	○	×	×
44	Mode switching between speed and torque	Speed/Torque change	ON: Torque control mode	×	×	×	○	○	×	×
45	Negative torque command	Reverse Tref	ON: Reverse external torque command	×	×	×	○	○	×	×
46	Zero-servo command	Zero-Servo	ON: Zero-servo operation	×	×	×	○	○	×	×
47	Fire Mode	Fire Mode	ON: Turn off hardware and software fault or alarm protection and run the inverter with value of 01-02 (a special application of HVAC)	○	○	○	○	○	○	○
48	KEB acceleration	KEB Accel.	ON: KEB acceleration start	○	○	×	×	×	×	○
49	Parameters writing allowable	Write Enabled	ON: all parameters are writable OFF: Except reference frequency (00-05) all parameters are write-protected.	○	○	○	○	○	○	○
50	Unattended Start Protection (USP)	USP	ON: After power is input, the inverter ignores the operation command OFF: After power is input, the inverter will return the operation status before power is cut off.	○	○	○	○	○	○	○
51	Mode switching between speed and position	Multi Pos. Switch	ON: Switch to position mode OFF: Switch to speed mode	×	×	×	○	○	×	×
52	Multi Position Reference Enable	Multi Pos. Enable	ON: Position reference is enabled. OFF: Position reference is disabled.	×	×	×	○	○	×	×
53	2-Wire Self Holding Mode (Stop Command)	2-Wire (STOP)	2-Wire Self Holding Mode (ON: Stop Command).	○	○	○	○	○	○	○
54	Reserved	Reserved	Reserved	-	-	-	-	-	-	-
55	Reserved	Reserved	Reserved	-	-	-	-	-	-	-

Value	Function		Description	Control mode						
	Name	LCD Display		V/F	V/F+PG	SLV	SV	PM SV	PM SLV	SLV 2
56	Reserved	Reserved	Reserved	-	-	-	-	-	-	-
57	Reserved	Reserved	Reserved	-	-	-	-	-	-	-
58	Safety Function	Safety Function	ON: Stop by the setting of 08-30	0	0	0	0	0	0	0
59	Reserved	Reserved	Reserved	-	-	-	-	-	-	-
60	Reserved	Reserved	Reserved	-	-	-	-	-	-	-
61	Reserved	Reserved	Reserved	-	-	-	-	-	-	-
62	EPS function	EPS Input	ON:EPS input	X	X	X	0	0	X	X
63	Reserved	Reserved	Reserved	-	-	-	-	-	-	-
64	Reserved	Reserved	Reserved	-	-	-	-	-	-	-
65	Short-circuit breaking	SC Brk	ON: SC Brk turn on	X	X	X	X	X	0	X
66	PID Disabled 2	PID Disable 2	ON: PID control function is disabled and the last frequency integral is remembered.	0	0	0	0	0	0	0
67	Manual Pulse Generator Mode Switch	HMPG Mode Switch	ON: in general mode, the frequency command is input from analog input AI1 OFF: Manual Pulse Generator Mode	0	X	X	X	X	X	X
68	External Fault 2	Ext. Fault 2	ON: the alarm of external Fault	0	0	0	0	0	0	0
69	External Overload	Ext. Overload	ON: the input of external overload	0	0	0	0	0	0	0

03-0X =00: 2-wire control: forward operation

03-0X =01: 2-wire control: reverse operation. Refer to the 2-wire operation mode in Figure 4.4.1.

03-0X =02: Multi-speed/position setting command 1.

03-0X =03: Multi-speed/position setting command 2.

03-0X =04: Multi-speed/position setting command 3.

03-0X =05: Multi-speed/position setting command 4 (setting =05).

Select frequency reference using multi-function digital input..

03-0X =29: Jog frequency selection (setting =29). Select frequency reference using the multi-function digital input. In SV or PMSV mode (00-00=3, 4), with 03-00~07 set to 51, multi-speed command can be used to select multiple segment positions.

Table 4.4.28 Multi-speed operation selection

Speed	Multi-function digital input (S1 to S8)					Frequency selection
	Jog frequency reference	Multi-speed frequency 4	Multi-speed frequency 3	Multi-speed frequency 2	Multi-speed frequency 1	
1	0	0	0	0	0	Frequency command 0(05-01) or main speed frequency *2
2	0	0	0	0	1	Auxiliary speed frequency (04-05 = 0) or frequency reference 1 (05-02) *3
3	0	0	0	1	0	Frequency command 2 (05-03)
4	0	0	0	1	1	Frequency command 3 (05-04)
5	0	0	1	0	0	Frequency command 4 (05-05)
6	0	0	1	0	1	Frequency command 5 (05-06)
7	0	0	1	1	0	Frequency command 6 (05-07)
8	0	0	1	1	1	Frequency command 7 (05-08)
9	0	1	0	0	0	Frequency command 8 (05-09)
10	0	1	0	0	1	Frequency command 9 (05-10)
11	0	1	0	1	0	Frequency command 10(05-11)
12	0	1	0	1	1	Frequency command 11 (05-12)
13	0	1	1	0	0	Frequency command 12 (05-13)
14	0	1	1	0	1	Frequency command 13(05-14)
15	0	1	1	1	0	Frequency command 14 (05-15)
16	0	1	1	1	1	Frequency command 15 (05-16)
17	1 *1	—	—	—	—	Jog frequency command (00-18)

0: OFF, 1: ON, -: Ignore

*1. Jog frequency terminal has a higher priority than multi-speed reference 1 to 4.

*2. When parameter 00-05=0 (frequency reference input = digital operator), multi-speed frequency 1 will be set by 05-01 frequency reference setting1). When parameter 00-05=1 (frequency reference input=control circuit terminal), multi-speed frequency command 1 is input through analog command terminal AI1 or AI2).

*3. Default setting of analog input (AI2) is auxiliary frequency. When 04-05≠0, multi-speed frequency reference is set by 05-02. When PID control mode 10-03=xxx1b (PID Enable), even though 03-00~03-07=16 (PID Control Disable), the auxiliary frequency cannot be switched.

Wiring Example: Figure 4.4.17 and 4.4.18 show an example of a 9-speed operation selection.

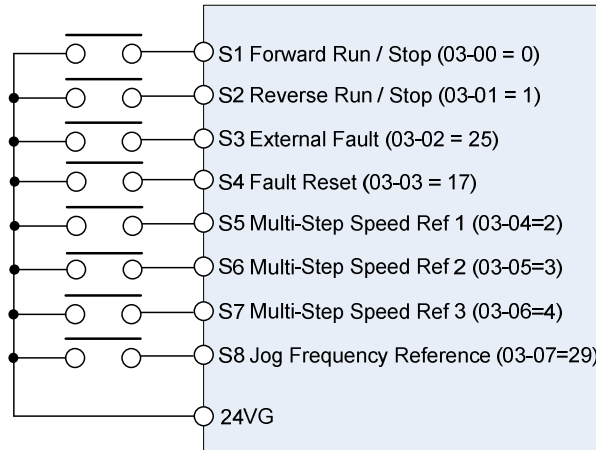


Figure 4.4.17 Control Terminal Wiring Example

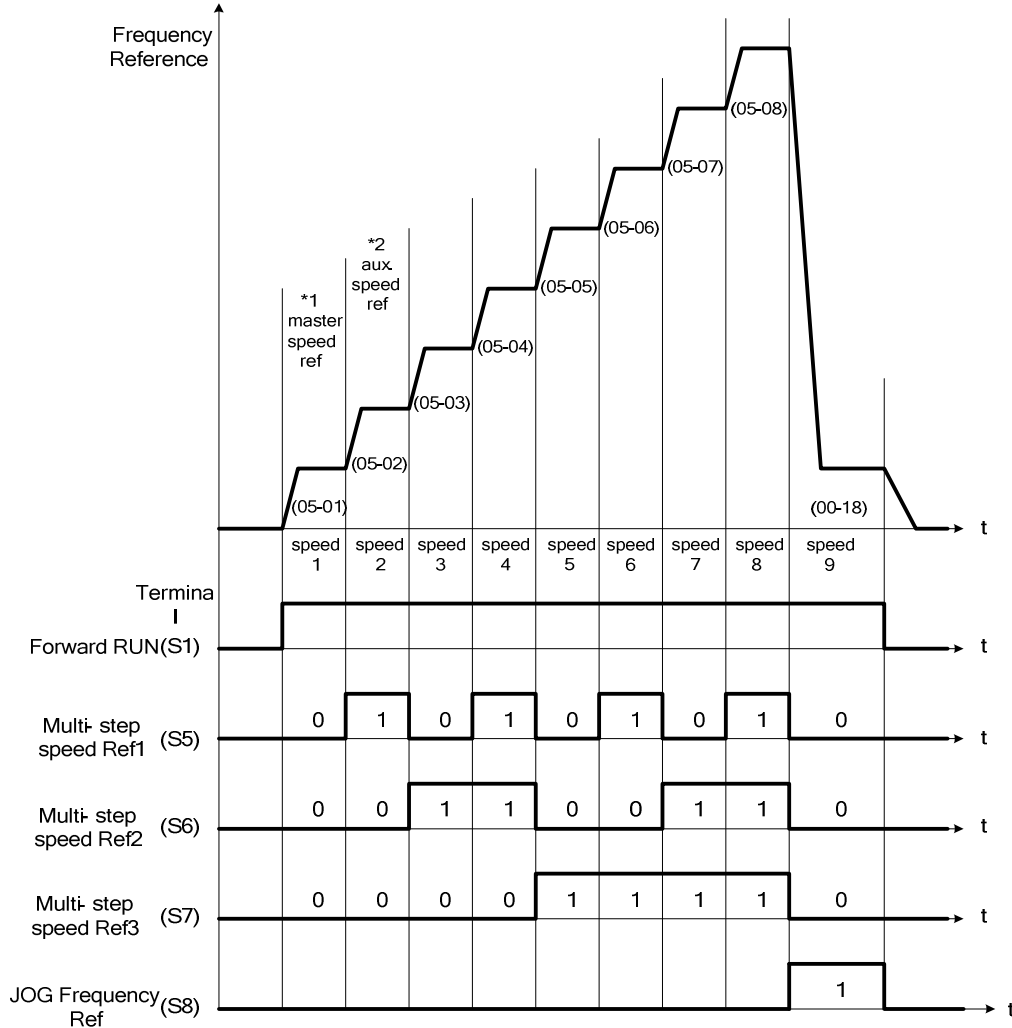


Figure 4.4.18: 9-speed timing diagram

*1. When 00-05=1, multi-speed frequency reference is set by analog input AI1 or AI2. When 00-05=0, multi-speed frequency reference is set by 05-01.

*2. When 04-05=0, multi-speed frequency reference is set by Auxiliary frequency (AI2). When 04-05≠0,

multi-speed frequency reference is set by 05-02.

03-0X =06: Forward jog run command, uses jog frequency parameter 00-18.

Note:

- Jog command has a higher priority than other frequency reference commands.
- Jog command uses stop mode set in parameter 07-09 when Jog command is active > 500ms.

03-0X =07: Reverse jog run command, uses jog frequency parameter 00-18.

Note:

- Jog command has a higher priority than other frequency reference commands.
- Jog command uses stop mode set in parameter 07-09 when Jog command is active > 500ms.

03-0X =12: Main/ Alternative Run Switch Function

When function terminals conduct, run command source is set in alternative run command (00-03). When functional terminal is set to 27 (Local/ Remote control selection), it will be precedential to main/alternative run switch.

03-0X =13: Main/ Alternative Frequency Switch Function

When function terminals conduct, frequency command source is set in alternative frequency command (00-06). When functional terminal is set to 27 (Local/ Remote control selection), it will be precedential to main/alternative frequency switch. When PID function is active(10-03=XXX1B),this function is invalid and main frequency is switched to PID function. When PID function is invalid, Main/ Alternative frequency switch function is valid then.

03-0X =14: Emergency stop (decelerate to zero and stop)

Refer to the "deceleration time of emergency stop" of parameter 00-26

03-0X =15: External Baseblock Command (coast to stop)

Execute the base block command by the use of ON / OFF way of multi-function digital input terminal, and prohibit the inverter output.

During run: When an external base block command is activated, the keypad displays "BBn BaseBlock (Sn)", indicating the inverter output is turned off (n indicates the digital input number 1 – 8). Upon removing the base block signal, the motor will run at the frequency reference. If speed search from frequency reference is active the inverter output frequency starts from the frequency reference and searches for the coasting motor speed and continue to operate. If speed search is not active the output frequency starts at 0Hz.

During deceleration: When an external base block command is activated, the keypad displays "BBn BaseBlock (Sn)", indicating the inverter output is turned off (n indicates the digital input number 1 – 8). Upon removing the base block signal, the motor is stopped or will coast to a stop and the inverter will remains in the stop condition.

During acceleration: When an external base block command is activated, the keypad displays "BBn BaseBlock (Sn)", indicating the inverter output is turned off (n indicates the digital input number 1 – 8). Upon removing the base block signal, the motor will run at the frequency reference. If speed search from frequency reference is active the inverter output frequency starts from the frequency reference and searches for the coasting motor speed and continue to operate. If speed search is not active the output frequency starts at 0Hz.

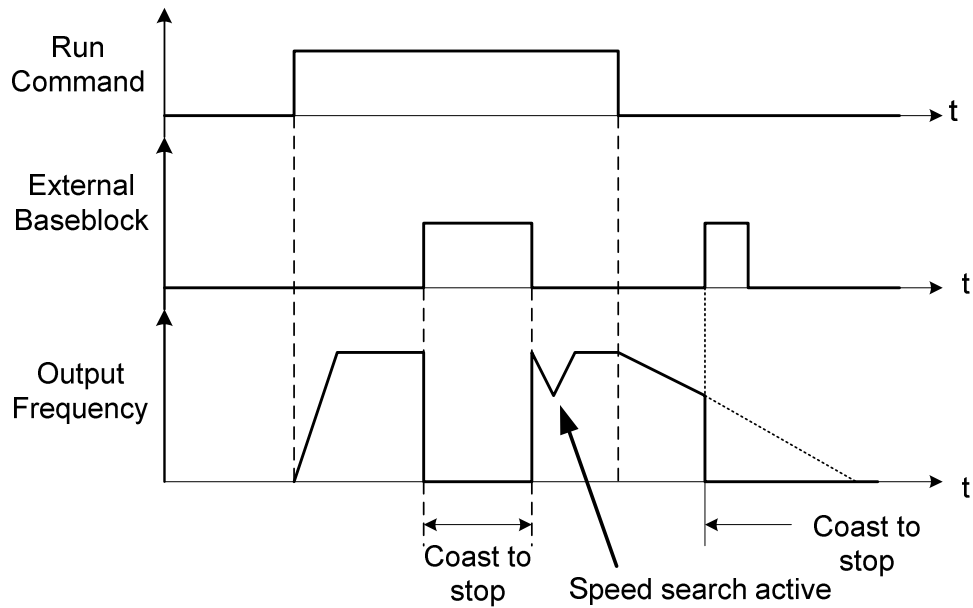


Figure 4.4.22 External base block operation

03-09	Multi-function terminal S1-S4 type selection			
Range	xxx0b: S1 A contact	xxx1b: S1 B contact		
	xx0xb: S2 A contact	xx1xb: S2 B contact		
	x0xxb: S3 A contact	x1xxb: S3 B contact		
	0xxxb: S4 A contact	1xxxb: S4 B contact		
03-10	Multi-function terminal S5-S8 type selection			
Range	xxx0b: S5 A contact	xxx1b: S5 B contact		
	xx0xb: S6 A contact	xx1xb: S6 B contact		
	x0xxb: S7 A contact	x1xxb: S7 B contact		
	0xxxb: S8 A contact	1xxxb: S8 B contact		

Parameter 03-09 and 03-10 selects the digital input type between a normally open and a normally closed switch/contact.

Each bit of 03-09/03-10 presents an input :

03-09= 0 0 0 0 0: normally open switch
 s4 s3 s2 s1 1: normally close switch

03-10= 0 0 0 0 0: normally open switch
 s8 s7 s6 s5 1: normally close switch

Example: S1 and S2 wired to a normally closed contact / switch set 03-09=0011.



Do not set the operation command parameter 00-02 to terminal control before setting the digital input type. Failure to comply may cause death or serious injury.

03-11	Relay (R1A-R1C) output
03-12	Relay (R2A-R2C) output
Range	0: During Running 1: Fault contact output 2: Frequency Agree 3: Setting Frequency Agree (03-13 ± 03-14) 4: Frequency detection 1 (> 03-13, hysteresis range is the setting value of 03-14) 5: Frequency detection 2 (< 03-13, hysteresis range is the setting value of 03-14) 6: Automatic restart 7~8: Reserved 9: Baseblock 10~11: Reserved 12: Over-Torque Detection 13: Current Agree 14: Mechanical Braking Control (03-17~18) 15~17: Reserved 18: PLC status 19: PLC control contact 20: zero speed 21: Inverter Ready 22: Undervoltage Detected 23: Source of operation command 24: Source of frequency command 25: Low torque detected 26: Frequency reference missing 27: Time function output 28: Traverse operation UP status 29: During Traverse operation status 30: Motor 2 selection 31: Zero Speed Servo Status (Position Mode) 32: Communication control contacts 33~36: Reserved 37: PID feedback loss detection output 38: Brake release 39: Frequency Detection 1 (dedicated for Crane) 40: Frequency Output 41: Position Agree (Position Mode) 42~44: Reserved 45: PID sleep 46~49: Reserved 50: Frequency Detection 3 (\geq 03-44+03-45) 51: Frequency Detection 4 (\leq 03-44+03-45) 52: Frequency Detection 5 (\geq 03-46+03-47) 53: Frequency Detection 6 (\leq 03-46+03-47) 54: Turn on short-circuit braking 57: Low Current Detection

58: Frequency Deceleration Detection
 59: Over-Temperature Detection

Note: For frame 1, the DO2 function is setting by 03-12.

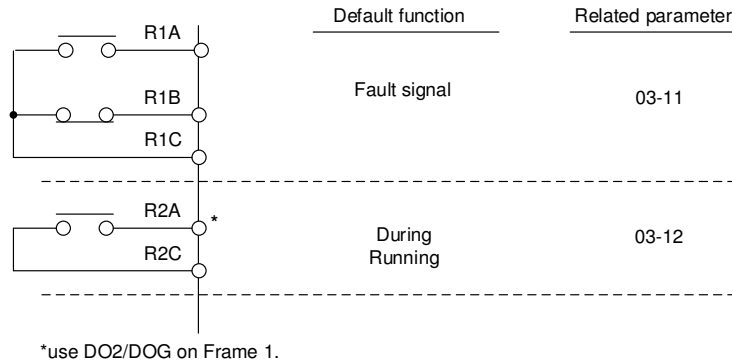


Figure 4.4.25 Multi-function digital output and related parameters

- The following table is the parameter setting in the control board and optical coupler.

Terminal	Frame 1 (U Type)	Frame 2 and above (for U Type) All frame (for UE Type)
R1A-R1C	03-11=R1A-R1C	03-11=R1A-R1C
R2A-R2C	none	03-12=R2A-R2C
D02(PH2)	03-12=D02(PH2)	none
D01(PH1)	03-28=D01(PH1)	03-28=D01(PH1)

Table 4.4.29 Function table of multi-function digital output

Setting	Function		Contents	Control mode						
	Name	LCD display		V/F	V/F + PG	SLV	SV	PM SV	PM SLV	SLV 2
0	During Running	Running	ON: During running (Run Command is ON)	○	○	○	○	○	○	○
1	Fault contact output	Fault	ON: Fault contact output (except CF00 and CF01)	○	○	○	○	○	○	○
2	Frequency agree	Freq. Agree	ON: frequency agree (frequency agree width detection is set by 03-14)	○	○	○	○	○	○	○
3	Setting frequency agree	Setting Freq Agree	ON: Output frequency = allowed frequency detection level (03-13) ± frequency bandwidth (03-14)	○	○	○	○	○	○	○
4	Frequency detection 1 (> 03-13)	Freq. Detect 1	ON: Output frequency > 03-13 Hysteresis range is 03-14	○	○	○	○	○	○	○
5	Frequency detection 2 (< 03-13)	Freq. Detect 2	OFF: Output frequency > 03-13, Hysteresis range is 03-14	○	○	○	○	○	○	○
6	Automatic restart	Auto Restart	ON: the period of automatic restart	○	○	○	○	○	○	○
7	Reserved	Reserved	Reserved	-	-	-	-	-	-	-

Setting	Function		Contents	Control mode						
	Name	LCD display		V/F	V/F + PG	SLV	SV	PM SV	PM SLV	SLV 2
8	Reserved	Reserved	Reserved	-	-	-	-	-	-	-
9	Baseblock	Baseblock	ON: During baseblock	○	○	○	○	○	○	○
10	Reserved	Reserved	Reserved	-	-	-	-	-	-	-
11	Reserved	Reserved	Reserved	-	-	-	-	-	-	-
12	Over-Torque Detection	Over Torque	ON: Over torque detection is ON	○	○	○	○	○	○	○
13	Current Agree	Current Agree	ON: when output current > 03-15 is ON	○	○	○	○	○	○	○
14	Mechanical Braking Control (03-17~18)	Mechanical Brake Control	ON: Mechanical braking release frequency OFF: Mechanical braking run frequency	○	○	○	○	○	○	○
15	Reserved	Reserved	Reserved	-	-	-	-	-	-	-
16	Reserved	Reserved	Reserved	-	-	-	-	-	-	-
17	Reserved	Reserved	Reserved	-	-	-	-	-	-	-
18	PLC status	PLC statement	ON: when 00-02 is set to 3 (PLC operation command source)	○	○	○	○	○	○	○
19	PLC control contact	Control From PLC	ON: Control from PLC	○	○	○	○	○	○	○
20	Zero speed	Zero Speed	ON: Output frequency < Minimum output frequency (Fmin)	○	○	○	○	○	○	○
21	Inverter Ready	Ready	ON: Inverter ready (after power on, no faults)	○	○	○	○	○	○	○
22	Undervoltage Detection	Low Volt Detected	ON: DC bus voltage = < Low-voltage warning detection level (07-13)	○	○	○	○	○	○	○
23	Source of operation command	Run Cmd Status	ON: operation command from LED digital operator (local mode)	○	○	○	○	○	○	○
24	Source of reference command	Freq Ref Status	ON: reference frequency from LED digital operator (local mode)	○	○	○	○	○	○	○
25	Low torque detected	Under Torque	ON: Low-torque detection is ON	○	○	○	○	○	○	○
26	Frequency reference missing	Ref. Loss.	ON: Reference frequency loss	○	○	○	○	○	○	○
27	Timing function output	Time Output	Set time function parameter to 03-33 and 03-34 , and the time function input is set by parameter from 03-00 and 03-07	○	○	○	○	○	○	○
28	Traverse operation UP Status	Traverse UP	ON: in acceleration period (when the wobbling is in operating)	○	○	X	X	X	X	○
29	During Traverse operation status	During Traverse	ON: In the period of frequency wobbling operation (when the wobbling is in operating)	○	○	X	X	X	X	○
30	Select motor 2	Motor 2 Selection	ON: Switch to motor 2	○	○	○	○	○	○	○

Setting	Function		Contents	Control mode						
	Name	LCD display		V/F	V/F + PG	SLV	SV	PM SV	PM SLV	SLV 2
31	Zero Speed Servo Status (Position Mode)	Zero Servo	ON: Zero servo function is active	X	X	X	O	O	X	X
32	Communication control contacts	Control From Communication	ON: Communication control contacts (location:2507H).	O	O	O	O	O	O	O
33	Reserved	Reserved	Reserved	-	-	-	-	-	-	-
34	Reserved	Reserved	Reserved	-	-	-	-	-	-	-
35	Reserved	Reserved.	Reserved	-	-	-	-	-	-	-
36	Reserved	Reserved	Reserved	-	-	-	-	-	-	-
37	PID Feedback Loss Detection Output	PID Fbk Loss	ON: PID Feedback Loss	O	O	O	O	O	O	O
38	Break Release	Brake Release	ON: Release Brake	X	X	O	O	O	X	X
39	Frequency Detection 1 (dedicated for Crane)	Freq. Detect 1 (Dedicated crane)	ON: Output frequency > 03-13, Hysteresis range : 03-14	O	O	O	X	X	X	X
40	Frequency Output	Frequency output Ing	ON: Inverter status is at DC brake, Base Block or stop.	X	X	X	O	X	X	X
42	Reserved	Reserved	Reserved	-	-	-	-	-	-	-
43	Reserved	Reserved	Reserved	-	-	-	-	-	-	-
44	Reserved	Reserved	Reserved	-	-	-	-	-	-	-
45	PID sleep	PID Sleep	ON: During PID Sleep	O	O	X	X	X	X	X
46	Reserved	Reserved	Reserved	-	-	-	-	-	-	-
47	Reserved	Reserved	Reserved	-	-	-	-	-	-	-
48	Reserved	Reserved	Reserved	-	-	-	-	-	-	-
49	Reserved	Reserved	Reserved	-	-	-	-	-	-	-
50	Frequency Detection 3	Freq. Detect 3	ON: output frequency > 03-44, Hysteresis range :03-45	O	O	O	O	O	O	O
51	Frequency Detection 4	Freq. Detect 4	OFF: output frequency > 03-44, Hysteresis range :03-45	O	O	O	O	O	O	O
52	Frequency Detection 5	Freq. Detect 5	ON: output frequency > 03-46, Hysteresis range :03-47	O	O	O	O	O	O	O
53	Frequency Detection 6	Freq. Detect 6	OFF: output frequency > 03-46, Hysteresis range :03-47	O	O	O	O	O	O	O
54	Turn on short-circuit braking	SC Brk	ON: Turn on short-circuit braking	X	X	X	X	X	O	X
57	Low Current Detection	Low Current Detect	ON: Output Current \leq 03-48 Low current detection level	O	O	O	O	O	O	O
58	Frequency Deceleration Detection	Freq. Decel to	ON: Output Frequency < Frequency Command – parameter 03-14 in deceleration	O	O	O	O	O	O	O

Setting	Function		Contents	Control mode						
	Name	LCD display		V/F	V/F + PG	SLV	SV	PM SV	PM SLV	SLV 2
59	Over-Temperature Detection	OH Detect	ON: Heat Sink Temperature >08-46, hysteresis Zone 08-47	○	○	○	○	○	○	○

04-External Analog Input / Output Parameter

04-00	AI input signal type
Range	0: AI1: 0~10V AI2: 0~10V 1: AI1: 0~10V AI2: 4~20mA 2: AI1: -10~10V AI2: 0~10V 3: AI1: -10~10V AI2: 4~20mA 4: AI1: 4~20mA AI2: 0~10V 5: AI1: 4~20mA AI2: 4~20mA
04-01	AI1 signal scanning and filtering time
Range	0.00~2.00 Sec
04-02	AI1 gain
Range	0.0~1000.0%
04-03	AI1 bias
Range	-100~100.0%
04-04	AI negative characteristics
Range	【0】 : Disable 【1】 : Enable

Refer to the followings for 04-00 AI input signal type:

(For standard U type)

If AI1 is 0~10V, set parameter 04-00 to 0 or 1.

If AI1 is -10~10V, set parameter 04-00 to 2 or 3.

If AI2 is 0~10V, set parameter 04-00 to 0 or 2 and tune SW2 on the control board to V.

If AI2 is 4~20mA, set parameter 04-00 to 1 or 3, tune SW2 on the control board to I.

(For enhanced UE type)

If AI1 is 0~10V, set parameter 04-00 to 0 or 1, and tune SW3 on the control board to V.

If AI1 is -10~10V, set parameter 04-00 to 2 or 3, and tune SW3 on the control board to V.

If AI1 is 4~20mA, set parameter 04-00 to 4 or 5, and tune SW3 on the control board to I.

If AI2 is 0~10V, set parameter 04-00 to 0 or 2 or 4, and tune SW4 on the control board to V.

If AI2 is 4~20mA, set parameter 04-00 to 1 or 3 or 5, tune SW4 on the control board to I.

(1) Analog Input Level Adjustment AI1, AI2 (04-02, 04-03, 04-04, 04-07, 04-08)

Each analog input AI1 and AI2 has a separate gain and bias parameter associated with it.

Analog input signal AI1 can be adjusted with parameter 04-02 and 04-03; Analog input signal AI2 can be adjusted with parameter 04-07 and 04-08. Refer to Figure 4.4.35.

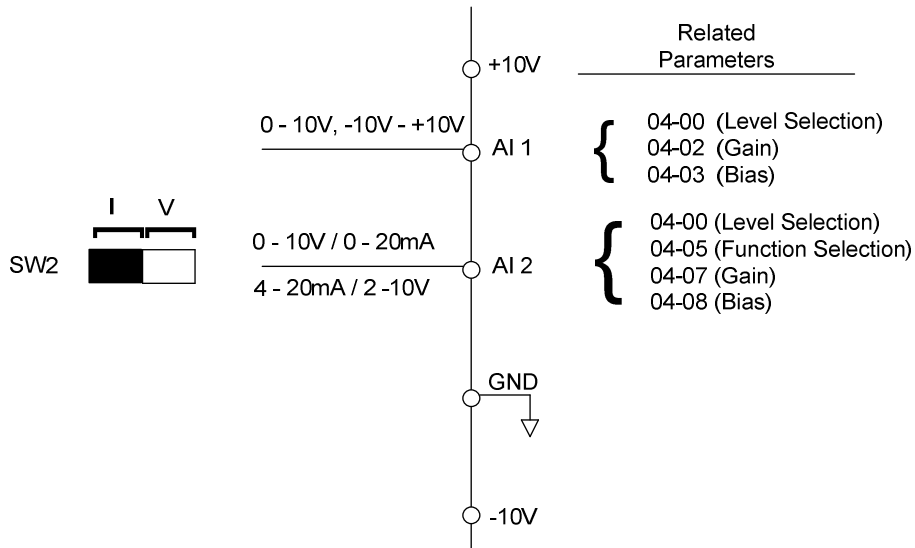


Figure 4.4.35 Analog inputs and related parameters (for Standard U type)

Gain setting: Sets the level in % that corresponds to a 10V, -10V or 20mA signal at the analog input.

(Set the maximum output frequency 01-02 to 100 %)

Bias setting: Sets the level in % that corresponds to a 0V or 4mA signal at the analog input.

(Set the maximum output frequency 01-02 to 100%)

Use both gain and bias setting to scale the input signal.

