N700E
INSTRUCTION MANUAL

(For sizes N700E-055LF/HF through N700E-3500HF)

CAUTION FOR UL/cUL REQUIREMENTS

- THE HYUNDAI ELECTRIC N700E VFD UL FILE NUMBER IS E205705
  (Except N700E-300LF/370LFP ~ N700E-750LF/900LFP) AND FILE NUMBER IS E479086
  (N700E-300LF/370LFP ~ N700E-750LF/900LFP)
  CONFIRMATION OF UL LISTING CAN BE FOUND ON THE UL WEB SITE: www.ul.com

- DO NOT CONNECT OR DISCONNECT WIRING, OR PERFORM SIGNAL CHECKS WHILE THE POWER SUPPLY IS TURNED ON.

- THERE ARE LIVE PARTS INSIDE THE VFD. NEVER TOUCH THE PRINTED CIRCUIT BOARD (PCB) WHILE THE POWER SUPPLY IS TURNED ON.

[WARNING] THE BUS CAPACITOR DISCHARGE TIME IS 5 MINUTES. BEFORE STARTING WIRING OR INSPECTION, SWITCH POWER OFF, WAIT FOR MORE THAN 5 MINUTS, AND CHECK FOR RESIDUAL VOLTAGE BETWEEN TERMINAL P (+) AND N (-) WITH A METER ETC., TO AVOID HAZARD OF ELECTRICAL SHOCK.

[**SHORT CIRCUIT RATING]** THIS VFD IS SUITABLE FOR USE ON A CIRCUIT CAPABLE OF DELIVERING NOT MORE THAN ___*1___ARMS SYMMETRICAL AMPERES, 480 VOLTS FOR HF TYPE AND 240 VOLTS FOR LF TYPE MAXIMUM.

BRANCH CIRCUIT SHORT CIRCUIT PROTECTION SHALL BE PROVIDED BY FUSE ONLY.

*1 **N700E MODELs and KA VALUE**

N700E-055LF/075LFP ~ N700E-300LF/370LFP N700E-055HF/075HFP ~ N700E-370HF/450HFP	5KA
N700E-370LF/450LFP ~ N700E-750LF/900LFP N700E-450HF/550HFP ~ N700E-1320HF/1600HFP	10KA
N700E-1600HF/2000HFP ~ N700E-2200HF/2500HFP	18KA
N700E-2800HF/3200HFP ~ N700E-3500HF/3800HFP	30KA

[**OVERSPEED PROTECTION]** THIS VFD DOES NOT PROVIDE OVERSPEED PROTECTION

[**MOTOR OVERLOAD PROTECTION]** THIS VFD PROVIDES MOTOR OVERLOAD PROTECTION. OVERLOAD PROTECTION LEVEL IS 20 ~ 120% OF FULL LOAD CURRENT. THE PROTECTION LEVEL MAY BE ADJUSTED BY PARAMETER (b04). REFER TO THE N700E USER GUIDE OR CATALOG.

[**MOTOR OVERTEMPERATURE]** MOTOR OVERTEMPATURE SENSING IS NOT PROVIDED BY THE VFD.

[ENVIRONMENT]

MAXIMUM AMBIENT TEMPERATURE	40℃(WHEN CARRIER FREQUENCY EQUAL TO OR LESS THAN DEFAULT VALUE)
AMBIENT HUMIDITY	90% RH OR LESS(NO CONDENSING)
STORAGE TEMPERATURE	-20~60℃
VIBRATION	5.9㎨OR LESS
ALTITUDE	ALTITUDE 1,000m OR LESS
AMBIENCE	INDOORS(NO CORROSIVE AND FLAMMABLE GASES, OIL MIST, DUST AND DIRT)
POLLUTION DEGREE	2

SAFETY

- FOR THE SAFE OPERATION OF THE N700E SERIES VFD, READ THIS MANUAL AND ALL OF THE WARNING SIGNS ATTACHED TO THE INVERTER CAREFULLY BEFORE INSTALLING AND OPERATING IT, AND FOLLOW THE INSTRUCTION EXACTLY. KEEP THIS MANUAL HANDY FOR YOUR QUICK REFERENCE.

SYMBOLS AND DEFINITION

- A SAFETY INSTRUCTION (MESSAGE) IS GIVEN WITH A HAZARD ALERT SYMBOL AND/OR A WARNING or CAUTION.
- EACH SIGNAL HAS THE FOLLOWING MEANING THROUGHOUT THIS MANUAL

HAZARDOUS HIGH VOLTAGE.

IT USED TO CALL YOUR ATTENTION TO ITEMS OR OPERATIONS THAT COULD BE DANGEROUS TO YOU OR OTHER PERSONS OPERATING THIS EQUIPMENT.
READ THESE MESSAGES AND FOLLOW THESE INSTRUCTIONS CAREFULLY.

SAFETY ALERT SYMBOL

THIS SYMBOL IS USED TO CALL YOUR ATTENTION TO ITEMS OR OPERATIONS THAT COULD BE DANGEROUS TO YOU OR OTHER PERSONS OPERATING THIS EQUIPMENT.
READ THESE MESSAGES AND FOLLOW THESE INSTRUCTIONS CAREFULLY.
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WARNING INDICATES A POTENTIALLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, CAN RESULT IN SERIOUS INJURY OR DEATH.

CAUTION INDICATES A POTENTIALLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, CAN RESULT IN MINOR TO MODERATE INJURY, OR SERIOUS DAMAGE OF PRODUCT.
THE MATTERS DESCRIBED UNDER ⚠**CAUTION** MAY, IF NOT AVOIDED, LEAD TO SERIOUS RESULTS DEPENDING ON THE SITUATION. IMPORTANT MATTERS ARE DESCRIBED IN **CAUTION** (AS WELL AS WARNING), SO BE SURE TO OBSERVE THEM.

NOTE INDICATES AN AREA OR SUBJECT OF SPECIAL MERIT, EMPHASIZING EITHER THE PRODUCT`S CAPABILITIES OR COMMON ERRORS IN OPERATION OR MAINTENANCE.

HAZARDOUS HIGH VOLTAGE

- MOTOR CONTROL EQUIPMENT AND ELECTRONIC CONTROLLERS ARE CONNECTED TO THE HAZARDOUS LINE VOLTAGE.
- WHEN SERVICING VFD AND ELECTRONIC CONTROLLERS, THERE MIGHT BE EXPOSED COMPONENTS OR ABOVE LINE POTENTIAL.
- EXTREME CARE SHOULD BE TAKEN TO PRODUCT AGAINST SHOCK. STAND ON AN INSULATING PAD AND MAKE IT A HABIT TO USE ONLY ONE HAND WHEN CHECKING COMPONENTS.
- ALWAYS WORK WITH ANOTHER PERSON IN CASE AN EMERGENCY OCCURS.
- DISCONNECT POWER BEFORE CHECKING CONTROLLER OR PERFORMING MAINTENANCE.
- BE SURE EQUIPMENT IS PROPERLY GROUNDED. WEAR SAFETY GLASSES WHENEVER WORKING ON AN ELECTRIC CONTROLLER OR ROTATING ELECTRICAL EQUIPMENT.

PRECAUTION

- A SAFETY INSTRUCTION (MESSAGE) IS GIVEN WITH A HAZARD ALERT SYMBOL AND A WARNING or CAUTION.

WARNING THIS IS EQUIPMENT SHOULD BE INSTALLED, ADJUSTED AND SERVICED BY QUALIFIED ELECTRICAL MAINTENANCE PERSONAL FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THE EQUIPMENT AND THE HAZARDS INVOLVED. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULTS IN BODILY INJURY.

WARNING THE USER IS RESPONSIBLE FOR ENSURING THAT ALL DRIVEN MACHINERY, DRIVE TRAIN MECHANISM NOT SUPPLIED BY HYUNDAI AND PROCESS LINE MATERIAL ARE CAPABLE OF SAFE OPERATION AT AN APPLIED FREQUENCY OF 150% OF THE MAXIMUM SELECTED FREQUENCY RANGE TO THE AC MOTOR. FAILURE TO DO SO CAN RESULT IN DESTRUCTION OF EQUIPMENT AND INJURY TO PERSONNEL SHOULD A SINGLE POINT FAILURE OCCUR.

WARNING FOR PROTECTION, INSTALL AN EARTH LEAKAGE BREAKER WITH A HIGH FREQUENCY CIRCUIT CAPABLE OF LARGE CURRENTS TO AVOID AN UNNECESSARY OPERATION.
THE GROUND FAULT PROTECTION CIRCUIT IS NOT DESIGNED TO PROTECT PERSONAL INJURY.

CAUTION HEAVY OBJECT. TO AVOID MUSCLE STRAIN OR BACK INJURY,
USE LIFTING AIDS AND PROPER LIFTING TECHNIQUES WHEN REMOVING OR REPLACING.

CAUTION THESE INSTRUCTIONS SHOULD BE READ AND CLEARLY UNDERSTOOD BEFORE WORKING ON N700E SERIES EQUIPMENT.

CAUTION PROPER GROUNDS, DISCONNECTING DEVICES AND OTHER SAFETY DEVICES AND THEIR LOCATION ARE THE RESPONSIBILITY OF THE USER AND ARE NOT PROVIDED BY HYUNDAI.

CAUTION BE SURE TO CONNECT A MOTOR THERMAL SWITCH OR OVERLOAD DEVICES TO THE N700E SERIES VFD TO ASSURE THAT INVERTER WILL SHUT DOWN IN THE EVENT OF AN OVERLOAD OR AN OVERHEATED MOTOR

CAUTION ROTATING SHAFTS AND ABOVE GROUND ELECTRICAL POTENTIALS CAN BE HAZARDOUS. THEREFORE, IT IS STRONGLY RECOMMENDED THAT ALL ELECTRICAL WORK CONFORM TO THE NATIONAL ELECTRICAL CODES AND LOCAL REGULATIONS.
ONLY QUALIFIED PERSONNEL SHOULD PERFORM INSTALLATION, ALIGNMENT AND MAINTENANCE. FACTORY RECOMMENDED TEST PROCEDURES, INCLUDED IN THE INSTRUCTION MANUAL, SHOULD BE FOLLOWED.
ALWAYS DISCONNECT ELECTRICAL POWER BEFORE WORKING ON THE UNIT.

NOTE: POLLUTION DEGREE 2

- THE VFD MUST BE USED IN THE ENVIRONMENT OF THE POLLUTION DEGREE 2.
- TYPICAL CONSTRUCTIONS THAT REDUCE THE POSSIBILITY OF CONDUCTIVE POLLUTION ARE,

1) THE USE OF AN UNVENTILATED ENCLOSURE.
2) THE USE OF A FILTERED VENTILATED ENCLOSURE WHEN THE VENTILATION IS FAN FORCED THAT IS, VENTILATION IS ACCOMPLISHED BY ONE OR MORE BLOWERS WITHIN THE ENCLOSURE THAT PROVIDE A POSITIVE INTAKE AND EXHAUST.

CAUTION FOR EMC (ELECTROMAGNETIC COMPATIBILITY)

TO SAFELY FOLLOW THE EMC DIRECTIVE AND TO COMPLY WITH STANDARDS, FOLLOWS THE CHECK LIST BELOW.

⚠ WARNING

THIS EQUIPMENT SHOULD BE INSTALLED, ADJUSTED, AND SERVICED BY QUALIFIED PERSONAL FAMILIAR WITH CONSTRUCTION AND OPERATION OF THE EQUIPMENT AND THE HAZARDS INVOLVED. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY INJURY.

1. THE POWER SUPPLY TO N700E INVERTER MUST MEET THESE SPECIFICATIONS
   a. VOLTAGE FLUCTUATION: ± 10% OR LESS.
   b. VOLTAGE IMBALANCE: ± 3% OR LESS.
   c. FREQUENCY VARIATION: ± 4% OR LESS.
   d. VOLTAGE DISTORTION: THD = 10% OR LESS

2. INSTALLATION MEASURE :
   a. USE A FILTER DESIGNED FOR N700E INVERTER

3. WIRING
   a. SHIELDED WIRE (SCREENED CABLE) IS REQUIRED FOR MOTOR WIRING, AND THE LENGTH MUST BE LESS THAN 20 METERS.
   b. THE CARRIER FREQUENCY SETTING MUST BE LESS THAN 5KHZ TO SATISFY EMC REQUIREMENTS.
   c. SEPARATE THE MAIN CIRCUIT FROM THE SIGNAL/PROCESS CIRCUIT WIRING.
   d. IN CASE OF REMOTE OPERATING WITH CONNECTOR CABLE, THE INVERTER DOES NOT CONFORM TO EMC

4. ENVIRONMENTAL CONDITIONS – WHEN USING A FILTER, FOLLOW THESE GUIDELINES:
   a. AMBIENT AIR TEMPERATURE: -10 - +40℃
   b. HUMIDITY: 20 TO 90% RH(NON-CONDENSING)
   c. VIBRATION: 5.9 M/S^2 (0.6G) 10 – 55HZ ((N700E-5.5kW(7.5 HP) ~ 3800kW(500 HP)
   d. LOCATION: 1000 METERS OR LESS ALTITUDE, INDOORS (NO CORROSIVE GAS OR DUST)

CONFORMITY TO THE UNDERVOLTAGE DIRECTIVE (UVD)

THE PROTECTIVE ENCLOSURE MUST CONFORM TO THE UNDERVOLTAGE DIRECTIVE.
THE VFD CAN CONFORM TO THE UVD BY MOUNTING INTO A CABINET OR BY ADDING COVERS AS FOLLOWS.

CABINET AND COVER

THE VFD MUST BE INSTALLED INTO A CABINET WHICH HAS THE PROTECTION DEGREE OF TYPE IP2X.
IN ADDITION THE TOP SURFACES OF CABINET ARE EASILY ACCESSIBLE SHALL MEET AT LEAST THE REQUIREMENTS OF THE PROTECTIVE TYPE IP4X, OR WHICH IS CONSTRUCTED TO PREVENT SMALL OBJECTS FROM ENTERING INVERTER.

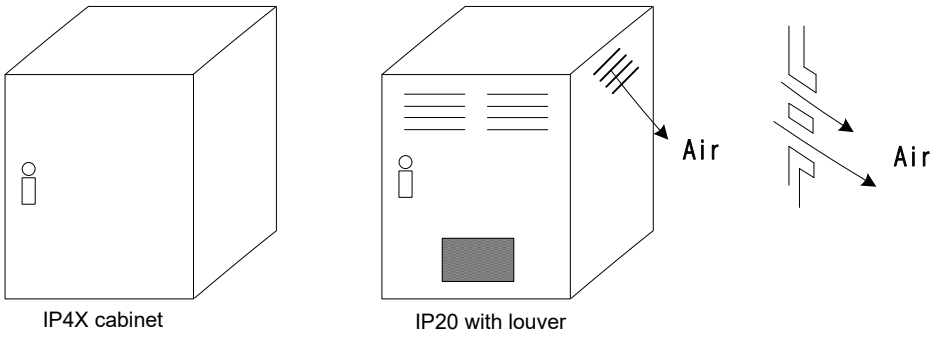


Fig 1. INVERTER CABINET

UL WARNINGS AND CAUTIONS MANUAL FOR N700E SERIES

- THIS AUXILIARY INSTRUCTION MANUAL SHOULD BE DELIVERED TO THE END USER.

1. WIRE MARKING FOR ELECTRICAL PRACTICE AND WIRE SPECIFICATIONS

"USE COPPER CONDUCTOR ONLY, 75℃WITH A TORQUE RATING.

2. TIGHTENING TORQUE AND WIRE RANGE

TIGHTENING TORQUE AND WIRE RANGE FOR FIELD WIRING TERMINALS ARE MARKED ADJACENT TO THE TERMINAL OR ON THE WIRING DIAGRAM.

MODEL NAME N700E - Heavy Duty/Normal Duty	TIGHTENING TORQUE [LB-IN]	WIRE RANGE		RING TERMINALSIZE MAXIMUM WIDTH [inch]
		AWG	kcmil	
N700E-055LF/075LFP	12.4	8	16.5	0.42
N700E-075LF/110LFP	12.4	8	16.5	0.42
N700E-110LF/150LFP	26.6	6	26.3	0.51
N700E-150LF/185LFP	26.6	4	41.7	0.51
N700E-185LF/220LFP	35.4	3	52.6	0.67
N700E-220LF	35.4	1	83.7	0.67
N700E-300LF/370LFP	58.4	3*2P	(52.6)*2P	0.87
N700E-370LF/450LFP	58.4	2*2P	(66.4)*2P	0.87
N700E-450LF/550LFP	58.4	1*2P	(83.7)*2P	0.87
N700E-550LF/750LFP	105.7	2/0*2P	(133.1)*2P	1.18
N700E-750LF/900LFP	105.7	3/0*2P	(167.8)*2P	1.18
N700E-055HF/075HFP	12.4	12	6.53	0.42
N700E-075HF/110HFP	12.4	10	10.4	0.42
N700E-110HF/150HFP	12.4	8	16.5	0.42
N700E-150HF/185HFP	26.6	8	16.5	0.51
N700E-185HF/220HFP	26.6	8	16.5	0.51
N700E-220HF/300HFP	26.6	6	26.3	0.51
N700E-300HF/370HFP	35.4	4	41.7	0.67
N700E-370HF/450HFP	35.4	2	66.4	0.67
N700E-450HF/550HFP	58.4	1	83.7	0.87
N700E-550HF/750HFP	58.4	2/0	133	0.87
N700E-750HF/900HFP	58.4	4/0	212	1.14
N700E-900HF/1100HFP	58.4	--	300	1.14
N700E-1100HF/1320HFP	105.7	--	350	1.18
N700E-1320HF/1600HFP	105.7	--	400	1.18
N700E-1600HF/2000HFP	113	4/0 * 2P	(212) * 2P	1.50
N700E-2200HF/2500HFP	113	--	(300) * 2P	1.50
N700E-2800HF/3200HFP	113	4/0 * 4P	(212) * 4P	1.50
N700E-3500HF/3800HFP	113	--	(300) * 4P	1.50

*RECOMMENDED RING TERMINAL SIZE (UL LISTED) FOR 055LF~110LF: MAXIMUM WIDTH 0.47[inch]

3. FUSE SIZE

DISTRIBUTION FUSE SIZE INFORMATION IS SHOWN IN THE TABLE BELOW. THE FUSE MUST BE A UL LISTED, 600V, INVERSE TIME RATED FUSE WITH THE CURRENT RATINGS SHOWN BELOW

MODEL NAME	FUSE [A]	Manufacturer
N700E-055LF/075LFP	30	-
N700E-075LF/110LFP	40	-
N700E-110LF/150LFP	60	-
N700E-150LF/185LFP	80	-
N700E-185LF/220LFP	100	-
N700E-220LF	125	-
N700E-300LF/370LFP	FWH-350A	Bussmann
N700E-370LF/450LFP	FWH-400A	Bussmann
N700E-450LF/550LFP	FWH-400A	Bussmann
N700E-550LF/750LFP	FWH-600A	Bussmann
N700E-750LF/900LFP	FWH-700A	Bussmann
N700E-055HF/075HFP	15	-
N700E-075HF/110HFP	20	-
N700E-110HF/150HFP	30	-
N700E-150HF/185HFP	40	-
N700E-185HF/220HFP	50	-
N700E-220HF/300HFP	60	-
N700E-300HF/370HFP	80	-
N700E-370HF/450HFP	100	-
N700E-450HF/550HFP	125	-
N700E-550HF/750HFP	150	-
N700E-750HF/900HFP	200	-
N700E-900HF/1100HFP	250	-
N700E-1100HF/1320HFP	300	-
N700E-1320HF/1600HFP	400	-
N700E-1600HF/2000HFP	A50P800-4	Ferraz
N700E-2200HF/2500HFP	A50P1000-4	Ferraz
N700E-2800HF/3200HFP	A50P1200-4	Ferraz
N700E-3500HF/3800HFP	A50P1200-4	Ferraz

*Ferraz was used when UL certified

*Bussmann was used when UL certified

General Safety Information

DEFINITIONS AND SYMBOLS

A SAFETY INSTRUCTION (MESSAGE) INCLUDES A HAZARD ALERT SYMBOL AND A SIGNAL WORD, DANGER OR CAUTION. EACH SIGNAL WORD HAS THE FOLLOWING MEANING:

THIS SYMBOL IS THE “SAFETY ALERT SYMBOL.” IT OCCURS WITH EITHER OF TWO SIGNAL WORDS: DANGER OR CAUTION, AS DESCRIBED BELOW.

⚠ DANGER : INDICATES A POTENTIALLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, CAN RESULT IN SERIOUS INJURY OR DEATH.

⚠ CAUTION : INDICATES A POTENTIALLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, CAN RESULT IN MINOR TO MODERATE INJURY, OR SERIOUS DAMAGE TO THE PRODUCT.

THE SITUATION DESCRIBED IN THE CAUTION MAY, IF NOT AVOIDED, LEAD TO SERIOUS RESULTS. IMPORTANT SAFETY MEASURES ARE DESCRIBED IN CAUTION (AS WELL AS DANGER), SO BE SURE TO OBSERVE THEM.

NOTE: INDICATES AN AREA OR SUBJECT OF SPECIAL MERIT, EMPHASIZING EITHER THE PRODUCT’S CAPABILITIES OR COMMON ERRORS DURING OPERATION OR MAINTENANCE.

1. Installation

⚠ CAUTION

Failure to comply with the following could result in electrical shock, fire, or other harm to personnel or machinery. Be sure to comply.

- Be sure to install the unit on flame resistant material such as metal.
- Be sure not to place anything highly flammable in the vicinity..
- Do not carry unit by top cover, always carry by supporting base of unit.
- Be sure not to let foreign matter enter VFD such as cut wire refuse, spatter from welding, iron refuse, wire, dust, etc.
- Be sure to install inverter in a place which can support the weight according to the specifications in the text. (Chapter 1.8. Installation)
- Be sure to install the unit on a perpendicular wall which is not subject to vibration
- Be sure not to install and operate a VFD which is damaged or has parts which are missing.
- Be sure to install the inverter in an area which is not exposed to direct sunlight and is well ventilated. Avoid environments which tend to be high in temperature, high in humidity or to have condensation, as well as places with dust, corrosive gas, explosive gas, highly flammable gas, grinding-fluid mist, salt damage, etc.

General Safety Information

2. Wiring

⚠ CAUTION

Failure to comply with the following could result in electrical shock, fire, or other harm to personnel or machinery. Be sure to comply.

- Be sure to ground the unit.
  Electrical wiring work should be carried out by qualified electricians.
- Implement wiring after checking that the power supply is off.
  After installing the main body, carry out wiring.
  Do not remove the rubber bushing where wiring connections are made.
  Due to the possibility that a wire may be damaged, shorted or may have a ground fault with the edge of the wiring cover.

⚠ CAUTION

Failure to comply with the following could result in electrical shock, fire, or other harm to personnel or machinery. Be sure to comply.

- Make sure that the input voltage is:
  200 to 240V +/- 10%, 50/60Hz
  380 to 480V +/- 10%, 50/60Hz
- For single phase input applications, de-rating of the VFD will be required for safe and reliable operation. Please contact World Wide Electric for sizing assistance and proper VFD selection.
- Be sure not to connect AC power supply to the output terminals(U, V, W).
  Be sure not to connect a resistor to the DC terminals(PD, P and N) directly.
- As for motor leads, earth leakage breakers, and electromagnetic contactors, be sure to use equivalent ones with the specified capacity(rated).
  Do not stop operation by switching off the electromagnetic contactors on the primary or secondary sides of the inverter..
- Fasten the screws to the specified torque. Check so that there is no loosening of screws.

General Safety Information

3. Control and operation

⚠ CAUTION

Failure to comply with the following could result in electrical shock, fire, or other harm to personnel or machinery.

- While the inverter is energized, be sure not to touch the main terminal or to check the signal or add or remove wires and/or connectors.
- Be sure to turn on the power supply with the front case is closed.
  While the inverter is energized, be sure not to open the front case.
- Be sure not to operate the switches with wet hands.
- While the inverter is energized, be sure not to touch the inverter terminals when the unit is not running.
- If the retry mode is selected, the VFD may suddenly restart during the trip stop.
  Be sure not to approach the equipment. (Be sure to design the equipment so that personnel safety will be secured even if equipment restarts.)
- Be sure not to select retry mode for lift or traveling equipment.
- Even if the power supply is cut for a short period of time, the inverter may restart operation after the power supply is restored if the operation command is given.
  If a restart may incur danger to personnel, be sure to make a circuit so that it will not restart after power recovery.
- The stop key is valid only when a function is on. Ensure that there is a hard wired emergency stop that is separate from the stop key of the inverter.
- With the operation command on, if the alarm reset is ordered, the inverter can restart suddenly. Be sure to set the alarm reset after checking the operation command is off.
- Be sure not to touch the inside of the energized VFD or to put a shorting bar into it.

General Safety Information

⚠CAUTION

Failure to comply with the following could result in electrical shock, fire, or other harm to personnel or machinery.

- The heat sink fins will have a high temperature. Be sure not to touch them.
- Low to high speed operation of the inverter can be easily set. Be sure to operate it after checking the tolerance of the motor and machine.
- Install an external breaking system if needed.
- If the motor needs to operate at a frequency higher than standard Max Frequency setting (50Hz/60Hz), be sure to check with the manufacturers of both the motor and the machine for their approval.
- Check the following before and during the test run.
  Was the direction of the motor correct?
  Did the inverter trip for on acceleration or deceleration?
  Were the RPM and frequency motor correct?
  Were there any abnormal motor vibrations or noises?
- The AC reactor must be installed when the power is not stable in order to avoid damage to the VFD.

4. Maintenance, Inspection and Part Replacement

⚠CAUTION

Failure to comply with the following could result in electrical shock, fire, or other harm to personnel or machinery.

- After turning off the input power supply, do not perform the maintenance and inspection for at least 5 minutes.
- Make sure that only qualified persons will perform maintenance, inspection and/or part replacement.
  (Before starting the work, remove metallic objects(wristwatch, bracelet, etc.)
  (Be sure to use insulated tools.)

General Safety Information

5. Others

⚠ CAUTION

Failure to comply with the following could result in electrical shock, fire, or other harm to personnel or machinery. Be sure to comply.

- Never modify the unit.

⚠ CAUTION

- For heavy objects over 33 lbs, use lifting aids and proper lifting techniques to avoid muscle strain or back injury.

CONTENTS

1. Hyundai N700E Series VFD

Hyundai N700E Series VFD with high durability, exceptional speed control and torque response provides overall superior vector performance. The N700E's compact size and Sensorless Vector control technology provide perfectly optimized performance for industrial / commercial equipment. Certificates of international standards (CE, UL/cUL) of N700E series make its application ready for global business.

1.1 Benefits of a VFD

The speed of induction motor is limited by the operating frequency and the number of poles.

$$\text{Motor RPM} = \frac{120 * \text{Frequency}}{\text{Number Poles}}$$

The fundamental benefit of the VFD is to control the motor speed by varying the frequency. The VFD offers more functions to benefit the total system such as ease of use or energy savings, which is summarized below.

- Motor speed is a function of the number of motor poles and the frequency.
  - At 60 Hz a motor runs at 3600, 1800, 1200, 900 RPM for 2 poles, 4 poles, 6 poles, and 8 pole respectively. At 50 Hz - 3000, 1500, 1000, 750 RPM
  - A VFD can control the frequency to operate the motor over a range of speeds to optimize an application.
- Maintain a constant motor speed regardless of load
- Control forward/reverse operation
- Start/Stop and restart control
  - When power loss occurs on an unmanned application, the VFD turns off. With programming, a user can configure the VFD to restart when power is back on.
  - Or program to stop VFD for conditions such as overvoltage, overcurrent, etc.
- Ramp to start or Ramp to stop
  - By controlling ramp slopes of start/stop, mechanical stress can be minimized.
- Reduce energy consumption by operating output at optimum frequency for the application.
- Protects VFD and motor by limiting current, speed, and temperature by generating trip signals
  - Current trip
  - Voltage trip
  - Over temperature trip etc.

1.2 N700E Models

Constant Torque (Heavy Duty) (HP)	Variable Torque (Normal Duty) (HP)	1 Phase 230 V	3 Phase 230 V	3 Phase 460 V
0.5		N700E-004SF	N700E-004LF	N700E-004HF
1		N700E-007SF	N700E-007LF	N700E-007HF
2		N700E-015SF	N700E-015LF	N700E-015HF
3		N700E-022SF	N700E-022LF	N700E-022HF
5			N700E-037LF	N700E-037HF
7.5	10		N700E-055LF	N700E-055HF
10	15		N700E-075LF	N700E-075HF
15	20		N700E-110LF	N700E-110HF
20	25		N700E-150LF	N700E-150HF
25	30		N700E-185LF	N700E-185HF
30	40		N700E-220LF	N700E-220HF
40	50		N700E-300LF	N700E-300HF
50	60		N700E-370LF	N700E-370HF
60	75		N700E-450LF	N700E-450HF
75	100		N700E-550LF	N700E-550HF
100	125		N700E-750LF	N700E-750HF
125	150			N700E-900HF
150	200			N700E-1100HF
200	250			N700E-1320HF
250	300			N700E-1600HF
300	350			N700E-2200HF
400	450			N700E-2800HF
500	550			N700E-3500HF

Table 1-1: Overview of N700E Models

1.3 N700E Specification

1.3.1 230V Class Specification

Inverter Model	Max Applicable Motor (4P,kW(HP)) (Note1)		Rated Capacity (kVA)				Rated Output Current (A)		Weight (lbs)
	HD	ND	HD		ND		HD	ND	
			200V	240V	200V	240V			
055LF/075LFP	5.5(7.5)	7.5(10)	8.3	10.0	10.4	12.5	24	30	9.26
075LF/110LFP	7.5(10)	11(15)	11.1	13.3	15.2	18.2	32	44	9.92
110LF/150LFP	11(15)	15(20)	15.6	18.7	20.0	24.1	45	50	9.92
150LF/185LFP	15(20)	18.5(25)	22.2	26.6	25.2	30.3	64	73	14.33
185LF/220LFP	18.5(25)	22(30)	26.3	31.6	29.4	35.3	76	85	16.53
220LF	22(30)	-	31.2	37.4	-	-	90	-	17.64
Rated Input Voltage			Three Phase 200 ~ 240 V +/- 10 %, 50/60 Hz +/- 5%						
Rated Output Voltage (Note2)			Three Phase 200 ~ 240 V (Corresponding to Input Voltage)						
Protection Design			IP20						

Table 1-2: 230V Class N700E 055LF ~ 220LF Specification Summary

Inverter Model	Max Applicable Motor (4P,kW(HP)) (Note1)		Rated Capacity (kVA)				Rated Output Current (A)		Weight (lbs)
	HD	ND	HD		ND		HD	ND	
			200V	240V	200V	240V			
300LF/370LFP	30(40)	37(50)	39	47	48	58	114	140	53.00
370LF/450LFP	37(50)	45(60)	48	58	59	71	140	170	75.53
450LF/550LFP	45(60)	55(75)	59	71	71	85	170	205	75.53
550LF/750LFP	55(75)	75(100)	73	88	90	108	211	261	99.38
750LF/900LFP	75(100)	90(125)	87	104	107	129	261	310	101.50
Rated Input Voltage			Three Phase 200 ~ 240 V +/- 10 %, 50/60 Hz +/- 5%						
Rated Output Voltage (Note2)			Three Phase 200 ~ 240 V (Corresponding to Input Voltage)						
Protection Design			IP00						

Table 1-3: 230V Class N700E: 300LF ~ 750LF Specification Summary

1.3.2 460V Class Specification

Inverter Model	Max Applicable Motor (4P,kW(HP))(Note1)		Rated Capacity (kVA)				Rated Output Current (A)		Weight (lbs)
	HD	ND	HD		ND		HD	ND	
			380V	480V	380V	480V			
055HF/075HFP	5.5(7.5)	7.5(10)	7.9	10.0	10.4	12.5	12	15	9.3
075HF/110HFP	7.5(10)	11(15)	10.5	13.3	15.2	18.2	16	22	9.9
110HF/150HFP	11(15)	15(20)	15.1	19.1	20.0	24.1	23	29	9.9
150HF/185HFP	15(20)	18.5(25)	21.1	26.6	25.6	30.7	32	37	15.4
185HF/220HFP	18.5(25)	22(30)	25.0	31.6	29.7	35.7	38	43	15.4
220HF/300HFP	22(30)	30(40)	29.6	37.4	39.4	47.3	45	57	16.5
Rated Input Voltage			Three Phase 380 ~ 480 V +/- 10 %, 50/60 Hz +/- 5%						
Rated Output Voltage(Note2)			Three Phase 380 ~ 480 V (Corresponding to Input Voltage)						
Protection Design			IP20						

Table 1-4: 460V Class N700E: 055HF ~ 220HF Specification Summary

Inverter Model	Max Applicable Motor (4P, kW(HP)) (Note1)		Rated Capacity (kVA)				Rated Output Current (A)		Weight (lbs)
	HD	ND	HD		ND		HD	ND	
			380V	480V	380V	480V			
300HF/370HFP	30(40)	37(50)	38.2	48.2	48.4	58.1	58	70	48.5
370HF/450HFP	37(50)	45(60)	49.4	62.4	58.8	70.1	75	85	48.5
450HF/550HFP	45(60)	55(75)	59.2	74.8	72.7	87.2	90	105	59.5
550HF/750HFP	55(75)	75(100)	72.4	91.5	93.5	112	110	135	66.1
750HF/900HFP	75(100)	90(125)	98.1	123.9	111	133	149	160	110.2
900HF/1100HFP	90(125)	110(150)	115.8	146.3	135	162	176	195	110.2
1100HF/1320HF	110(150)	132(200)	142.8	180.4	159	191	217	230	132.3
1320HF/1600HFP	132(200)	160(250)	171.1	216.2	204	245	260	285	132.3
1600HF/2000HFP	160(250)	200(300)	195	230	245	285	300	370	242.5
2200HF/2500HFP	220(300)	250(350)	270	315	305	360	415	450	242.5
2800HF/3200HFP	280(400)	320(450)	340	400	390	470	525	600	374.8
3500HF/3800HFP	350(500)	375(550)	430	500	460	550	656	680	374.8
Rated Input Voltage			Three Phase 380 ~ 480 V +/- 10 %, 50/60 Hz +/- 5%						
Rated Output Voltage(Note2)			Three Phase 380 ~ 480 V (Corresponding to Input Voltage)						
Protection Design			IP00						

Table 1-5: 460V Class N700E: 300HF ~ 3500HF Specification Summary

Note 1: The applicable motor refers to HYUNDAI standard 3-phase motor (4-pole).
To use other motors, care must be taken to prevent the rated motor current (50/60Hz) from exceeding the rated output current of the inverter.

Note 2: The output voltage decreases as the main supply voltage decreases (except for use of the AVR function). In any case, the output voltage cannot exceed the input power supply voltage.

1.3.3 N700E Performance Specification

Features		Performance Specification
Control Method(Note3)		V/f control, Sensorless Vector control
Output Frequency Range(Note4)		0.01～400Hz (Sensorless Vector Control : 0.5 ～ 300Hz)
Frequency Accuracy		Digital command ±0.01% of Max Frequency / Analog Frequency ±0.1% (25±10℃)
Frequency Resolution		Digital Setting : 0.01Hz (Under 100Hz), 0.1Hz (Over 100Hz) Analog setting: Max. frequency / 1,000 (DC 0～10V, 4～20mA)
Voltage/frequency Characteristic		Constant Torque, Variable Torque
Overload Current Rate		Heavy Duty(150%, 60sec), Normal Duty(120%, 60sec)
Acceleration/Deceleration		0.1～3000 sec (Linear, S curve, U curve)
DC Injection Braking		Separately configurable start and stop up to 10 sec, 100 % motor rated current
Input Signal	Frequency	▪ Set by Keypad (Potentiometer or Arrow Keys) ▪ Input voltage: DC 0～10V (Input impedance 10KΩ) ▪ Input current: DC 4～20mA (Input impedance 200Ω)
	Run/Stop	▪ Run / Stop key ▪ Input Terminal: Forward Run/Reverse Run ▪ Input Terminal: Start, Stop, FW/RV Selection
	Intelligent Input Terminal	▪ FW(Forward Run), RV(Reverse Run), ▪ CF1~4(Multi-speed Inputs 1~4), ▪ RS(Reset), ▪ AT(Analog input current/voltage selection signal), ▪ USP(Unattended Start Protection) ▪ EXT1~6(External trip 1~6), ▪ FRS(Free-Run Stop), ▪ JG(Jogging), ▪ SFT(software lock), ▪ 2CH(2nd Acceleration / Deceleration), ▪ STA, STP, F/R(3-wire) ▪ UP, DOWN(Up/down), UP/DOWN initial value clear ▪ O/R (Local Keypad Operation), T/R(Local Terminal Input Operation), ▪ PIDIR(PID Integral Reset), ▪ PIDD(PID Disabled) ▪ F/O (Frequency Override), R/O (Reset Override)

Feature		Performance Specification
Output Signal	Intelligent Output Terminal (RN0-RN1,RN2-RN3, AL0-AL1-AL2)	▪ RUN(Run Status Signal), ▪ FA1 (Frequency Arrival Signal 1), ▪ FA2 (Frequency Arrival Signal 2), ▪ OL(Overload Alarm), ▪ OD(PID Error Deviation Signal), ▪ FLT(Fault Signal) ▪ COM(Operation by Communication) ▪ SOL(System Overload)/SUL(System Underload)
	FM Output	Analog Output Meter (DC 0~10V full scale. Max · 1mA) Output Frequency, Output Current, Output Voltage, Output Power, Output Torque, Operation by Communication
	AMI Output	Analog Output Meter (4~20mA full scale. Max · 250Ω) Output Frequency, Output Current, Output Voltage, Output Power, Output Torque, Operation by Communication

Application Specification Functions		▪ AVR function, ▪ Curved Acceleration / Deceleration Profile, ▪ Upper and Lower Limiters, ▪ 16-stage Speed Profile, ▪ Fine Adjustment of Start Frequency, ▪ Carrier Frequency Change(0.5 to 16Khz), ▪ Frequency Jump, ▪ Gain and Bias Setting, ▪ Process Jogging, ▪ Electronic Thermal Level Adjustment, ▪ Retry Function, ▪ Trip History Monitor, ▪ Auto Tuning(1), ▪ V/f Characteristic Selection, ▪ Speed Search ▪ Automatic Torque Boost, ▪ Frequency Conversion Display, ▪ USP function
Protection Functions		▪ Over current, ▪ Overload(Electronic thermal), ▪ Overvoltage, ▪ Inverter Overload(IOLT), ▪ Under voltage, ▪ Communication Error, ▪ Output Short Circuit Detection, ▪ USP error, ▪ EEPROM error, ▪ External error, ▪ Ground fault, ▪ Over temperature, ▪ Input Phase Loss, ▪ Braking resistor overload ▪ OVS fail ▪ Fan fault (Only 300LF~750LF)
Environment specification	Ambient Temperature	-10~40℃ (If ambient temperature is above 40℃, Carrier frequency should be lower than default value.)
	Storage temperature	-20~60℃
	Ambient humidity	Below 90%RH (Installed with no dew condensation)
	Vibration	5.9m/s^2(0.6G). 10~55Hz
	Location	Under 1000m above sea level, indoors (Installed away from corrosive gasses dust)
Option		Noise filter , DC reactor, AC reactor Remote operator, cable for remote operator, Braking resistor

Table 1-6: N700E Performance Specification Summary

Note 3: Control method setting A31 to 2 (sensorless vector control) Selected, set carrier frequency (b11) more than 2.1kHz.