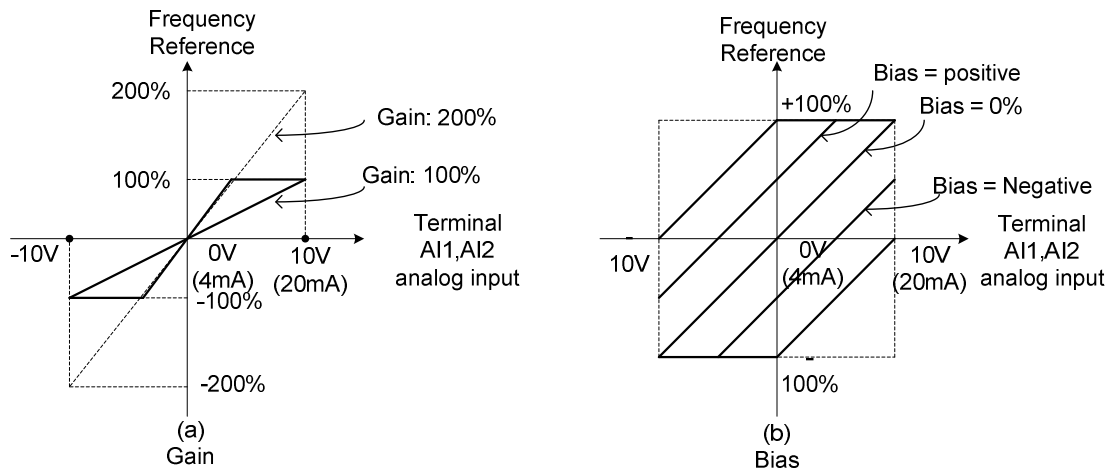
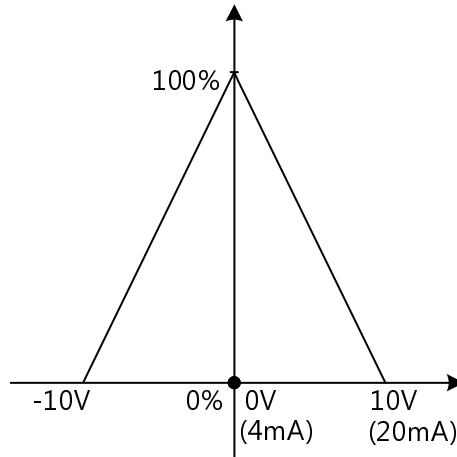


Figure 4.4.36 Gain and bias operations (for frequency reference signal)

04-04 (AI negative characteristics)

Through the following figure negative characteristics diagram find out the AI Input 10V, -10V, or 20mA input relative frequency reference to be used for the ratio of maximum output frequency (set the maximum output frequency 01-02 to 100%), the ratio will be presented in reverse.



04-11	AO1 function Setting
Range	<ul style="list-style-type: none"> 0: Output frequency 1: Frequency command 2: Output voltage 3: DC voltage 4: Output current 5: Output power 6: Motor speed 7: Output power factor 8: AI1 input 9: AI2 input 10: Torque command 11: q -axis current 12: d-axis current 13: Speed deviation 14: Reserved 15: ASR output 16: Reserved 17: q-axis voltage 18: d-axis voltage 19~20: Reserved 21: PID input 22: PID output 23: PID target value 24: PID feedback value 25: Output frequency of the soft starter 26: PG feedback 27: Reserved

	28: Communication control
04-12	AO1 gain
Range	0.0~1000.0%
04-13	AO1 bias
Range	-100.0~100.0%
04-16	AO2 function setting
Range	See parameter 04-11
04-17	AO2 gain
Range	0.0~1000.0%
04-18	AO2 bias
Range	-100.0~100.0%

For the analog output and related parameters, refer to figure 4.4.50.

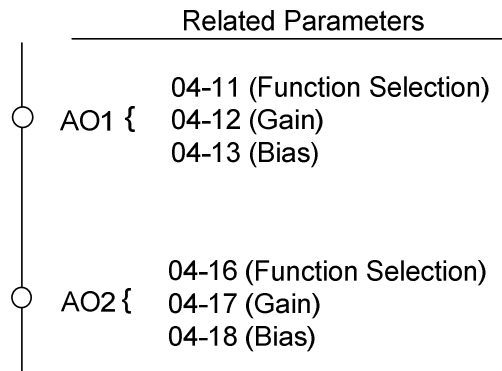


Figure 4.4.50 Analog outputs and related parameters

Analog output AO1 and AO2 adjustment (04-12, 04-13 and 04-17, 04-18)

Signal: Use parameter 04-11 to select the analog output signal for AO1 and parameter 04-16 to select the analog output signal for AO2.

Gain: Use parameter 04-12 to adjust the gain for AO1 and parameter 04-17 to adjust the gain for AO2. Adjust the gain so that the analog output (10V/20mA) matches 100% of the selected analog output signal (04-11 for AO1 and 04-16 for AO2).

Bias: Use parameter 04-13 to adjust the bias for AO1 and parameter 04-18 to adjust the bias for AO2. Adjust the bias so that the analog output (0V/4mA) matches 0% of the selected analog output signal (04-11 for AO1 and 04-16 for AO2).

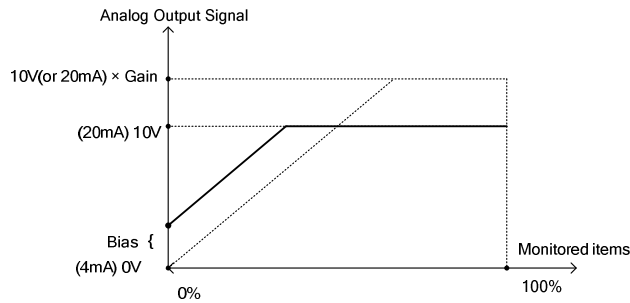


Figure 4.4.51 Analog output level adjustment

04-19	AO output signal type
Range	【0】 : AO1 0~10V; AO2 0~10V 【1】 : AO1 0~10V; AO2 4~20mA 【2】 : AO1 4~20mA; AO2 0~10V (For UE type) 【3】 : AO1 4~20mA; AO2 4~20mA (For UE type)

- For standard U type:

It is required to be with the setting of SW6 on the control board when AO2 analog output signal is active.
 When 04-19=0 (AO2 is 0~10V) and SW6 on the control board is V, AO2 output signal type is voltage.
 When 04-19=1 (AO2 is 4~20mA and SW6 on the control board is I, AO2 output signal type is current.

- For UE type:

It is required to be with the setting of SW1 and SW2 on the control board when AO1 and AO2 analog output signals are active.

When 04-19=0, AO1 is 0~10V, and SW1 on the control board is V, AO1 output signal type is voltage.

AO2 is 0~10V, and SW2 on the control board is V, AO2 output signal type is voltage.

When 04-19=1, AO1 is 0~10V, and SW1 on the control board is V, AO1 output signal type is voltage.

AO2 is 4~20mA, and SW2 on the control board is I, AO2 output signal type is current.

When 04-19=2, AO1 is 4~20mA, and SW1 on the control board is I, AO1 output signal type is current.

AO2 is 0~10V, and SW2 on the control board is V, AO2 output signal type is voltage.

When 04-19=3, AO1 is 4~20mA, and SW1 on the control board is I, AO1 output signal type is current.

AO2 is 4~20mA, and SW2 on the control board is I, AO2 output signal type is current.

07- Start/Stop Parameters

07-00	Momentary Power Loss/Fault Restart Selection
Range	0: Disable 1: Enable

07-00=0: Inverter trips on “UV” fault if power loss time is greater than 8ms.

07-00=1: Inverter restarts after restarting the power at the momentary power loss.

Note: When 07-00=1, inverter restore automatically the motor rotation after restarting the power even if momentary power loss occurs.

07-01	Fault reset time
Range	0~7200 Sec

Restart time of momentary power loss is the same as Fault reset time.

07-01 <07-18: Automatic restart time interval is set by minimum baseblock time (07-18).

07-01 > 07-18: Automatic restart time interval is set by fault reset time (07-01).

Note:

Automatic restart time interval is time of 07-18 plus 07-01 and delay time of speed search (07-22).

Refer to Figure 4.4.55 for automatic restart interval.

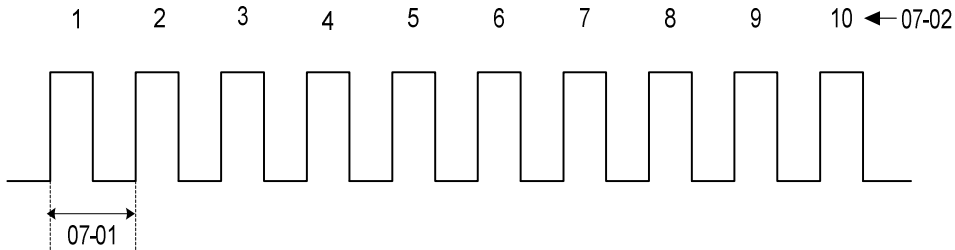


Figure 4.4.55 Automatic restart interval

07-02	Number of restart attempts
Range	0~10

If numbers of fault reset reaches the setting value of 07-02, then inverter stops running. So manual to restart the inverter after eliminating fault causes.

When the automatic restart function is enabled the internal automatic restart attempt counter is reset based on the following actions:

- a) No fault occurs in 10 minutes or longer after the automatic restart
- b) Reset command to clear fault via input terminal or using the keypad (ex: press reset/ ◀ key)
- c) Power to the inverter is turned off and back on again

Note:

Multi-function digital output R1A-R1C, R2A-R2C, or optocoupler output can be programmed to activate during an automatic reset attempt, refer to parameter 03-11, 03-12 and 03-28.

Automatic restart operation:

- a) Fault is detected. The inverter turn off the output, displays the fault on the keypad and waits for the minimum baseblock time parameter 07-18 to expire before accepting another run / automatic restart command.
- b) After the minimum baseblock time (07-18) and delay time of speed search have expired, the active fault is reset and a speed search operation is performed. The time between each fault restart attempt is set by parameter 07-01.
- c) When the total number of restart attempts exceed the number of automatic restart attempts set in parameter 07-02, the inverter will turn off the output and the fault contact is activated.

Please refer to Figure 4.4.56 for the automatic restart operation.

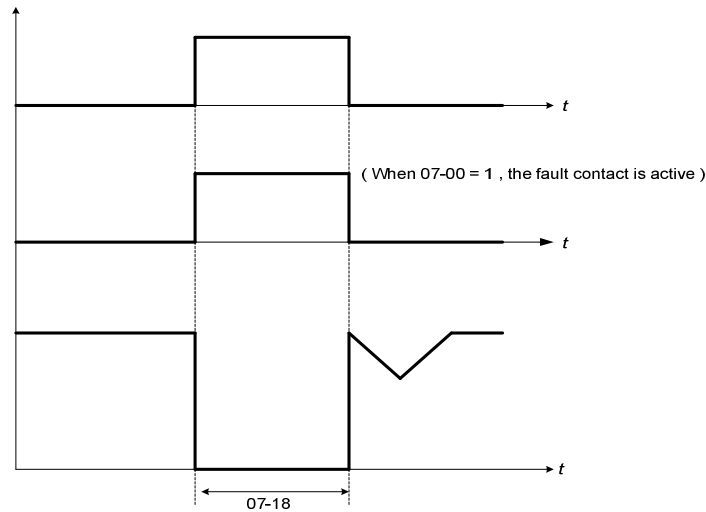


Figure 4.4.56 Auto-restart operation.

The automatic restart function is active for the following faults. Please note that when the fault is not listed in the table the inverter will not attempt an automatic restart.

Parameter Name	Faults	Numbers of Restart
07-00	UV (under voltage)	Unlimited
07-01	OC (over current) OCA (over current in ACC.) OCC (over current in constant speed)	Depend on parameter 07-02
07-02	OCd (over current in DEC) OL1 (motor overload) UT (Under torque detection) IPL (input phase loss)	
	GF (ground failure) OV (overvoltage) OL2 (Inverter overload) OT (Over-torque detection) OPL (Output phase loss) CF07 (SLV motor control setting fault) CF08 (PMSLV motor control setting fault)	

Notes:

1. Fault restart function contains momentary power loss restart and auto reset restart.
2. Refer to chapter 10 for the details of troubleshooting and fault diagnostics.
3. Refer to speed search function (07-19~07-24) for the selection of speed search modes.

Note:

Automatic restart function is only active in the state of no harm to the safety or to the application devices.

Warning - Excessively use of the automatic restart function will damage the inverter.

07-04	Direct Start at Power on
Range	【0】 : When the external run command is enabled, direct start at power up 【1】 : When the external run command is enabled, unable to direct start at power-up.

07-04=0,

If operation switch is conducted at power up, the inverter will start automatically.

07-04=1,

If operation switch is not conducted at power up, the inverter is not able to start and the warning signal of STP1 flashes. It is required to turn off the operation switch first, and then make it be conducted to start the inverter.

07-05	Delay of Direct Start at Power on
Range	【1.0~300.0】 Sec

If 07-04=0, it will count the delay time set by 07-05 first when the inverter starts directly at power on. When the delay time is completed, it starts to run.

! DANGER:

- **When 07-04=【0】 and the external run is set (00-02/ 00-03=1),**
If the operation switch is conducted at power up, the inverter starts automatically. It is suggested to turn off the power switch and operation switch at power failure to avoid the damage to the user or the machine when the inverter reconnects.
- **When 07-04=【1】 and the external run is set (00-02/ 00-03=1),**
If the operation switch is not conducted at power up, the inverter is not able to start and the warning signal of STP1 flashes. It is required to turn off the operation switch first and the delay time of direct start at power up is completed. Then make it be conducted to start the inverter.

07-09	Stop mode selection
Range	0: Deceleration to stop 1: Coast to stop 2: DC braking to stop 3: Coast to stop with timer

When a stop command is issued the inverter stops according to the stop mode selected. There are four types of stop modes,

Note: DC braking stop (2) and coast to stop with timer (3) are not available in SV mode.

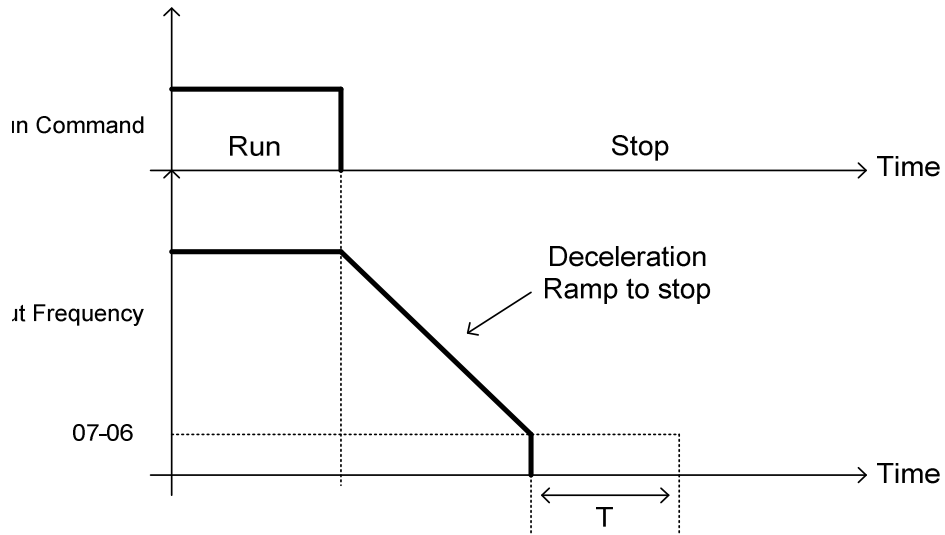
07-09=0: Deceleration to stop

When a stop command is issued, the motor will decelerate to the minimum output frequency (01-08) F_{min} and then stop. Deceleration rate depends on the deceleration time (factory default: 00-15).

When the output frequency reaches the DC braking stop frequency (07-06) or the minimum output frequency (01-08), DC injection braking is activated and the motor stops.

$$\text{Deceleration time} = \frac{\text{Output frequency when stop command is issued}}{\text{Maximum output frequency } F_{max} \text{ (01-02)}} \times \text{deceleration time setting}$$

Note: S curve setting will add to the overall stop time



T: DC Braking Time at stop (07-08)

Figure 4.4.59 Deceleration to stop

07-09=1: Coast to stop

When a stop command is issued, the motor will coast to a stop. Stop time depends on motor load and friction of the system.

The inverter waits for the time set in the minimum baseblock time (07-18) before accepting the next run command.

In SLV mode (00-00=2) the speed search function is automatically enabled upon the next run command.

Note: When using a mechanical brake set parameter 07-26 to 1 (Software version 1.3 or later).

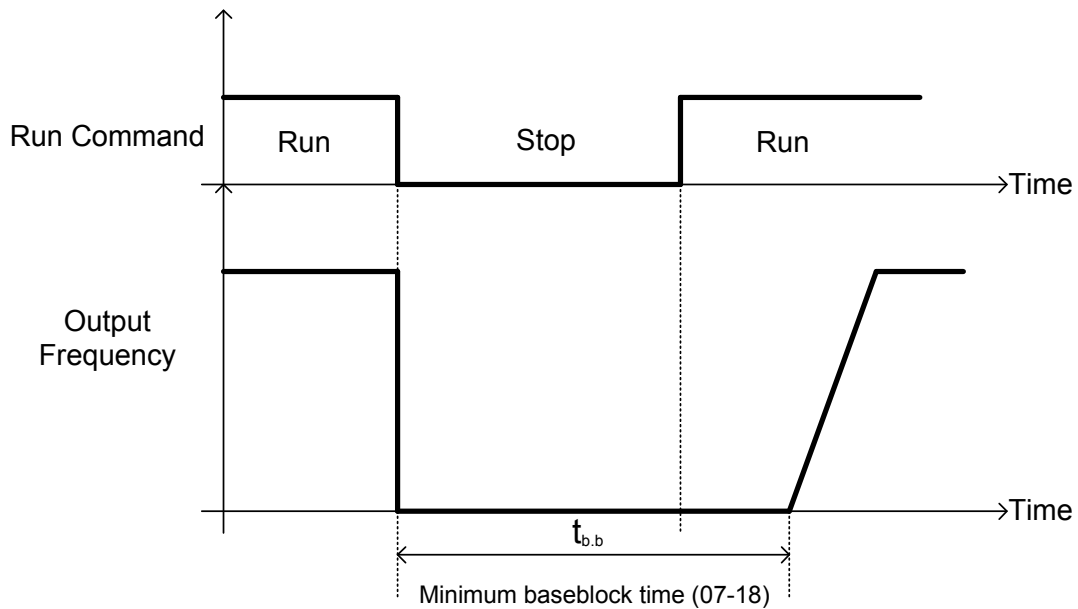


Figure 4.4.60 Coast to stop

07-09=2: DC braking to stop

When a stop command is issued, the inverter will turn off the output (Baseblock) and after the minimum Baseblock time (07-18) has expired activate DC braking (07-07). Refer to Figure 4.4.61.

The DC braking time (t_{DCDB}) of Figure 4.4.61 is determined by the value of 07-08 (DC Braking start time) and the output frequency at the time the stop command was issued.

$$t_{DCDB} = \frac{(07-08) \times 10 \times \text{output frequency}}{F_{\max} (01-02)}$$

Note: Increase the minimum Baseblock time (07-18) in case an Overcurrent trip occurs during the DC braking.

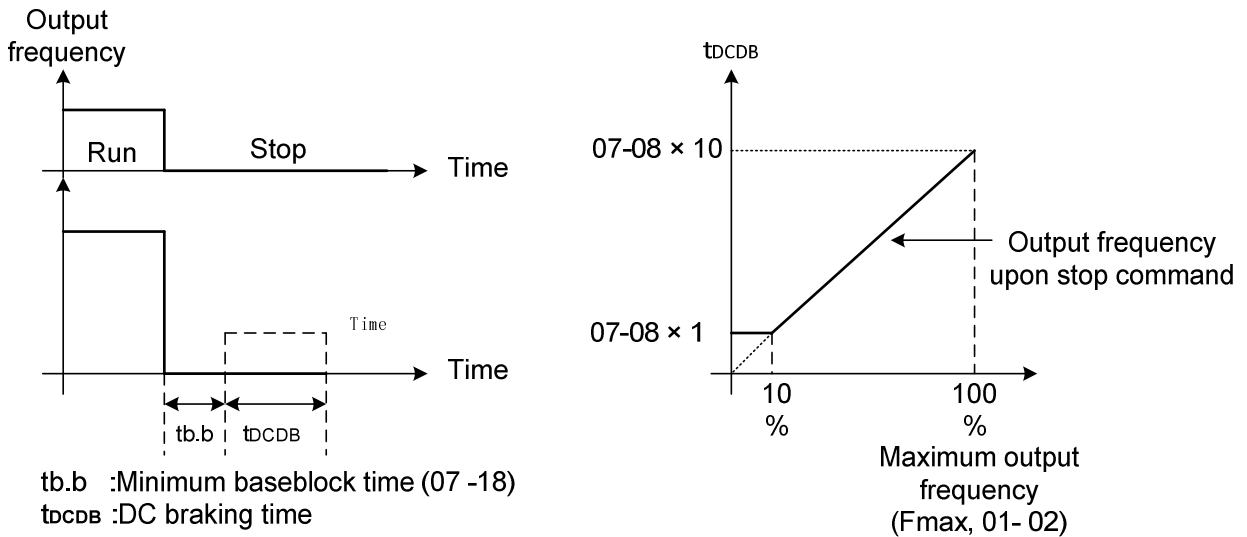


Figure 4.4.61 DC braking to stop

07-09=3: Coast to stop with timer

When a stop command is issued the motor will coast to a stop after the minimum Baseblock time (07-18) has expired. The inverter ignores the run command until the total time of the timer has expired.

The total time of the timer is determined by the deceleration time (00-15, 17, 22 or 24) and the output frequency upon stop. Refer to Figure 4.4.62

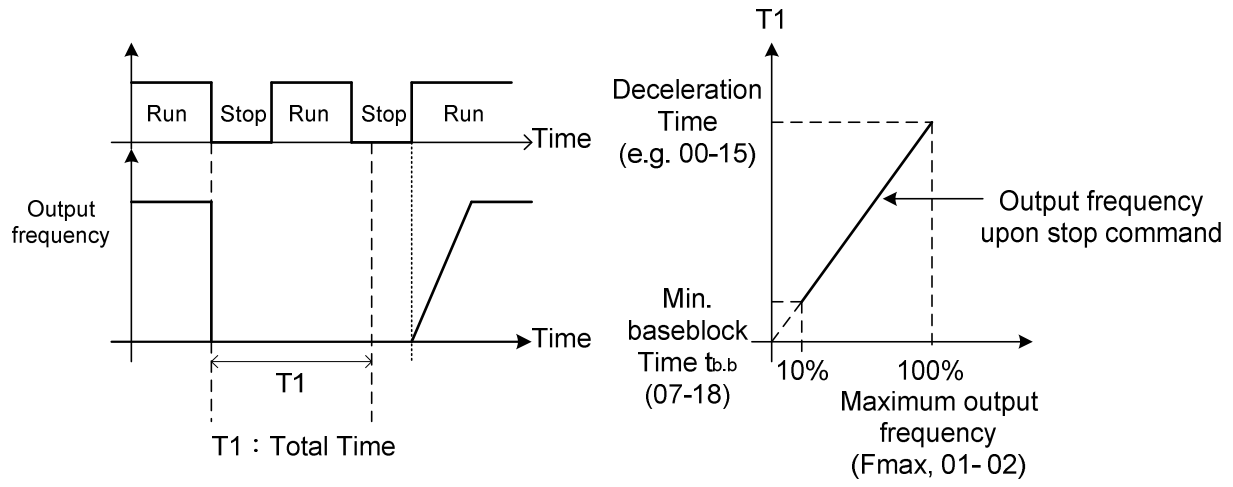


Figure 4.4.62 Coast to stop with timer

13-08	Restore factory setting / Initialize
Range	<p>0 : No initialization</p> <p>2 : 2 wire initialization (60Hz) (230V/460V/690V)</p> <p>3 : 3 wire initialization (60Hz) (230V/460V/690V)</p> <p>4 : 2 wire initialization (50Hz) (230V/415V)</p> <p>5 : 3 wire initialization (50Hz) (230V/415V)</p> <p>6 : 2 wire initialization (50Hz) (200V/380V/575V)</p> <p>7 : 3 wire initialization (50Hz) (200V/380V/575V)</p> <p>8 : PLC initialization</p> <p>9 : 2 wire Initialization (60Hz) (230V/460V)</p> <p>10 : 3 wire Initialization (60Hz) (230V/460V)</p> <p>11 : 2 wire Initialization (60Hz)(230V/400V)</p> <p>12 : 3 wire Initialization (60Hz)(230V/400V)</p> <p>13 : 2 wire Initialization (50Hz)(230V/400V)</p> <p>14 : 3 wire Initialization (50Hz)(230V/400V)</p> <p>15 : 2 wire Initialization (220V/380V, 50Hz)</p> <p>16 : 3 wire Initialization (220V/380V, 50Hz)</p>

Use parameter 13-08 to initialize the inverter to factory default. It is recommended to write down the modified parameters before initializing the inverter. After initialization, the value of 13-08 will return to zero automatically.

13-08=2: 2-wire initialization (60Hz) (230V/460V/690V)

Multi-function digital input terminal S1 controls forward operation / stop command, and S2 controls reverse operation / stop command. Refer to Figure 4.4.1. Inverter input voltage (01-14) is automatically set to 230V (200V class) or 460V (400V class) or 690V (660V class).

When 01-00V/Curve= F, 01-02 will automatically set to 60Hz.

13-08=3: 3-wire initialization (60Hz) (230V/460V/690V)

Multi-function digital input terminal S7 controls the forward / reverse direction, and terminals S1 and S2 are set for 3-wire start operation and stop command. Refer to Figure 4.4.2 and Figure 4.4.3 for 3-wire type operation mode. Inverter input voltage (01-14) is automatically set to 230V (200V class) or 460V (400V class) or 690V (660V class).

When 01-00V/Curve= F, 01-02 will automatically set to 60Hz.

Chapter 5 Check Motor Rotation and Direction

This test is to be performed solely from the inverter keypad. Apply power to the inverter after all the electrical connections have been made and protective covers have been re-attached.

Important: Motor rotation and direction only applies to standard AC motors with a base frequency of 60Hz. For 50Hz or other frequency AC motors please set the max frequency and base frequency in group 01 accordingly before running the motors.

◆ LCD Keypad Display

At this point, **DO NOT RUN THE MOTOR**, the LCD keypad should display as shown below in Fig. 5.3 and the speed reference 12-16=005.00Hz should be blinking at the parameter code "12-16". Next press the **RUN** key, see Fig 5.4. The motor should now be operating at low speed running in forward (clockwise) direction. The parameter code 12-17 shown at the bottom left corner of the screen will change from 12-17=000.00Hz to 12-17=005.00Hz. Next press **STOP** key to stop the motor.



Fig 5.3: LCD Keypad (Stopped)



Fig 5.4: LCD Keypad (Running)

Notes:

- If the motor rotation is incorrect, power down the inverter.
- After the power has been turned OFF, wait at least ten minutes until the charge indicator extinguishes completely before touching any wiring, circuit boards or components.
- Using Safety precaution, and referring to section 3.8 exchange any two of the three output leads to the motor (U/T1, V/T2 and W/T3). After the wiring change, repeat this step and recheck motor direction.

Chapter 6 Speed Reference Command Configuration

The inverter offers users several choices to set the speed reference source. The most commonly used methods are described in the next sections.

Frequency reference command is selected with parameter 00-05.

00-05: Main Frequency Command (Frequency Source)

This function sets the frequency command source.

Setting Range: 0 to 5

To set parameter 00-05:

- After power-up press the **DSP/FUN** key
- Set Group **00** (Basic Fun), and select parameter -05 with the **UP/DOWN ▲** and **▼** keys and press the **READ/ ENTER** key.

00-05	Main Frequency Command Source Selection
Range	0: Keypad 1: External control (analog) 2: Terminal command UP / DOWN 3: Communication control (RS-485) 4: Pulse input 5: Reserved 6: Reserved 7: AI2 Auxiliary Frequency 8: Manual Pulse Generator (MPG)

6.1 Reference from Keypad

◆ LED Keypad:

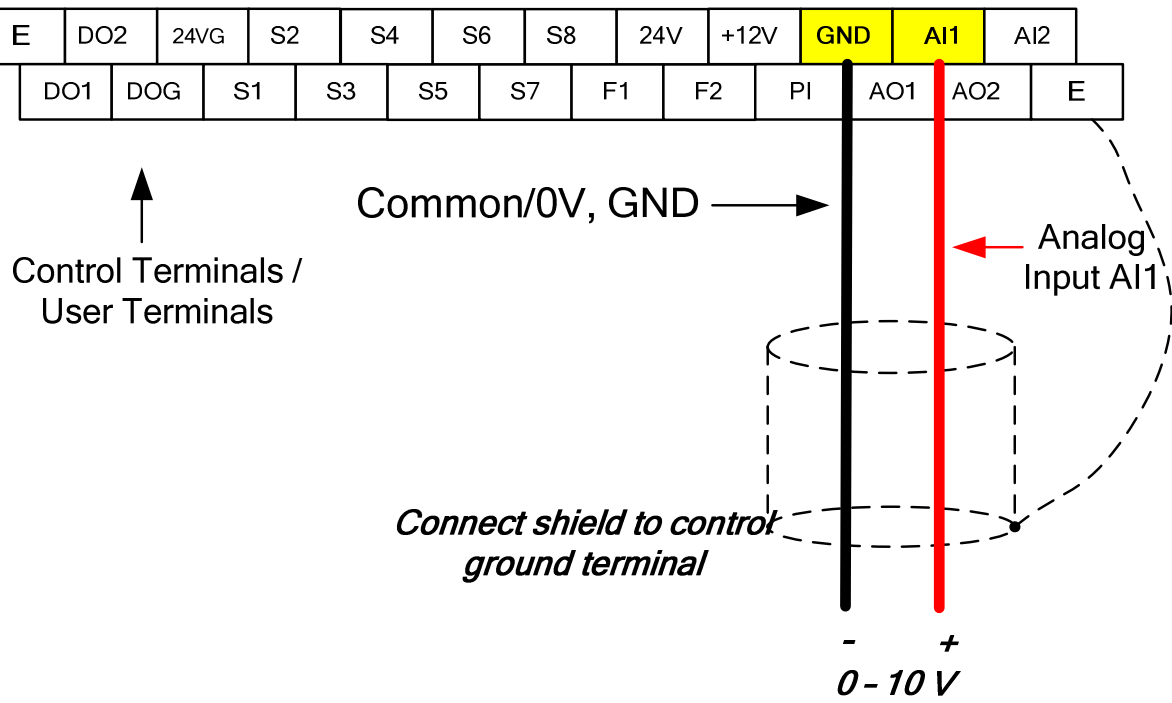
Use the </RESET, ▲ and ▼ keys to change the speed reference and then press the **READ/ ENTER** key. Refer to section 4.1.5 for more details.