- Sensorless vector performance will be reduced when using a motor less than half of the rated capacity of the VFD.
- Multiple motors cannot be driven by sensorless vector control.

Note 4: To operate the motor over rated frequency, consult the motor manufacturer about the maximum allowable rotation speed.

1.4 N700E Panel View

1.4.1 N700E-055LF/075LFP ~ N700E-220HF/300HFP

Figure 1-1: Front View with/without Front Cover: 055LF ~ 220HF

1.4.2 N700E-300LF/370LFP

Figure 1-2: Front View with/without Front Cover: 300LF

1.4.3 N700E-370LF/450LFP ~ N700E-450LF/550LFP

Figure 1-3: Front View with/without Front Cover: 370LF ~ 450LF

1.4.4 N700E-550LF/750LFP ~ N700E-750LF/900LFP

Figure 1-4: Front View with/without Front Cover: 550LF ~ 750LF

1.4.5 N700E-300HF/370HFP ~ N700E-1320HF/1600HFP

Figure 1-5: Front View with/without Front Cover: 370HF ~ 1320HF

1.4.6 N700E-1600HF/2000HFP ~ N700E-2200HF/2500HFP

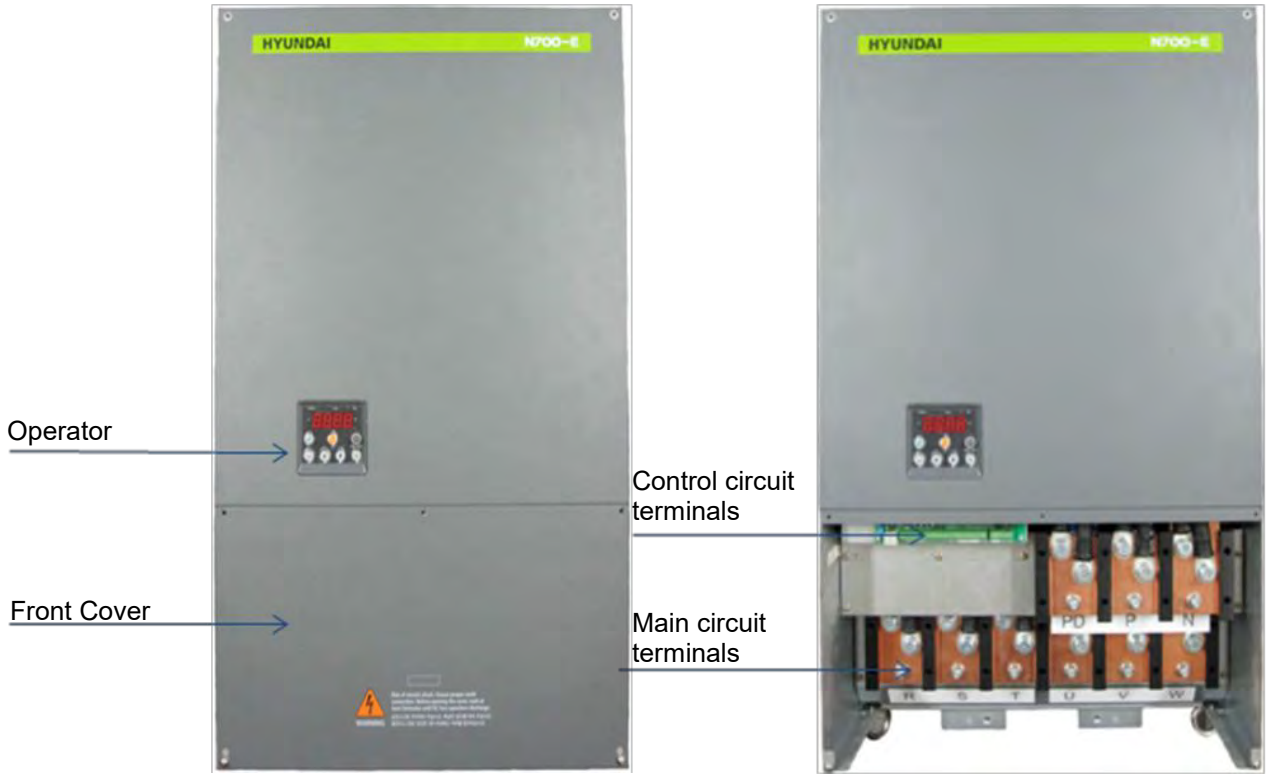


Figure 1-6: Front View with/without Front Cover: 1600HF ~ 1320HF

1.4.7 N700E-2800HF/3200HFP ~ N700E-3500HF/3800HFP

Figure 1-4: Front View with/without Front Cover: 2800HF ~ 3500HF

1.5 N700E Dimension

Summarized is the dimension of N700E models in Table 1-6. Respective drawing and sizes are specified in section 1.5.1 through 1.5.8.

Model	W(Width) (inch)	W1 [inch]	W2 [inch]	H(Height) [inch]	H1 [inch]	D(depth) [inch]	ø [inch]	Weight [lbs]
N700E-055LF/075LFP	8.27	7.44	-	10.83	9.69	6.61	0.28	9.26
N700E-075LF/110LFP	8.27	7.44	-	10.83	9.69	6.61	0.28	9.92
N700E-110LF/150LF	8.27	7.44	-	10.83	9.69	6.61	0.28	9.92
N700E-150LF/185LF	9.84	9.02	-	15.35	14.80	7.40	0.28	14.33
N700E-185LF/220LF	9.84	9.02	-	15.35	14.80	7.40	0.28	16.53
N700E-220LF	9.84	9.02	-	15.35	14.80	7.40	0.28	17.64
N700E-300LF/370LFP	10.63	7.87	-	21.65	20.94	10.43	0.35	53.00
N700E-370LF/450LFP	11.61	7.87	-	25.98	25.28	10.43	0.35	75.53
N700E-450LF/550LFP	11.61	7.87	-	25.98	25.28	10.43	0.35	75.53
N700E-550LF/750LFP	13.58	9.06	-	29.92	28.94	10.83	0.47	99.38
N700E-750LF/900LFP	13.58	9.06	-	29.92	28.94	10.83	0.47	101.50
N700E-055HF/075HFP	8.27	7.44	-	10.83	9.69	6.61	0.28	9.26
N700E-075HF/110HFP	8.27	7.44	-	10.83	9.69	6.61	0.28	9.92
N700E-110HF/150HFP	8.27	7.44	-	10.83	9.69	6.61	0.28	9.92
N700E-150HF/185HFP	9.84	9.02	-	15.35	14.80	7.40	0.28	15.43
N700E-185HF/220HFP	9.84	9.02	-	15.35	14.80	7.40	0.28	15.43
N700E-220HF/300HFP	9.84	9.02	-	15.35	14.80	7.40	0.28	16.53
N700E-300HF/300HFP	12.28	10.43	9.45	20.87	20.08	10.63	0.39	48.50
N700E-370HF/450HFP	12.28	10.43	9.45	20.87	20.08	10.63	0.39	48.50
N700E-450HF/550HFP	13.46	11.81	-	21.57	20.47	11.02	0.47	59.52
N700E-550HF/750HFP	13.46	11.81	-	21.57	20.47	11.02	0.47	66.14
N700E-750HF/900HFP	15.59	11.81	-	27.48	26.38	11.02	0.47	110.23
N700E-900HF/1100HFP	15.59	11.81	-	27.48	26.38	11.02	0.47	110.23
N700E-1100HF/1320HFP	18.90	14.96	-	29.13	27.95	11.81	0.47	132.28
N700E-1320HF/1600HFP	18.90	14.96	-	29.13	27.95	11.81	0.47	132.28
N700E-1600HF/2000HFP	19.92	13.78	-	36.22	35.04	15.35	0.55	242.51
N700E-2200HF/2500HFP	19.92	13.78	-	36.22	35.04	15.35	0.55	242.51
N700E-2800HF/3200HFP	31.73	27.56	-	40.16	38.58	15.55	0.55	374.79
N700E-3500HF/3800HFP	31.73	27.56	-	40.16	38.58	15.55	0.55	374.79

Table 1-7: N700E Dimensional Specification Summary

1.5.1 N700E-055LF/075LFP, N700E-075LF/110LFP, N700E-110LF/150LFP, N700E-055HF/075HFP,N700E-075HF/110HFP, N700E-110HF/150HFP