◆ LCD Keypad:

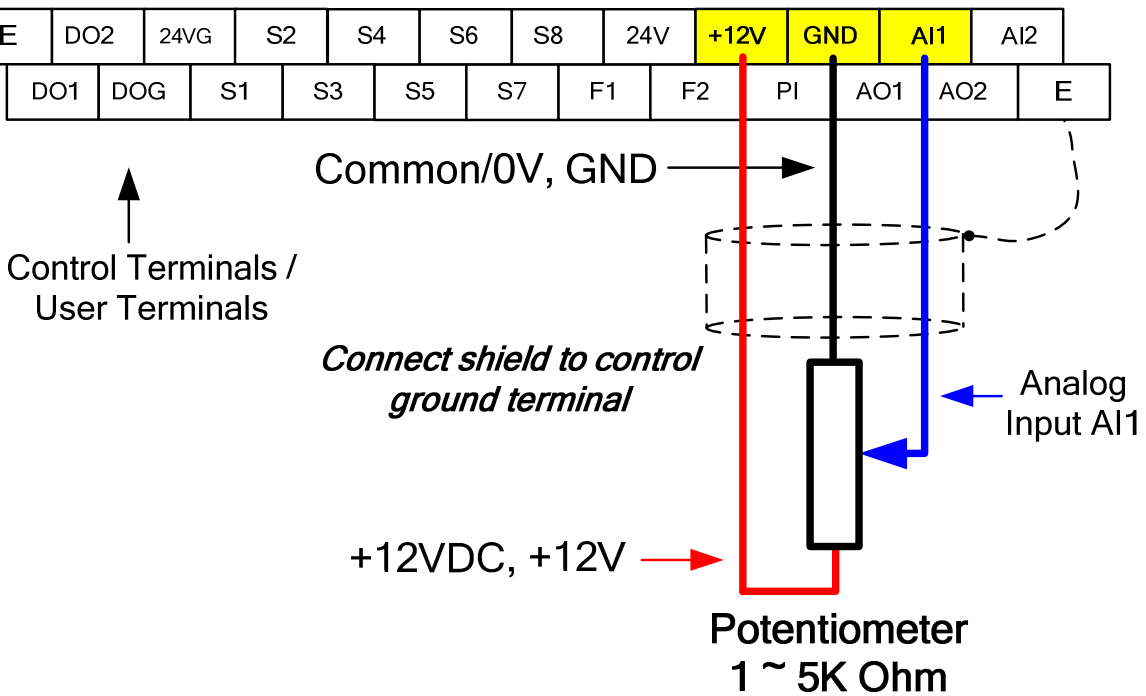
Press the **READ/ ENTER** key first and use the </RESET, ▲ and ▼ keys to change the speed reference.

6.2 Reference from External Analog Signal (0-10V / 4-20mA)

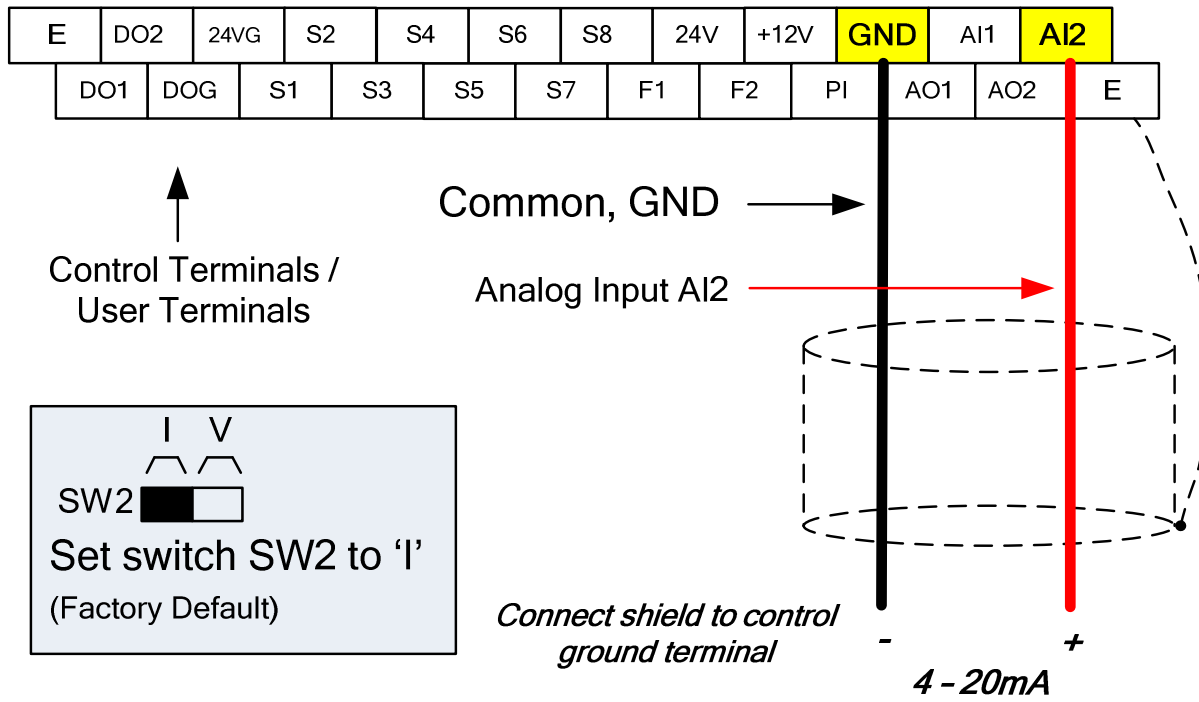
Analog Reference: 0 – 10 V (Setting 00-05 = 1)



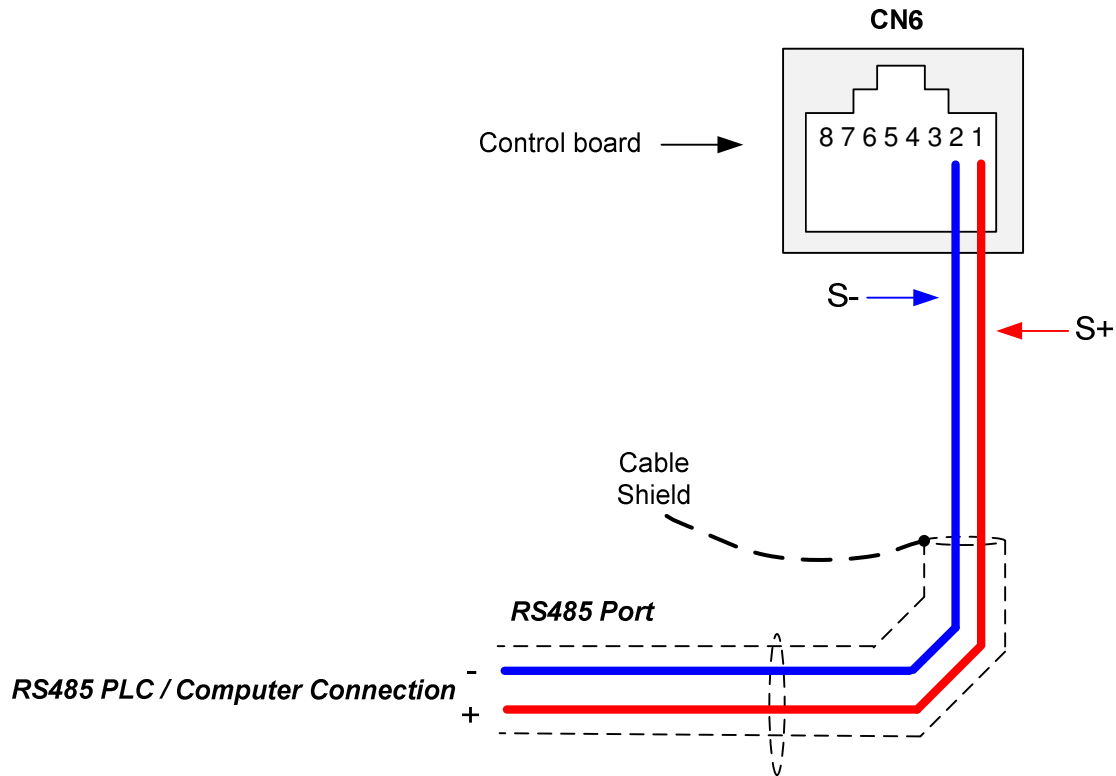
Analog Reference: Potentiometer / Speed Pot (Setting 00-05 = 1)



Analog Reference: 4 – 20mA (Setting 00-05 = 1)



6.3 Reference from Serial Communication RS485 (00-05=3)



To set the speed reference for the inverter via serial communication parameter 00-05 has be set to “3” for frequency command via serial communication.

Default Communication Setting is: Address “1”, 9600 Bits/sec, 1 Start Bit, 1 Stop Bit, and No Parity

The serial communication link function uses RS485 Modbus RTU protocol and allows for:

- 1) Monitoring (data monitoring, function data check).
- 2) Frequency setting.
- 3) Operation command (FWD, REV, and other commands for digital input).
- 4) Write function data.

Frequency Reference Command Register

Inverter Frequency Reference Register: 2502 (Hexadecimal) - Bit 0 – Bit 15: 0.00 ~ 599.00 Hz

Examples:

Frequency Reference Command: 10.00 Hz (Inverter Node Address: 01)

Command String (hexadecimal): 01 06 25 02 03 E8 23 B8

To set the frequency reference to 10.00, a value of '1000' (03E8h) has to be send to the inverter.

Frequency Reference Command: 30.00 Hz (Inverter Node Address: 01)

Command String (hexadecimal): 01 06 25 02 0B B8 24 44

To set the frequency reference to 30.00, a value of '3000' (0BB8h) has to be send to the inverter.

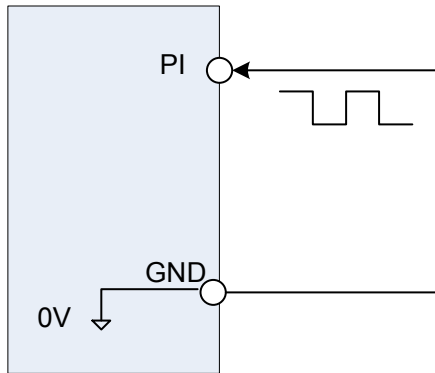
Frequency Reference Command: 60.00 Hz (Inverter Node Address: 01)

Command String (hexadecimal): 01 06 25 02 17 70 2D 12

To set the frequency reference to 60.00, a value of '6000' (1770h) has to be send to the inverter

Note: The last 2 bytes of the command strings consist of a CRC16 checksum, please refer to section 4.5 of the instruction manual for additional information.

6.4 Reference from Pulse Input (00-05=4)



Serial pulse input
(Internal resistance : 3.89 K)

Specification

Low Input Level: 0.0 to 0.5 V
 High Input Level: 4.0 to 13.5 V
 Duty cycle: (ON / OFF) 30 % to 70%
 Pulse Input frequency range: 50 to 32 KHz

Set Pulse Input Setup as Frequency Reference

Set parameter 00-05 to 4 and 03-30 to 0 to use the pulse input terminal PI as the frequency reference source. Next set the pulse input scaling (03-31), enter the pulse input frequency to match the maximum output frequency. Adjust the pulse input filter time in case interference or noise is encountered.

Example: Pulse train input maximum 10 kHz, set parameter 03-31 to 10000 when maximum frequency is set to 60.0Hz.

03- 30	Selection of Pulse Input
Range	0: General Pulse Input 1: PWM

Function selects source for the pulse input.

03-31	Scale of pulse input
Range	Depending on the setting of 03-30 03-30 = 0: 50~32000Hz 03-30 = 1:10~1000Hz

Pulse input scaling, 100% = Maximum pulse frequency.

03- 32	Pulse input gain
Range	0.0~1000.0 %

Target value (03-03) in % = Pulse input frequency scaled to 100% based on maximum pulse frequency (03-31) times the gain (03-32) + bias (03-33).

03-33	Pulse input bias
Range	-100.0~100.0 %

Target value (03-03) in % = Pulse input frequency scaled to 100% based on maximum pulse frequency (03-31) times the gain (03-32) + bias (03-33).

03-34	Pulse input filter time
Range	0.00~2.00 Sec

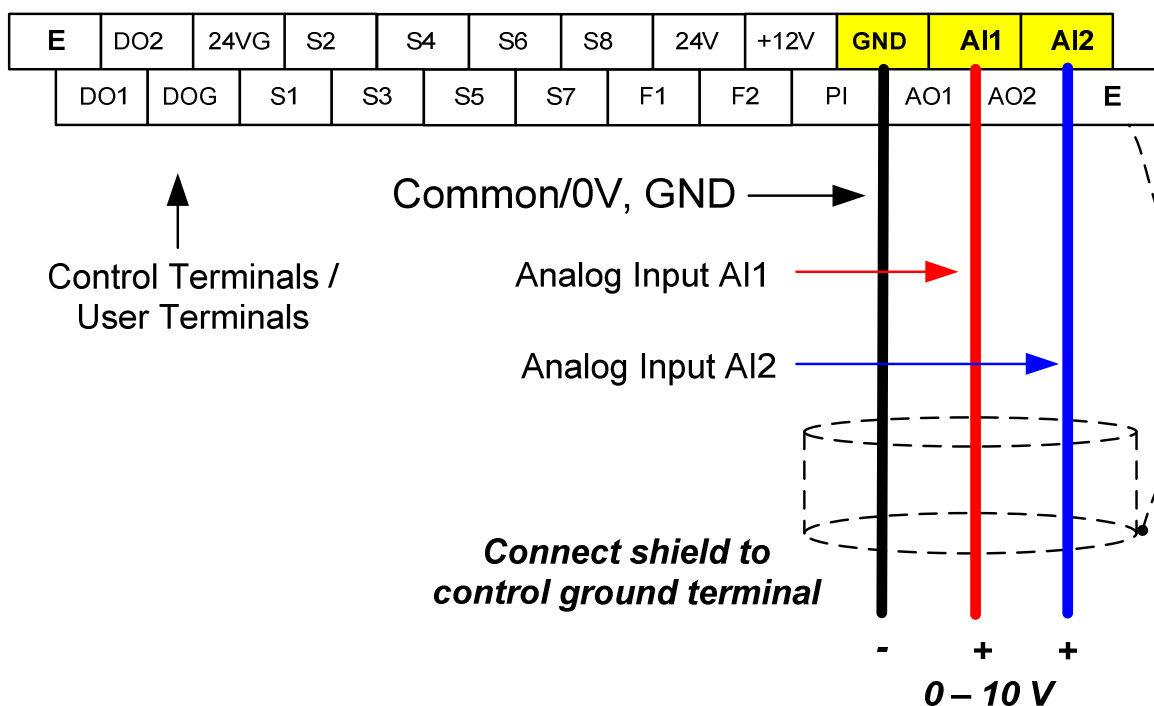
6.5 Reference from two Analog Inputs

Analog input AI1 is used as master frequency reference and analog input AI2 is used as auxiliary frequency reference.

Analog Reference AI1: 0 – 10 V (Setting 00-05 = 1)

Analog Reference AI2: 0 – 10 V (Setting 00-06 = 1, 04-05 = 1)

AI1 – Analog Input 1	AI2 – Analog Input 2	04-00 Setting (Default = 1)	Dipswitch SW2 (Default 'V')
0 ~ 10V	0 ~ 10V	0	Set to 'V'
0 ~ 10V	4 ~ 20mA	1	Set to 'I'



6.6 Change Frequency Unit from Hz to rpm

Enter the number of motor poles in 16-03 to change the display units from Hz to rpm.

16-03	Display unit
Range	0: Frequency display unit is Hz (Resolution is 0.01Hz)
	1: Frequency display unit is % (Resolution is 0.01%)
	2: Frequency display unit is rpm.
	3~39: Reserved
	40~9999: 100% is XXXX with no decimals (integer only)
	10001~19999: 100% is XXX.X with 1 decimal
	20001~29999: 100% is XX.XX with 2 decimals
30001~39999: 100% is X.XXX with 3 decimals	

Chapter 7 Operation Method Configuration (Run / Stop)

The inverter offers users several choices to run and stop from different sources. The most commonly used methods are described in the next sections.

Operation command is selected with parameter 00-02.

00-02: Run Command Selection

This function sets the frequency command source.

Setting Range: 0 to 3

To set parameter 00-02:

- After power-up press the **DSP/FUN** key
- Set Group **00** (Basic Fun), and select parameter -02 with the **UP/DOWN ▲** and **▼** keys and press the **READ/ ENTER** key.

00-02	Main Run Command Source Selection
Range	0: Keypad control 1: External terminal control 2: Communication control (RS-485) 3: PLC

7.1 Run/Stop from the LED/LCD Keypad (00-02=0)

Use the **RUN** key to run the drive in forward direction and the **FWD/REV** key to change the motor direction. (Note: to disable reverse direction set parameter 11-01 to 1)

Press **STOP** key to stop the inverter. (Note: Stop method can be set with parameter 07-09, default is **deceleration to stop**).

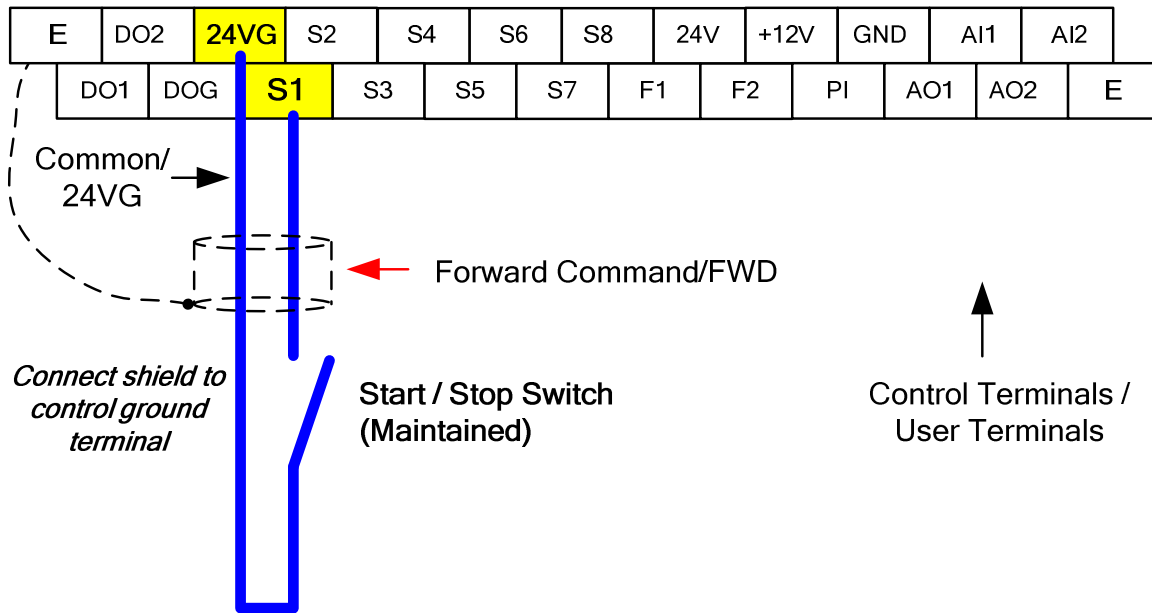


7.2 Run/Stop from External Switch / Contact or Pushbutton (00-02=1)

Use an external contact or switch to Run and Stop the inverter.

Example: NPN wiring

◆ Permanent Switch / Contact



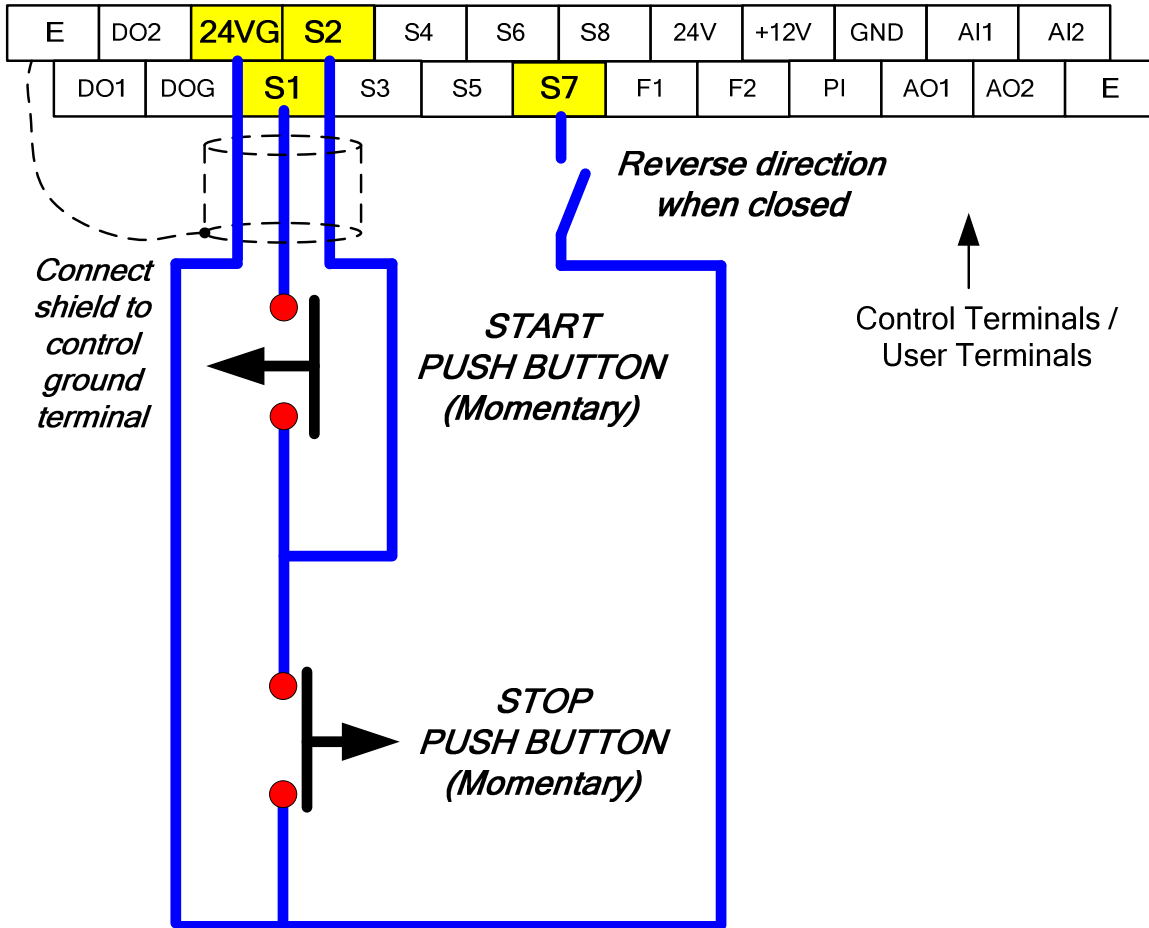
◆ **Momentary Contacts (Push Buttons)**

Use push button / momentary switch to Run and Stop the inverter.

Set parameter 13-08 to 3, 5 or 7 for 3-wire program initialization, multi-function input terminal S1 is set to run operation, S2 for stop operation and S7 for forward/reverse command.

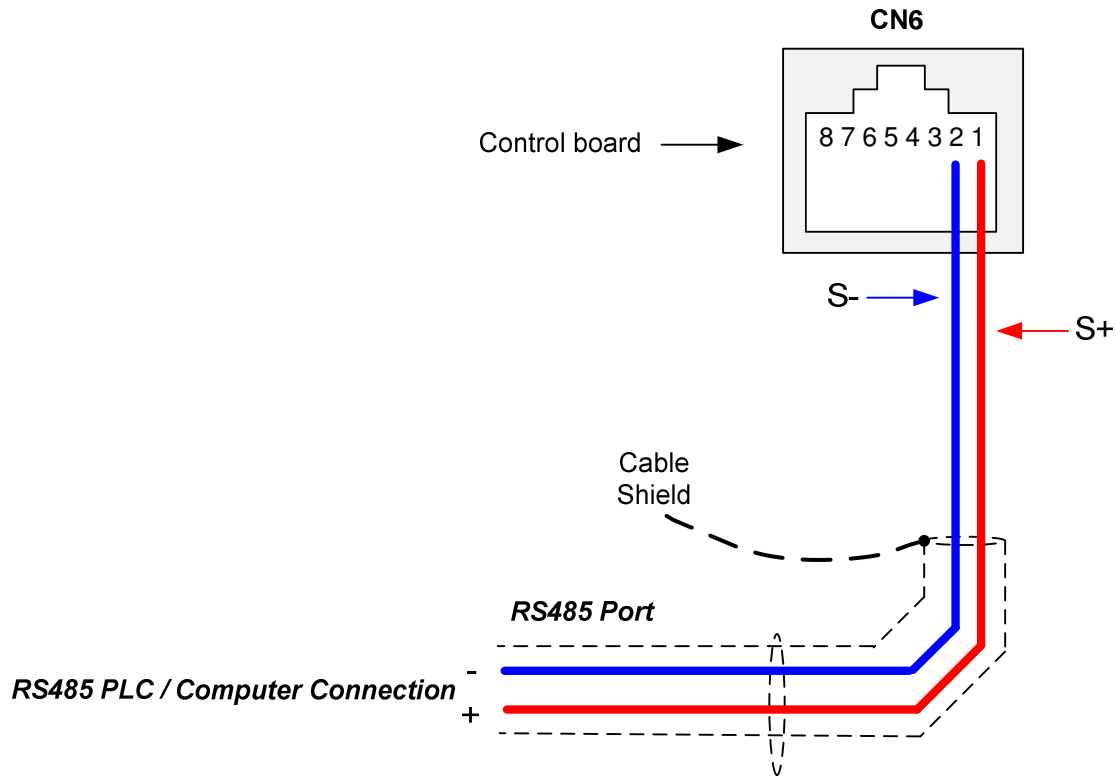
00-01 Operation Method = 1

03-07 Terminal S7 Function = 26



Note: Stop mode selection can be set with parameter 07-09, default is **deceleration to stop**.

7.3 Run/Stop from Serial Communication RS485 (00-02=3)



To control (Run/Stop) the inverter via serial communication parameter 00-02 has be set to either a “2” for communication control.

Default Communication Setting is: Address “1”, 19200 Bits/sec, 1 Start Bit, 1 Stop Bit, and No Parity

The serial communication link function uses RS485 Modbus RTU protocol and allows for:

- 1) Monitoring (data monitoring, function data check).
- 2) Frequency setting.
- 3) Operation command (FWD, REV, and other commands for digital input).
- 4) Write function data.

Command Register

Inverter Command Register: 2501 (Hexadecimal)

Bit 0: Run Forward

Bit 1: Run Reverse

Bit 2 ~ Bit 15: Refer to the chapter XX of this manual

Examples:

Run Forward Command (Inverter Node Address: 01)

Command String (hexadecimal): 01 06 25 01 00 01 12 C6

Run Reverse Command (Inverter Node Address: 01)

Command String (hexadecimal): 01 06 25 01 00 03 93 07

Stop Command (Inverter Node Address: 01)

Command String (hexadecimal): 01 06 25 01 00 00 D3 06

Note: The last 2 bytes of the command strings consist of a CRC16 checksum, please refer to section 4.5 of the instruction manual for additional information.

Chapter 8 Motor and Application Specific Settings

It is essential that before running the motor, the motor nameplate data matches the motor data in the inverter.

8.1 Set Motor Nameplate Data (02-01, 02-05)

02-05 Rated power of motor 1

The nominal motor rated capacity is set at the factory. Please verify that the motor name plate data matches the motor rated capacity shown in parameter 02-05. The setting should only be changed when driving a motor with a different capacity.

Range: 0.00 to 600.00 kW (1HP = 0.746 kW)

To set parameter 02-05:

- After power-up press the **DSP/FUN** key
- Set Group **02** (Motor Parameter), and select parameter -05 with the **UP/DOWN ▲** and **▼** keys and press the **READ/ ENTER** key.

Default values vary based on the inverter model.

02-01 Rated current of motor 1

The motor rated current is set at the factory based on the inverter model. Enter the motor rated current from the motor nameplate if it does not match the value shown in parameter 02-01.

Setting range: 0.01 to 600.00A

To set parameter 02-01:

- After power-up press the **DSP/FUN** key
 - Set Group **02** (Motor Parameter), and select parameter -01 with the **UP/DOWN ▲** and **▼** keys and press the **READ/ ENTER** key.
-

8.2 Acceleration and Deceleration Time (00-14, 00-15)

Acceleration and Deceleration times directly control the system dynamic response. In general, the longer the acceleration and deceleration time, the slower the system response, and the shorter time, the faster the response. An excessive amount of time can result in sluggish system performance while too short of a time may result in system instability.

The default values suggested normally result in good system performance for the majority of general purpose applications. If the values need to be adjusted, caution should be exercised, and the changes should be in small increments to avoid system instability.

00-14 Acceleration time 1

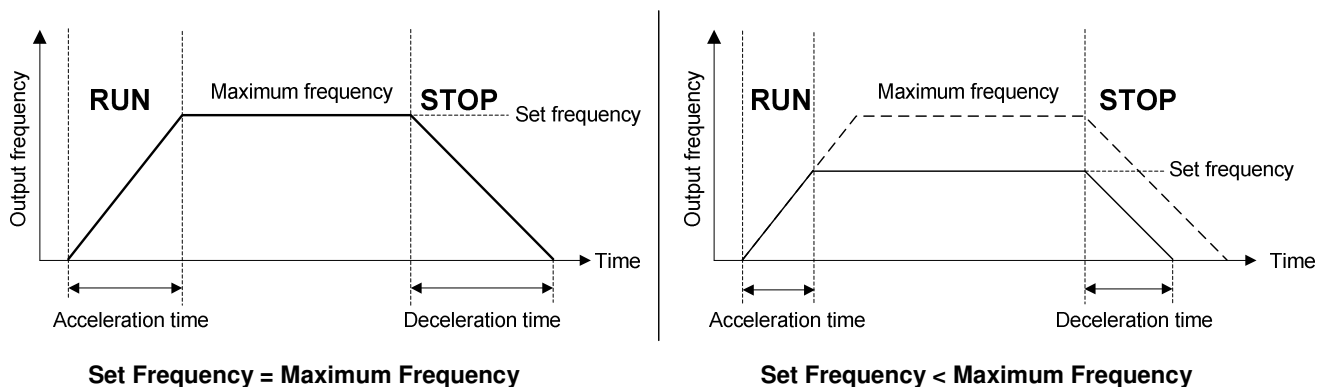
00-15 Deceleration time 1

These parameters set the acceleration and deceleration times of the output frequency from 0 to maximum frequency and from maximum frequency to 0.

To set parameter 00-14 or 00-15:

- After power-up press the **DSP/FUN** key
- Set Group **00** (Basic Fun), and select parameter -14 or -15 with the **UP/DOWN ▲** and **▼** keys and press the **READ/ ENTER** key.

Acceleration and deceleration times are represented by the three most significant (high order) digits. Set acceleration and deceleration times with respect to maximum frequency. The relationship between the set frequency value and acceleration/deceleration times is as follows:



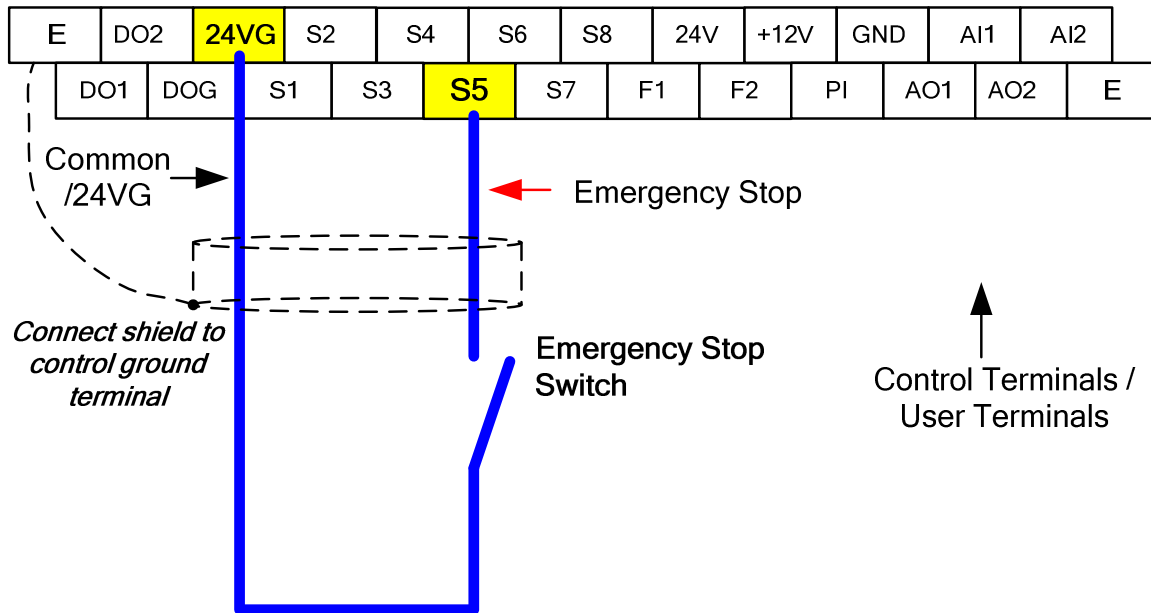
Note: If the set acceleration and deceleration times are set too low, the torque limiting function or stall prevention function can become activated if the load torque and or inertia are relatively high. This will prolong the acceleration and or deceleration times and not allow the set times to be followed. In this case the acceleration and or the deceleration times should be adjusted.

8.3 Emergency Stop

The emergency stop time is used in combination with multi-function digital input function #14 (Emergency stop). When emergency stop input is activated the inverter will decelerate to a stop using the Emergency stop time (00-26) and display the [EM STOP] condition on the keypad.

Note: To cancel the emergency stop condition the run command has to be removed and emergency stop input deactivated.

Example: Emergency Stop Switch with NPN wiring set for input terminal S5 (03-04 = 14).

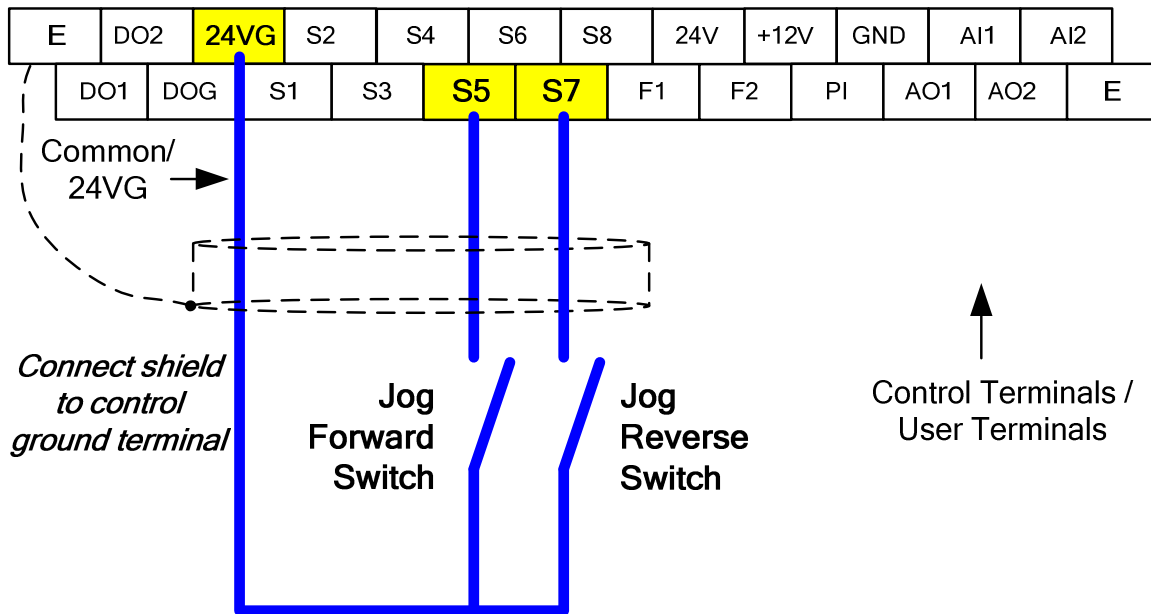


00-26	Emergency stop time
Range	0.1~6000.0 Sec

8.4 Forward and Reverse Jog

The jog forward command is used in combination with multi-function digital input function #6 (Jog Forward) and the jog reverse command is used in combination with multi-function digital input function #7 (Jog Reverse).

Example: Jog Forward input terminal S5 (03-04 = 06) and Jog Reverse input terminal S7 (03-06=7) with NPN wiring.

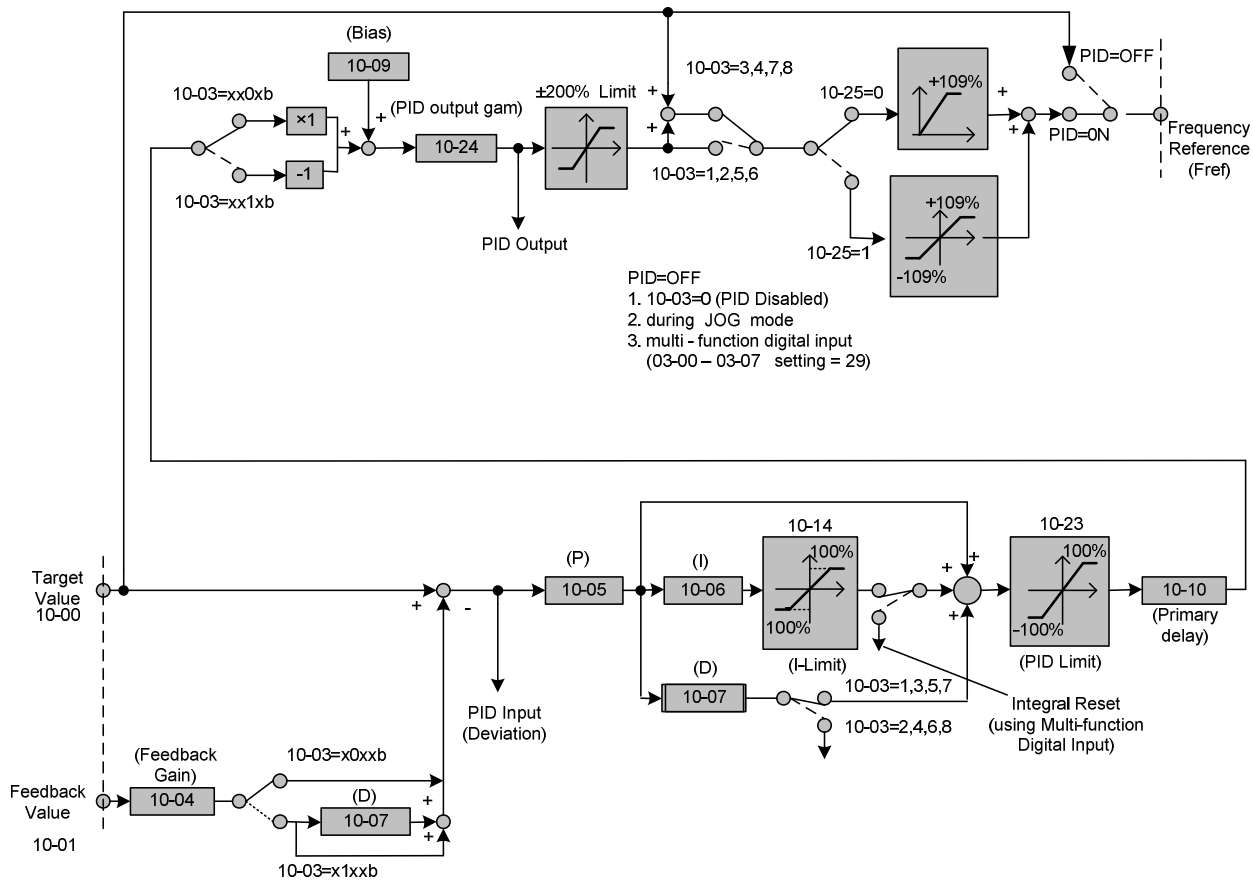


Chapter 9 Using PID Control for Constant Flow / Pressure Applications

9.1 What is PID Control?

The PID function in the inverter can be used to maintain a constant process variable such as pressure, flow, temperature by regulating the output frequency (motor speed). A feedback device (transducer) signal is used to compare the actual process variable to a specified setpoint. The difference between the set-point and feedback signal is called the error signal.

The PID control tries to minimize this error to maintain a constant process variable by regulating the output frequency (motor speed).



The amplitude of the error can be adjusted with the Proportional Gain parameter 10-05 and is directly related to the output of the PID controller, so the larger gain the larger the output correction.

Example 1:

Gain = 1.0

Set-Point = 80%

Feedback = 78%

Error = Set-point - Feedback = 2%

Control Error = Gain x Error = 2%

Example 2:

Gain = 2.0

Set-Point = 80%

Feedback = 78%

Error = Set-point - Feedback = 2%

Control Error = Gain x Error = 4%

Please note that an excessive gain can make the system unstable and oscillation may occur.

The response time of the system can be adjusted with the Integral Gain set by parameter 10-06. Increasing the Integral Time will make the system less responsive and decreasing the Integral Gain Time will increase response but may result in instability of the total system.

Slowing the system down too much may be unsatisfactory for the process. The end result is that these two parameters in conjunction with the acceleration (00-14) and deceleration (00-15) times are adjusted to achieve optimum performance for a particular application.

For typical fan and pump applications a Proportional Gain (10-05) of 2.0 and an Integral Time (10-06) of 5.0 sec is recommended.

10-03 PID control mode

PID control can be enabled by setting parameter 10-03 to 'xxx1b'

10-03	PID control mode
Range	xxx0b: PID disable xxx1b: PID enable xx0xb: PID positive characteristic xx1xb: PID negative characteristic x0xxb: PID error value of D control x1xxb: PID feedback value of D control 0xxxb: PID output 1xxxb: PID output + frequency command

Commonly used PID control modes

0001b: Forward operation: PID operation enabled, motor speeds increases when feedback signal is smaller than set-point (most fan and pump applications)

0011b: Reverse operation: PID operation enabled, motor slows down when feedback signal is smaller than set-point (e.g. level control applications)

To set parameter 10-03:

- After power-up press the **DSP/FUN** key
- Set Group **10** (PID Control), and select parameter -03 with the **UP/DOWN ▲** and **▼** keys and press the **READ/ ENTER** key.

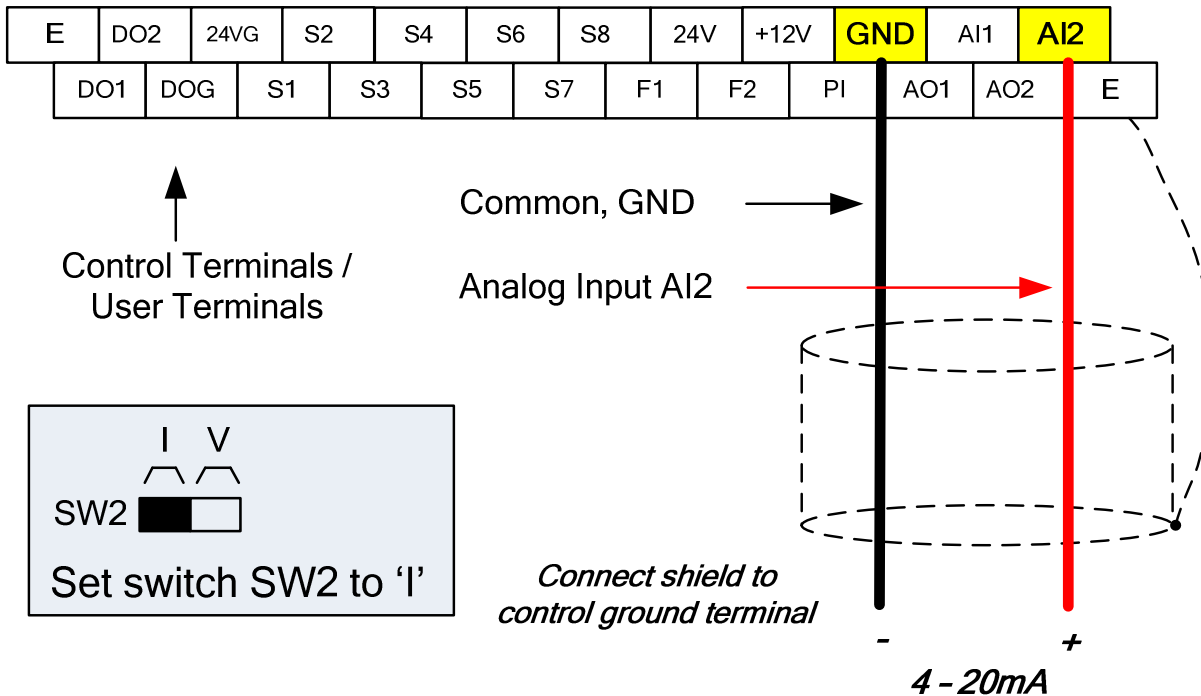
Important: To use the PID function parameter 00-05 (Main Frequency Command Source Selection) has to be set to 5 for PID reference.

9.2 Connect Transducer Feedback Signal (10-01)

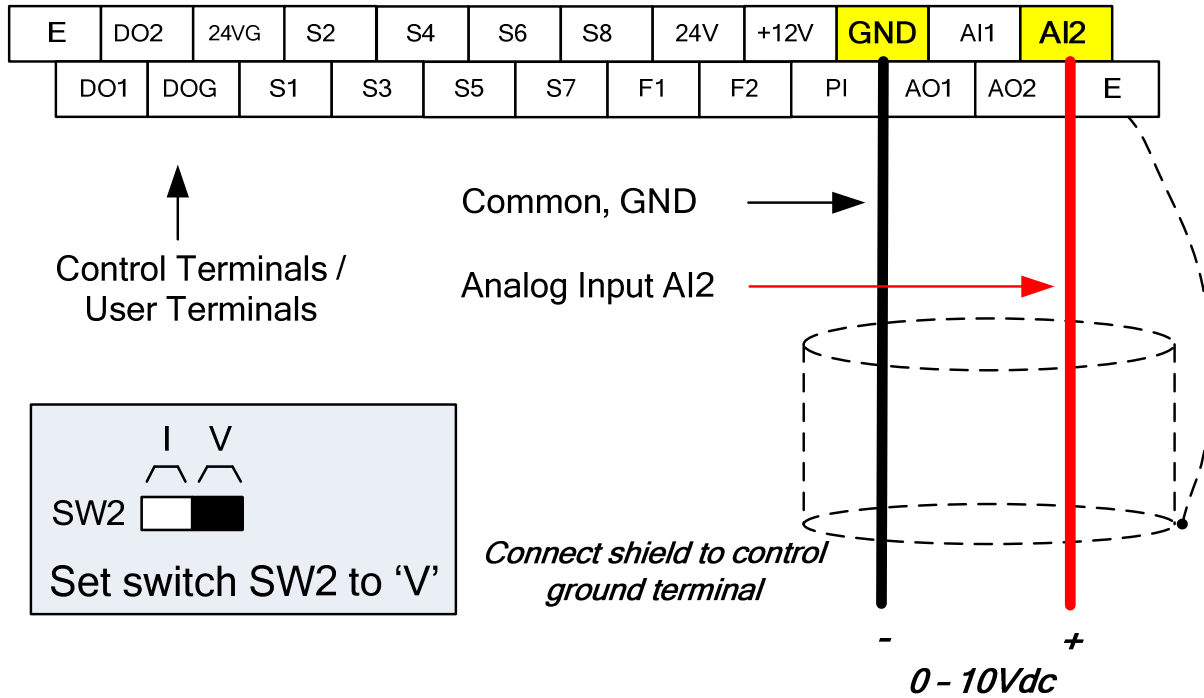
The PID function in the inverter

Depending on the type of feedback transducer used, the inverter can be setup for either 0-10V or a 4-20mA feedback transducer.

Feedback Signal from AI2 (10-01 = 2), and set the input current to 4 – 20mA / SW2 = I



Feedback Signal from AI1 (10-01 = 1), and set the input voltage to 0 – 10V / SW2 = V



9.3 Engineering Units (only for LCD)

The PID setpoint scaling can be selected with parameter 16-03 and 16-04.

Example: 0 – 200.0 PSI Setpoint, set 16-03 to 12000 (1 decimal, range 0 – 200) and 16-04 to 2 (PSI).

9.4 Sleep / Wakeup Function

The PID Sleep function can be used to prevent a system from running at low speeds and is frequently used in pumping application. The PID Sleep function is turned on by parameter 10-29 set to 1. The inverter output turns off when the PID output falls below the PID sleep level (10-17) for the time specified in the PID sleep delay time parameter (10-18).

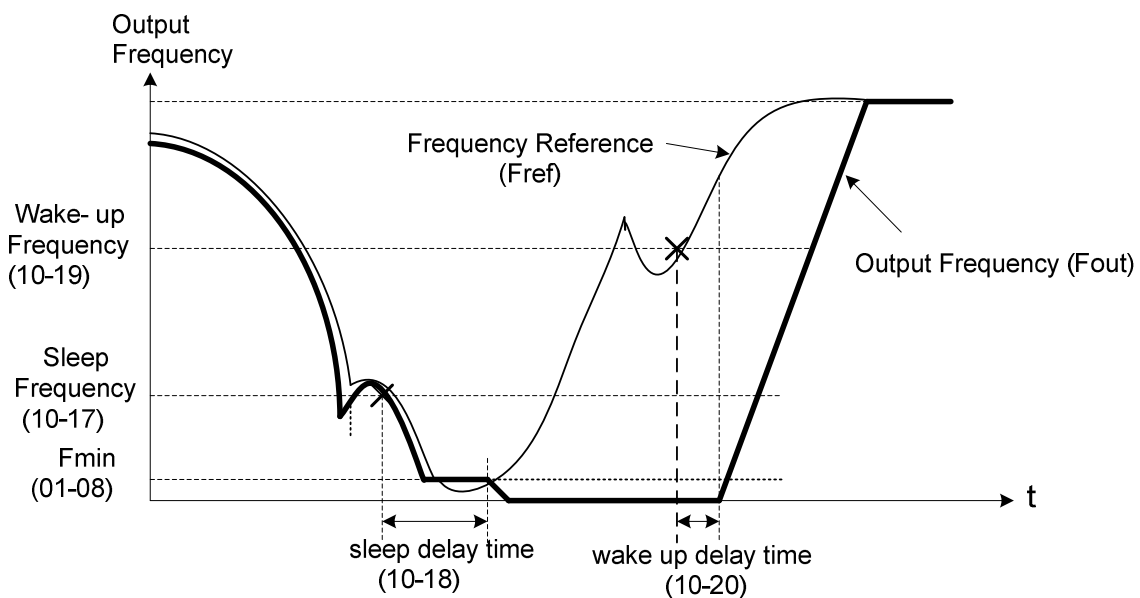
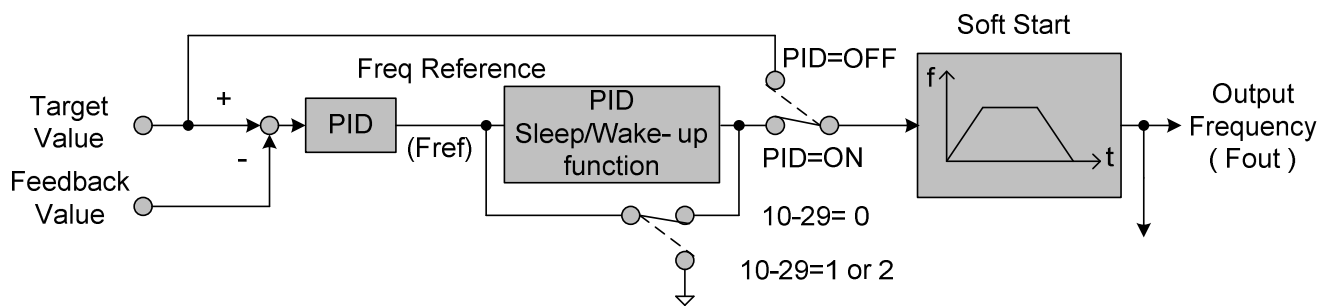
The inverter wakes up from a sleep condition when the PID output (Reference frequency) rises above the PID wake-up frequency (10-19) for the time specified in the PID wake-up delay time (10-20).

10-29 =0: PID Sleep function is disabled.

10-29 =1: PID sleep operation is based on parameters of 10-17 and 10-18.

10-29 =2: PID sleep mode is enabled by multi-function digital input

Refer to the following figures for PID sleep / wakeup operation.



PID Sleep Function

Chapter 10 Troubleshooting and Fault Diagnostics

10.1 General

Inverter fault detection and early warning / self-diagnosis function. When the inverter detects a fault, a fault message is displayed on the keypad. The fault contact output energizes and the motor will coast to stop (The stop method can be selected for specific faults).

When the inverter detects a warning / self-diagnostics error, the digital operator will display a warning or self-diagnostic code, the fault output does not energize in this case. Once the warning is removed, the system will automatically return to its original state.

10.2 Fault Detection Function




When a fault occurs, please refer to Table 10.2.1 for possible causes and take appropriate measures.







Use one of the following methods to restart:

1. Set one of multi-function digital input terminals (03-00, 03-07) to 17 (Fault reset); activate input
2. Press the reset button on the keypad.
3. Power down inverter wait until keypad goes blank and power-up the inverter again.


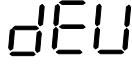


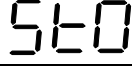

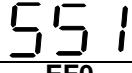

When a fault occurs, the fault message is stored in the fault history (see group 12 parameters).

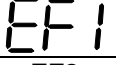
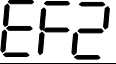
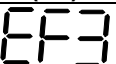
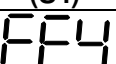
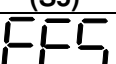
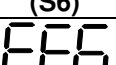
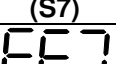
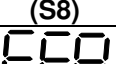
Table 10.2.1 Fault information and possible solutions







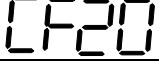


LED display	Description	Cause	Possible solutions
OC over current	The inverter output current exceeds the overcurrent level (200% of the inverter rated current).	<ul style="list-style-type: none"> • Acceleration / Deceleration time is too short. • Contactor at the inverter output side. • A special motor or applicable capacity is greater than the inverter rated value. • Short circuit or ground fault. 	<ul style="list-style-type: none"> • Extend acceleration / deceleration time. • Check the motor wiring. • Disconnect motor and try running inverter.
			
OCA over current	The inverter output current exceeds the overcurrent level in acceleration time	<ul style="list-style-type: none"> • Acceleration time is too short • Capacity of motor is bigger than inverter • Short circuit between winding and shell of motor • Short circuit between wire and ground of motor • IGBT broken module 	<ul style="list-style-type: none"> • Set the longer acceleration time • Change to bigger capacity of inverter • Examine motor • Check the wire • Replace IGBT module
			
OCC over current	The inverter output current exceeds the overcurrent level in constant speed	<ul style="list-style-type: none"> • Instantaneous change of load • Instantaneous change of current 	<ul style="list-style-type: none"> • Change to bigger capacity of inverter • Add reactor to power source
			

LED display	Description	Cause	Possible solutions
OCd over current	The inverter output current exceeds the overcurrent level in deceleration time	<ul style="list-style-type: none"> • Deceleration time is too short 	<ul style="list-style-type: none"> • Set the longer acceleration time
			
SC short circuit	Inverter output short circuit or ground fault.	<ul style="list-style-type: none"> • Short circuit or ground fault (08-23 = 1). • Motor damaged (insulation). • Wire damage or deterioration. 	<ul style="list-style-type: none"> • Check the motor wiring. • Disconnect motor and try running inverter.
			
GF Ground fault	The current to ground exceeds 50% of the inverter rated output current (08-23 = 1, GF function is enabled).	<ul style="list-style-type: none"> • Motor damaged (insulation). • Wire damage or deterioration. • Inverter DCCT sensors defect. 	<ul style="list-style-type: none"> • Replace motor. • Check the motor wiring. • Disconnect motor and try running inverter. • Check resistance between cables and ground. • Reduce carrier frequency.
			
OV Over voltage	DC bus voltage exceeds the OV detection level: 200V class: 410Vdc 400V class: 820Vdc 575V class: 1050Vdc 690V class: 1230Vdc	<ul style="list-style-type: none"> • Deceleration time set too short, resulting in regenerative energy flowing back from motor to the inverter. • The inverter input voltage is too high. • Use of power factor correction capacitors. • Excessive braking load. • Braking transistor or resistor defective. • Speed search parameters set incorrectly. 	<ul style="list-style-type: none"> • Increase deceleration time • Reduce input voltage to comply with the input voltage requirements or install an AC line reactor to lower the input voltage. • Remove the power factor correction capacitor. • Use dynamic braking unit. • Replace braking transistor or resistor. • Adjust speed search parameters.
			
UV Under voltage	DC bus voltage is lower than the UV detection level or the pre-charge contactor is not active while the inverter is running. 200V class: 190Vdc 400V class: 380Vdc 575/690V class: 546Vdc (The detection value can be adjusted by 07-13).	<ul style="list-style-type: none"> • The input voltage is too low. • Input phase loss. • Acceleration time set too short. • Input voltage fluctuation. • Pre-charge contactor damaged. • DC bus voltage feedback signal value not incorrect. 	<ul style="list-style-type: none"> • Check the input voltage. • Check input wiring. • Increase acceleration time. • Check power source • Replace pre-charge contactor • Replace control board or complete inverter.
			
IPL input phase loss	Phase loss at the input side of the inverter or input voltage imbalance, active when 08-09 = 1 (enabled).	<ul style="list-style-type: none"> • Wiring loose in inverter input terminal. • Momentary power loss. • Input voltage imbalance. 	<ul style="list-style-type: none"> • Check input wiring / faster screws. • Check power supply.
			

LED display	Description	Cause	Possible solutions
OPL output phase loss	Phase loss at the output side of the inverter, active when 08-10 = 1 (enabled).	<ul style="list-style-type: none"> Wiring loose in inverter output terminal. Motor rated current is less than 10% of the inverter rated current. 	<ul style="list-style-type: none"> Check output wiring / faster screws. Check motor & inverter rating.
OPL			
OH1 Heatsink overheat	The temperature of the heat sink is too high. Note: when OH1 fault occurs three times within five minutes, it is required to wait 10 minutes before resetting the fault.	<ul style="list-style-type: none"> Ambient temperature too high. cooling fan failed Carrier frequency set too high. Load too heavy. 	<ul style="list-style-type: none"> Install fan or AC to cool surroundings. Replace cooling fan. Reduce carrier frequency. Reduce load / Measure output current
OH1			
OL1 Motor overload	Internal motor overload protection tripped, active when protection curve 08-05 = xxx1.	<ul style="list-style-type: none"> Voltage setting V/F mode too high, resulting in over-excitation of the motor. Motor rated current (02-01) set incorrectly. Load too heavy. 	<ul style="list-style-type: none"> Check V/f curve. Check motor rated current Check and reduce motor load, check and operation duty cycle.
OL1			
OL2 Inverter overload	Inverter thermal overload protection tripped. If an inverter overload occurs 4 times in five minutes, it is required to wait 4 minutes before resetting the fault.	<ul style="list-style-type: none"> Voltage setting V/F mode too high, resulting in over-excitation of the motor. Inverter rating too small. Load too heavy. 	<ul style="list-style-type: none"> Check V/f curve. Replace inverter with larger rating. Check and reduce motor load, check and operation duty cycle.
OL2			
OT Over torque detection	Inverter output torque is higher than 08-15 (over torque detection level) for the time specified in 08-16. Parameter 08-14 = 0 to activate.	<ul style="list-style-type: none"> Load too heavy. 	<ul style="list-style-type: none"> Check over torque detection parameters (08-15 / 08-16). Check and reduce motor load, check and operation duty cycle.
OT			
UT Under torque detection	Inverter output torque is lower than 08-19 (under torque detection level) for the time specified in 08-20. Parameter 08-18 = 0 to activate.	<ul style="list-style-type: none"> Sudden drop in load. Belt break. 	<ul style="list-style-type: none"> Check under torque detection parameters (08-19 / 08-20). Check load / application.
UT			
run Switch for Motor1/Motor 2	Switch for Motor1/Motor2 in running time	<ul style="list-style-type: none"> Execute command for switching motor2 in running time Execute command for switching motor in running time 	<ul style="list-style-type: none"> Revise the sequence control and switch motor in top time.
run			
OS Over speed	Motor speed exceeds level set in 20-20 (PG Over speed Level) for the time set in 20-21 (PG over speed time). Active when 20-19 (= 0 or 1). This fault is active V/F + PG and SV control mode (00-00 = 1 or 3 or 4). Motor speed can be monitored by 12-22	<ul style="list-style-type: none"> Motor speed overshoot (ASR) PG ppr set incorrectly. Overspeed parameters set incorrectly. 	<ul style="list-style-type: none"> Check ASR parameters group 21. Check PG parameters Check overspeed parameters 20-20/20-12.
OS			

LED display	Description	Cause	Possible solutions
PGO PG Open circuit 	PG pulses are not received by the inverter for the time specified in 20-26 (PG open circuit detection time). This fault is active V/F + PG and SV control mode (00-00 = 1 or 3 or 4).	<ul style="list-style-type: none"> PG cable disconnected. PG has no power. Mechanical brake active preventing motor from turning. 	<ul style="list-style-type: none"> Check PG wiring. Check PG power-supply. Make sure brake is released.
DEV Speed deviation 	Motor speed rises above 20-23 level (PG speed deviation level) for the time specified in 20-24 (PG deviation time)...Active when parameter 20-22(=0 or 1). This fault is active V/F + PG and SV control mode (00-00 = 1 or 3 or 4).	<ul style="list-style-type: none"> Load too heavy Mechanical brake active preventing motor from turning. PG wiring error. PG parameters (group 20) set incorrectly. Acceleration / deceleration time set to short. 	<ul style="list-style-type: none"> Check load Make sure brake is released. Check PG wiring. Check PG parameters 20-23/20-24. Increase Acceleration / deceleration time.
CE communicati on error 	No Modbus communication received in for the time specified in 09-06 (communication error detection time). Active when 09-07(= 0 to 2).	<ul style="list-style-type: none"> Connection lost or wire broken. Host stopped communicating. 	<ul style="list-style-type: none"> Check connection Check host computer / software.
FB PID feedback loss 	PID feedback signal falls below level specified in 10-12 (PID feedback loss detection level) for the time specified in 10-13 (Feedback loss detection time). Active when parameter (10-11 = 2).	<ul style="list-style-type: none"> Feedback signal wire broken Feedback sensor broken. 	<ul style="list-style-type: none"> Check feedback wiring Replace feedback sensor.
STO Safety switch 	Run permissive input open.	<ul style="list-style-type: none"> Terminal board Input F1 and F2 are not connected (For standard H & C type) Terminal board Input SF1 / SF2 and SG are not connected (For enhanced E & G type) 08-30 set to 1, free run to stop, and digital terminal is open, when 03-00~03-07=58 	<ul style="list-style-type: none"> Check F1 and F2 connection. (For standard U type) Check SF1 / SF2 and SG connection (For enhanced UE type) Check if 08-30 =0 and 03-00~03-07=58
STO2 Safety switch 			
SS1 Digital input Stop command 	Digital input Stop command enabled	<ul style="list-style-type: none"> 08-30 =0 and 03-00~03-07=58 	<ul style="list-style-type: none"> Check if 08-30 =0 and 03-00~03-07=58
EF0 External fault 0 	External fault (Modbus)	Modbus communication 0x2501 bit 2= "1"	<ul style="list-style-type: none"> Reset Modbus communication 0x2501 bit 2= "1"

LED display	Description	Possible causes	Corrective action
EF1 External fault (S1) 	External fault (Terminal S1) Active when 03-00= 25 or 68, and Inverter external fault selection 08-24=0 or 1.	<ul style="list-style-type: none"> • Multifunction digital input external fault active. 	<ul style="list-style-type: none"> • Multi-function input function set incorrectly. • Check wiring
EF2 External fault (S2) 	External fault (Terminal S2) Active when 03-01= 25 or 68, and Inverter external fault selection 08-24=0 or 1.		
EF3 External fault (S3) 	External fault (Terminal S3) Active when 03-02= 25 or 68, and Inverter external fault selection 08-24=0 or 1.		
EF4 External fault (S4) 	External fault (Terminal S4) Active when 03-03= 25 or 68, and Inverter external fault selection 08-24=0 or 1.		
EF5 External fault (S5) 	External fault (Terminal S5) Active when 03-04= 25 or 68, and Inverter external fault selection 08-24=0 or 1.		
EF6 External fault (S6) 	External fault (Terminal S6) Active when 03-05= 25 or 68, and Inverter external fault selection 08-24=0 or 1.		
EF7 External fault (S7) 	External fault (Terminal S7) Active when 03-06= 25 or 68, and Inverter external fault selection 08-24=0 or 1.		
EF8 External fault (S8) 	External fault (Terminal S8) Active when 03-07= 25 or 68, and Inverter external fault selection 08-24=0 or 1.		