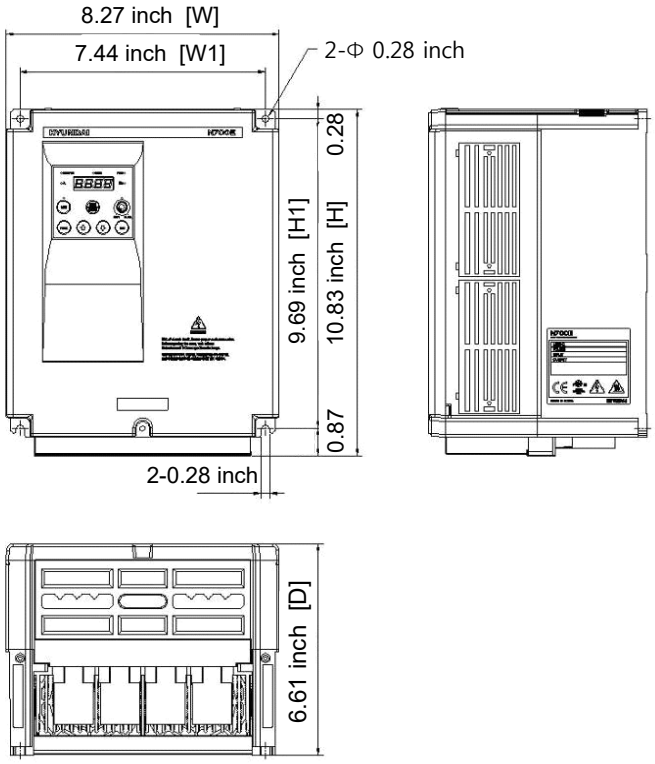


Figure 1-8: Physical Dimension Specific to 055LF~110LF, 055HF~110HF

1.5.2 N700E-150LF/185LFP, N700E-185LF/220LFP, N700E-220LF, N700E-150HF/185HFP, N700E-185HF/220HFP, N700E-220HF/300HFP

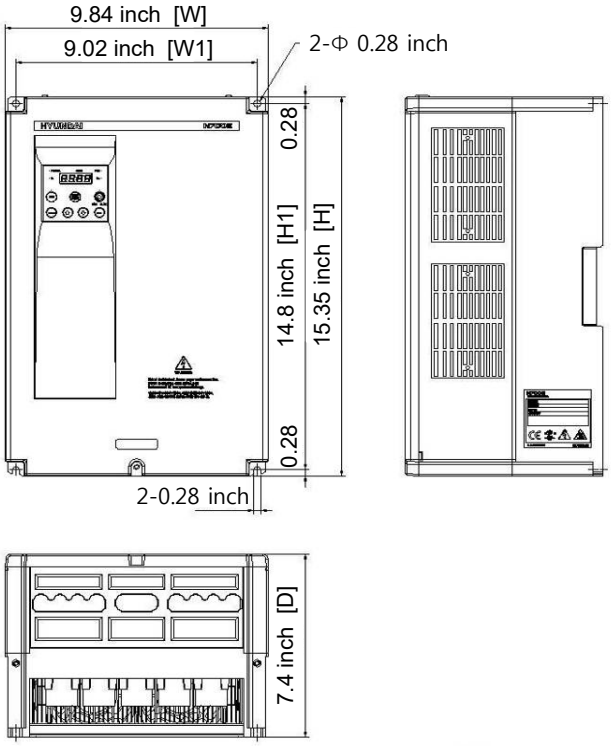


Figure 1-9: Physical Dimension Specific to 150LF~220LF, 185HF~220HF

1.5.3 N700E-300LF/370LFP

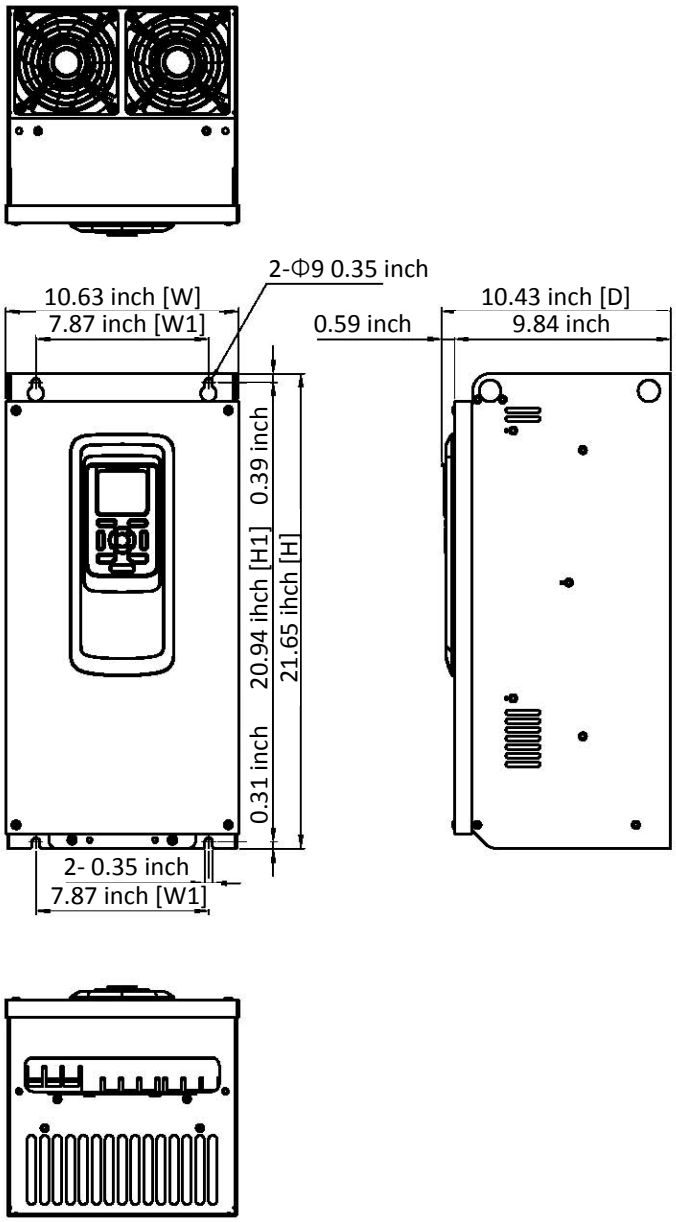


Figure 1-10: Physical Dimension Specific to 300LF

1.5.4 N700E-370LF/450LFP, N700E-450LF/550LFP

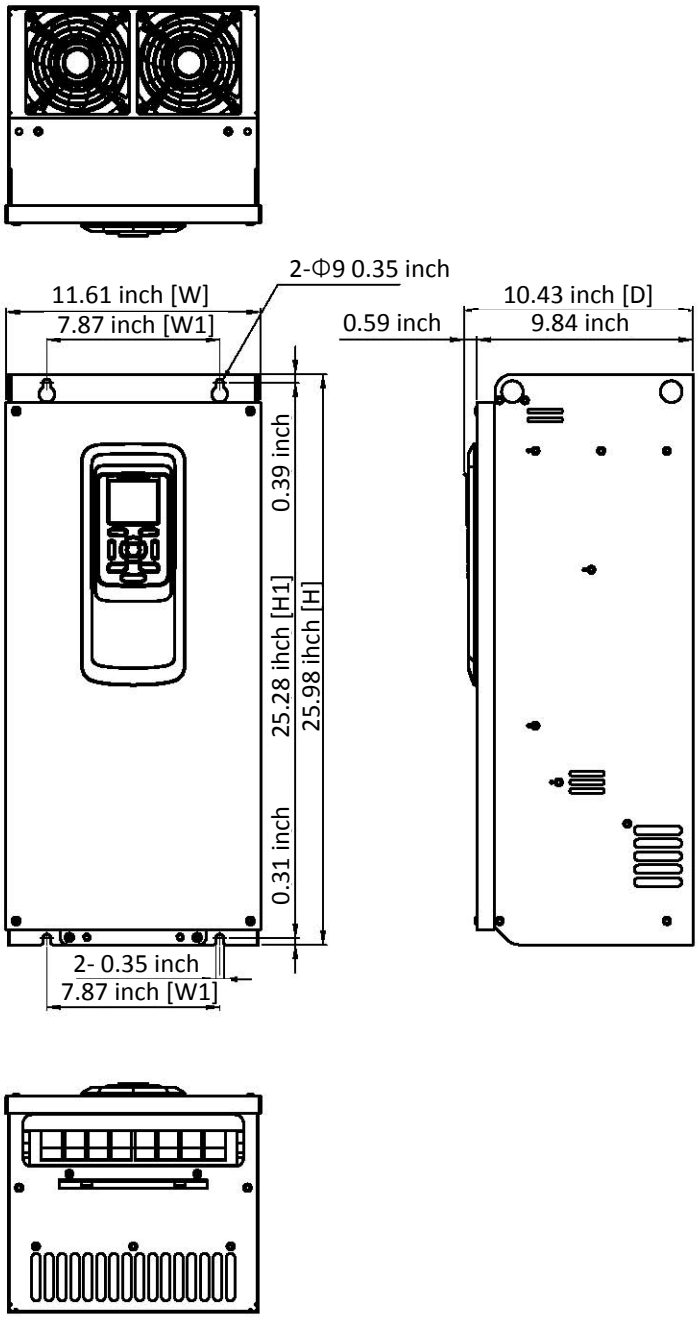


Figure 1-11: Physical Dimension Specific to 370LF ~ 450LF

1.5.5 N700E-550LF/750LFP, N700E-750LF/900LFP

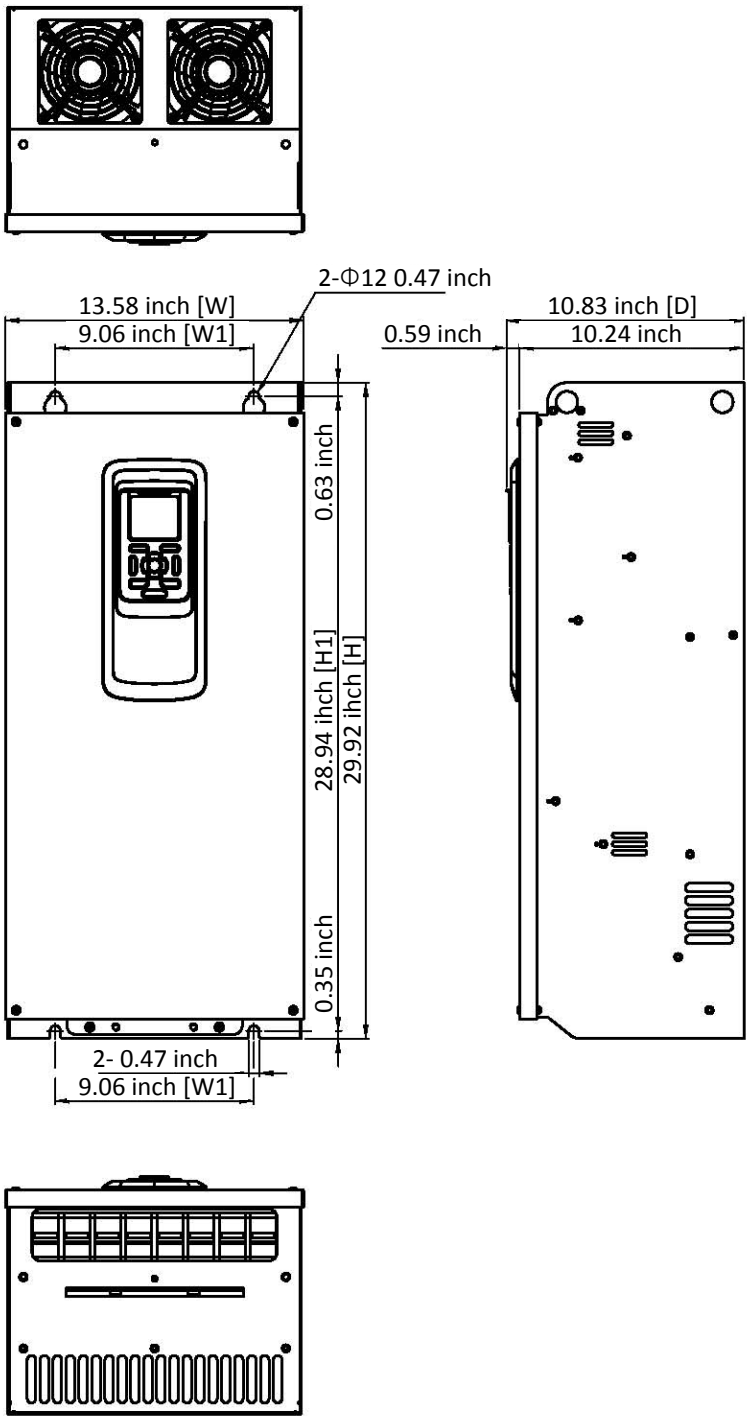
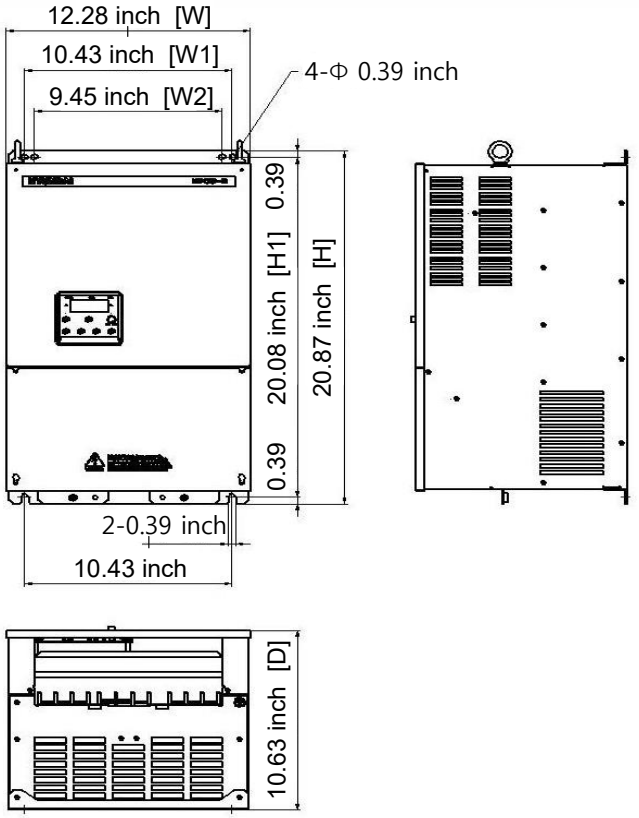
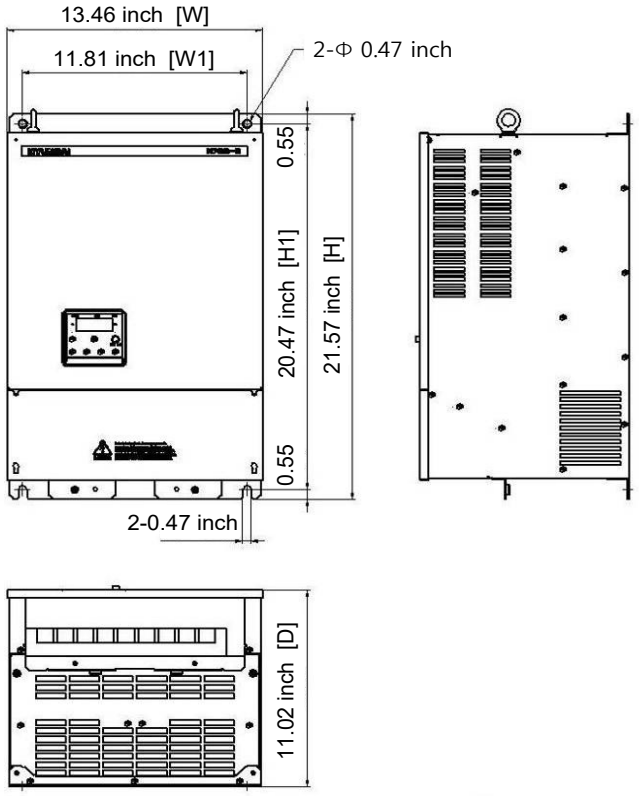


Figure 1-12: Physical Dimension Specific to 550LF ~ 750LF

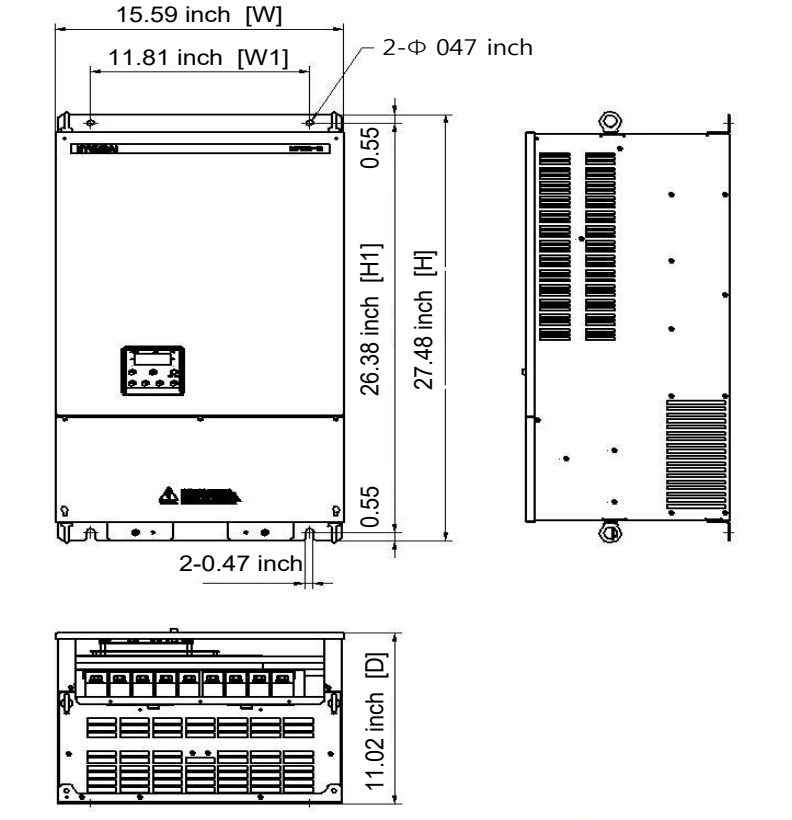
1.5.6 N700E-300HF/370HFP, N700E-370HF/450HFP *(Figure 1-13: 300HF, 370HF)*



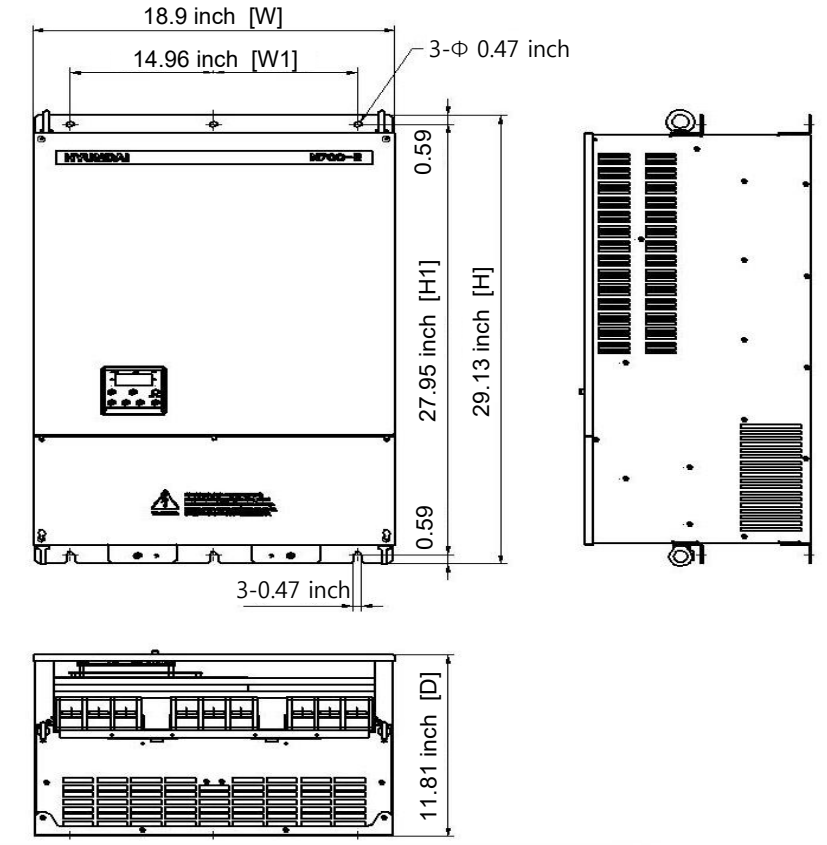
1.5.7 N700E-450HF/550HFP, N700E-550HF/750HFP *(Figure 1-14: 450HF, 550HF)*



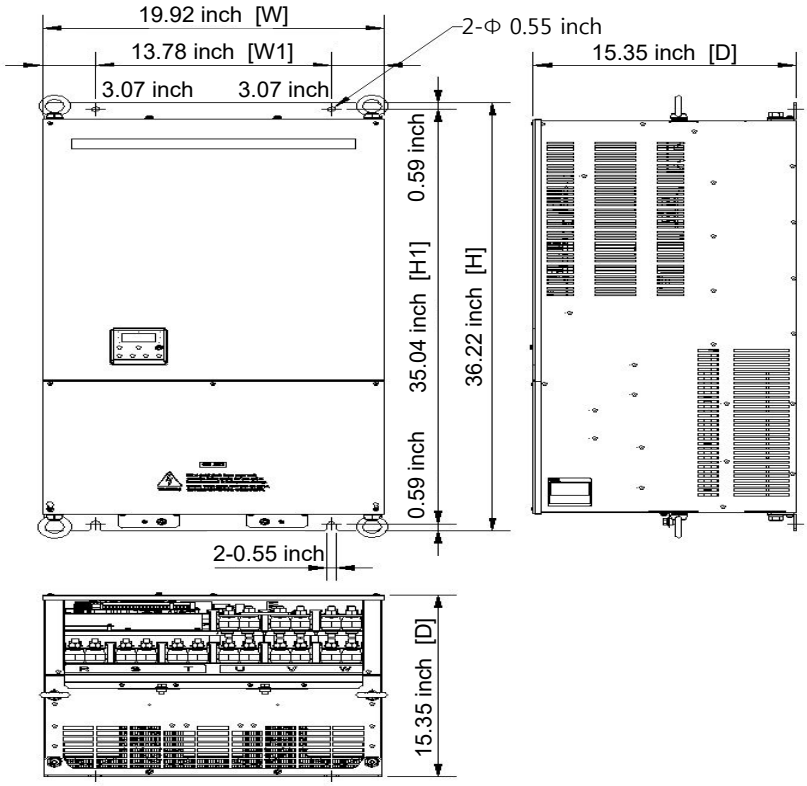
1.5.8 N700E-750HF/900HFP, N700E-900HF/1100HFP *(Figure 1-15: 750HF, 900HF)*



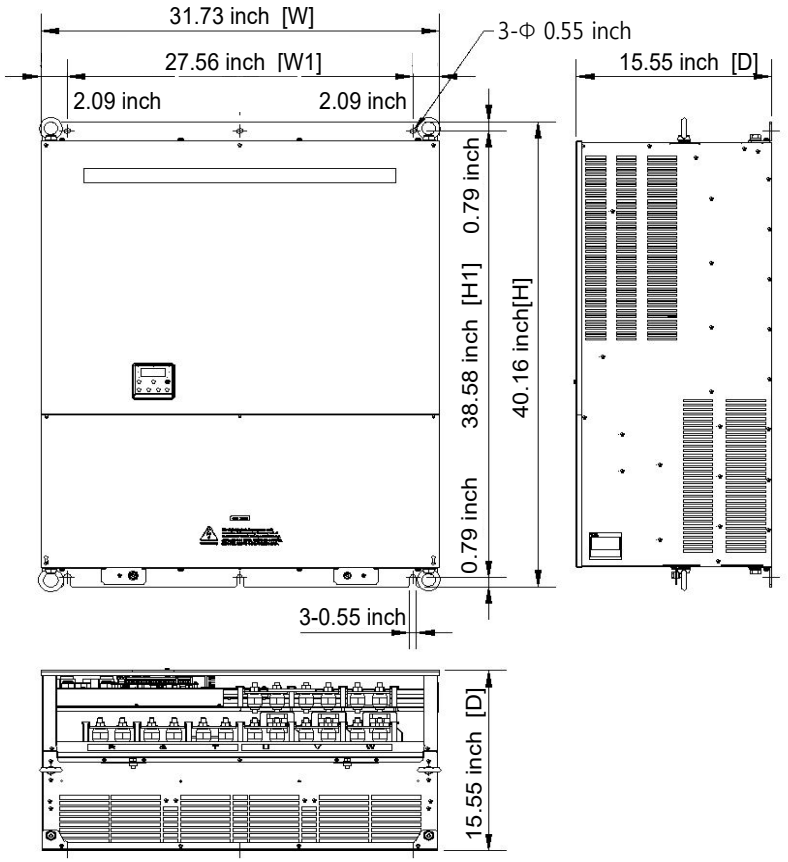
1.5.9 N700E-1100HF/1320HFP, N700E-1320HF/1600HFP *(Figure 1-16: 1100HF, 1320HF)*



1.5.10 N700E-1600HF/2000HFP, N700E-2200HF/2500HFP *(Figure 1-17: 1600HF, 2200HF)*



1.5.11 N700E-2800HF/3200HFP, N700E-3500HF/3800HFP *(Figure 1-18: 2800HF, 3500HF)*



1.6 Transportation

Please inspect following

- Handle according to the weight of the product.
- Do not stack the inverter boxes higher than the number recommended on boxes
- Install according to instructions specified in this manual
- Do not open the cover during delivery
- Do not place heavy items on the inverter

1.7 Unpacking

Please inspect following

- No damage made to the unit during transportation
- One Operational Manual is enclosed
- Check the Label Specification if the correct product is delivered per your order

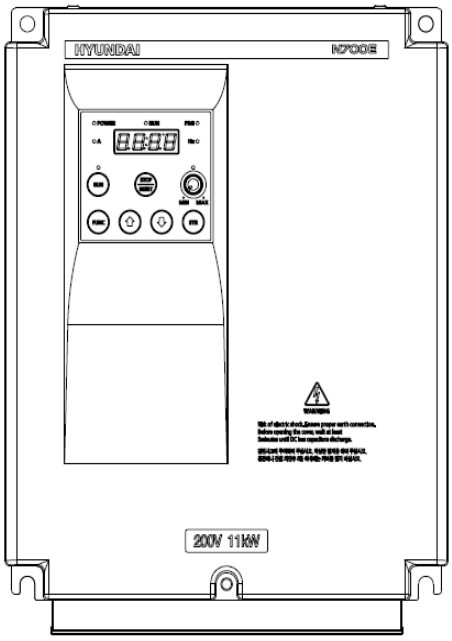


Figure 1-19: Outlook of N700E

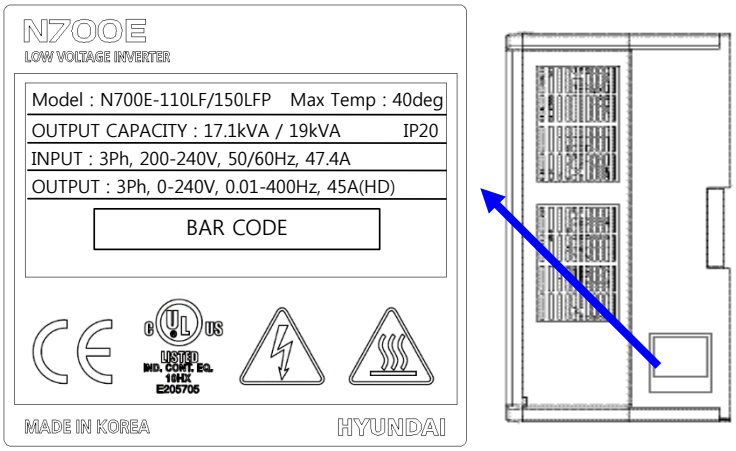


Figure 1-20: N700E Specification on Label

1.8 Installation

⚠ CAUTION

Failure to following recommendation may result in VFD damage, Personal Injury, or Fire.