LED display	Description	Possible causes	Corrective action
CF07 Motor control fault 	Motor control fault	<ul style="list-style-type: none"> • SLV mode is unable to run motor. 	<ul style="list-style-type: none"> • Perform rotational or stationary auto-tune • Increase minimum output frequency (01-08)
CF08 Motor control fault 	Motor control fault	<ul style="list-style-type: none"> • Start or Run fault in PMSLV mode. 	<ul style="list-style-type: none"> • Increase the value of 22-10 properly. • Re auto-tune (22-21) • Check if the load is too heavy to raise torque output limit.
FU fuse open 	DC bus fuse blown DC fuse (Models 200V 50HP and above, 400V 100HP and above) open circuit.	<ul style="list-style-type: none"> • IGBT damaged. • Short circuit output terminals. 	<ul style="list-style-type: none"> • Check IGBTs • Check for short circuit at inverter output. • Replace inverter.
CF00 Operator Communicati on Error 	Errors of data transmission occur in LCD keypad.	<ul style="list-style-type: none"> • LCD keypad and inverter cannot transmit data after power on 5 seconds. 	<ul style="list-style-type: none"> • Disconnect the operator and then reconnect. • Replace the control board
CF01 Operator Communicati on Error 2 	Errors of data transmission occur in LCD keypad.	<ul style="list-style-type: none"> • LCD keypad and inverter can transmit data but transmission error occurs for more than 2 seconds 	<ul style="list-style-type: none"> • Disconnect the operator and then reconnect. • Replace the control board
CTER CT Failure 	Errors of detecting voltages from three phase's current transformer to detect output current.	<ul style="list-style-type: none"> • Errors of detecting voltages • Noises too much • Control board failure 	<ul style="list-style-type: none"> • Check current transformer signal and the voltage on the control board.
CF20 Communicati on Failure 	Use Profibus & Modbus Communication at the same time.	<ul style="list-style-type: none"> • Maybe use two kind of communication type at the same time. 	<ul style="list-style-type: none"> • Check only use one kind of communication type.
PF Protection Fault 	OH1 error occurs for 3 times in 5 minutes when run command in multi-function digital input terminals is not removed.	<ul style="list-style-type: none"> • Run command in multi-function digital input terminals is not removed. 	<ul style="list-style-type: none"> • Remove run command in multi-function digital input terminals.
TOL External Overload 	External overload (enabled only when firemode activated)	<ul style="list-style-type: none"> • External overload in multi-function digital input terminals. (Ex. Fan overheat) 	<ul style="list-style-type: none"> • Check external overload. • Reset external overload of digital input.

10.3 Warning / Self-diagnosis Detection Function

When the inverter detects a warning, the keypad displays a warning code (flash).

Note: The fault contact output does not energize on a warning and the inverter continues operation. When the warning is no longer active the keypad will return to its original state.



When the inverter detected a programming error (for example two parameters contradict each other or are set to an invalid setting), the keypad displays a self-diagnostics code.








Note: The fault contact output does not energize on a self-diagnostics error. While a self-diagnostics code is active the inverter does not accept a run command until the programming error is corrected.






Note: When a warning or self-diagnostic error is active the warning or error code will flash on the keypad. When the RESET key is pressed, the warning message (flash) disappears and returns after 5 sec. If the warning or self-diagnostic error still exists.






Refer to Table 10.3.1 for an overview, cause and corrective action for inverter warnings and self-diagnostic errors.






Table 10.3.1 warning / self-diagnosis and corrective actions









LED display	Description	Possible causes	Corrective action
<p>OV (flash) Over voltage</p>	<p>DC bus voltage exceeds the OV detection level: 200V class: 410Vdc 400V class: 820Vdc 575V class: 1050Vdc 690V class: 1230Vdc (for 400V class, if input voltage 01-14 is set lower than 400V, the OV detection value will be decreased to 700Vdc)</p>	<ul style="list-style-type: none"> • Deceleration time set too short, resulting in regenerative energy flowing back from motor to the inverter. • The inverter input voltage is too high. • Use of power factor correction capacitors. • Excessive braking load. • Braking transistor or resistor defective. • Speed search parameters set incorrectly. 	<ul style="list-style-type: none"> • Increase deceleration time • Reduce input voltage to comply with the input voltage requirements or install an AC line reactor to lower the input voltage. • Remove the power factor correction capacitor. • Use dynamic braking unit. • Replace braking transistor or resistor. • Adjust speed search parameters.
			
<p>UV (flash) under voltage</p>	<p>DC bus voltage is lower than the UV detection level or the pre-charge contactor is not active while the inverter is running. 190Vdc: 200V class; 380Vdc: 400V class 546Vdc: 575/690V class (the detection value can be adjusted by 07-13)</p>	<ul style="list-style-type: none"> • The input voltage is too low. • Input phase loss. • Acceleration time set too short. • Input voltage fluctuation. • Pre-charge contactor damaged. • DC bus voltage feedback signal value not incorrect. 	<ul style="list-style-type: none"> • Check the input voltage. • Check input wiring. • Increase acceleration time. • Check power source • Replace pre-charge contactor • Replace control board or complete inverter.
			






LED display	Description	Possible causes	Corrective action
OH1 Heatsink overheat	The temperature of the heat sink is too high. Note: when OH1 fault occurs three times within five minutes, it is required to wait 10 minutes before resetting the fault.	<ul style="list-style-type: none"> • Ambient temperature too high. • cooling fan failed • Carrier frequency set too high. • Load too heavy. 	<ul style="list-style-type: none"> • Install fan or AC to cool surroundings. • Replace cooling fan. • Reduce carrier frequency. • Reduce load / Measure output current
			
OH2 (flash) Inverter over heating warning	Inverter overheat warning Multi-function digital input set to 31. (Terminal S1 ~ S8) Active when 03-00 ~ 03-07 = 31).	<ul style="list-style-type: none"> • Multifunction digital input overheat warning active 	<ul style="list-style-type: none"> • Multi-function input function set incorrectly. • Check wiring
			
OT (flash) over torque detection	Inverter output torque is higher than 08-15 (over torque detection level) for the time specified in 08-16. Parameter 08-14 = 0 to activate.	<ul style="list-style-type: none"> • Load too heavy. 	<ul style="list-style-type: none"> • Check over torque detection parameters (08-15 / 08-16). • Check and reduce motor load, check and operation duty cycle.
			
UT (flash) under torque detection	Inverter output torque is lower than 08-19 (under torque detection level) for the time specified in 08-20. Parameter 08-18 = 0 to activate.	<ul style="list-style-type: none"> • Sudden drop in load. • Belt break. 	<ul style="list-style-type: none"> • Check under torque detection parameters (08-19 / 08-20). • Check load / application.
			
bb1 (flash) External baseblock	External base block (Terminal S1)	<ul style="list-style-type: none"> • Multifunction digital input external baseblock active. 	<ul style="list-style-type: none"> • Multi-function input function set incorrectly. • Check wiring
			
bb2 (flash) External baseblock	External base block (Terminal S2)	<ul style="list-style-type: none"> • Multifunction digital input external baseblock active. 	<ul style="list-style-type: none"> • Multi-function input function set incorrectly. • Check wiring
			
bb3 (flash) External baseblock	External base block (Terminal S3)	<ul style="list-style-type: none"> • Multifunction digital input external baseblock active. 	<ul style="list-style-type: none"> • Multi-function input function set incorrectly. • Check wiring
			








LED display	Description	Possible causes	Corrective action
bb4 (flash) External baseblock 	External base block (Terminal S4)		
bb5 (flash) External baseblock 	External base block (Terminal S5)		
bb6 (flash) External baseblock 	External base block (Terminal S6)	<ul style="list-style-type: none"> • Multifunction digital input external baseblock active. 	<ul style="list-style-type: none"> • Multi-function input function set incorrectly. • Check wiring
bb7 (flash) External baseblock 	External base block (Terminal S7)		
bb8 (flash) External baseblock 	External base block (Terminal S8)		






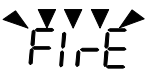

LED display	Description	Possible causes	Corrective action
OS (flash) Motor over speed	Motor speed exceeds level set in 20-20 (PG Over speed Level) for the time set in 20-21 (PG over speed time). Active when 20-19 (= 0 or 1). This fault is active V/F + PG and SV control mode (00-00 = 1 or 3 or 4). Motor speed can be monitored by 12-22	<ul style="list-style-type: none"> • Motor speed overshoot (ASR) • PG ppr set incorrectly. • Overspeed parameters set incorrectly. 	<ul style="list-style-type: none"> • Check ASR parameters group 21. • Check PG parameters • Check overspeed parameters 20-20/20-12.
			
PGO (flash) PG open circuit	PG pulses are not received by the inverter for the time specified in 20-26 (PG open circuit detection time). This fault is active V/F + PG and SV control mode (00-00 = 1 or 3 or 4).	<ul style="list-style-type: none"> • PG cable disconnected. • PG has no power. • Mechanical brake active preventing motor from turning. 	<ul style="list-style-type: none"> • Check PG wiring. • Check PG power-supply. • Make sure brake is released.
			
DEV (flash) Speed deviation	Motor speed rises above 20-23 level (PG speed deviation level) for the time specified in 20-24 (PG deviation time). Active when parameter 20-22(=0 or 1). This fault is active V/F + PG and SV control mode (00-00 = 1 or 3 or 4).	<ul style="list-style-type: none"> • Load too heavy • Mechanical brake active preventing motor from turning. • PG wiring error. • PG parameters (group 20) set incorrectly. • Acceleration / deceleration time set to short. 	<ul style="list-style-type: none"> • Check load • Make sure brake is released. • Check PG wiring. • Check PG parameters 20-23/20-24. • Increase Acceleration / deceleration time.
			
OL1 Motor overload	Internal motor overload protection tripped, active when protection curve 08-05 = xxx1.	<ul style="list-style-type: none"> • Voltage setting V/F mode too high, resulting in over-excitation of the motor. • Motor rated current (02-01) set incorrectly. • Load too heavy. 	<ul style="list-style-type: none"> • Check V/f curve. • Check motor rated current • Check and reduce motor load, check and operation duty cycle.
			
OL2 Inverter overload	Inverter thermal overload protection tripped. If an inverter overload occurs 4 times in five minutes, it is required to wait 4 minutes before resetting the fault.	<ul style="list-style-type: none"> • Voltage setting V/F mode too high, resulting in over-excitation of the motor. • Inverter rating too small. • Load too heavy. 	<ul style="list-style-type: none"> • Check V/f curve. • Replace inverter with larger rating. • Check and reduce motor load, check and operation duty cycle.
			





LED display	Description	Possible causes	Corrective action
CE (flash) communication error 	No Modbus communication received for 2 sec. Active when 09-07=3.	<ul style="list-style-type: none"> • Connection lost or wire broken. • Host stopped communicating. 	<ul style="list-style-type: none"> • Check connection • Check host computer / software.
CLA over current protection level A 	Inverter current reaches the current protection level A.	<ul style="list-style-type: none"> • Inverter current too high. • Load too heavy. 	<ul style="list-style-type: none"> • Check load and duty cycle operation.
CLB over current protection level B 	Inverter current reaches the current protection level B.	<ul style="list-style-type: none"> • Inverter current too high. • Load too heavy. 	<ul style="list-style-type: none"> • Check load and duty cycle operation.
Retry (flash) retry 	Automatic reset activated, warning is displayed until restart delay time set (07-01) expires.	<ul style="list-style-type: none"> • Parameter 07-01 set to a value greater than 0. • Parameter 07-02 set to a value greater than 0. 	<ul style="list-style-type: none"> • Warning disappears after automatic reset.
ES (flash) External emergency stop 	External emergency stop Enabled.	<ul style="list-style-type: none"> • 03-00~03-08 set to 14, and the digital input enabled. 	<ul style="list-style-type: none"> • Turn off run command, and remove external emergency stop command.

LED display	Description	Possible causes	Corrective action
EF1 (flash) External fault (S1) 	External fault (Terminal S1) Active when 03-00=25 or 68, and Inverter external fault selection 08-24=2.	<ul style="list-style-type: none"> • Multifunction digital input external fault active and parameter 08-24 = 2 for operation to continue. 	<ul style="list-style-type: none"> • Multi-function input function set incorrectly. • Check wiring • Multi-function input function set incorrectly. • Check wiring
EF2 (flash) External fault (S2) 	External fault (Terminal S2) Active when 03-01=25 or 68, and Inverter external fault selection 08-24=2.		
EF3 (flash) External fault (S3) 	External fault (Terminal S3) Active when 03-02=25 or 68, and Inverter external fault selection 08-24=2.		
EF4 (flash) External fault (S4) 	External fault (Terminal S4) Active when 03-03=25 or 68, and Inverter external fault selection 08-24=2.		
EF5 (flash) External fault (S5) 	External fault (Terminal S5) Active when 03-04=25 or 68, and Inverter external fault selection 08-24=2.		
EF6 (flash) External fault (S6) 	External fault (Terminal S6) Active when 03-05=25 or 68, and Inverter external fault selection 08-24=2.		
EF7 (flash) External fault (S7) 	External fault (Terminal S7) Active when 03-06=25 or 68, and Inverter external fault selection 08-24=2.		
EF8 (flash) External fault (S8) 	External fault (Terminal S8) Active when 03-07=25 or 68, and Inverter external fault selection 08-24=2.		

LED display	Description	Possible causes	Corrective action
EF9 (flash) error of forward/reversal rotation 	Forward run and reverse run are active within 0.5 sec of each other. Stop method set by parameter 07-09.	<ul style="list-style-type: none"> • Forward run and reverse run active (see 2-wire control). 	<ul style="list-style-type: none"> • Check run command wiring
SE01 Rang setting error 	Parameter setting falls outside the allowed range.	<ul style="list-style-type: none"> • Some parameter ranges are determined by other inverter parameters which could cause an out of range warning when the dependency parameter is adjusted. Example: 1.02-00>02-01, or 20>02-21 2.00-12>00-13, 3.00-07 = 1,00-05=00-06 4.02-03 > 02-06 or 02-22 > 02-25 5.20-16 < 20-15 	<ul style="list-style-type: none"> • Check parameter setting.
SE02 Digital input terminal error 	Multi-function input setting error.	<ul style="list-style-type: none"> • Multi-function digital input terminals (03-00 to 03-07) are set to the same function (not including ext. fault and not used.) or ①UP/DOWN commands are not set at the same time(they must be used together). ②UP/DOWN commands (08 and 09) and ACC/DEC commands (11) are set at the same time. ③Speed search 1(19, maximum frequency) and Speed search 2 (34, from the set frequency) are set at the same time. 03-00~03-07 set two-wire and three-wire in the same time. 	<ul style="list-style-type: none"> • Check multi-function input setting.
SE03 V/f curve error 	V/f curve setting error.	<ul style="list-style-type: none"> • V/F curve setting error. ① 01-02 > 01-12 > 01-06 >01-08; • (Fmax) (Fbase) (Fmid1) (Fmin) ②01-16 > 01-24 > 01-20 > 01-22; • (Fmax2) (Fbase2)(Fmid1) (Fmin2) 	<ul style="list-style-type: none"> • Check V/F parameters
SE05 PID selection error 	PID selection error.	<ul style="list-style-type: none"> • 10-00 and 10-01 set to 1(AI1) or set to 2(AI2) • 10-29 = 1 or 2 and 10-25 = 1 allow to reverse. • 10-29 = 1 or 2 and 10-03 =1xxxb(PID output+ target value) 	<ul style="list-style-type: none"> • Check 10-00 and 10-01 • Check 10-29 and 10-25 • Check 10-29 and 10-03

LED display	Description	Possible causes	Corrective action
HPErr Model selection error 	Inverter capacity setting error: Inverter capacity setting 13-00 does not match the rated voltage.	<ul style="list-style-type: none"> Inverter capacity setting does not match voltage class (13-00). 	<ul style="list-style-type: none"> Check inverter capacity setting 13-00.
SE07 PG card error 	Inverter PG card setting error.	<ul style="list-style-type: none"> No PG feedback card installed. Set wrong type for PM Encoder Type (22-08) 	<ul style="list-style-type: none"> Install PG feedback card. Check control mode. Set right type for PM Encoder Type (22-08) and power on again.
SE08 PM Motor mode error 	Inverter rating does not support the PM Motor mode.	<ul style="list-style-type: none"> Inverter rating does not support PM motor control mode. 	<ul style="list-style-type: none"> Check control mode.
SE09 PI setting error 	Inverter PI setting error	<ul style="list-style-type: none"> Inverter pulse input selection (03-30) selection conflicts with PID source (10-00 and 10-01). 	<ul style="list-style-type: none"> Check pulse input selection (03-30) and PID source (10-00 and 10-01).
FB (flash) PID feedback breaking 	PID feedback signal falls below level specified in 10-12 (PID feedback loss detection level) for the time specified in 10-13 (Feedback loss detection time). Active when parameter (10-11 = 1).	<ul style="list-style-type: none"> Feedback signal wire broken Feedback sensor broken. 	<ul style="list-style-type: none"> Check feedback wiring Replace feedback sensor.
USP (flash) Unattended Start Protection 	Unattended Start Protection (USP) is enabled (enabled at power-up.)	<ul style="list-style-type: none"> USP at power-up (activated by multi-function digital input) is enabled. The inverter will not accept a run command. While the warning is active the inverter does not accept a run command. (See parameter 03-00 - 03-08 = 50). 	<ul style="list-style-type: none"> Remove run command or reset inverter via multi-function digital input (03-00 to 03-07 = 17) or use the RESET key on the keypad to reset inverter. Activate USP input and re-apply the power.
STP0 Zero Speed Stop Error 	Frequency command is smaller than 01-08 without DC brake.	<ul style="list-style-type: none"> Frequency command is smaller than motor minimum output frequency. 	<ul style="list-style-type: none"> Adjust frequency command
STP2 External	External Terminal is main run command	<ul style="list-style-type: none"> Run command executes from external terminal but executes 	<ul style="list-style-type: none"> Remove the run command from external

LED display	Description	Possible causes	Corrective action
Terminal Stop Error 	source selection (00-02=1) and run command executes but executes stop command from keypad.	stop command from keypad.	terminal
EnC Encoder Error 	PG card is connected but encoder signal error is detected when motor auto rotational tuning is running.	<ul style="list-style-type: none"> Abnormal encoder signal 	<ul style="list-style-type: none"> Check encoder wiring 17-07 PG pulse number setting is not corresponding to the encoder. Replace the encoder.
RunEr Wrong running direction Error 	Running direction is different from 11-00	<ul style="list-style-type: none"> Check the command among 11-00, jog and DI control to see if any difference. 	<ul style="list-style-type: none"> Revise the command among 11-00, jog and DI control to see if any difference
PArEr Parameter setting error 	Parameter setting error	<ul style="list-style-type: none"> The parameter setting is wrong 	<ul style="list-style-type: none"> Please refer to the manual for correct setting
STP1 Direct start warning 	The inverter can't start directly, due to 07-04=1	<ul style="list-style-type: none"> Run command from the terminal is enabled and 07-04=1 	<ul style="list-style-type: none"> Remove the run command from the terminal first, and enabled later.
FirE Fire mode enabled 	Fire mode enabled	<ul style="list-style-type: none"> Fire mode enabled. 	<ul style="list-style-type: none"> Check the environment and confirm the fire status. If no fire, turn off the power and power on again.
AdCEr Voltage on C/B error 	The voltage on the control board error	<ul style="list-style-type: none"> Errors of detecting voltages Noises too much Control board failure 	<ul style="list-style-type: none"> Check the voltage on the control board.
EPErr EEPROM	The data save in EEPROM is wrong.	<ul style="list-style-type: none"> EEPROM circuit failure Parameter check error after 	<ul style="list-style-type: none"> Restore factory setting, then cut off the power

LED display	Description	Possible causes	Corrective action
Save error 		power on	and power on again. <ul style="list-style-type: none"> If warning again, replace control board.
bdErr Control board error 	Firmware can't meet Control board.	<ul style="list-style-type: none"> Firmware can't meet Control board. 	<ul style="list-style-type: none"> Replace the control board.
Parameter Lock 	Parameter lock key code (password) already locked	<ul style="list-style-type: none"> Parameter lock key code already enable (13-07) 	<ul style="list-style-type: none"> Lifting the parameter lock key code, to enter the correct parameter for 13-07
Set password failed 	Parameter lock key code cannot enable	<ul style="list-style-type: none"> To enable the parameter lock key code (password) function, but the password is not correct 	<ul style="list-style-type: none"> Enter the correct parameter for 13-07 to enable the parameter lock key

10.4 Auto-tuning Error

When a fault occurs during auto-tuning of a standard AC motor, the display will show the “AtErr” fault and the motor stops. The fault information is displayed in parameter 17-11.

Note: The fault contact output does not energize with an auto-tuning fault. Refer to Table 10.4.1, for fault information during tuning, cause and corrective action.

Table 10.4.1 Auto-tuning fault and corrective actions

Error	Description	Cause	Corrective action
01	Motor data input error.	<ul style="list-style-type: none"> Motor Input data error during auto-tuning. Inverter output current does not match motor rated current. 	<ul style="list-style-type: none"> Check the motor tuning data (17-00 to 17-09). Check inverter capacity
02	Motor lead to lead resistance R1 tuning error.	<ul style="list-style-type: none"> Auto-tuning is not completed within the specified time Auto-tuning results fall outside parameter setting range. Motor rated current exceeded. Motor was disconnected. 	<ul style="list-style-type: none"> Check the motor tuning data (17-00 to 17-09). Check motor connection. Disconnect motor load. Check inverter current detection circuit and DCCTs. Check motor installation.
03	Motor leakage inductance tuning error.		
04	Motor rotor resistance R2 tuning error.		
05	Motor mutual inductance Lm tuning error.		
07	Deadtime compensation detection error		
06	Motor encoder error	<ul style="list-style-type: none"> PG feedback noise 	<ul style="list-style-type: none"> Check motor rated current. Check PG card grounding.
08	Motor acceleration error (Rotational type auto-tuning only).	<ul style="list-style-type: none"> Motor fails to accelerate in the specified time (00-14=20sec). 	<ul style="list-style-type: none"> Increase acceleration time (00-14). Disconnect motor load.
09	Other	<ul style="list-style-type: none"> No load current is higher than 70% of the motor rated current. Torque reference exceeds 100%. Errors other than ATE01~ATE08. 	<ul style="list-style-type: none"> Check the motor tuning data (17-00 to 17-09). Check motor connection.

10.5 PM Motor Auto-tuning Error

When a fault occurs during auto-tuning of a PM motor, the display will show the “IPErr” fault and the motor stops. The fault information is displayed in parameter 22-18.

Note: The fault contact output does not energize with an auto-tuning fault. Refer to Table 10.5.1, for fault information during tuning, cause and corrective action.

Table 10.5.1 Auto-tuning fault and corrective actions for PM motor

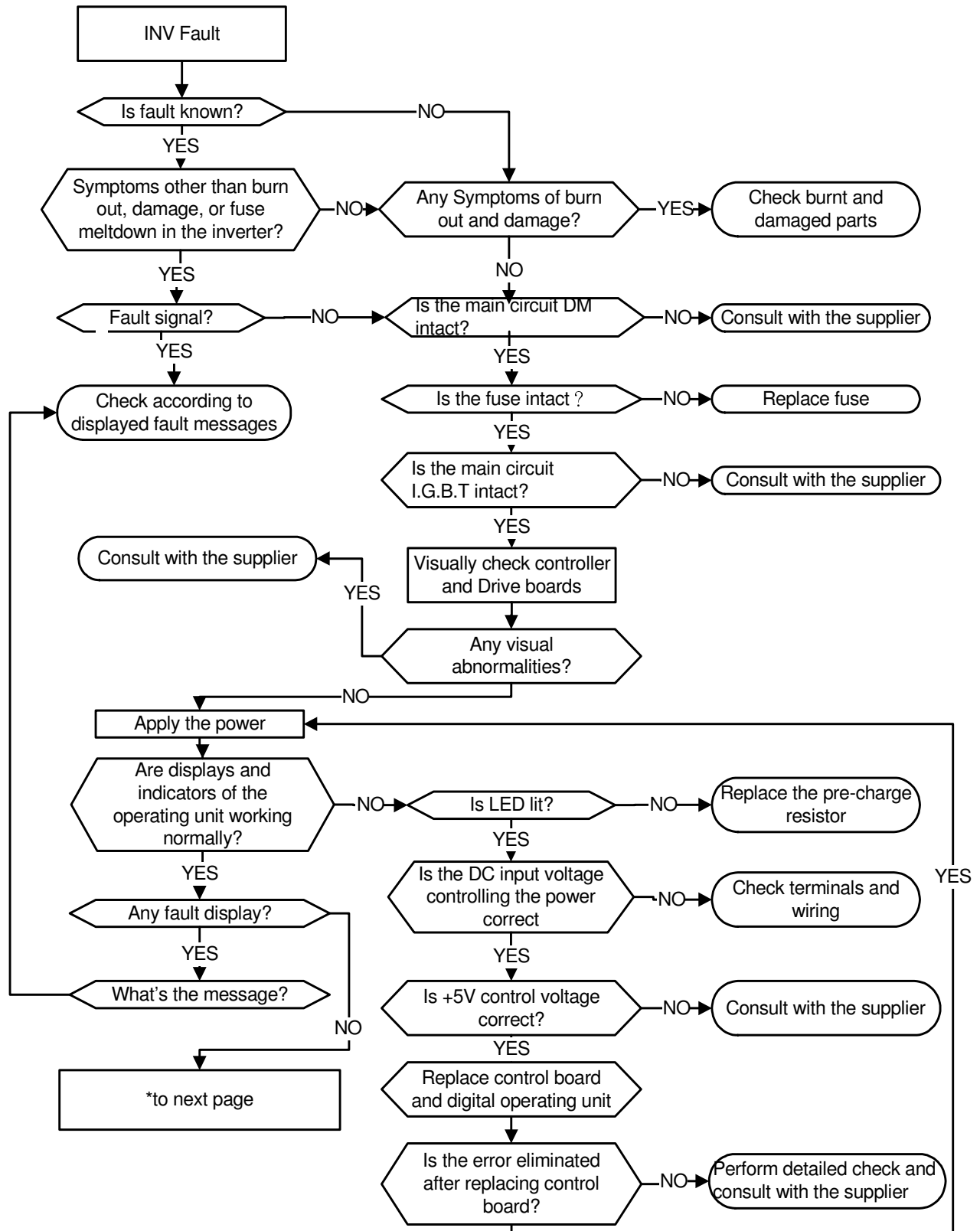
Error	Description	Cause	Corrective action
01	Magnetic pole alignment tuning failure (static).	<ul style="list-style-type: none"> Inverter output current does not match motor current. 	<ul style="list-style-type: none"> Check the motor tuning data (22-02). Check inverter capacity
02	PG option missing.	<ul style="list-style-type: none"> Magnetic pole cannot be aligned without PG option card. 	<ul style="list-style-type: none"> Install PG feedback card.
03	Magnetic pole alignment auto-tuning abort during rotational auto-tune.	<ul style="list-style-type: none"> System abnormality during magnetic pole alignment. 	<ul style="list-style-type: none"> Check for active protection functions preventing auto-tuning.
04	Timeout during magnetic pole alignment during rotational auto-tune.	<ul style="list-style-type: none"> Motor cannot rotate 	<ul style="list-style-type: none"> Check motor. Check motor wiring. Check brake released.
05	Circuit tuning time out.	<ul style="list-style-type: none"> System abnormality during circuit tuning. 	<ul style="list-style-type: none"> Check for active protection functions preventing auto-tuning.
06	Encoder error	<ul style="list-style-type: none"> PG feedback noise 	<ul style="list-style-type: none"> Check motor rated current. Check PG card grounding.
07	Warning	<ul style="list-style-type: none"> Other motor tuning error 	<ul style="list-style-type: none"> Check the motor tuning data (22-02). Check motor connection.
08	Motor current out of range during magnetic pole alignment (rotational auto-tune).	<ul style="list-style-type: none"> Motor cannot operate at low speeds. 	<ul style="list-style-type: none"> Check PG card wiring Check motor connection.
09	Current out of range during circuit tuning.	<ul style="list-style-type: none"> Inverter output current does not match motor current. 	<ul style="list-style-type: none"> Check the motor tuning data (22-02). Check inverter capacity
10	Magnetic pole alignment and circuit tuning failed.	<ul style="list-style-type: none"> Auto-tuning is not successful. 	<ul style="list-style-type: none"> Retry magnetic pole alignment and circuit tuning.