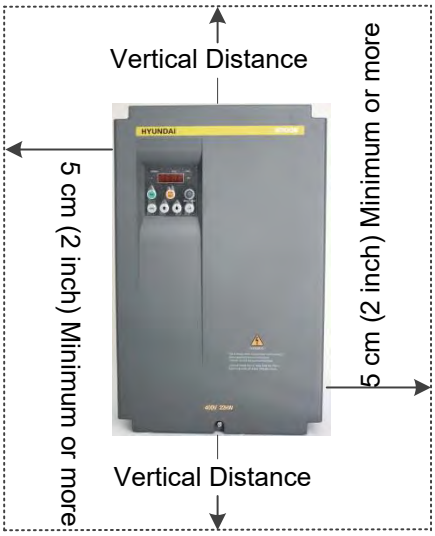
- Be sure to install the unit on flame resistant material such as metal.
- Be sure not to place anything flammable such as corrosive gas, explosive gas, inflammable gas, grinding fluid mist, salt in the vicinity
- Do not carry the unit by the top cover, but always by supporting the base of the unit
- Be sure not to let foreign matter enter such as cut wire refuse, spatter from welding, iron refuse, wire, dust, etc.
- Be sure to install the VFD in a place which can support the weight according to the specification in the manual.
- Be sure to install the unit on a perpendicular wall which is not subject to vibration.
- Be sure not to install and operate a damaged inverter or one with the missed parts
- Be sure to install the unit in an area which is not exposed to direct sunlight and well ventilated. Avoid an environment which tends to be high in temperature, high in humidity or to have condensation.

1.8.1 Mounting Surface

It is critical to mount the VFD to the proper surface in order to prevent any possible risk of fire. The temperature of the VFD heatsink can rise very high. The surface must be made of a non-flammable material (i.e. steel). Attention should also be made to the air gap surrounding the VFD. Especially, when there is a heat source such as a breaking resistor or reactor.

1.8.2 Mounting Position

Mount the VFD in a vertical position using screws or bolts. The mounting surface should also be free from vibration and can easily hold the weight of the VFD.



VFD Size	Vertical Distance
5.5 kW ~ 55 kW	4 inch or more
75 kW ~ 132 kW	12 inch or more
160 kW ~ 375 kW	20 inch or more

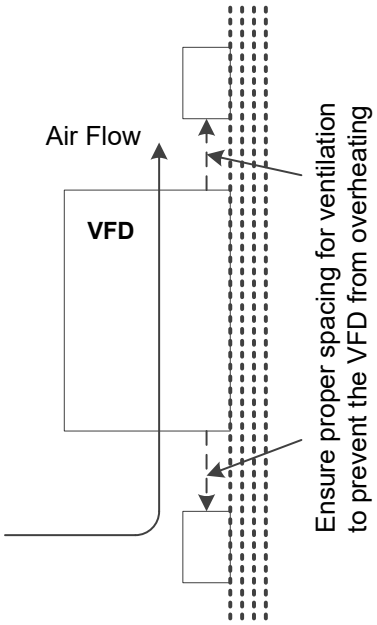


Figure 1-21: Mounting Spacing from Surrounding *Figure 1-22: Air Gap* *Figure 1-23: Mounting Holes*

1.8.3 Environment-Ambient Temperature

The ambient temperature surrounding the inverter should not exceed the allowable temperature range (14 to 122°F, -10 to 50℃). The temperature should be measured in the air gap surrounding the inverter, shown in the diagram above. If the temperature exceeds the allowable temperature, component life will become shortened especially in the case of the bus capacitors.

1.8.4 Environment-Humidity

The humidity surrounding the inverter should be within the limit of the allowable percentage range (20% to 90% / RH). Under no circumstances should the VFD be in an environment where there is the possibility of moisture entering the inverter.
Also avoid having the VFD mounted in a place that is exposed to the direct sunlight.

1.8.5 Environment-Air

Install the VFD in a place free from dust, corrosive gas, explosive gas, combustible gas, mist of coolant and sea damage.

1.8.6 Ventilation within an Enclosure

If you are installing one or more VFDs in an enclosure, a ventilation fan should be installed to consider the airflow shown in Figure 1-22: Air Gap. The positioning of VFD, cooling fans and air intake is very important. If these positions are wrong, airflow around the VFD decreases and the temperature surrounding the VFD will rise. So please make sure that the temperature around is within the limit of the allowable range.

2. N700E VFD Set Up

In order to operate N700E VFD, it has to be wired properly to the power supply and the motor. Often accessory units are used for performance enhancement. Then, the VFD needs to be configured of how to be operated, where the start/stop command and frequency command source comes from. This configuration is done by programming parameters with selected values. The overall setting of N700E is discussed in this chapter.

- Wiring
- Programming
- Frequency Command Source and Run Command Source

2.1 Wiring

⚠ WARNING

Failure to comply with the following could result in electrical shock, fire, or other harm to personnel or machinery.

- Be sure to ground the unit.
- Wiring work should be carried out by qualified electricians.
- Implement wiring after checking that the power supply is off.
- After mounting the VFD, carry out wiring.
- Do not remove the rubber bushings where wiring connections are made. (5.5 kW (7.5 HP) to 22kW (30HP)) Due to the possibility that a wire may be damaged, shorted or may have a ground fault with the edge of the wiring cover.

⚠ CAUTION

Failure to comply with the following could result in electrical shock, fire, or other harm to personnel or machinery.

- Make sure that the input voltage is:
  200 to 240V +/- 10%, 50/60Hz
  (Model : N700E-055LF/075LFP~750LF/900LFP)
  380 to 480V +/- 10%, 50/60Hz
  (Model : N700E-055HF/075HFP~3500HF/3800HFP)
- For single phase input applications, de-rating of the VFD will be required for safe and reliable operation. Please contact WorldWide Electric Corporation for sizing assistance and proper VFD selection. When wiring input power, be sure to connect to input terminals (R, T)
- Be sure not to connect AC power supply to the output terminals (U, V, W).
- Be sure not to connect a resistor to the DC terminals (PD, P) directly.
- Be sure to use an earth leakage breaker or fuses on input supply to the VFD.
- As for motor leads, earth leakage breaker or electromagnetic contactors should not be used unless consulting with WorldWide Electric.
- Do not use the electromagnetic contactors on the primary side of the VFD as means of start/stop control.

2.1.1 N700E Terminal Connection Diagram and Description

N700E VFD terminal connection overview is shown in Figure 2-1 (Except 300LF~750LF)
There are three segments of Connections

- Power Circuit
- Control Circuit
- Communication

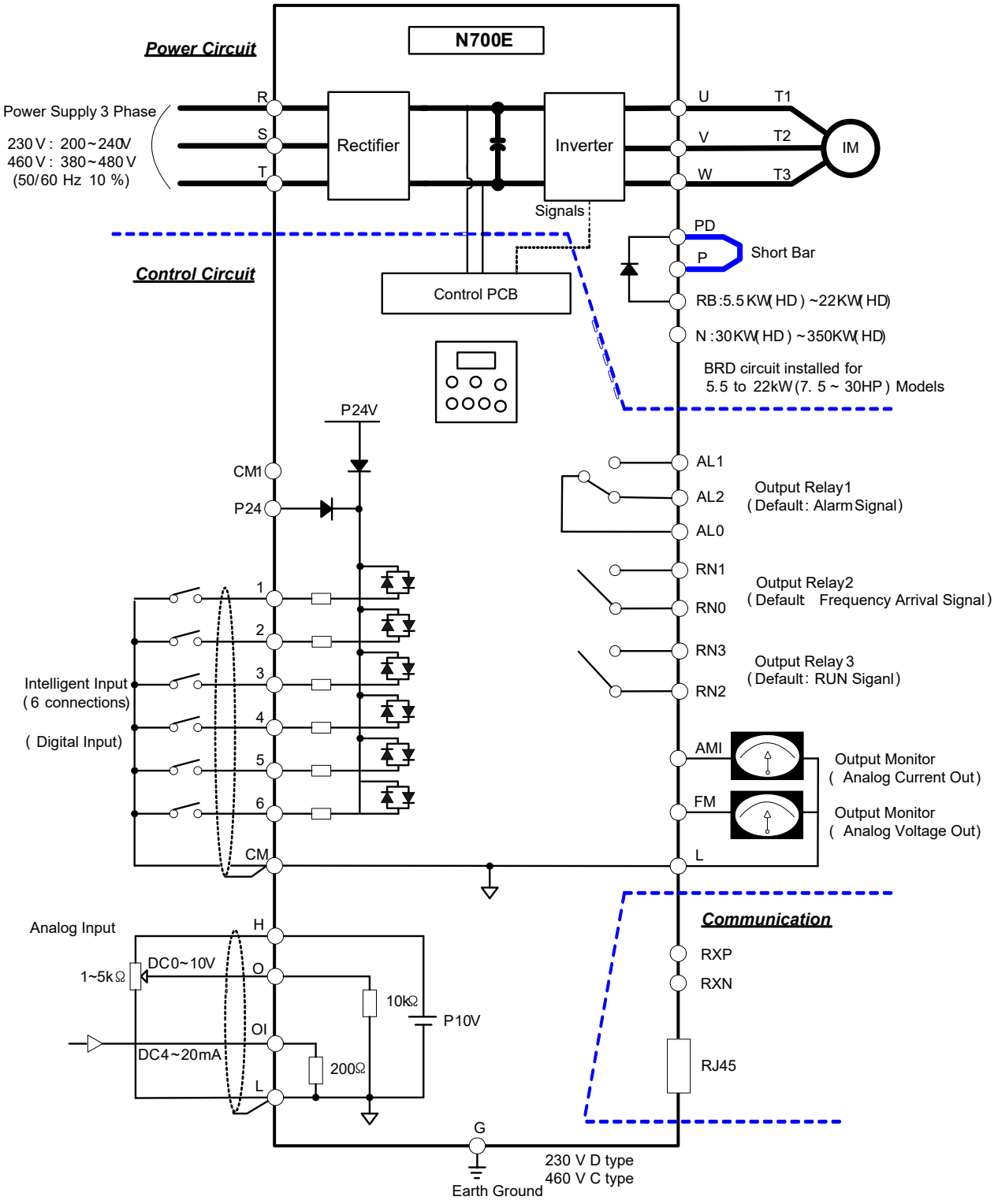


Figure 2-1: N700E Terminal Connection Overview (Except 300LF~750LF)

N700E VFD terminal names and descriptions are summarized in Table 2-1

Terminal Name	In/Out	Functional Description	Value
Main Circuit Connector			
R,S,T (L1, L2, L3)	IN	3 Phase 50/60 Hz, AC input power supply.	200 ~240V ±10% 380 ~480 V ±10%
U,V,W (T1,T2,T3)	OUT	3 Phase PWM output power for motor	
PD, P (+1, +)		Optional External DC Reactor connector. Remove the shorting bar between PD and P for connection to DC Reactor.	
P, PB (+,-)		Optional External Braking Resistor Connector. Recommend to use for 5.5 ~ 22 kW (7.5 ~ 30 HP) models.	
P,N		Optional External Braking Unit Connector. Recommend to use for 30~350 kW (40 ~ 500 HP) models	
G		Ground Terminal	
Control Circuit Connector			
P24	OUT	Power Supply for external device such as PLC	24VDC ±10%, 35 mA
Intelligent Input[1:6]	IN	6 Bit Intelligent input terminal. By programming the respective terminal, can be used as command	Contact Closed : ON Contact Open : OFF Min ON Time : 12 ms
CM1	IN/OUT	Common Terminal for Intelligent Input and Monitor Output	
AMI	OUT	Analog Current (4~20mA) Output	
FM	OUT	Analog Voltage (0~10V) Output	
L	OUT	DC Power Supply Common	
H (P12)	OUT	Power Supply for Potentiometer	12VDC
O	IN	Analog Voltage for Frequency Setpoint	0 ~ 10 VDC, Input Impedance 10 kΩ
OI	IN	Analog Current for Frequency Setpoint	4~ 20mA, Input Impedance 200 Ω
AL0, AL1, AL2	OUT	OUTPUT RELAY 1	
		Contact Rating (Resistor load):	AC 250V / 2.5A
		(Inductor load):	AC 250V / 0.2A
		(Resistor load):	DC 30V / 3.0A
		(Inductor load):	DC 30V / 0.7A
RN0, RN1	OUT	OUTPUT RELAY 2	
RN2, RN3	OUT	OUTPUT RELAY 3	
		Contact Rating (Resistor load):	AC 250V / 2.5A
		(Inductor load):	AC 250V / 0.2A
		(Resistor load):	DC 30V / 3.0A
		(Inductor load):	DC 30V / 0.7A
Communication Connector			
RJ45		RS 485 Communication Terminal also for ROP7	
RXP		RS 485 Positive Communication Terminal;	
RXN		RS 485 Negative Communication Terminal	

Table 2-1: N700E VFD terminal names and descriptions (Except 300LF~750LF)

N700E VFD terminal connection overview is shown in Figure 2-2 (Only 300LF~750LF)
There are three segments of Connections

- Power Circuit
- Control Circuit
- Communication

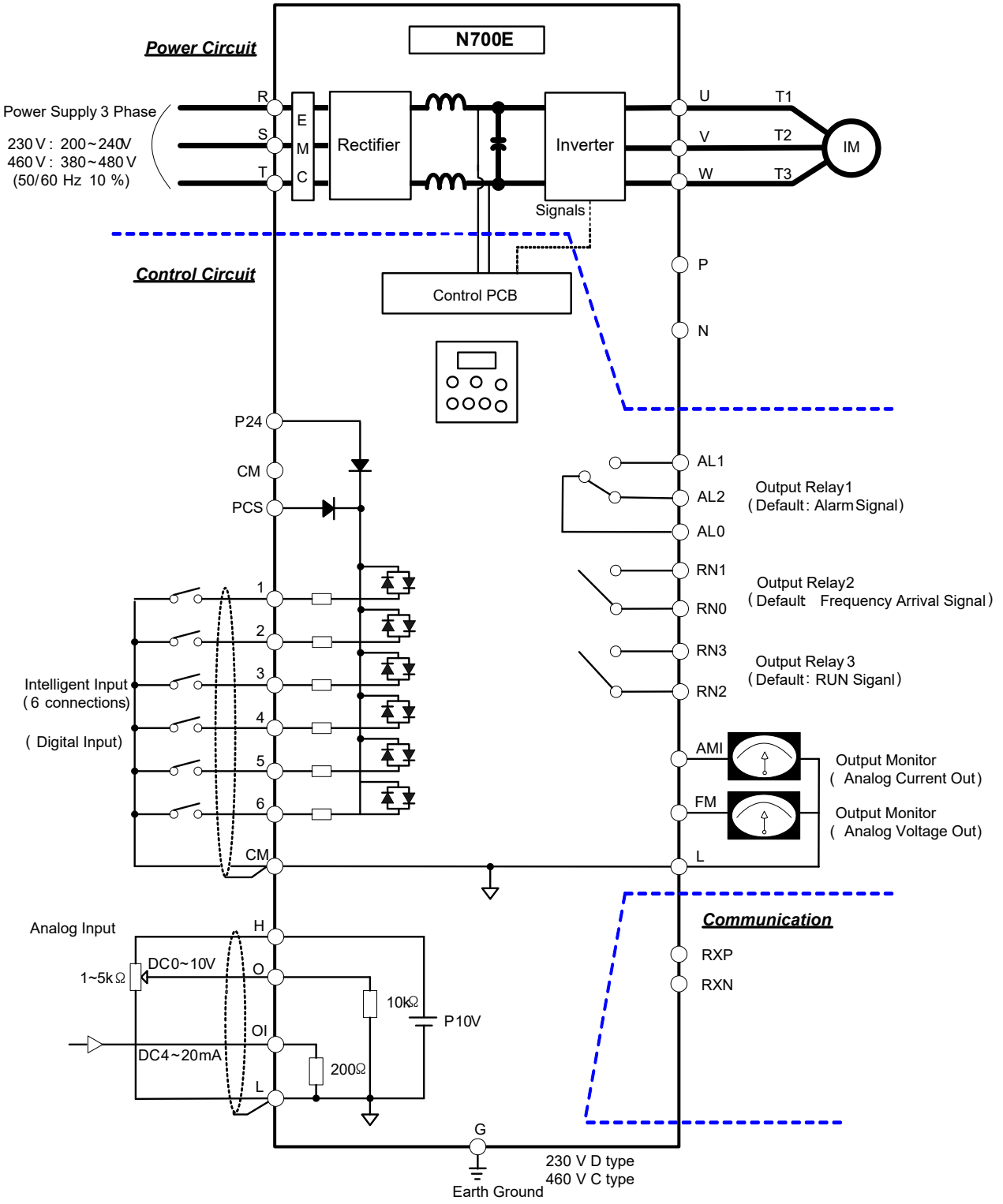


Figure 2-2: N700E Terminal Connection Overview (Only 300LF~750LF)

N700E VFD terminal names and descriptions are summarized in Table 2-2

Terminal Name	In/Out	Functional Description	Value
Main Circuit Connector			
R,S,T (L1, L2, L3)	IN	3 Phase 50/60 Hz, AC input power supply.	200 ~240V ±10%
U,V,W (T1,T2,T3)	OUT	3 Phase PWM output power for motor	
P,N		Optional External Braking Unit Connector. Recommend to use for 30~75 kW (40 ~ 100 HP) models	
G		Ground Terminal	
Control Circuit Connector			
P24	OUT	Power Supply for external device (Always ON)	24VDC ±10%, P24+PCS = 35 mA
PCS	OUT	Power Supply for external device such as PLC (Variable ON – OFF)	24VDC ±10%, P24+PCS = 35 mA
Intelligent Input[1:6]	IN	6 Bit Intelligent input terminal. By programming the respective terminal, can be used as command	Contact Closed : ON Contact Open : OFF Min ON Time : 12 ms
CM	IN/OUT	Common Terminal for Intelligent Input and Monitor Output	
AMI	OUT	Analog Current (4~20mA) Output	
FM	OUT	Analog Voltage (0~10V) Output	
L	OUT	DC Power Supply Common	
H (P12)	OUT	Power Supply for Potentiometer	12VDC
O	IN	Analog Voltage for Frequency Setpoint	0 ~ 10 VDC, Input Impedance 10 kΩ
OI	IN	Analog Current for Frequency Setpoint	4~ 20mA, Input Impedance 200 Ω
AL0, AL1, AL2	OUT	OUTPUT RELAY 1	
		Contact Rating (Resistor load):	AC 250V / 2.5A
		(Inductor load):	AC 250V / 0.2A
		(Resistor load):	DC 30V / 3.0A
		(Inductor load):	DC 30V / 0.7A
RN0, RN1	OUT	OUTPUT RELAY 2	
RN2, RN3	OUT	OUTPUT RELAY 3	
		Contact Rating (Resistor load):	AC 250V / 2.5A
		(Inductor load):	AC 250V / 0.2A
		(Resistor load):	DC 30V / 3.0A
		(Inductor load):	DC 30V / 0.7A
Communication Connector			
RXP RXN		RS 485 Positive Communication Terminal; RS 485 Negative Communication Terminal	

Table 2-2: N700E VFD terminal names and descriptions (Only 300LF~750LF)

2.1.2 Power Circuit Wiring

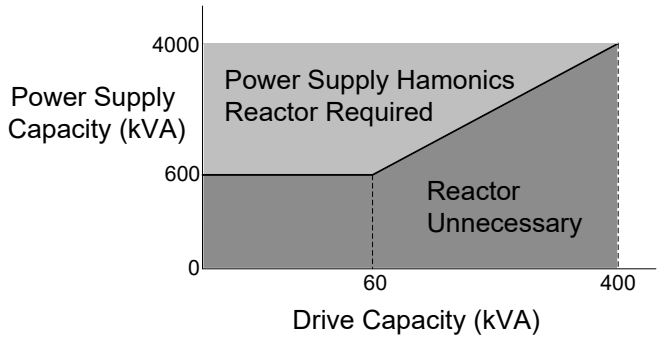
High voltage power supply is applied to the VFD. Each terminal and wiring procedure is respectively described in this section.