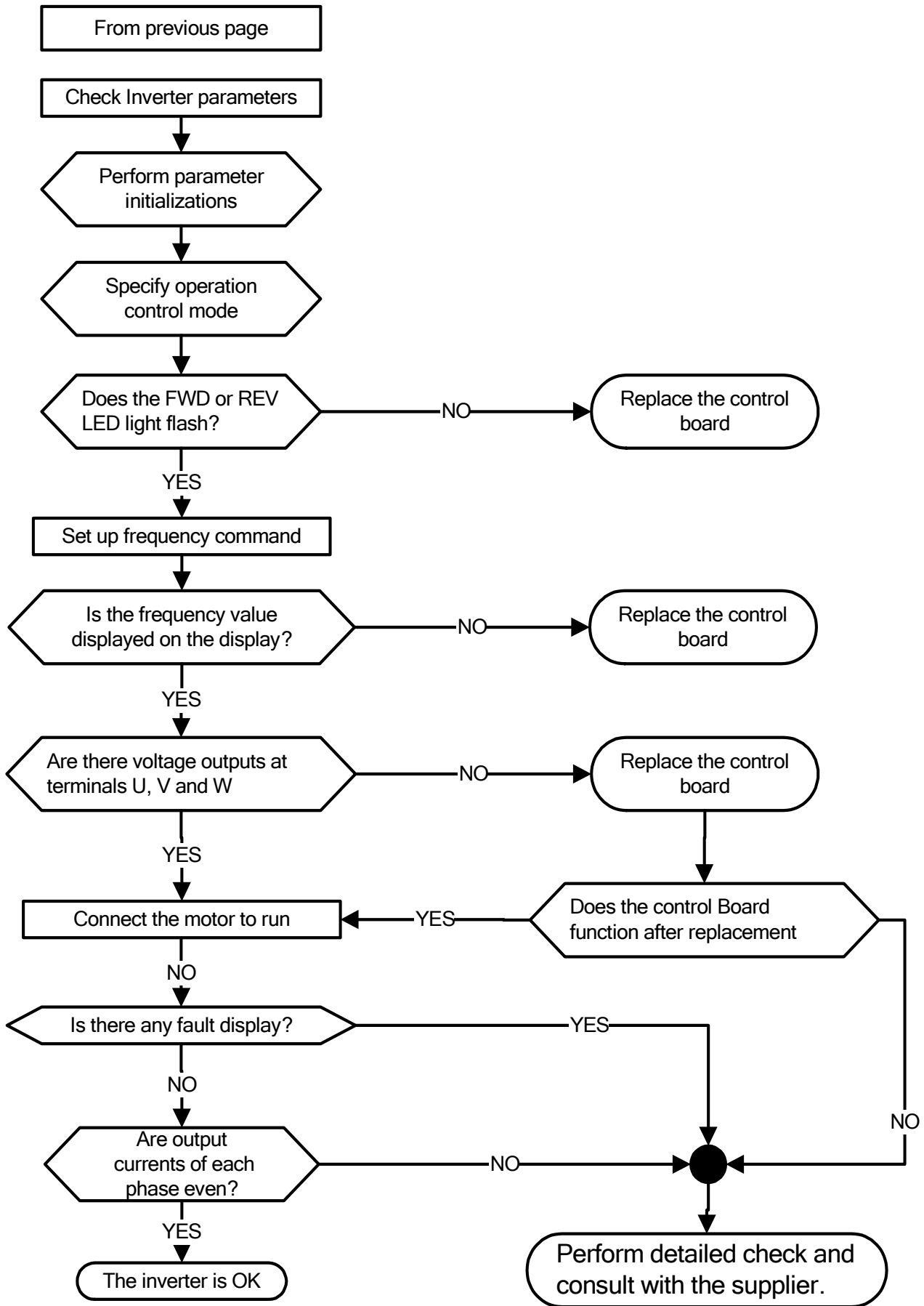
10.6 General troubleshooting

Status	Checking point	Remedy
Motor runs in wrong direction	Is the wiring for the output terminals correct?	Wiring must match U, V, and W terminals of the motor.
	Is the wiring for forward and reverse signals correct?	Check for correct wiring.
The motor speed can not be regulated.	Is the wiring for the analog frequency inputs correct?	Check for correct wiring.
	Is the setting of operation mode correct?	Check the Frequency Source set in parameters 00-05/00-06.
	Is the load too excessive?	Reduce the load.
Motor running speed too high or too low	Check the motor specifications (poles, voltage...) correct?	Confirm the motor specifications.
	Is the gear ratio correct?	Confirm the gear ratio.
	Is the setting of the highest output frequency correct?	Confirm the highest output frequency
Motor speed varies unusually	Is the load too excessive?	Reduce the load.
	Does the load vary excessively?	1.Minimize the variation of the load. 2.Consider increasing the capacities of the inverter and the motor.
	Is the input power unstable or is there a phase loss ?	1.Consider adding an AC reactor at the power input side if using single-phase power. 2.Check wiring if using three-phase power
Motor can not run	Is the power connected to the correct L1, L2, and L3 terminals? is the charging indicator lit ?	1.Is the power applied? 2.Turn the power OFF and then ON again. 3.Make sure the power voltage is correct. 4.Make sure screws are secured firmly.
	Is there voltage across the output terminals T1, T2, and T3?	Turn the power OFF and then ON again.
	Is overload causing the motor to stall?	Reduce the load so the motor will run.
	Are there any abnormalities in the inverter?	See error descriptions to check wiring and correct if necessary.
	Is there a forward or reverse run command ?	
	Has the analog frequency signal been input?	1.Is analog frequency input signal wiring correct? 2.Is voltage of frequency input correct?
	Is the operation mode setting correct?	Operate through the digital keypad

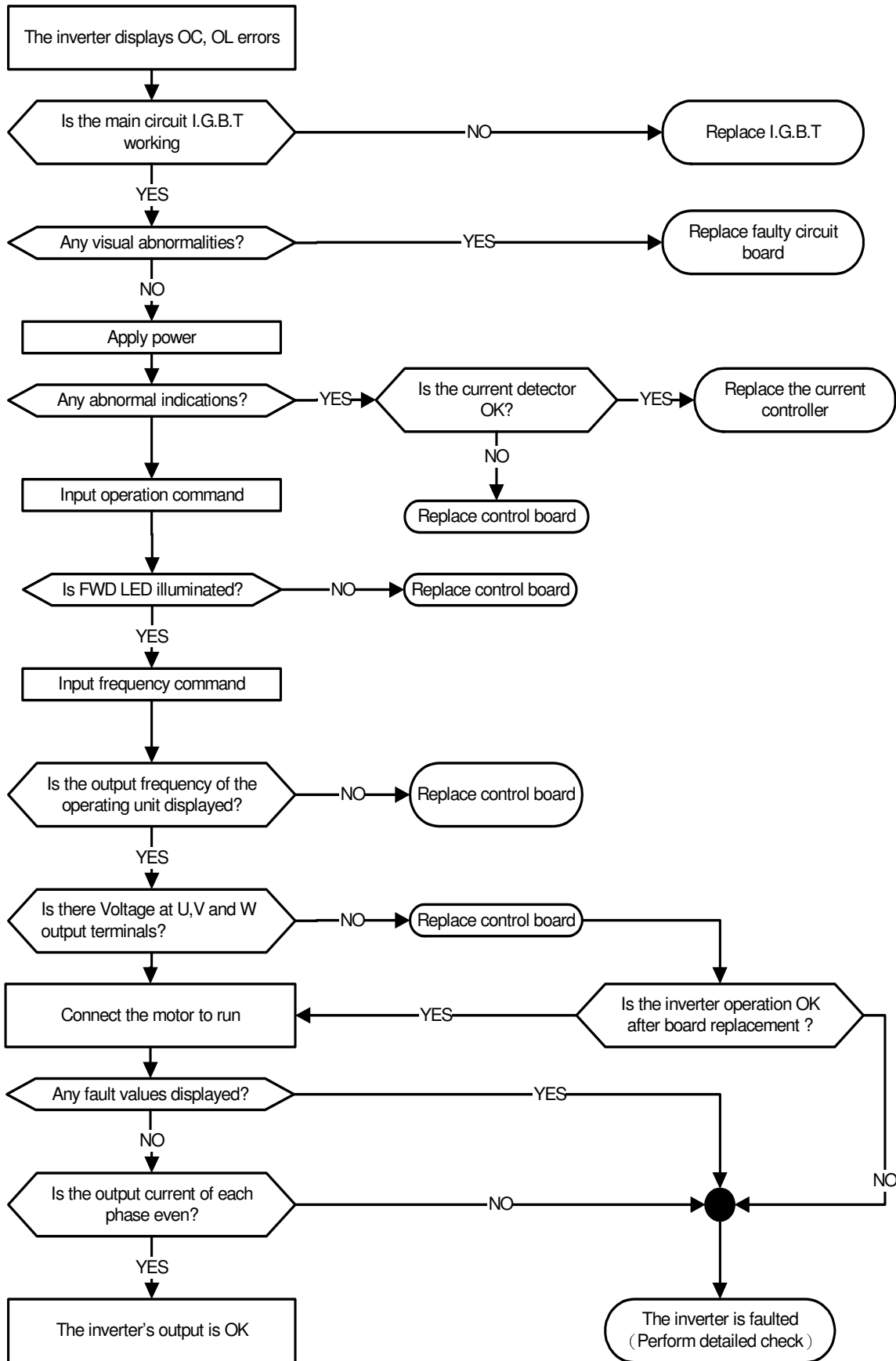
10.7 Troubleshooting of the Inverter

10.7.1 Quick troubleshooting of the Inverter

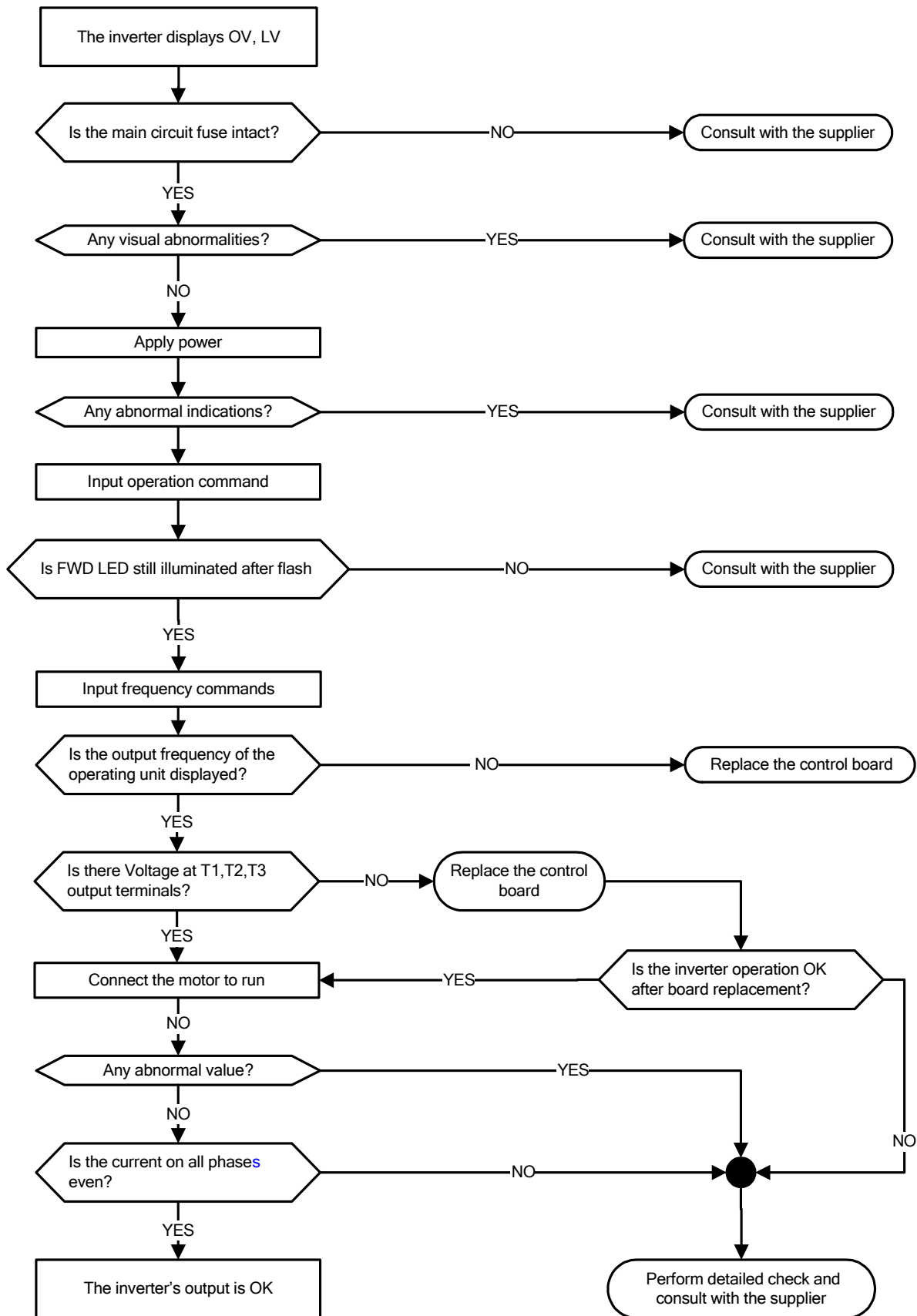




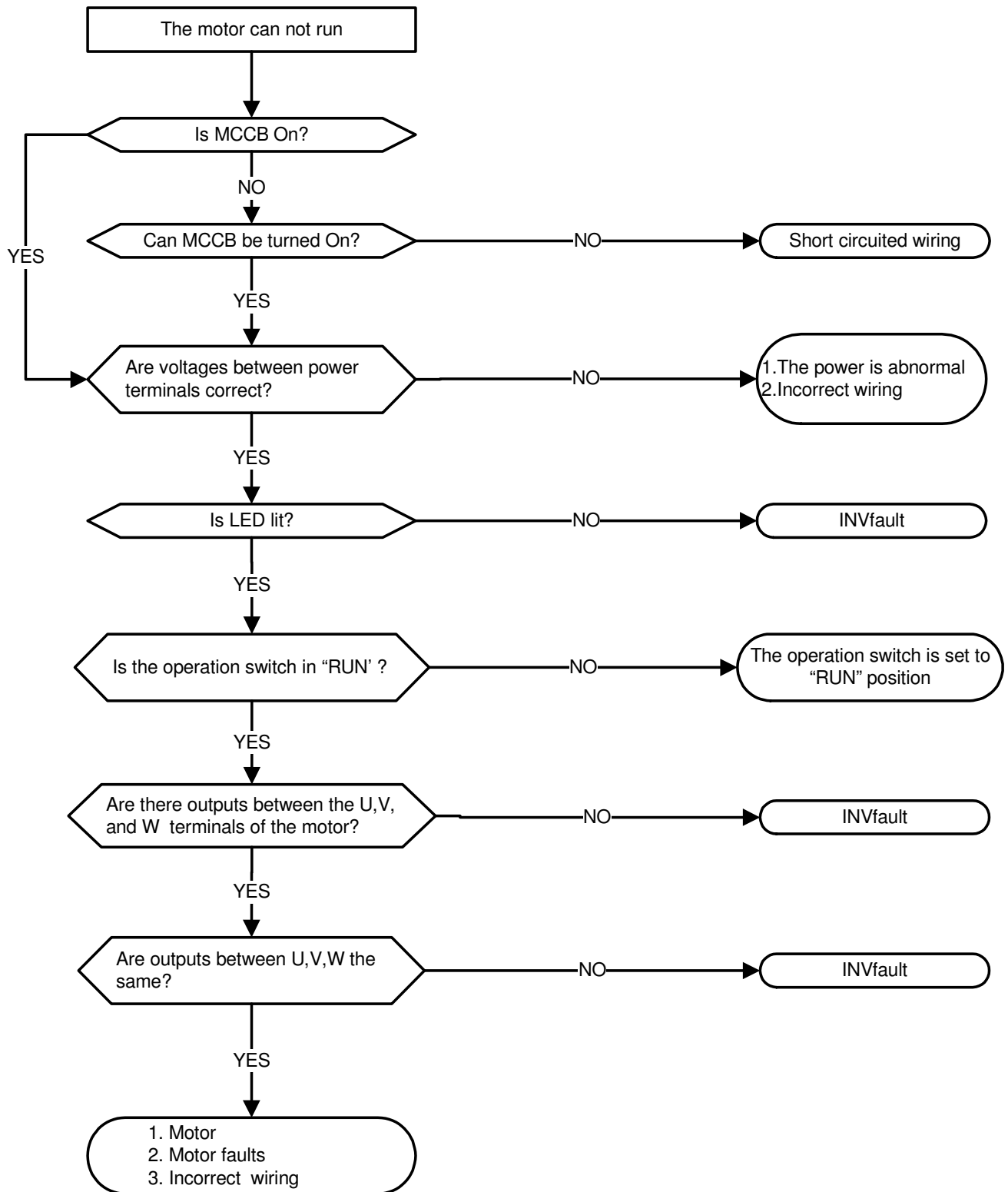
10.7.2 Troubleshooting for OC, OL error displays



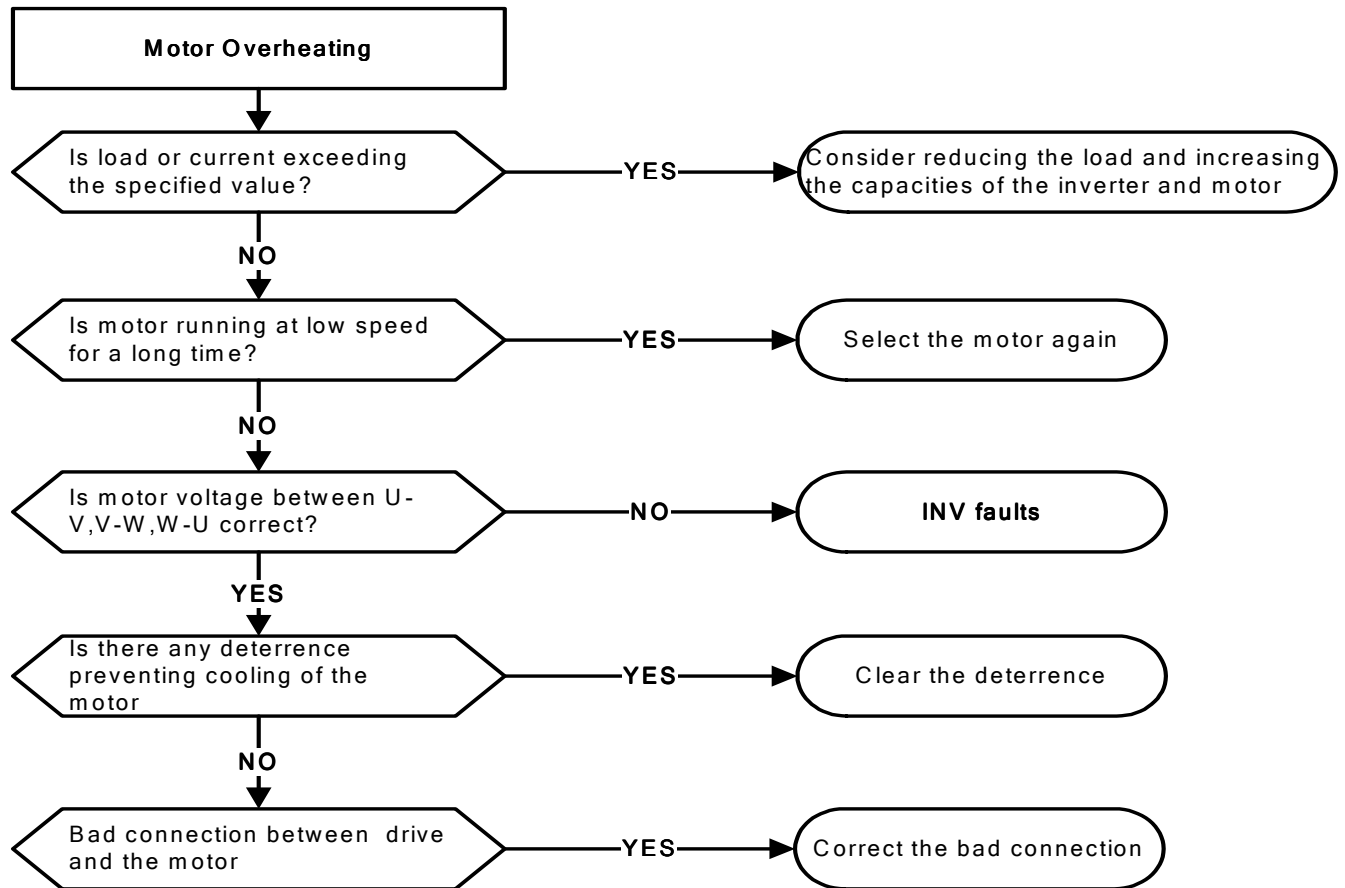
10.7.3 Troubleshooting for OV, LV error



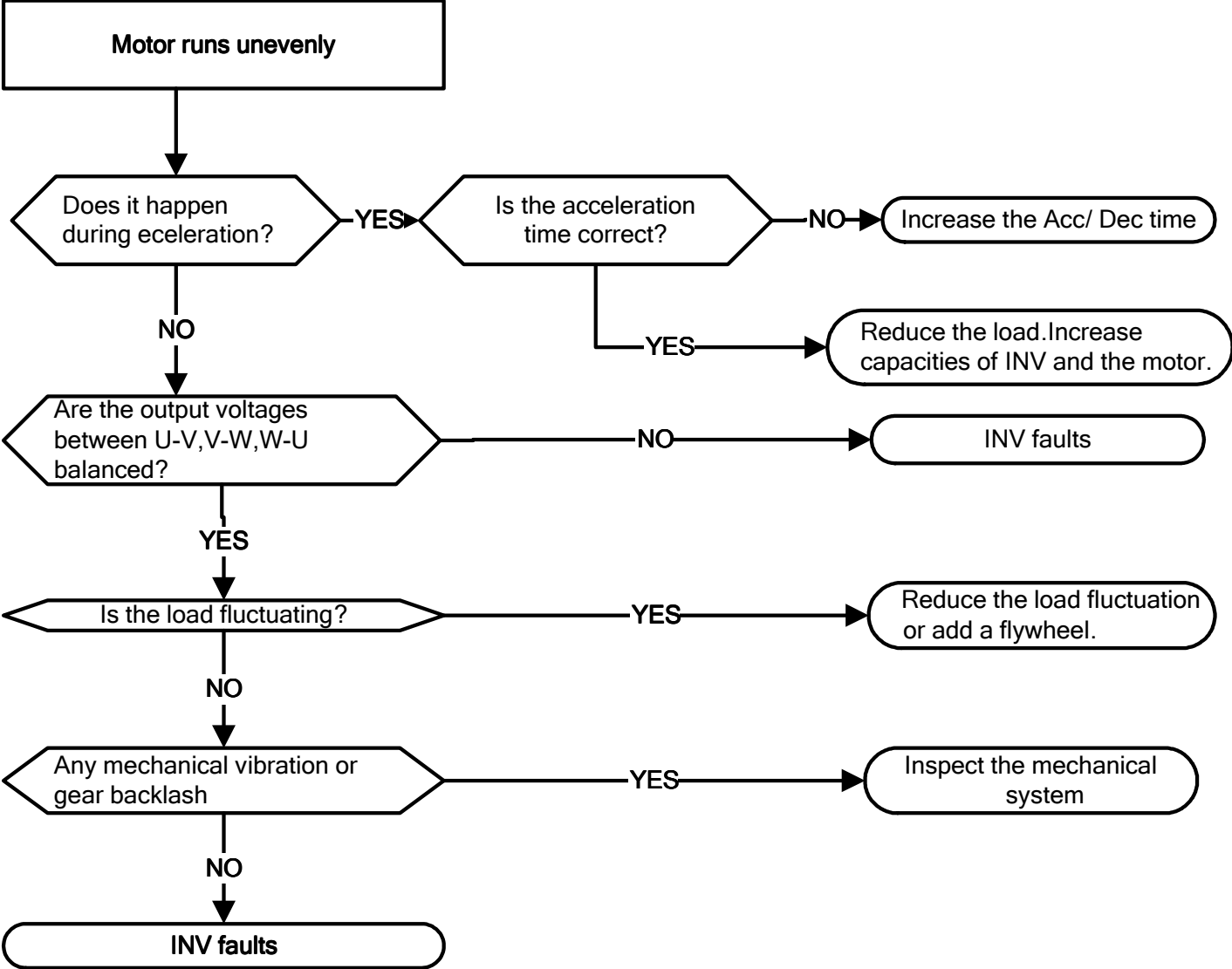
10.7.4 The motor can not run



10.7.5 Motor Overheating



10.7.6 Motor runs unbalanced



10.8 Routine and periodic inspection

To ensure stable and safe operations, check and maintain the inverter at regular intervals.

Use the checklist below to carry out inspection.

Disconnect power after approximately 5 minutes to make sure no voltage is present on the output terminals before any inspection or maintenance.

Items	Details	Checking period		Methods	Criteria	Remedies
		Daily	1Year			
Environment & Ground connection						
Ambient conditions at the installation	Confirm the temperature and humidity at the machine	◎		Measure with thermometer and hygrometer	Temperature: -10 ~40°C/50°C (14~104°F)/(122°F) Humidity: Below 95%RH	Improve the ambient or relocate the drive to a better area.
Installation Grounding	Is the grounding resistance correct?		◎	Measure the resistance with a multi-tester	200Vclass: below 100Ω	Improve the grounding if needed.
Terminals & Wiring						
Connection terminals	Any loose parts or terminals?		◎	Visual check Check with a screwdriver	Correct installation requirement	Secure terminals and remove rust
	Any damage to the base ?		◎			
	Any corroded Terminals?		◎			
Wiring	Any broken wires?		◎	Visual check	Correct wiring requirement	Rectify as necessary
	Any damage to the wire insulation?		◎			
voltage						
Input power voltage	Is the voltage of the main circuit correct?	◎		Measure the voltage with a multi-tester	Voltage must conform with the spec.	Improve input voltage if necessary.
Circuit boards and components						
Printed circuit board	Any contamination or damage to printed circuit board?		◎	Visual check	Correct component condition	Clean or replace the circuit board
Power component	Any dust or debris		◎			Clean components
		Check resistance between terminals		◎	Measure with a multi-tester	No short circuit or broken circuit in three phase output
Cooling System						
Cooling fan	Unusual vibration and noise?		◎	Visual and sound check	Correct cooling	Consult with the supplier
	Excessive dust or debris	◎				Clean the fan
Heat sink	Excessive dust or debris	◎		Visual check		Clean up debris or dust
Ventilation Path	Is the ventilation path blocked?	◎				Clear the path

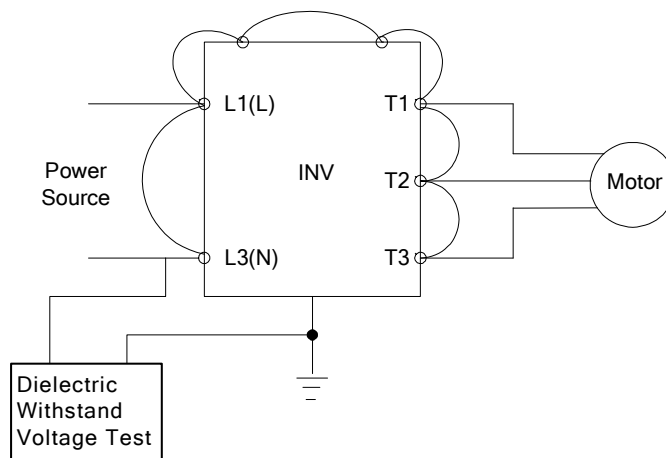
10.9 Maintenance

To ensure long-term reliability, follow the instructions below to perform regular inspection. Turn the power off and wait for a minimum of 5 minutes before inspection to avoid potential shock hazard from the charge stored in high-capacity capacitors.

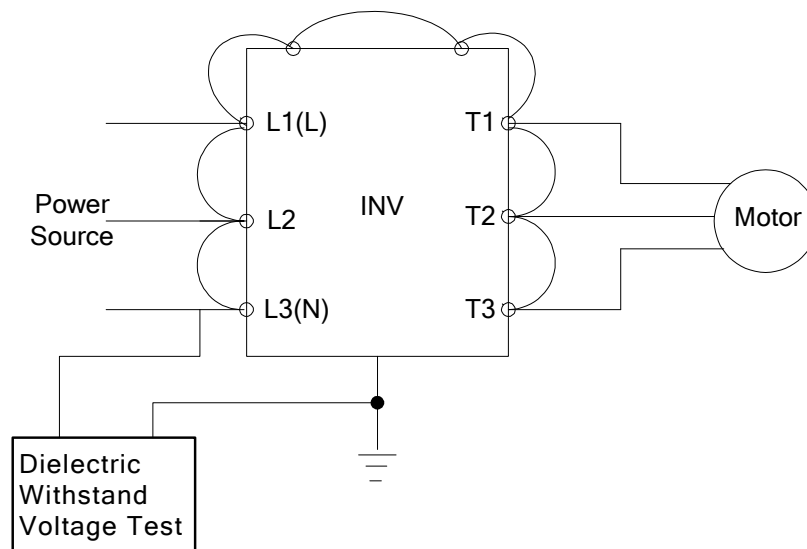
1. Maintenance Check List.

➤ Ensure that temperature and humidity around the inverters is as required in the instruction manual, installed away from any sources of heat and the correct ventilation is provided..
➤ For replacement of a failed or damaged inverter consult with the local supplier.
➤ Ensure that the installation area is free from dust and any other contamination.
➤ Check and ensure that the ground connections are secure and correct.
➤ Terminal screws must be tight, especially on the power input and output of the inverter.
➤ Do not perform any insulation test on the control circuit.

2. Insulation test Method . Single Phase



Three Phase



Chapter 11 Inverter Peripheral devices and Options

11.1 Braking Resistors and Braking Units

Inverters ratings 200V 1 ~ 25HP / 400V 1 ~ 40HP / 575V 1~10HP/600V 15~40HP have a built-in braking transistor. For applications requiring a greater braking torque an external braking resistor can be connected to terminals B1 / P and B2; for inverter ratings above 200V 30HP / 400V 50HP/600V 50HP, an external braking unit (connected to ⊕ - ⊖ of the inverter) and a braking resistor (connected to two ends of the detection module BR⊕ - BR⊖) is required.