⚠WARNING

- For all wiring work, wait at least for 5 Minutes when the power is turned off
- Use a voltage meter to make sure no AC voltage is present on R, S, T.
- Use a voltage meter to make sure no voltage is present on the DC bus.
- Verify the charge lamp is not illuminated
- Be aware that even after shutting of the power supply, there is a time for the capacitors to dissipate all the charge off. Larger VFDs will take a longer time to dissipate charge.

2.1.2.1 Main Power Terminals: R(L1), S(L2), T(L3)

- Connect the main power terminals (R(L1), S(L2) and T(L3)) to the power supply through an electromagnetic contactor or an earth-leakage breaker. These devices isolate the utility power supply from the VFD and prevent the spread of damage.
- This unit is designed to be used on a three-phase power supply. If using on a single phase power supply, please contact WorldWide Electric for proper sizing.
- Do not operate under the following conditions.
  - Unbalanced power supply voltage more than 3%
  - Power supply capacity more than 10 times of the capacity of inverter and case beyond 600kVA.



  - Turning on/off the power supply more than three times in one minute. Could possibly damage the precharge circuit of the VFD.

2.1.2.2 Inverter Output Terminals: U(T1), V(T2), W(T3)

- Make sure to use a heavier gauge wire when you have long motor leads. This will help to reduce the voltage drop.
- Do not install power factor correction capacitors or a surge absorber to the output of the VFD. The VFD will trip or sustain damage to the output transistors.
- If the motor cable length is more than 65 feet, it is possible that a surge voltage will be generated and may damage the motor. This is due to phenomena called “Reflective Wave”. Install a dv/dt filter in front of the motor to protect it.
- In the case of two or more motors on the output of an inverter, install an independent overload protection device for each motor. Set the rated current value of the overload device to 1.1 times the motor rated current.

2.1.2.3 DC Reactor Terminals: PD, P (Except 300LF~750LF)

- These are the terminals to connect a DC reactor (Option) to help improve the power factor.
- The shorting bar is connected to the terminals when shipped from the factory. If you are going to connect a DC Reactor, you will need to remove the shorting bar.
- When you do not use a DC Reactor, do not disconnect the shorting bar.

2.1.2.4 External Braking Resistor Terminals: P, PB (<= 22kW(30HP) Units)

- The regenerative braking circuit is built-in as standard
- When braking is required, install an external braking resistor to these terminals.
- The cable length should be less than 16 feet, and twist the two connecting wires to reduce inductance.
- Do not connect any other device other than the external braking resistor to these terminals.
- When installing an external braking resistor make sure that the resistance is correctly rated to limit the current drawn through the BRD (Dynamic Braking Module).

2.1.2.5 Regenerative Breaking Unit Terminals: P, N (>= 30kW(40HP) Units)

- VFDs rated greater than and equal to 30KW(40HP) do not contain an internal BRD circuit. If regenerative braking is going to occur, then an external BRD circuit (Option) is required along with a resistor. (Option)
- Connect external regenerative braking unit terminals (P,N) to terminals (P,N) on the VFD.
- The braking resistor is then wired into the External BRD board and not directly to the VFD.
- The cable length between the VFD and the BRD board, BRD board and the resistor, should be less than 16 feet and twist the connecting wires to reduce inductance.

2.1.2.6 Earth Ground: G

- Make sure that you securely ground the inverter and motor for prevention of electric shock.
- The inverter and motor must be connected to an appropriate safety earth ground and follow all local electrical codes.
- In case connecting 2 or more inverters, use caution not to create a ground loop situation which may cause the inverter to malfunction. Use a star configuration grounding technique.

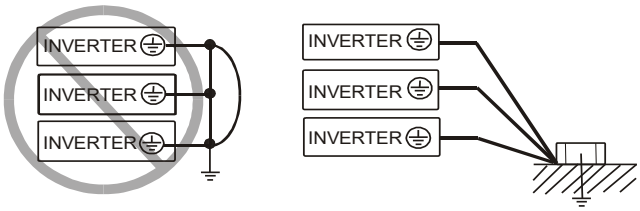
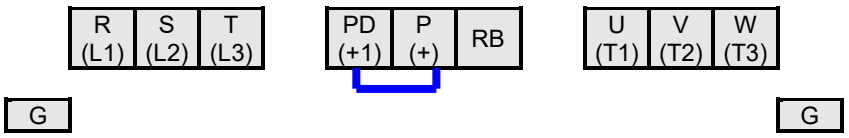
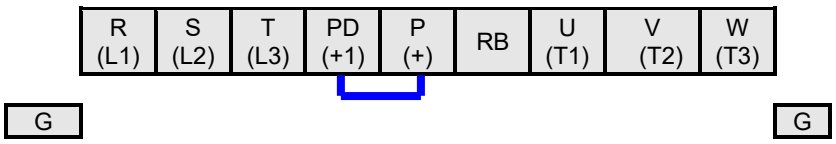
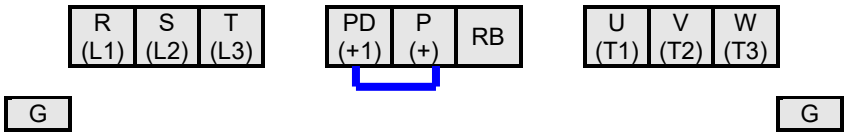
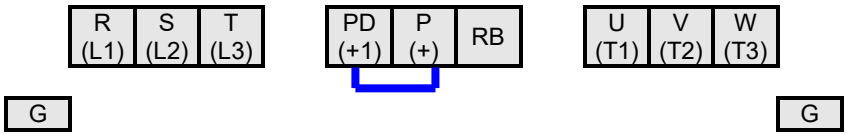
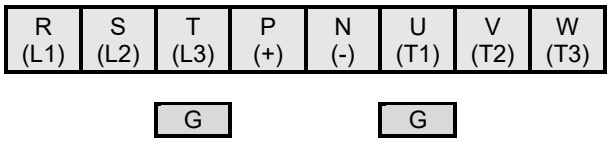
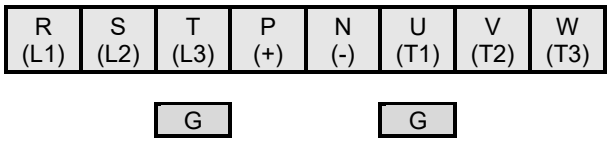
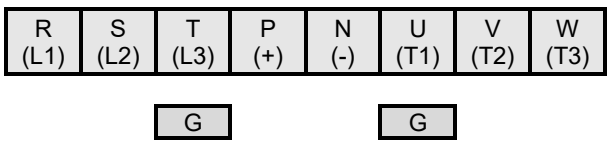
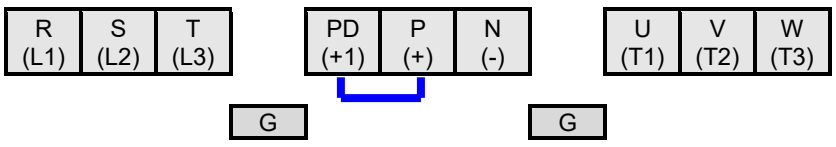


Figure 2-3: Earth Ground (G) Connection

2.1.2.7 Main Circuit Terminals View over N700E Products

Terminal view of corresponding N700E models are shown below.
Respective screw size and width are indicated in case of using DC Reactor P&PD are reserved

Wiring of terminals	Corresponding type	Screw Size	Width (inch)
	N700E-055LF/075LFP N700E-075LF/110LFP N700E-055HF/075HFP N700E-075HF/110HFP N700E-110HF/150HFP	M4	0.42
	N700E-110LF/150LFP	M5	0.51
	N700E-150LF/185LFP N700E-150HF/185HFP N700E-185HF/220HFP N700E-220HF/300HFP	M5	0.51
	N700E-185LF/220LFP N700E-220LF	M6	0.67
	N700E-300LF/370LFP	M8	0.87
	N700E-370LF/450LFP N700E-450LF/550LFP	M8	0.87
	N700E-550LF/750LFP N700E-750LF/900LFP	M10	1.18
	N700E-300HF/370HFP N700E-370HF/450HFP	M6	0.67

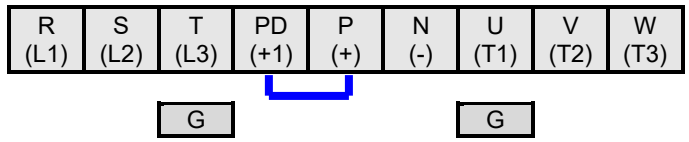
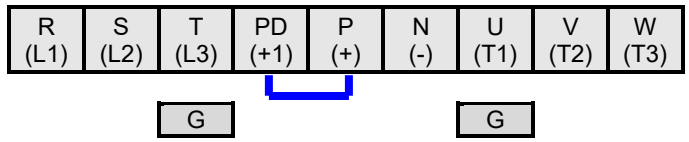
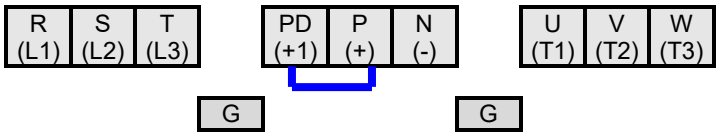
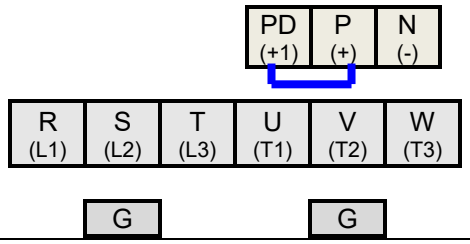
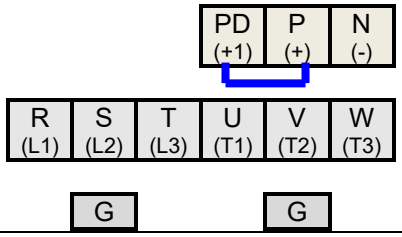
	N700E-450HF/550HFP N700E-550HF/750HFP	M8	0.87
	N700E-750HF/900HFP N700E-900HF/1100HFP	M8	1.14
	N700E-1100HF/1320HFP N700E-1320HF/1600HFP	M10	1.18
	N700E-1600HF/2000HFP N700E-2200HF/2500HFP	M10	1.50
	N700E-2800HF/3200HFP N700E-3500HF/3800HFP	M13	1.50

Table 2-3: Wiring of Power Circuit Terminals

2.1.2.8 Torque and Wire Specification

TIGHTENING TORQUE AND WIRE RANGE FOR FIELD WIRING TERMINALS ARE MARKED ADJACENT TO THE TERMINAL OR ON THE WIRING DIAGRAM.
SELECT A MOLDED CASE CIRCUIT BREAKER(MCCB) WITH A RATED CURRENT 1.5 TO 2 TIMES HIGHER THAN THE VFD RATED CURRENT

V	Motor Output (HP)	Inverter Model	Power lines R,S,T U,V,W, P,PD,N		External Resister between P and RB (AWG)	Screw Size of Terminal	Torque N•m (Lb•ft)
			AWG	kcmil			
230V Class	7.5	N700E-055LF/075LFP	> 8	16.5	8	M4	1.2(0.89)
	10	N700E-075LF/110LFP	> 8	16.5	8	M4	1.2(0.89)
	15	N700E-110LF/150LFP	> 6	26.3	8	M5	3.0(2.21)
	20	N700E-150LF/185LFP	> 4	41.7	4	M5	3.0(2.21)
	25	N700E-185LF/220LFP	> 3	52.6	4	M6	4.5(3.32)
	30	N700E-220LF	> 1	83.7	4	M6	4.5(3.32)
	40	N700E-300LF/370LFP	3*2P	(52.6)*2P	-	M8	6.0(4.43)
	50	N700E-370LF/450LFP	2*2P	(66.4)*2P	-	M8	6.0(4.43)
	60	N700E-450LF/550LFP	1*2P	(83.7)*2P	-	M8	6.0(4.43)
	75	N700E-550LF/750LFP	2/0*2P	(133.1)*2P	-	M10	10.0(7.38)
	100	N700E-750LF/900LFP	3/0*2P	(167.8)*2P	-	M10	10.0(7.38)

Table 2-4: Torque and Wiring Specification for N700E 230V Models(Heavy Duty)

V	Motor Output (HP)	Inverter Model	Power lines R,S,T U,V,W, P,PD,N		External Resister between P and RB (AWG)	Screw Size of Terminal	Torque N•m (Lb•ft)
			AWG	kcmil			
460V Class	7.5	N700E-055HF/075HFP	> 12	6.53	10	M4	1.2(0.89)
	10	N700E-075HF/110HFP	> 10	10.4	10	M4	1.2(0.89)
	15	N700E-110HF/150HFP	> 8	16.5	8	M4	1.2(0.89)
	20	N700E-150HF/185HFP	> 8	16.5	6	M5	3.0(2.21)
	25	N700E-185HF/220HFP	> 8	16.5	6	M5	3.0(2.21)
	30	N700E-220HF/300HFP	> 6	26.3	6	M5	3.0(2.21)
	40	N700E-300HF/370HFP	> 4	41.7	-	M6	4.5(3.32)
	50	N700E-370HF/450HFP	> 2	66.4	-	M6	4.5(3.32)
	60	N700E-450HF/550HFP	> 1	83.7	-	M8	6.0(4.43)
	75	N700E-550HF/750HFP	> 2/0	133	-	M8	6.0(4.43)
	100	N700E-750HF/900HFP	> 4/0	212	-	M8	6.0(4.43)
	125	N700E-900HF/1100HFP	-	300	-	M8	6.0(4.43)
	150	N700E-1100HF/1320HFP	-	350	-	M10	10.0(7.38)
	200	N700E-1320HF/1600HFP	-	400	-	M10	10.0(7.38)
	250	N700E-1600HF/2000HFP	> 4/0*2P	212*2P	-	M10	10.0(7.38)
	300	N700E-2200HF/2500HFP	-	300*2P	-	M10	10.0(7.38)
	400	N700E-2800HF/3200HFP	> 4/0*4P	212*4P	-	M10	10.0(7.38)
	450	N700E-3500HF/3800HFP	-	300*4P	-	M10	10.0(7.38)

Table 2-5: Torque and Wiring Specification for N700E 460V Models(Heavy Duty)

Class	Motor Output (HP)	Inverter Model	Power lines R,S,T U,V,W, P,PD,N		External Resister between P and RB (AWG)	Screw Size of Terminal	Torque N•m (Lb•ft)
			AWG	kcmil			
230V Class	10	N700E-055LF/075LFP	> 8	16.5	8	M4	1.2(0.89)
	15	N700E-075LF/110LFP	> 8	16.5	8	M5	3.0(2.21)
	20	N700E-110LF/150LFP	> 6	26.3	4	M5	3.0(2.21)
	25	N700E-150LF/185LFP	> 4	41.7	4	M6	4.5(3.32)
	30	N700E-185LF/220LFP	> 3	52.6	4	M6	4.5(3.32)
	30	N700E-220LF	> 1	83.7	4	M6	4.5(3.32)
	40	N700E-300LF/370LFP	3*2P	(52.6)*2P	-	M8	6.0(4.43)
	50	N700E-370LF/450LFP	2*2P	(66.4)*2P	-	M8	6.0(4.43)
	60	N700E-450LF/550LFP	1*2P	(83.7)*2P	-	M8	6.0(4.43)
	75	N700E-550LF/750LFP	2/0*2P	(133.1)*2P	-	M10	10.0(7.38)
	100	N700E-750LF/900LFP	3/0*2P	(167.8)*2P	-	M10	10.0(7.38)

Table 2-6: Torque and Wiring Specification for N700E 230V Models(Normal Duty)

Class	Motor Output (HP)	Inverter Model	Power lines R,S,T U,V,W, P,PD,N		External Resister between P and RB (AWG)	Screw Size of Terminal	Torque N•m (Lb•ft)
			AWG	kcmil			
460V Class	10	N700E-055HF/075HFP	> 12	6.53	10	M4	1.2(0.89)
	15	N700E-075HF/110HFP	> 10	10.4	8	M4	1.2(0.89)
	20	N700E-110HF/150HFP	> 8	16.5	6	M5	3.0(2.21)
	25	N700E-150HF/185HFP	> 8	16.5	6	M5	3.0(2.21)
	30	N700E-185HF/220HFP	> 8	16.5	6	M5	3.0(2.21)
	40	N700E-220HF/300HFP	> 6	26.3	-	M6	4.5(3.32)
	50	N700E-300HF/370HFP	> 4	41.7	-	M6	4.5(3.32)
	60	N700E-370HF/450HFP	> 2	66.4	-	M8	6.0(4.43)
	75	N700E-450HF/550HFP	> 1	83.7	-	M8	6.0(4.43)
	100	N700E-550HF/750HFP	> 2/0	133	-	M8	6.0(4.43)
	125	N700E-750HF/900HFP	> 4/0	212	-	M8	6.0(4.43)
	150	N700E-900HF/1100HFP	-	300	-	M10	10.0(7.38)
	200	N700E-1100HF/1320HFP	-	350	-	M10	10.0(7.38)
	250	N700E-1320HF/1600HFP	-	400		M10	10.0(7.38)
	300	N700E-1600HF/2000HFP	> 4/0*2P	212*2P	-	M10	10.0(7.38)
	400	N700E-2200HF/2500HFP	-	300*2P	-	M10	10.0(7.38)
	450	N700E-2800HF/3200HFP	> 4/0*4P	212*4P	-	M10	10.0(7.38)
	500	N700E-3500HF/3800HFP	-	300*4P	-	M10	10.0(7.38)

Table 2-7: Torque and Wiring Specification for N700E 460V Models(Normal Duty)

2.1.2.9 Fuse Size

DISTRIBUTION FUSE SIZE INFORMATION IS SHOWN IN THE TABLE BELOW. THE FUSE MUST BE A UL LISTED, 600V, INVERSE TIME RATED FUSE WITH THE CURRENT RATINGS SHOWN IN THE TABLE BELOW.

MODEL NAME	FUSE [A]	Manufacturer
N700E-055LF/075LFP	30	-
N700E-075LF/110LFP	40	-
N700E-110LF/150LFP	60	-
N700E-150LF/185LFP	80	-
N700E-185LF/220LFP	100	-
N700E-220LF	125	-
N700E-300LF/370LFP	FWH-350A	Bussmann
N700E-370LF/450LFP	FWH-400A	Bussmann
N700E-450LF/550LFP	FWH-400A	Bussmann
N700E-550LF/750LFP	FWH-600A	Bussmann
N700E-750LF/900LFP	FHW-700A	Bussmann
N700E-055HF/075HFP	15	-
N700E-075HF/110HFP	20	-
N700E-110HF/150HFP	30	-
N700E-150HF/185HFP	40	-
N700E-185HF/220HFP	50	-
N700E-220HF/300HFP	60	-
N700E-300HF/370HFP	80	-
N700E-370HF/450HFP	100	-
N700E-450HF/550HFP	125	-
N700E-550HF/750HFP	150	-
N700E-750HF/900HFP	200	-
N700E-900HF/1100HFP	250	-
N700E-1100HF/1320HFP	300	-
N700E-1320HF/1600HFP	400	-
N700E-1600HF/2000HFP	A50P800-4	Ferraz
N700E-2200HF/2500HFP	A50P1000-4	Ferraz
N700E-2800HF/3200HFP	A50P1200-4	Ferraz
N700E-3500HF/3800HFP	A50P1200-4	Ferraz

Table 2-8: Fuse Specification for N700E Models

*Ferraz was used when UL certified.
*Bussmann was used when UL certified.

2.1.2.10 N700E Accessory Wiring

For better system performance enhancement, optional accessories may be used with N700E inverters.

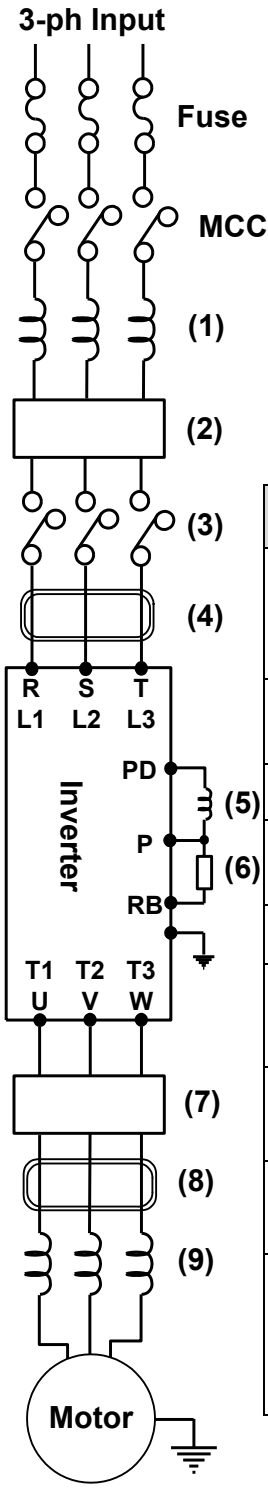
Note1: The applied equipment for this analysis was a HYUNDAI standard 4 pole squirrel cage motor.
Note2: Be sure to consider the capacity of the circuit breaker to be used.
Note3: Be sure to use larger wire for power lines if the distance exceeds 20m.
Note4: Be sure to use a grounding wire same size of power line or similar.
Note5: Use 0.75㎟ for AL relay and RN relay.

Separate by the sum wiring distance from inverter to power supply, from inverter to motor for the sensitive current of leakage breaker (ELB)

Wiring distance	Sensitive Current(mA)
100m and less	50
300m and less	100

Table 2-9: Sensitive Current per Wiring Distance

Note6: When using CV line and wiring by rigid metal conduit, leak flows.
Note7: IV line is high dielectric constant. SO the current increase 8 times. Therefore, use the sensitive current 8 times as large as that of the left list.
And if the distance of wire is over 100m, use CV line.



Name		Function
(1)	Input AC Reactor	Recommended to use when the unbalance voltage rate is 3% or more and power supply is 500 kVA or more, and there is a rapid change in the power supply. It also reduces harmonics and improves the power factor.
(2)	Noise filter for Inverter	Reduces common noise generated between the power supply and the ground, as well as normal noise. Put it in the primary side of inverter.
(3)	Radio Noise Filter (zero-phase reactor)	Helps to reduce noise on a peripheral radio when an inverter is running.
(4)	Input Radio Noise Filter (capacitor filter)	Reduces radiation noise emitted from wire at the input.
(5)	DC Reactor	Helps to improve power factor for the VFD.
(6)	Breaking Resistor / Regenerative Breaking Unit	Used for applications that need to increase the brake torque of the inverter or to frequently start/stop and to run high inertia load.
(7)	Output Noise Filter	Reduces noise emitted from the VFD motor leads. This helps to minimize interference with sensitive equipment (ie: sensors or weight scale).
(8)	Radio Noise Filter (Zero-phase reactor)	Reduces noise generated at the output of the VFD. (It is possible to use for both input and output.)
(9)	Output AC Reactor	Recommended to use if motor lead length is greater than 65 feet to help prevent reflective wave.
	LCR filter	Sine-wave filter to prevent reflective wave if motor lead length is greater than 65 feet

Table 2-10: Optional Accessories for Improved Performance

Figure 2-4: Accessories Connection View

2.1.2.11 Braking Resistor Specification

- Resistor values in Table 2-6 are calculated on the basis of 150% rated braking torque, 5% duty cycle.
- Wattage rating of resistor should be doubled for 10% duty cycle. For VFDs greater than 220 HF, additional braking unit should be installed.

Inverter capacity	Ohm [Ω]	Wattage [W]
055LF/075LFP	17	1000
075LF/110LFP	17	1000
110LF/150LFP	17	1000
150LF/185LFP	8.7	2500
185LF/220LFP	6	3000
220LF	6	4000
055HF/075HFP	70	1200
075HF/110HFP	50	1200
110HF/150HFP	50	2000
150HF/185HFP	30	2500
185HF/220HFP	20	3000
220HF/300HFP	20	4000

Table 2-11: Recommended DB Resistors for the N700E VFDs (5 % Duty Cycle)

2.1.3 Control Circuit Wiring

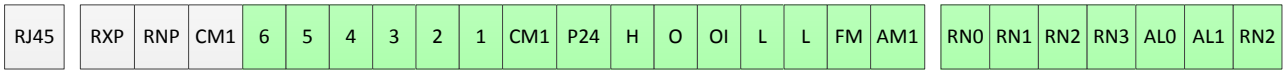


Figure 2-5: Control Circuit Terminal Connector Diagram (Except 300LF~750LF)

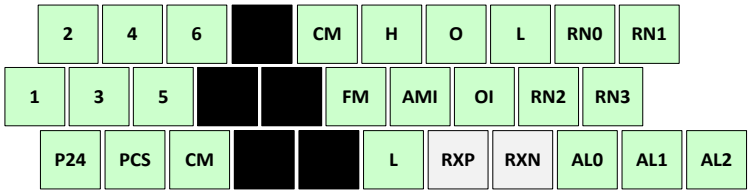


Figure 2-6: Control Circuit Terminal Connector Diagram (Only 300LF~750LF)

2.1.3.1 Internal Wiring

- Control circuit wires are insulated from power lines (R,S,T,U,V,W)
- Use twisted screened cable for input and output wires of the control circuit terminals
- Limit the connection wires to 65 feet
- Separate the control circuit wiring from the main power and relay control wiring
- When using relays for the FW terminal or an intelligent input terminal, use a control relay that is designed to work with 24 Vdc.
- When a relay is used as an intelligent output, connect a diode for surge protection parallel to the relay coil.
- Do not short the analog voltage terminals H and L or the internal power terminals P24 and all CM1 or CM's to prevent any VFD damage
- When connecting a thermistor to the TH and all CM1 or CM's terminals, twist the thermistor cables and separate them from the rest. Limit the connection wires to 65 feet.

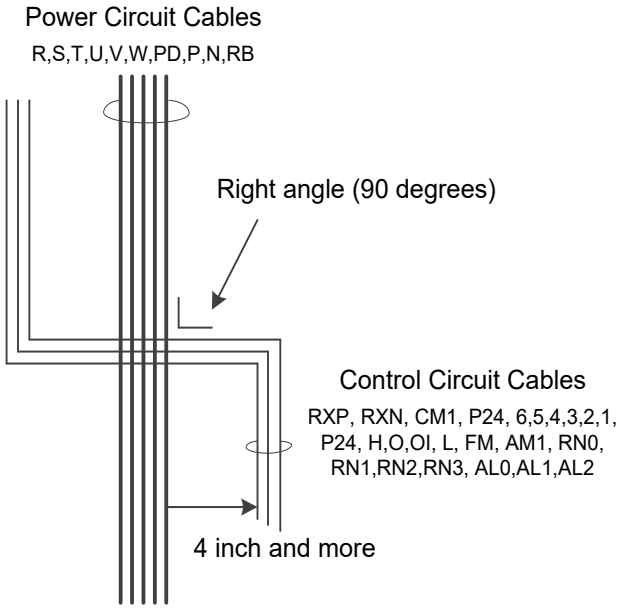


Figure 2-7: Power and Control Circuit Cabling Diagram

2.1.3.2 Configuration for Sinking and Source Modes

- J1(J3,SW2) : Selection switch for operating mode(Sink mode, Source mode)
- J2(J4,SW3) : Selection of signal power source(Internal 24Vdc, External 24Vdc)

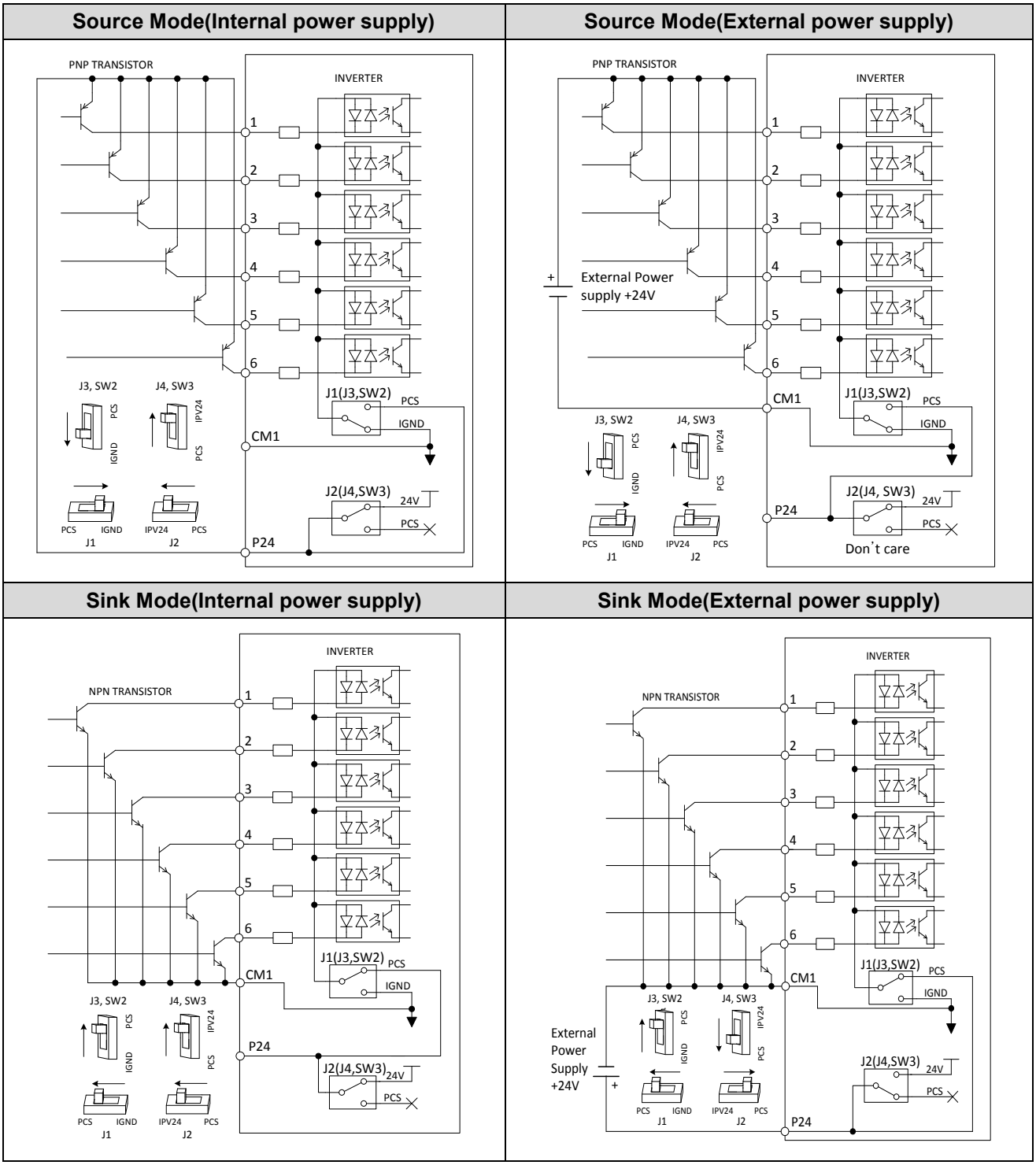


Figure: 2-8: Input Terminal and PLC Connection Diagram

Note: 5.5LF/HF(7.5 HP) (HD) ~ 22LF/HF(30 HP) (HD) : Switch J3, J4
300HF (40 HP) (HD) ~ 350HF(500 HP) (HD) : Switch J1, J2
300LF (40 HP) (HD) ~750LF (100 HP) (HD) : Switch SW2(PCS-IGND), SW3(IPV24-PCS)

2.1.3.3 Example of Connection to PLC

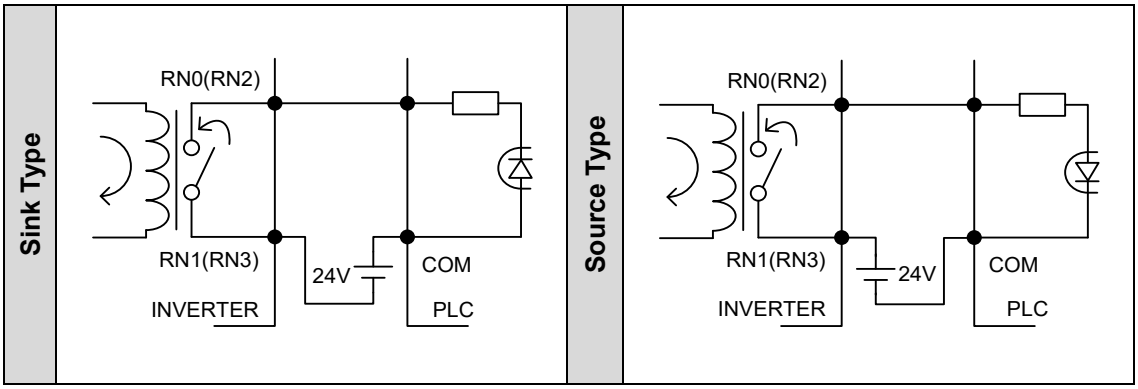


Figure 2-9: Output Terminal and PLC Connection Diagram

2.1.4 RS 485 Wiring

N700E VFD communication with external controller is done via Modbus over a RS 485 network. RJ45 modular connector is located on the control terminal strip. In addition, a second RS 485 option is offered via RXP/RXN terminals.

Figure 2-10: Communication Terminal Connector Diagram (Except 300LF~750LF)

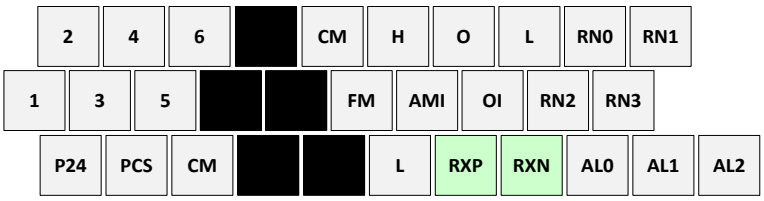


Figure 2-11: Communication Terminal Connector Diagram (Only 300LF~750LF)

2.1.4.1 RJ45, Communication Connect (Except 300LF~750LF)

RJ45 port connection diagram and signal descriptions are summarized below

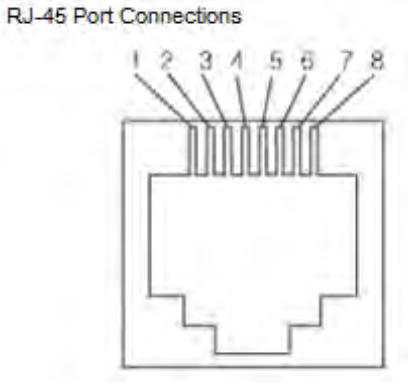


Figure 2-12: RJ45 Pin Connector Diagram

Pin No.	Signal Description
1	
2	
3	RS - 485+
4	
5	
6	RS - 485-
7	24V
8	24V GND

Table 2-12: RJ45 Pin outs and Description

2.1.4.2 RXP-RXN, Communication Connect

RXP	RXN
Transmit/Receive +side	Transmit/Receive -side

Table 2-13: RXP / RXN Connector Description

The termination resistor of the RS 485 RXP-RXN communication has a purpose of preventing the distortion and attenuation of the communication line. This resistor means the impedance matching resistor in long distance transport of RS 485 data. The termination resistor is inserted only in the final stage in single line.

<Terminating resistance selection switch>
- SW7: 055LF/HF~220LF/HF, 300HF~3500HF except 300LF~750LF
- SW1: Only 300LF~750LF

Default Status: Terminating resistance ON

1. Regarding terminating resistance, only applied to RXP-RXN terminals
2. Turn off the switch when master communicate more then one of inverter (For example : master – PLC, DCS, PC and etc)

RS-485 Terminating resistance On: 

RS-485 Terminating resistance Off: 

2.1.4.3 ROP 7 CONNECTION (Except 300LF~750LF)

RJ45 connector can also be used to interface with ROP7 option.
Refer to ROP7 option manual.

2.2 Programming N700E VFD

In order to operate N700E VFD as desired, corresponding parameters must be programmed properly with specific setting values. Parameters are set using keys on the keypad. Described each key function and navigating parameters using these keys. Illustrated is how to change parameters and corresponding values.