Table 11.1.1 List of braking resistors and braking units

Inverter			Braking unit		Braking resistor					Braking torque (Peak / Continues) 10%ED	Minimum Resistance*1	
Input Voltage	HP	KW	Model	Qty Req.	Part Number	Resistor specification	Qty Req. (set)	Spec for one Resistor and dimensions (L*W*H) mm	ty Req. (pcs)		(Ω)	(W)
200V 1 ∅ / 3 ∅	1	0.75	-	-	JNBR-150W200	150W/200Ω	1	150W/200Ω (251*28*60)	1	119%	17Ω	1000W
	2	1.5	-	-	JNBR-150W100	150W/100Ω	1	150W/100Ω (251*28*60)	1	119%	17Ω	1000W
	3	2.2	-	-	JNBR-260W70	260W/70Ω	1	260W/70Ω (274*40*78)	1	115%	17Ω	1000W
200V 3 ∅	5	3.7	-	-	JNBR-390W40	390W/40Ω	1	390W/40Ω (395*40*78)	1	119%	17Ω	1000W
	7.5	5.5	-	-	JNBR-520W30	520W/30Ω	1	520W/30Ω (400*50*100)	1	108%	17Ω	1000W
	10	7.5	-	-	JNBR-780W20	780W/20Ω	1	780W/20Ω (400*50*100)	1	119%	11Ω	1500W
	15	11	-	-	JNBR-2R4KW13R6	2400W/13.6Ω	1	1200W/27.2Ω (535*60*110)	2	117%	11Ω	1500W
	20	15	-	-	JNBR-3KW10	3000W/10Ω	1	1500W/20Ω (615*60*110)	2	119%	7Ω	2400W
	25	18.5	-	-	JNBR-4R8KW8	4800W/8Ω	1	1200W/32Ω (535*60*110)	4	119%	7Ω	2400W
	30	22	JNTBU-230	1	JNBR-4R8KW6R8	4800W/6.8Ω	1	1200W/27.2Ω (535*60*110)	4	117%	5.5Ω	3000W
	40	30	JNTBU-230	2	JNBR-3KW10	3000W/10Ω	2	1500W/20Ω (615*60*110)	4	119%	5.5Ω	3000W
	50	37	JNTBU-230	2	JNBR-3KW10	3000W/10Ω	2	1500W/20Ω (615*60*110)	4	99%	5.5Ω	3000W
			JNTBU-260	1	JNBR-4R8KW8	4800W/8Ω	2 In para	1200W/32Ω (535*60*110)	8	113%	3.8Ω	4500W
60	45	JNTBU-230	2	JNBR-4R8KW6R8	4800W/6.8Ω	2	1200W/27.2Ω (535*60*110)	8	117%	5.5Ω	3000W	

Inverter			Braking unit		Braking resistor					Braking torque (Peak / Continues) 10%ED	Minimum Resistance ^{*1}		
Input Voltage	HP	KW	Model	Qty Req.	Part Number	Resistor specification	Qty Req. (set)	Spec for one Resistor and dimensions (L*W*H) mm	ty Req. (pcs)		(Ω)	(W)	
400V 3 ∅	75	55	JNTBU-260	1	JNBR-4R8KW8	4800W/8Ω	2 In para	1200W/32Ω (535*60*110)	8	98%	3.8Ω	4500W	
			JNTBU-230	2	JNBR-4R8KW6R8	4800W/6.8Ω	2	1200W/27.2Ω (535*60*110)	8	98%	5.5Ω	3000W	
	100	75	JNTBU-260	1	JNBR-4R8KW8	4800W/8Ω	2 In para	1200W/32Ω (535*60*110)	8	82.5%	3.8Ω	4500W	
			JNTBU-230	3	JNBR-4R8KW6R8	4800W/6.8Ω	3	1200W/27.2Ω (535*60*110)	12	108%	5.5Ω	3000W	
	125	90	JNTBU-260	2	JNBR-4R8KW8	4800W/8Ω	2 In para X2	1200W/32Ω (535*60*110)	16	113%	3.8Ω	4500W	
			JNTBU-230	4	JNBR-4R8KW6R8	4800W/6.8Ω	4	1200W/27.2Ω (535*60*110)	16	113%	5.5Ω	3000W	
	150	110	JNTBU-260	2	JNBR-4R8KW8	4800W/8Ω	2 In para X2	1200W/32Ω (535*60*110)	16	95%	3.8Ω	4500W	
			JNTBU-230	4	JNBR-4R8KW6R8	4800W/6.8Ω	4	1200W/27.2Ω (535*60*110)	16	98%	5.5Ω	3000W	
	400V 3 ∅	1	0.75	-	-	JNBR-150W750	150W/750Ω	1	150W/750Ω (251*28*60)	1	126%	120Ω	600W
		2	1.5	-	-	JNBR-150W400	150W/400Ω	1	150W/400Ω (251*28*60)	1	119%	120Ω	600W
3		2.2	-	-	JNBR-260W250	260W/250Ω	1	260W/250Ω (274*40*78)	1	126%	100Ω	680W	
5		3.7	-	-	JNBR-400W150	400W/150Ω	1	400W/150Ω (395*40*78)	1	126%	60Ω	1200W	
7.5		5.5	-	-	JNBR-600W130	600W/130Ω	1	600W/130Ω (470*50*100)	1	102%	43Ω	1600W	
10		7.5	-	-	JNBR-800W100	800W/100Ω	1	800W/100Ω (535*60*110)	1	99%	43Ω	1600W	
15		11	-	-	JNBR-1R6KW50	1600W/50Ω	1	1600W/50Ω (615*60*110)	1	126%	43Ω	1600W	
20		15	-	-	JNBR-1R5KW40	1500W/40Ω	1	1500W/40Ω (615*60*110)	1	119%	22Ω	3000W	
25		18.5	-	-	JNBR-4R8KW32	4800W/32Ω	1	1200W/32Ω (535*60*110)	4	119%	14Ω	4800W	
30		22	-	-	JNBR-4R8KW27R2	4800W/27.2Ω	1	1200W/27.2Ω (535*60*110)	4	117%	14Ω	4800W	

Inverter			Braking unit		Braking resistor					Braking torque (Peak / Continues) 10%ED	Minimum Resistance ^{*1}	
Input Voltage	HP	KW	Model	Qty Req.	Part Number	Resistor specification	Qty Req. (set)	Spec for one Resistor and dimensions (L*W*H) mm	ty Req. (pcs)		(Ω)	(W)
	40*	30	-	-	JNBR-6KW20	6000W/20Ω	1	1500W/20Ω (615*60*110)	4	119%	11Ω	6000W
	50	37	JNTBU-430	2	JNBR-4R8KW32	4800W/32Ω	2	1200W/32Ω (535*60*110)	8	119%	19.2Ω	3600W
	60	45	JNTBU-430	2	JNBR-4R8KW27R2	4800W/27.2Ω	2	1200W/27.2Ω (535*60*110)	8	117%	19.2Ω	3600W
	75	55	JNTBU-430	2	JNBR-6KW20	6000W/20Ω	2	1500W/20Ω (615*60*110)	8	126%	19.2Ω	3600W
	100	75	JNTBU-430	3	JNBR-6KW20	6000W/20Ω	3	1500W/20Ω (615*60*110)	12	139%	19.2Ω	3600W
			JNTBU-4120	1	JNBR-6KW20	6000W/20Ω	2 In para	1500W/20Ω (615*60*110)	8	99%	7.6Ω	9000W
	125	90	JNTBU-430	3	JNBR-6KW20	6000W/20Ω	3	1500W/20Ω (615*60*110)	12	115%	19.2Ω	3600W
			JNTBU-4120	2	JNBR-6KW20	6000W/20Ω	2 In para X2	1500W/20Ω (615*60*110)	16	146%	7.6Ω	9000W
	150	110	JNTBU-430	4	JNBR-6KW20	6000W/20Ω	4	1500W/20Ω (615*60*110)	16	125%	19.2Ω	3600W
			JNTBU-4120	2	JNBR-6KW20	6000W/20Ω	2 In para X2	1500W/20Ω (615*60*110)	16	125%	7.6Ω	9000W
	175	132	JNTBU-430	4	JNBR-6KW20	6000W/20Ω	4	1500W/20Ω (615*60*110)	16	111%	19.2Ω	3600W
			JNTBU-4120	2	JNBR-6KW20	6000W/20Ω	2 In para X2	1500W/20Ω (615*60*110)	16	110%	7.6Ω	9000W
	215	160	JNTBU-430	5	JNBR-6KW20	6000W/20Ω	5	1500W/20Ω (615*60*110)	20	112%	19.2Ω	3600W
			JNTBU-4120	3	JNBR-6KW20	6000W/20Ω	2 In para X3	1500W/20Ω (615*60*110)	24	130%	7.6Ω	9000W
	215H (Note)	160	JNTBU-430	6	JNBR-6KW20	6000W/20Ω	6	1500W/20Ω (615*60*110)	24	120%	19.2Ω	3600W
			JNTBU-4120	3	JNBR-6KW20	6000W/20Ω	2 In para X3	1500W/20Ω (615*60*110)	24	114%	7.6Ω	9000W
	270	200	JNTBU-430	6	JNBR-6KW20	6000W/20Ω	6	1500W/20Ω (615*60*110)	24	108%	19.2Ω	3600W
			JNTBU-4120	3	JNBR-6KW20	6000W/20Ω	2 In para X3	1500W/20Ω (615*60*110)	24	114%	7.6Ω	9000W

Inverter			Braking unit		Braking resistor					Braking torque (Peak / Continues) 10%ED	Minimum Resistance ^{*1}	
Input Voltage	HP	KW	Model	Qty Req.	Part Number	Resistor specification	Qty Req. (set)	Spec for one Resistor and dimensions (L*W*H) mm	ty Req. (pcs)		(Ω)	(W)
	300	220	JNTBU-430	6	JNBR-6KW20	6000W/20Ω	6	1500W/20Ω (615*60*110)	24	99%	19.2Ω	3600W
			JNTBU-4120	3	JNBR-6KW20	6000W/20Ω	2 In para X3	1500W/20Ω (615*60*110)	24	99%	7.6Ω	9000W
	375	280	JNTBU-430	8	JNBR-6KW20	6000W/20Ω	8	1500W/20Ω (615*60*110)	32	105%	19.2Ω	3600W
			JNTBU-4120	4	JNBR-6KW20	6000W/20Ω	2 In para X4	1500W/20Ω (615*60*110)	32	104%	7.6Ω	9000W
	425	315	JNTBU-430	9	JNBR-6KW20	6000W/20Ω	9	1500W/20Ω (615*60*110)	36	104%	19.2Ω	3600W
			JNTBU-4120	5	JNBR-6KW20	6000W/20Ω	2 In para X5	1500W/20Ω (615*60*110)	40	113%	7.6Ω	9000W

Note1: The spec. please refer to Chapter 3.18, the rated current is 330/370A.

Note2: “2 in parallel” means that need to use 2 set of braking resistor and to be connected in parallel, then connected to braking unit. For example, 400V class 100HP, it need TBU-4120 for 1 and 6000W/20Ω for 2, the braking resistor need to be connected in parallel, after the connection, the braking resistor is 12000W/10Ω.

***Note: UE version of A510-4040-C3-UE may not include braking resistor. Contact Factory.**

Inverter			Braking unit		Braking resistor					Braking torque (Peak / Continues) 10%ED	Minimum Resistance *1	
Input Voltage	HP	KW	Model	Qty Req.	Part Number	Resistor specification	Qty Req. (set)	Spec for one Resistor and dimensions (L*W*H) mm	Qty Req. (pcs)		(Ω)	(W)
575V 3Φ	1	0.75	-	-	-	150W/1400Ω	1		1	120%	130 Ω	1600W
	2	1.5	-	-	-	250W/800Ω	1		1	120%	130 Ω	1600W
	3	2.2	-	-	-	350W/600Ω	1		1	120%	130 Ω	1600W
	5	3.7	-	-	-	600W/350Ω	1		1	120%	130 Ω	1600W
	7.5	5.5	-	-	-	850W/240Ω	1		1	120%	130 Ω	1600W
690V 3Φ	15	11	-	-	-	1600W/150Ω	1		1	120%	25Ω	10000 W
	20	15	-	-	-	2400W/110Ω	1		1	120%	25Ω	10000 W
	25	18.5	-	-	-	3000W/90Ω	1	-	1	120%	25Ω	10000 W
	30	22	-	-	-	3300W/80Ω	1	-	1	120%	25Ω	10000 W
	40	30	-	-	-	4400W/60Ω	1	-	1	120%	25Ω	10000 W

*1: Minimum resistance is the acceptable minimum value of the braking resistor for a single braking unit.

Note: Keep sufficient space between inverter, braking unit and braking resistor and ensure proper cooling is provided for.

11.2 AC Line Reactors

Contact TECO Westinghouse Motor Company for AC Line Reactor Information

11.3 Input Noise Filters

Contact TECO Westinghouse Motor Company for Input and Output Filter Information.

11.4 Input Current and Fuse Specifications

200V class

Model	Horse power	KVA	100% of rated output current HD/ND	3 phases Rated input current HD/ND	Three-phase fuse rating	Single-phase rated input current HD/ND
A510-2001-C-UE	1	1.9	5/6	5.4/6.5	20	9.4/11.3
A510-2002- C-UE	2	3	8/9.6	8.5/10.3	30	14.7/17.9
A510-2003- C-UE	3	4.2	11/12	11.7/12.8	50	20.3/22.1
A510-2005-C3-UE	5	6.7	17.5/22	18.7/22.3	50	X
A510-2008- C3-UE	7.5	9.5	25/30	26.3/31.6	63	X
A510-2010- C3-UE	10	12.6	33/42	34.5/41.7	100	X
A510-2015- C3-UE	15	17.9	47/56	51.1/60.9	120	X
A510-2020- C3-UE	20	22.9	60/69	65.2/75	150	X
A510-2025- C3-UE	25	28.6	73/80	79.4/85.9	200	X
A510-2030- C3-UE	30	32.4	85/110	92.4/119.6	250	X
A510-2040- C3-UE	40	43.8	115/138	125/150	300	X
A510-2050- C3-UE	50	55.3	145/169	159/186	400	X
A510-2060-C3-UE	60	68.6	180/200	186/232	500	X
A510-2075-C3-UE	75	81.9	215/250	232/275	600	X
A510-2100-C3-UE	100	108	283/312	275/343	700	X
A510-2125-C3-UE	125	132	346/400	380/440	800	X
A510-2150-C3-UE	150	158	415/450	456/495	800	X

400V class

Model	Horse power	KVA	100% of rated output current HD/ND	Rated input current HD/ND	Fuse rating
A510-4001-C3-UE	1	2.6	3.4/4.1	3.7/4.5	10
A510-4002-C3-UE	2	3.2	4.2/5.4	5.3/5.9	16
A510-4003-C3-UE	3	4.2	5.5/6.9	6.0/7.5	16
A510-4005-C3-UE	5	7	9.2/12.1	9.6/11.6	25
A510-4008-C3-UE	7.5	11.3	14.8/17.5	15.5/18.2	40
A510-4010-C3-UE	10	13.7	18/23	18.7/24.0	50
A510-4015-C3-UE	15	18.3	24/31	25.0/32.3	63
A510-4020-C3-UE	20	23.6	31/38	33.7/41.3	80
A510-4025-C3-UE	25	29.7	39/44	42.4/47.8	100
A510-4030-C3-UE	30	34.3	45/58	48.9/58.7	120
A510-4040-C3-UE	40	45.7	60/73	65.2/78.3	150
A510-4050-C3-UE	50	57.2	75/88	81.5/95.7	200
A510-4060-C3-UE	60	69.3	91/103	98.9/112	250
A510-4075-C3-UE	75	85.4	118/145	130/159	300
A510-4100-C3-UE	100	114	150/168	159/181	400
A510-4125-C3-UE	125	137	180/208	181/229	500
A510-4150-C3-UE	150	165	216/250	229/275	600
A510-4175-C3-UE	175	198	260/296	275/325	700
A510-4215-C3-UE	215	225	295/328	325/361	700
A510-4270-C3-UE	250	270	380/435	407/478	800
A510-4300-C3-UE	300	317	450/515	495/566	800
A510-4375-C3-UE	375	400	523/585	575/643	1000
A510-4425-C3-UE	425	446	585/585	643.5/643.5	1000

600V class

Model	Horse power	KVA	100% of rated output current HD/ND	Rated input current HD/ND	Fuse rating
A510-5001-C3-UE	1	1.7	1.7/3.0	1.7/3.0	10
A510-5002-C3-UE	2	3	3/4.2	3/4.2	10
A510-5003-C3-UE	3	4.2	4.2/5.8	4.2/5.8	10
A510-5005-C3-UE	5	6.6	6.6/8.8	6.6/8.8	15
A510-5008-C3-UE	7.5	9.9	9.9/12.2	9.9/12.2	20
A510-5010-C3-UE	10	11.4	11.4/14.5	11.4/14.5	20
A510-6015-C3-UE	15	17.9	15/19	15/19	30
A510-6020-C3-UE	20	22.7	19/22	19/22	40
A510-6025-C3-UE	25	26.3	22/27	22/27	40
A510-6030-C3-UE	30	32.3	27/34	27/34	50
A510-6040-C3-UE	40	40.	34/42	34/42	80
A510-6050-C3-UE	50	50.2	42/52	42/52	80
A510-6060-C3-UE	60	64.5	54/62	54/62	100
A510-6075-C3-UE	75	74.1	62/80	62/80	125
A510-6100-C3-UE	100	103	86/99	86/99	150
A510-6125-C3-UE	125	118	99/125	99/125	200
A510-6150-C3-UE	150	156	131/147	131/147	250
A510-6175-C3-UE	175	175	147/163	147/163	300
A510-6215-C3-UE	215	194	163/212	163/212	300
A510-6250-C3-UE	270	229	192/216	192/216	400
A510-6270-C3-UE	300	258	216/246	216/246	400

Fuse type: Choose semiconductor fuse to comply with UL.

Voltage Range:

For 200V class inverter, use 300V class fuse.

For 400V class inverter, use 600V class fuse.

11.5 PG Speed Feedback Card

ITEM	Encoder/Resolver Input Type	Output Type	Drive Installation	
			SIZE 1	>=SIZE 2
JN5-PG-O	Open collector feedback card	Open collector	YES	YES
JN5-PG-L	Line driver speed feedback card	Line Driver	YES	YES
JN5-PG-L-24	Line driver speed feedback card	Open collector	YES	YES
JN5-PG-PM	Synchronous motor line driver speed feedback card	Line Driver	No	YES
JN5-PG-PMR	Speed feedback card with TAMAGAWA Resolver	Line Driver	No	YES
JN5-PG-PMS	Speed feedback card with Heidenhain ERN 1387 Encoder Sin-Cos Incremental Encoder	Line Driver	No	YES
JN5-PG-PMS-24	Speed feedback card with Heidenhain ERN 1387 Encoder Sin-Cos Incremental Encoder	Open collector	No	YES
JN5-PG-PMC	Speed feedback card with Heidenhain ECN 1313 Encoder 8192 (13bits) Absolute Encoder	Line Driver	No	YES
JN5-PG-PMC-24	Speed feedback card with Heidenhain ECN 1313 Encoder 8192 (13bits) Absolute Encoder	Open collector	No	YES

Refer to specified instruction manual for installation of each option card.

JN5-PG-O JN5-PG-L JN5-PG-L-24 JN5-PG-PM JN5-PG-PMR JN5-PG-PMS JN5-PG-PMS-24 JN5-PG-PMC JN5-PG-PMC-24	Wiring Size		24~16 AWG (0.205~1.31mm ²)
	Torque	TB1	0.22~0.25 N.M
		TB2	0.2 N.M

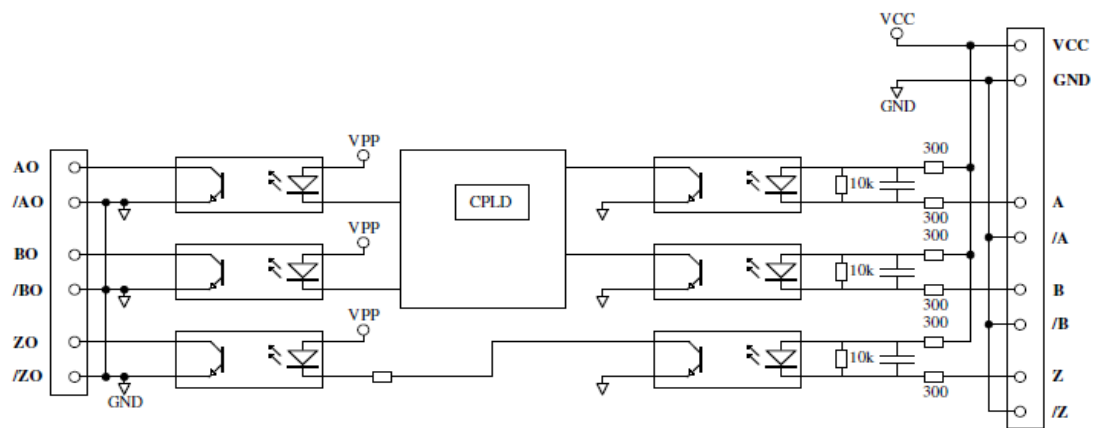
Refer to the dedicated option card manual for installation instructions.

A) JN5-PG-O speed feedback card: Open collector speed feedback card

JN5-PG-O terminal specification:

Terminal Name	Description
Vcc	Power supply for encoder. 12V or 5V ±5%, 200mA Maximum (12V or 5V input voltage selected by the Switch Jumper. Can't use both 12V and 5V at the same time)
GND (0V Common Terminal)	
A, /A, B, /B, Z, /Z	Encoder input signal, two-phase input is required for correct divider ratio output. Open collector input type.
AO, /AO, BO, /BO, ZO, /ZO	A, B phase divider ratio output, z phase output monitor, Open collector type: 24V, 30mA.
E	Grounding Terminal.

JN5-PG-O block diagram:



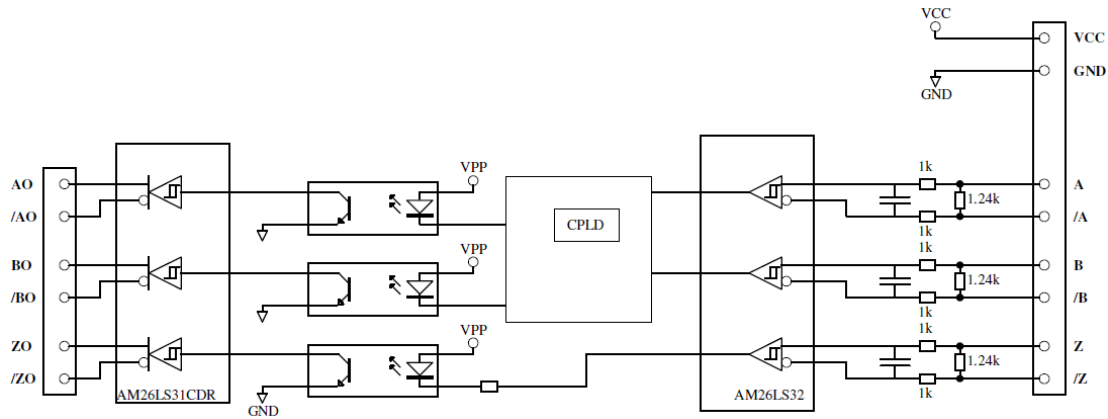
B) JN5-PG-L / JN5-PG-L-24 speed feedback card: Line driver speed feedback card

JN5-PG-L / JN5-PG-L-24 terminal specification

Terminal Name	Description
Vcc	Power supply for encoder. 12V or 5V $\pm 5\%$, 200mA Maximum
GND (0V Common Terminal)	(12V or 5V input voltage selected by the Switch Jumper. Can't use both 12V and 5V at the same time)
A, /A, B, /B, Z, /Z	Encoder input signal, A correct divider ratio output requires a two-phase input. Line driver input type, RS-422 level input.
AO, /AO, BO, /BO, ZO, /ZO	A, B phase divider ratio output, z phase output monitor, Line driver output type, RS-422 level output.
E	Grounding terminal.

Note: The AO, /AO, BO, /BO, ZO, /ZO of JN5-PG-L-24 are open collector type output.

JN5-PG-L / JN5-PG-L-24 block diagram:

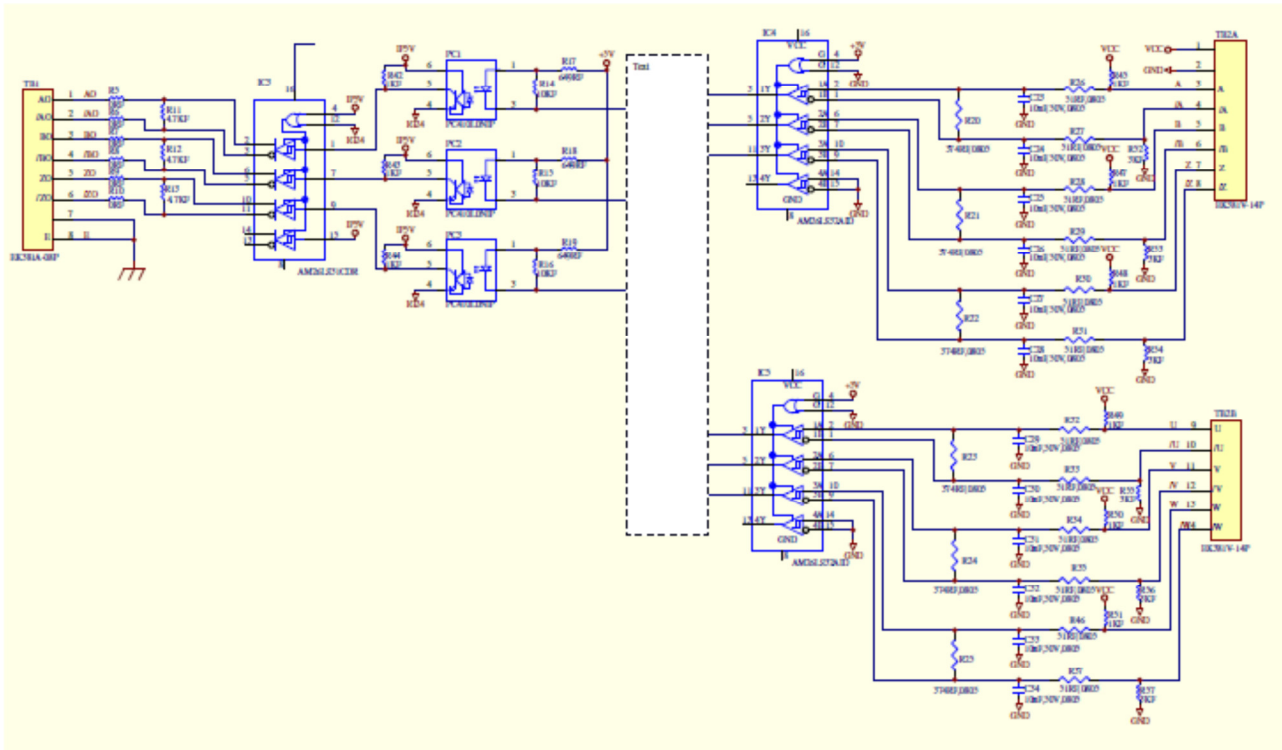


C) JN5-PG-PM speed feedback card: synchronous motor line driver speed feedback card

JN5-PG-PM terminal specification

Terminal Name	Description
Vcc	Power supply for encoder.
GND (0V Common Terminal)	5V ±5%, 200mA Maximum
A, /A, B, /B, Z, /Z U, /U, V, /V, Z, /Z	Encoder input signal, A correct divider ratio output requires a two-phase input. Line driver input type, RS-422 level input.
AO, /AO, BO, /BO, ZO, /ZO	A, B phase divider ratio output, z phase output monitor, Line driver output type, RS-422 level output.
E	Grounding terminal.

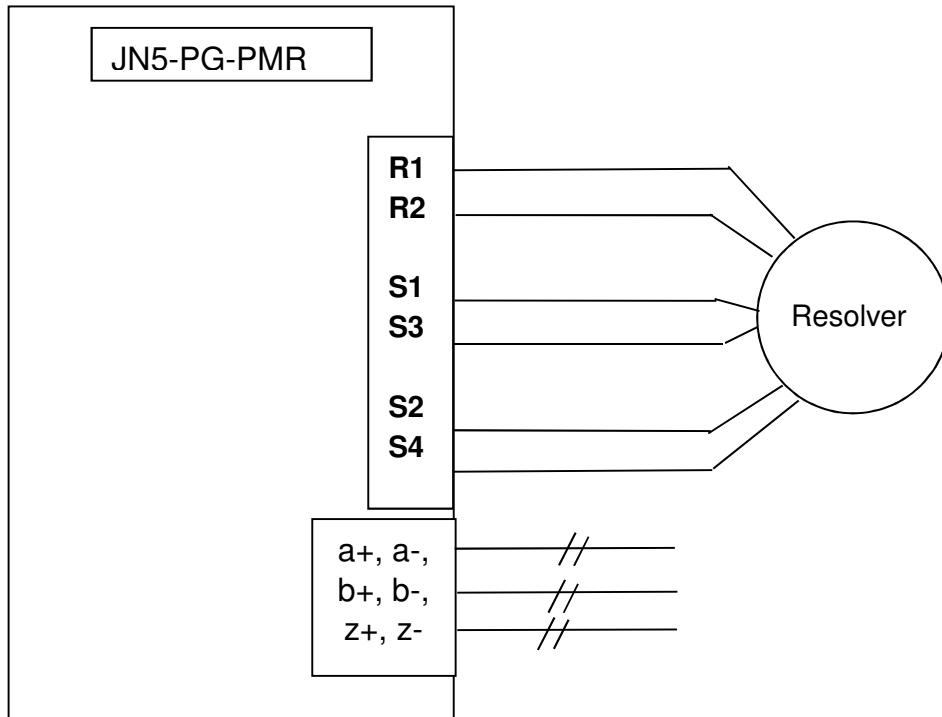
JN5-PG-PM block diagram:



D) JN5-PG-PMR speed feedback card with TAMAGAWA Resolver Encoder

JN5-PG-PMR terminal specification

Terminal Name	Description
R+, R-	Excitation signal to Resolver. 7Vrms, 10KHz.
S1, S3	COS signals from Resolver.
S2, S4	SIN signals from Resolver.
a+, a-, b+, b-, z+, z-	A,B,Z pulse Monitor signal output, Line driver output Type,RS-422 level.
E	Grounding terminal

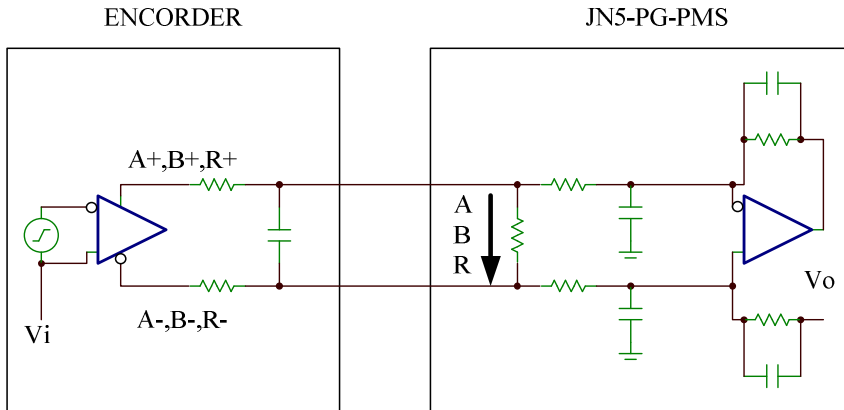


E) JN5-PG-PMS/JN5-PG-PMS-24 speed feedback card with Heidenhain ERN 1387 Encoder

JN5-PG-PMS / JN5-PG-PMS-24 terminal specification

Terminal Name	Description
E5V	Power supply for encoder. 5V±5%, 200mA
GND	0V Common Terminal
C+,C-	input C pulse from the encoder, Vp-p= 0.6~1.2V
D+, D-	input D pulse from the encoder, Vp-p= 0.6~1.2V
A+, A-	input A pulse from the encoder, Vp-p= 0.6~1.2V, fmax=20KHz
B+, B-	input B pulse from the encoder, Vp-p= 0.6~1.2V, fmax=20KHz
R+, R-	input R pulse (encoder home pulse)
a+, a-	output a ratio of the A pulse frequency
b+, b-	output b ratio of the B pulse frequency

Note: The a+, a-, b+, b- of JN5-PG-PMS-24 are open collector type output.

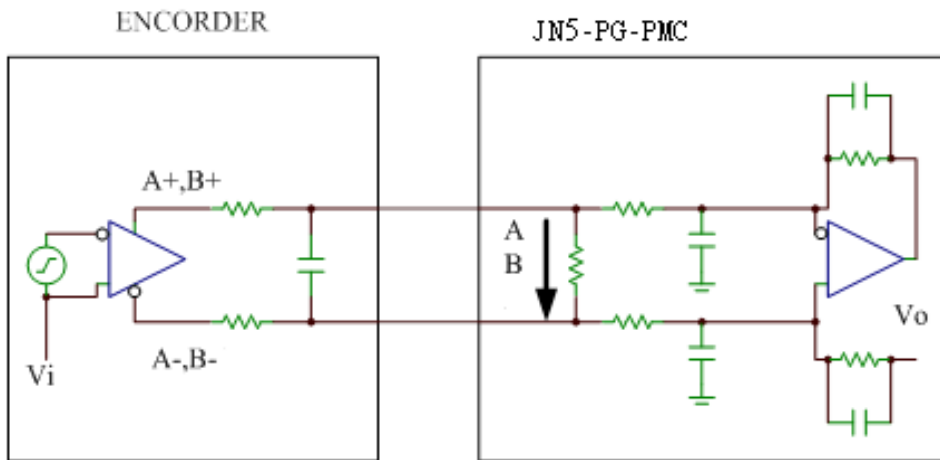


F. JN5-PG-PMC/JN5-PG-PMC-24 speed feedback card with Heidenhain ECN 1313 Encoder

JN5-PG-PMC / JN5-PG-PMC-24 terminal specification

Terminal Name	Description
E5V	Power supply for encoder. 5V±5%, 200mA
GND	0V Common Terminal
DATA+/-	Bi-direct data for the encoder, RS485 driver.
CLOCK+/-	output clock to the encoder, line driver RS422 output
A+, A-	input A pulse from the encoder, $V_{p-p} = 0.6 \sim 1.2V$, $f_{max} = 20KHz$
B+, B-	input B pulse from the encoder, $V_{p-p} = 0.6 \sim 1.2V$, $f_{max} = 20KHz$
a+/a-, b+/b-	line driver RS422 output(a ratio of the A,B pulse frequency)

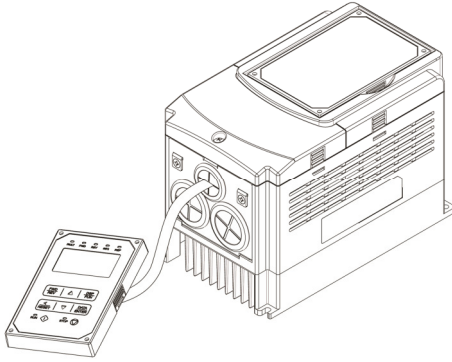
Note: The a+, a-, b+, b- of JN5-PG-PMS-24 are open collector type output.



11.6 Other Options

A. Blank cover and keypad extension cable

When used for remote control purposes, the keypad can be removed and remotely connected with an extension cable. Extension cables are available in the following lengths: 1m (3.3ft), 2m (6.6ft), 3m (10ft), and 5m (16.4ft).



Remote control

Name	Model	Specification
LED digital operator wire with blank cover	JN5-CB-01MK	1m (3.3ft)
	JN5-CB-02MK	2m (6.6ft)
	JN5-CB-03MK	3m (10ft)
	JN5-CB-05MK	5m (16.4ft)

When using a remote mount keypad a blank cover can be installed in place of the original keypad to prevent dust and debris from entering the inverter.

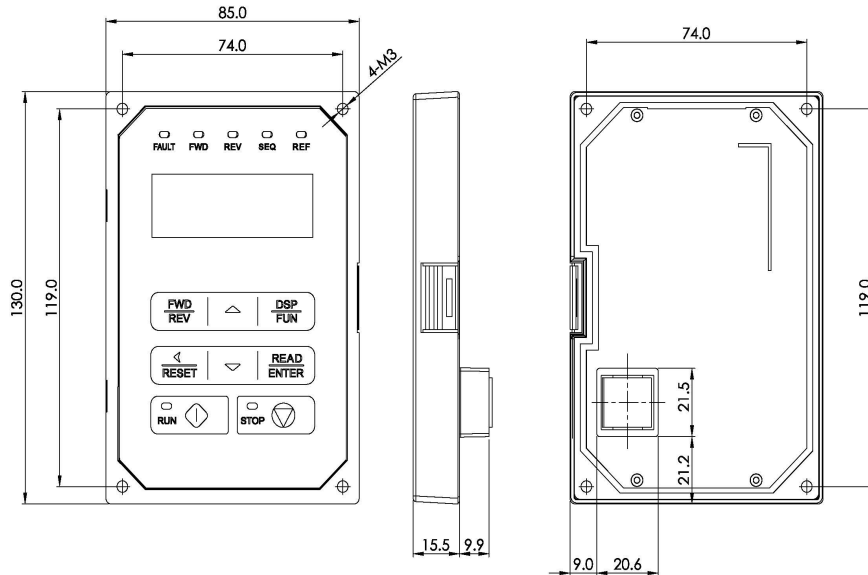


Blank keypad cover

Name	Model	Specification
Blank cover	JN5-OP-A03	Blank cover

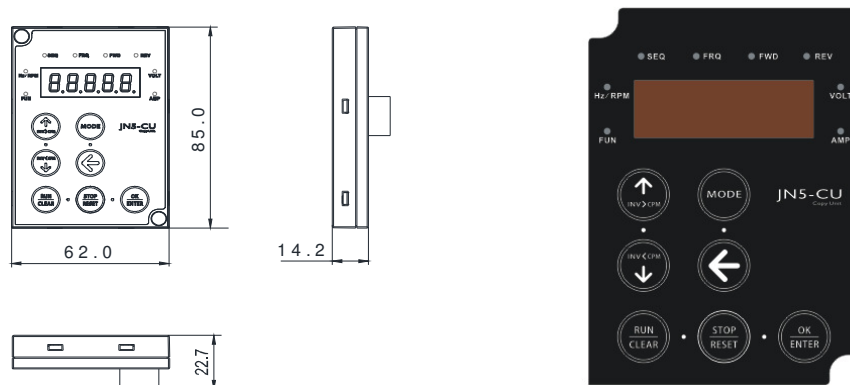
Name	Model	Specification
LED digital operator wire	JN5-CB-01M	1m (3.3ft)
	JN5-CB-02M	2m (6.6ft)
	JN5-CB-03M	3m (10ft)
	JN5-CB-05M	5m (16.4ft)

LED/LCD keypad dimensions



B. Copy Unit (JN5-CU) *NOTE STANDARD LCD KEYPAD IS ALSO A COPY UNIT*

The copy unit is used to copy an inverter parameter setup to another inverter. The copy unit saves time in applications with multiple inverters requiring the same parameter setup.



Copy Unit (JN5-CU) dimensions and appearance

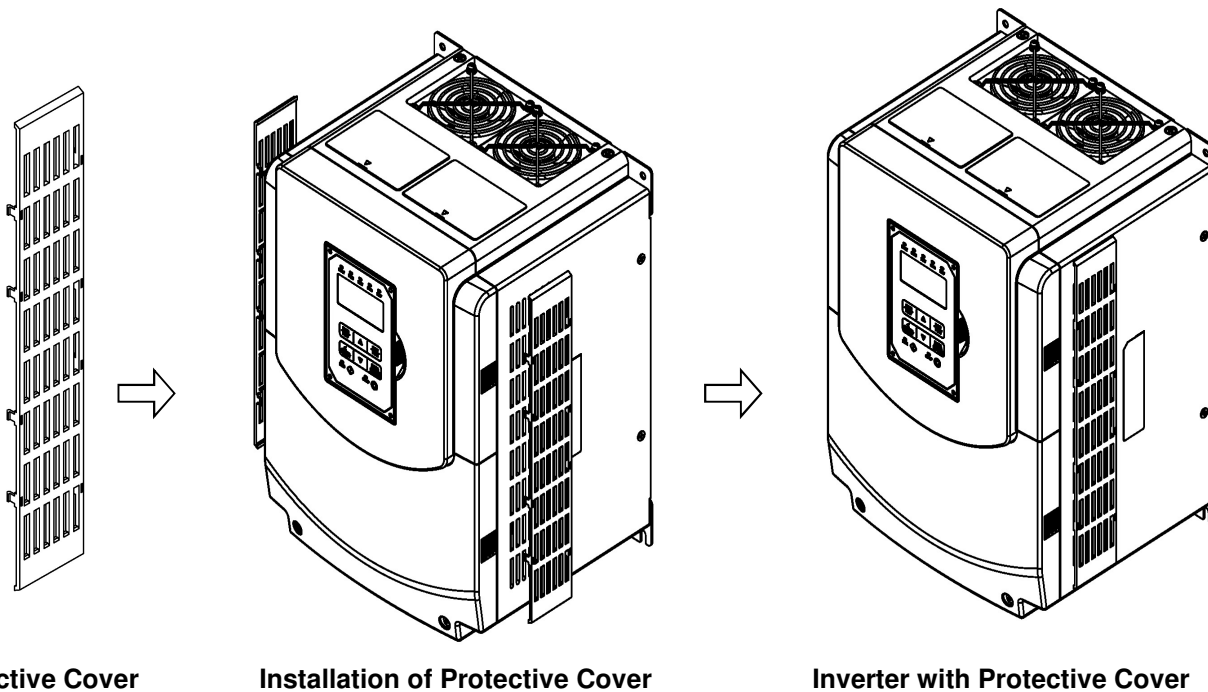
C. Option Protective Cover

The installation environment will have a direct affect on the correct operation and the life span of the inverter. To obtain maximum service life inverter shall be installed in a suitable environment as specified in this manual. Chapter 3.1.

Option cover may be used to provide protection against external objects entering the unit and restrict dust ingress. No temperature derate is necessary.

Option cover part numbers:

Frame	Model
1	JN5-CR-A01
2	JN5-CR-A02
4	JN5-CR-A04



11.7 NEMA1 Kit

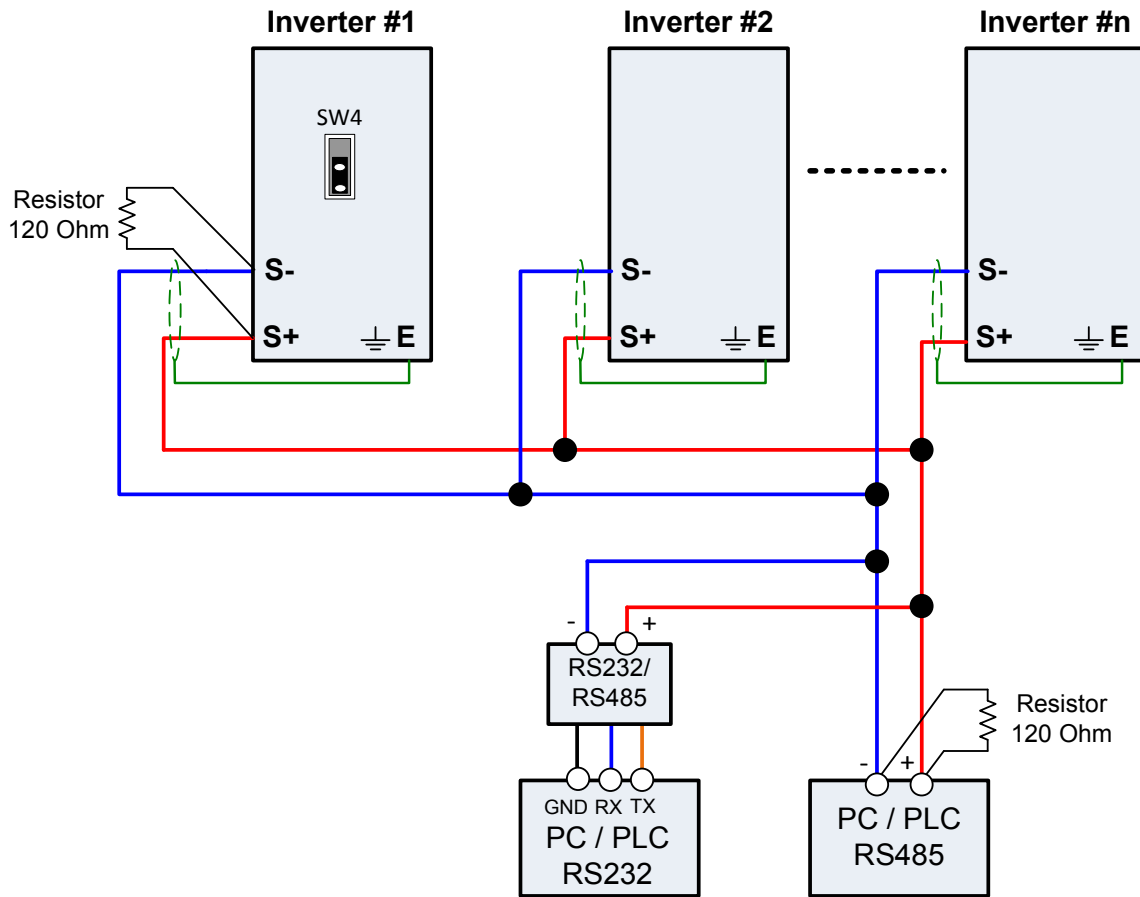
If NEMA1 or IP20 protective level is necessary to upgrade, it is recommended to purchase the NEMA1 kit positioned on top and bottom sides of the inverter. The drawings installed in the inverter, please refer to chapter 3.7.

Frame	Model
6	JN5-NK-A06
7	JN5-NK-A07
8	JN5-NK-A08

Appendix A: Communication Networks

A1.1 RS485 –Network (Modbus)

This section shows a RS485 network consisting of several inverters communicating using the built-in Modbus RTU protocol.



Wiring diagram RS485 Modbus RTU Network

Notes:

- A PC / PLC controller with a built-in RS-485 interface can be connected directly to the RS-485 network. Use a RS232 to RS485 converter to connect a PC / PLC with a built-in RS-232 interface.
- A maximum of 31 inverters can be connected to the network. Terminating resistors of 120 ohm must be installed at both end of the network.

Refer to A510s RS-485 Modbus communication manual for more information.

Appendix B: UL Instructions

Danger

Electric Shock Hazard

Do not connect or disconnect wiring while the power is on.
Failure to comply will result in death or serious injury.

Warning

Electric Shock Hazard

Do not operate equipment with covers removed.

Failure to comply could result in death or serious injury.

The diagrams in this section may show inverters without covers or safety shields to show details. Be sure to reinstall covers or shields before operating the inverters and run the inverters according to the instructions described in this manual.

Always ground the motor-side grounding terminal.

Improper equipment grounding could result in death or serious injury by contacting the motor case.

Do not touch any terminals before the capacitors have fully discharged.

Failure to comply could result in death or serious injury.

Before wiring terminals, disconnect all power to the equipment. The internal capacitor remains charged even after the power supply is turned off. After shutting off the power, wait for at least the amount of time specified on the inverter before touching any components.

Do not allow unqualified personnel to perform work on the inverter.

Failure to comply could result in death or serious injury.

Installation, maintenance, inspection, and servicing must be performed only by authorized personnel familiar with installation, adjustment, and maintenance of inverters.

Do not perform work on the inverter while wearing loose clothing, jewelry, or lack of eye protection.

Failure to comply could result in death or serious injury.

Remove all metal objects such as watches and rings, secure loose clothing, and wear eye protection before beginning work on the inverter.

Do not remove covers or touch circuit boards while the power is on.

Failure to comply could result in death or serious injury.

Warning

Fire Hazard

Tighten all terminal screws to the specified tightening torque.

Loose electrical connections could result in death or serious injury by fire due to overheating of electrical connections.

Do not use an improper voltage source.

Failure to comply could result in death or serious injury by fire.

Verify that the rated voltage of the inverter matches the voltage of the incoming power supply before applying power.

Do not use improper combustible materials.

Failure to comply could result in death or serious injury by fire. Attach the inverter to metal or other noncombustible material.

NOTICE

Observe proper electrostatic discharge procedures (ESD) when handling the inverter and circuit boards.

Failure to comply may result in ESD damage to the inverter circuitry.

Never connect or disconnect the motor from the inverter while the inverter is outputting voltage.

Improper equipment sequencing could result in damage to the inverter.

Do not use unshielded cable for control wiring.

Failure to comply may cause electrical interference resulting in poor system performance. Use shielded twisted-pair wires and ground the shield to the ground terminal of the inverter.

Do not modify the inverter circuitry.

Failure to comply could result in damage to the inverter and will void warranty. Teco is not responsible for any modification of the product made by the user. This product must not be modified.

Check all the wiring to ensure that all connections are correct after installing the inverter and connecting any other devices.

Failure to comply could result in damage to the inverter.

❖ **UL Standards**

The UL/cUL mark applies to products in the United States and Canada and it means that UL has performed product testing and evaluation and determined that their stringent standards for product safety have been met. For a product to receive UL certification, all components inside that product must also receive UL certification.



❖ **UL Standards Compliance**

This inverter is tested in accordance with UL standard UL508C and complies with UL requirements. To ensure continued compliance when using this inverter in combination with other equipment, meet the following conditions:

■ **Installation Area**

Do not install the inverter to an area greater than pollution severity 2 (UL standard).

■ Main Circuit Terminal Wiring

UL approval requires crimp terminals when wiring the inverter's main circuit terminals. Use crimping tools as specified by the crimp terminal manufacturer. Teco recommends crimp terminals made by NICHIFU for the insulation cap.

The table below matches inverter models with crimp terminals and insulation caps. Orders can be placed with a Teco representative or directly with the Teco sales department.

Closed-Loop Crimp Terminal Size

Drive Model A510S	Wire Gauge mm ² , (AWG)		Terminal Screws	Crimp Terminal Model No.	Tool Machine No.	Insulation Cap Model No.
	R/L1 • S/L2 • T/L3	U/T1 • V/T2 • W/T3				
2001/2002	2 (14)		M4	R2-4	Nichifu NH 1 / 9	TIC 2
	3.5 (12)			R5.5-4		TIC 3.5
	5.5 (10)					TIC 5.5
2003/2005/2008	5.5 (10)		M4	R5.5-4	Nichifu NH 1 / 9	TIC 5.5
2010	8 (8)		M4	R8-4	Nichifu NOP 60	TIC 8
2015/2020/2025	22 (4)		M6	R22-6	Nichifu NOP 60 / 150H	TIC 22
2030/2040	60 (1/0)		M8	R60-8	Nichifu NOP 60 / 150H	TIC 60
2050/2060	100 (4/0)		M10	R80-10	Nichifu NOP 150H	TIC 80
2075/2100	200 (4/0)*2		M10	R100-10	Nichifu NOP 150H	TIC 100
4001/4002/4003	2 (14)		M4	R2-4	Nichifu NH 1 / 9	TIC 2
	3.5 (12)			R5.5-4		TIC 3.5
	5.5 (10)					TIC 5.5
4005/4008	3.5 (12)		M4	R5.5-4	Nichifu NH 1 / 9	TIC 3.5
4010/4015/4020	5.5 (10)		M4	R5.5-4	Nichifu NH 1 / 9	TIC 5.5
	8 (8)					TIC 8
	14 (6)					TIC 14
4025/4030	14 (6)		M6	R14-6	Nichifu NOP 60 / 150H	TIC 14
4040/4050	38 (2)		M8	R38-8	Nichifu NOP 60 / 150H	TIC 38
4060/4075	38 (2)		M8	R38-8	Nichifu NOP 60 / 150H	TIC 38
4100/4125	80 (3/0)		M10	R80-10	Nichifu NOP 150H	TIC 80
4150/4175/4215	100 (4/0)*2		M10	R100-10	Nichifu NOP 150H	TIC 100
2125	100 (4/0)		M12	R100-12	Nichifu NOP 150H	TIC 100
2150	100 (4/0)		M12	R100-12	Nichifu NOP 150H	TIC 100
4250	100 (4/0)		M12	R100-12	Nichifu NOP 150H	TIC 100
4300	100 (4/0)		M12	R100-12	Nichifu NOP 150H	TIC 100
4375	100 (4/0)		M12	R100-12	Nichifu NOP 150H	TIC 100
4425	100 (4/0)		M12	R100-12	Nichifu NOP 150H	TIC 100

Drive Model A510S (F)	Wire Gauge mm ² , (AWG)		Terminal Screws	Crimp Terminal Model No.	Tool Machine No.	Insulation Cap Model No.
	R/L1 • S/L2 • T/L3	U/T1 • V/T2 • W/T3				
4001/4002/4003	2 (14)		M4	R2-4	Nichifu NH 1 / 9	TIC 2
	3.5 (12)			R5.5-4		TIC 3.5
	5.5 (10)					TIC 5.5
4005/4008	3.5 (12)		M4	R5.5-4	Nichifu NH 1 / 9	TIC 3.5
4010/4015	5.5 (10)		M4	R5.5-4	Nichifu NH 1 / 9	TIC 5.5
	8 (8)					TIC 8
	14 (6)					TIC 14
4020/4025/4030	14 (6)		M6	R14-6	Nichifu NOP 60 / 150H	TIC 14
4040/4050/4060	38 (2)		M8	R38-8	Nichifu NOP 60 / 150H	TIC 38

❖ **Type 1**

During installation, all conduit hole plugs shall be removed, and all conduit holes shall be used.

Drive Model A510	Fuse Type	
	Manufacturer: Bussmann / FERRAZ SHAWMUT	
	Model	Fuse Ampere Rating (A)
200 V Class Three-Phase Drives		
2001	Bussmann 20CT	690V 20A
2002	Bussmann 30FE	690V 30A
2003	Bussmann 50FE	690V 50A
2005	Bussmann 50FE	690V 50A
2008	Bussmann 63FE	690V 63A
2010	FERRAZ SHAWMUT A50QS100-4	500V 100A
2015	Bussmann 120FEE / FERRAZ A50QS150-4	690V 120A / 500V 150A
2020	FERRAZ SHAWMUT A50QS150-4	500V 150A
2025	FERRAZ SHAWMUT A50QS200-4	500V 200A
2030	FERRAZ SHAWMUT A50QS250-4	500V 250A
2040	FERRAZ SHAWMUT A50QS300-4	500V 300A
2050	FERRAZ SHAWMUT A50QS400-4	500V 400A
2060	FERRAZ SHAWMUT A50QS500-4	500V 500A
2075	FERRAZ SHAWMUT A50QS600-4	500V 600A
2100	FERRAZ SHAWMUT A50QS700-4	500V 700A

Drive Model A510	Fuse Type	
	Manufacturer: Bussmann / FERRAZ SHAWMUT	
	Model	Fuse Ampere Rating (A)
400 V Class Three-Phase Drives		
4001	Bussmann 10CT	690V 10A
4002	Bussmann 16CT	690V 16A
4003	Bussmann 16CT	690V 16A
4005	Bussmann 25ET	690V 25A
4008	Bussmann 40FE	690V 40A
4010	Bussmann 50FE	690V 50A
4015	Bussmann 63FE	690V 63A
4020	Bussmann 80FE	690V 80A
4025	Bussmann 100FE / FERRAZ A50QS100-4	690V 100A / 500V 100A
4030	Bussmann 120FEE	690V 120A
4040	FERRAZ SHAWMUT A50QS150-4	500V 150A
4050	FERRAZ SHAWMUT A50QS200-4	500V 200A
4060	FERRAZ SHAWMUT A50QS250-4	500V 250A
4075	FERRAZ SHAWMUT A50QS300-4	500V 300A
4100	FERRAZ SHAWMUT A50QS400-4	500V 400A
4125	FERRAZ SHAWMUT A50QS500-4	500V 500A
4150	FERRAZ SHAWMUT A50QS600-4	500V 600A
4175	FERRAZ SHAWMUT A50QS700-4	500V 700A
4215	FERRAZ SHAWMUT A50QS700-4	500V 700A

❖ **Motor Overtemperature Protection**

Motor overtemperature protection shall be provided in the end use application.

■ **Field Wiring Terminals**

All input and output field wiring terminals not located within the motor circuit shall be marked to indicate the proper connections that are to be made to each terminal and indicate that copper conductors, rated 75°C are to be used.

■ Inverter Short-Circuit Rating

This inverter has undergone the UL short-circuit test, which certifies that during a short circuit in the power supply the current flow will not rise above value. Please see electrical ratings for maximum voltage and table below for current.

- The MCCB and breaker protection and fuse ratings (refer to the preceding table) shall be equal to or greater than the short-circuit tolerance of the power supply being used.
- Suitable for use on a circuit capable of delivering not more than (A) RMS symmetrical amperes for DiJ2.IHp in 240 / 480 V class drives motor overload protection.

Horse Power (Hp)	Current (A)	Voltage (V)
1 - 50	5,000	240 / 480
51 - 200	10,000	240 / 480
201 - 400	18,000	240 / 480
401 - 600	30,000	240 / 480

❖ Inverter Motor Overload Protection

Set parameter 02-0 I (motor rated current) to the appropriate value to enable motor overload protection. The internal motor overload protection is UL listed and in accordance with the NEC and CEC.

■ 02-01 Motor Rated Current

Setting Range Model Dependent
Factory Default: Model Dependent

The motor rated current parameter (02-0) protects the motor and allows for proper vector control when using open loop vector or flux vector control methods (00-00 = 2 or 3). The motor protection parameter 08-05 is set as factory default. Set 02-01 to the full load amps (FLA) stamped on the nameplate of the motor. The operator must enter the rated current of the motor (17-02) in the menu during auto-tuning. If the auto-tuning operation completes successfully (17-00 = 0), the value entered into 17-02 will automatically write into 02-0 I.

■ 08-05 Motor Overload Protection Selection

The inverter has an electronic overload protection function (OL1) based on time, output current, and output frequency, which protects the motor from overheating. The electronic thermal overload function is UL-recognized, so it does not require an external thermal overload relay for single motor operation. This parameter selects the motor overload curve used according to the type of motor applied.

08-05	Selection for motor overload protection (OL1)
Range	<p>xxx0b: Motor overload is invalid xxx1b: Motor overload is valid xx0xb: Cold start of motor overload xx1xb: Hot start of motor overload x0xxb: Standard motor x1xxb: Special motor 0xxxb: Reserved 1xxxb: Reserved</p>

Sets the motor overload protection function in 08-05 according to the applicable motor.

08-05 = ---OB: Disables the motor overload protection function when two or more motors are connected to a single inverter. Use an alternative method to provide separate overload protection for each motor such as connecting a thermal overload relay to the power line of each motor.

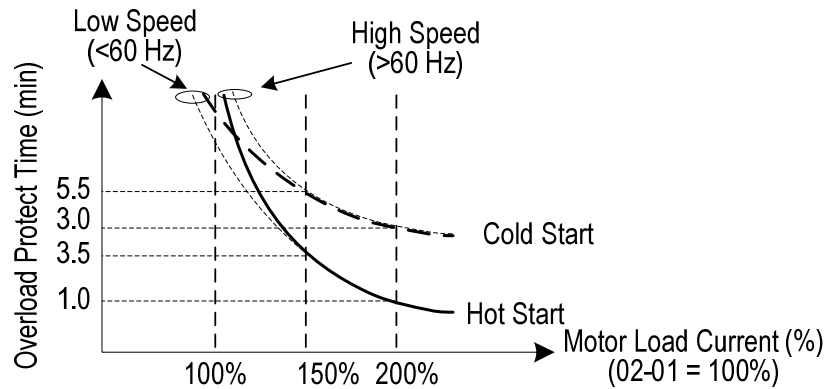
08-05 = --1-B: The motor overload protection function should be set to hot start protection characteristic curve when the power supply is turned on and off frequently, because the thermal values are reset each time when the power is turned off.

08-05 = -0—B: For motors without a forced cooling fan (general purpose standard motor), the heat dissipation capability is lower when in low speed operation.

08-05 = -1—B: For motors with a forced cooling fan (inverter duty or VIF motor), the heat dissipation capability is not dependent upon the rotating speed.

To protect the motor from overload by using electronic overload protection, be sure to set parameter 02-01 according to the rated current value shown on the motor nameplate.

Refer to the following "Motor Overload Protection Time" for the standard motor overload protection curve example: Setting 08-05 = -0--B.



■ **08-06 Motor Overload Operation Selection**

08-06	Start-up mode of overload protection operation (OL1)
Range	0: Stop output after overload protection 1: Continuous operation after overload protection.

08-06=0: When the inverter detects a motor overload the inverter output is turned off and the OL1 fault message will flash on the keypad. Press RESET button on the keypad or activate the reset function through the multi-function inputs to reset the OL1 fault.

08-06=1: When the inverter detects a motor overload the inverter will continue running and the OL1 alarm message will flash on the keypad until the motor current falls within the normal operating range.

UL- Additional Data

Recommended Input Fuse Selection

Drive Model A510	Fuse Type	
	Manufacturer: Bussmann / FERRAZ SHAWMUT	
	Model	Fuse Ampere Rating (A)
200 V Class Three-Phase Drives		
2125	Bussmann 170M5464	690V 800A
2150	Bussmann 170M5464	690V 800A

Drive Model A510	Fuse Type	
	Manufacturer: Bussmann / FERRAZ SHAWMUT	
	Model	Fuse Ampere Rating (A)
400 V Class Three-Phase Drives		
4250	Bussmann 170M5464	690V 800A
4300	Bussmann 170M5464	690V 800A
4375	Bussmann 170M5466	690V 1000A
4425	Bussmann 170M5466	690V 1000A

TECO   **Westinghouse**

INVERTER

A510

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