2.2.1 Keypad Overview

Programming Parameters is done by keypad. N700E Keypad has four major parts:

- Display
- Functional Keys
- Potentiometer
- LEDs for status indicator

Its view and description are illustrated in Figure 2-13 and Table 2-14 respectively.

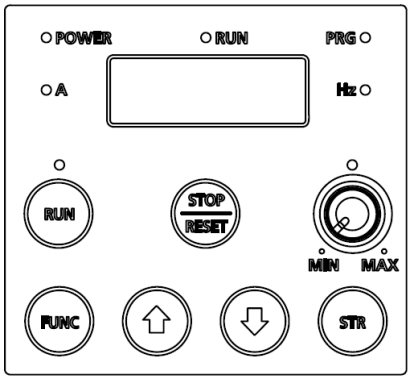


Figure 2-13: N700E Keypad View

Key Pad			Description
KEY	STOP RESET	Stop / Reset	Stop the motor or reset the faults
	FUNC	Function	Selection of parameter and parameter value
	RUN	Run	To run VFD. Key is active when its LED is ON
	⇧	UP Arrow	Increment the parameter or increase the parameter value
	⇩	Down Arrow	Decrement the parameter or decrease the parameter value
	STR	Store	Stores the new parameter value to memory
		Potentiometer	Set the VFD output frequency setpoint. Active when its LED is ON
LED		Display	Displays Frequency, Motor Current, Motor Speed, Fault History, and parameter values
	●	Power	Indicates internal power circuitry is properly operating.
	●	RUN	Indicates output frequency is greater than 0 Hz.
	●	A	Parameter on Display is in units of Amperes
	●	Hz	Parameter on Display is in units of Herz
	●	PRG	Indicates in program mode. Parameter value can be modified.

Table 2-14: Keypad Description

2.2.2 Key Pad Navigation

Illustrated what each key is used for parameter changes or respective value changes.

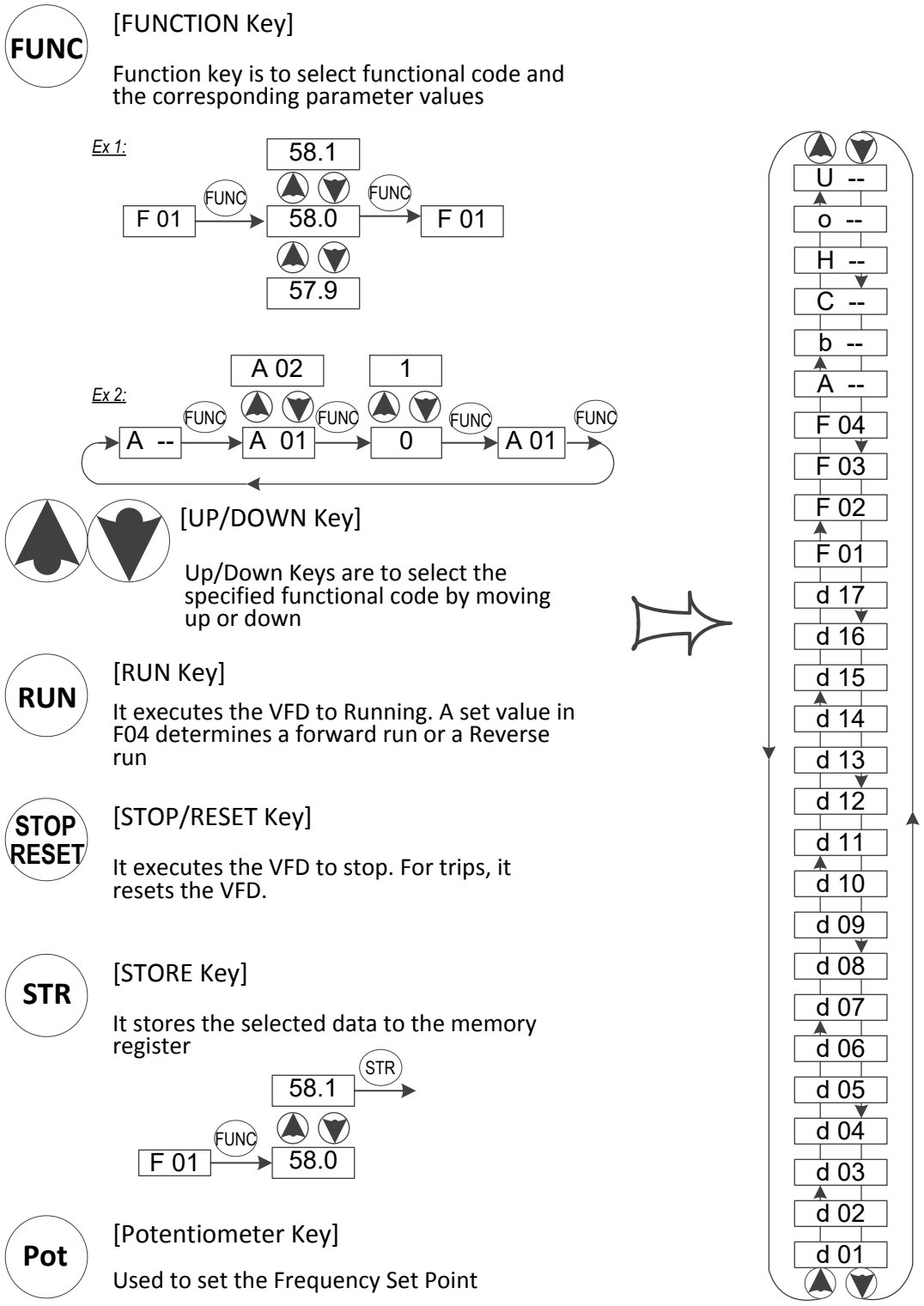
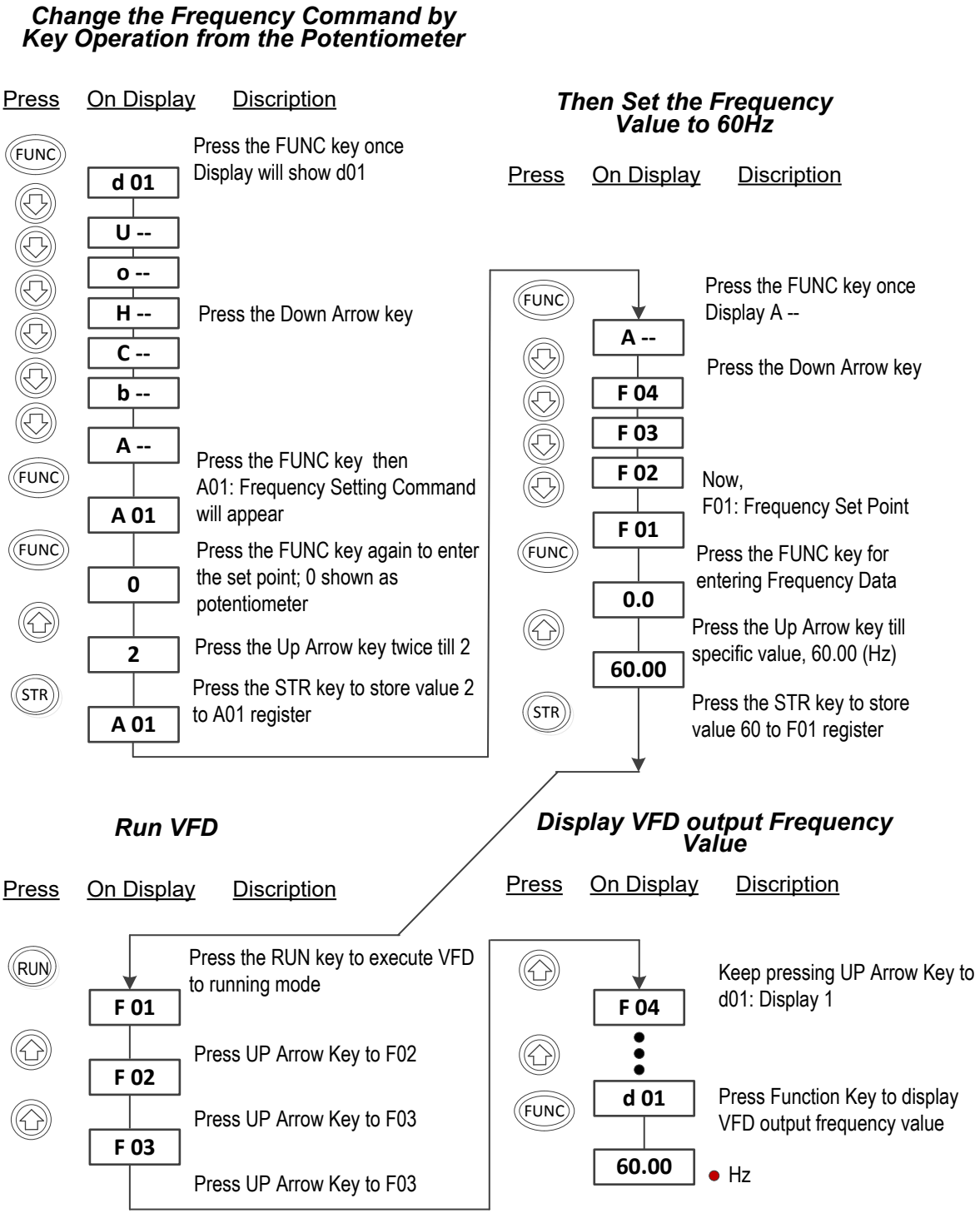


Figure 2-14: N700E Keypad Navigation Description

2.2.3 Navigation Example: Change Frequency Command Source and Set Point

Demonstrated an example of

- Change Frequency Command Source to Up/Down Keys (A01=2) from Potentiometer (A01=0)
- Set the Frequency Value to 60 Hz (F01=60)
- Run VFD
- Display VFD Frequency Out to validate its change(d01)



**Suggestion: Press Run after setting up d01 in order to see the ramping from 0 Hz to 60 Hz.

Figure 2-15: N700E Navigation Example

**Suggestion: Instead Run VFD then display, change to the display parameter then Run in order to demonstrate ramping frequency value from 0 to 60 Hz.

2.2.4 Advanced Key Feature: "Shift Data Bit" & Short Cut functions

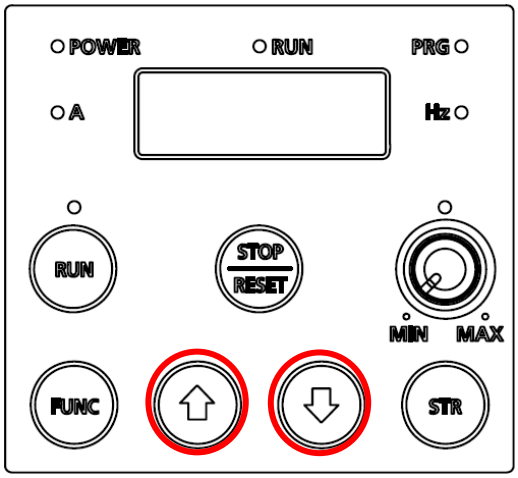
Simultaneous UP/DOWN Keys press for

- Right Shifting bit in the data field
- Short Cut to d-group Parameter

Shift Data Bit

Scroll up/down to select the desired data for specific function can be a cumbersome process, 0 to 60,00. Thus, an advanced key operation, "SHIFT" function, is offered to enhance changing the data in more convenient way. It is achieved by first pressing both UP and DOWN keys simultaneously and move the digit by the "STR" key.

When UP and DOWN keys are pressed simultaneously, the most left 7-segment digit blinks. Then, by pressing the STR key, the data pointer is shift to the right and blinks its corresponding segment bit. When reached to the most right segment, "STR key brings it back to the functional code.



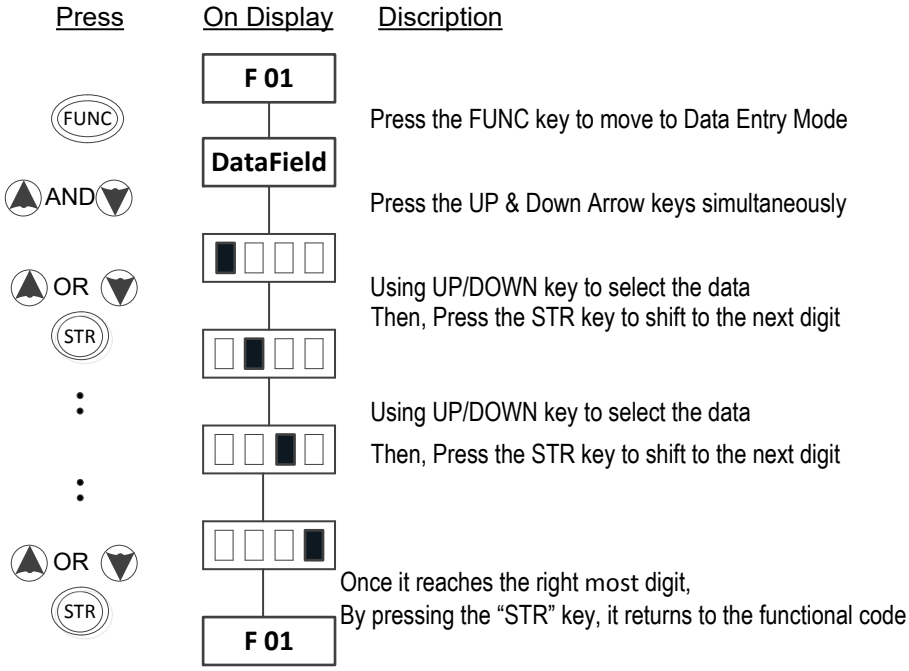


Figure 2-16: N700E Advanced Key Feature: Shift Data Bit

Shortcut to d group Parameter

From any functional mode, by pressing both UP and DOWN keys simultaneously to move to the display mode. It goes to one of d group Parameters by set point in b30 Parameter.

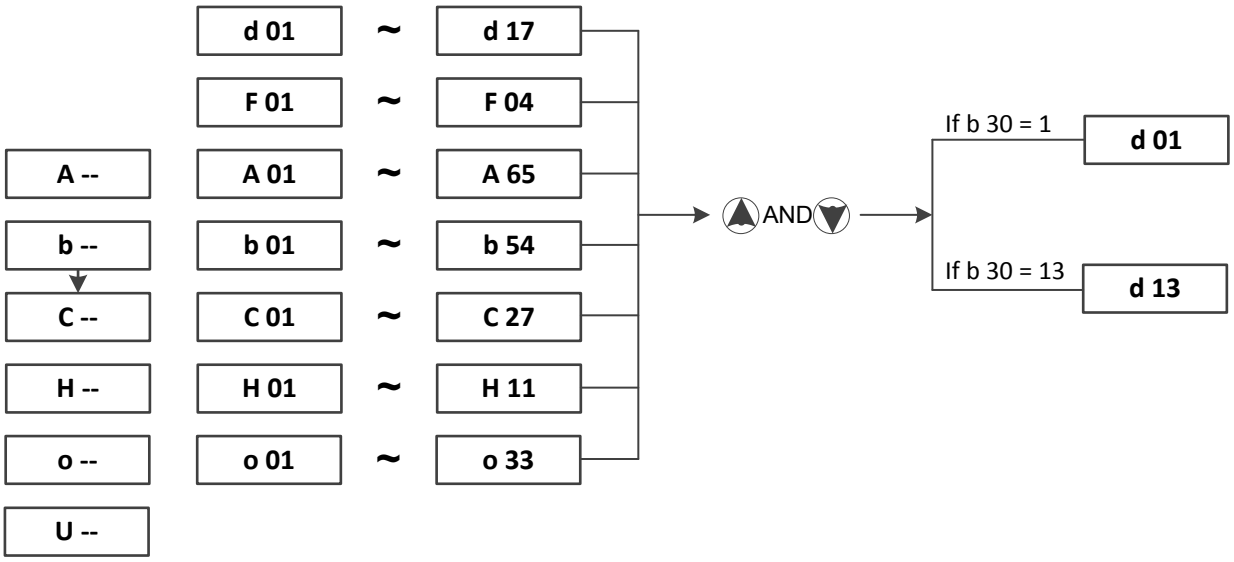


Figure 2-17: N700E Advanced Key Feature: Shortcut to d Group Parameter

2.3 Frequency and Run Sources

In order to run the VFD, the run command source and frequency command source must be determined. Select one frequency command source and one run command source from list below and follow the instruction in the section referenced.

Frequency command can be done by

- Keypad – Potentiometer - (2.3.1)
- Keypad – Up/Down Arrow Keys - (2.3.2)
- Input Terminal –
  - Multi Frequency - (2.3.3)
  - Analog Input Voltage - (2.3.4)
  - Analog Input Current - (2.3.4)
- Modbus – RJ-45 - (2.3.5)
- Modbus – Remote Operator (RXN, RXP) - (2.3.6)

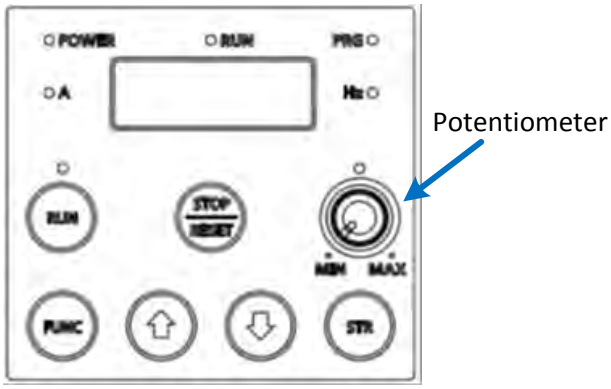
And running/stopping command can be done by

- Keypad RUN/STOP Keys - (2.3.7)
- Intelligent Input Terminal Connector - (2.3.8)
- Modbus – RJ-45 - (2.3.9)
- Modbus –Remote Operator - (2.3.10)

2.3.1 Frequency Command Source to Potentiometer

- Keypad Diagram
- Programming N700E Parameters
- Set Frequency Setpoint

❖ ***Keypad Diagram***



❖ ***Programming N700E Parameters for Frequency Command Source to Potentiometer on Keypad***

- On Keypad, program following parameters with corresponding values:

Code	Set Value	Description
A01	0	Frequency Command Source to Potentiometer

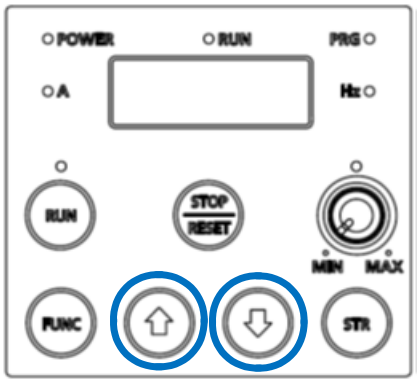
❖ ***Setting Frequency Setpoint***

- Rotate potentiometer on the keypad to program the frequency setpoint. In order to view the frequency setpoint, access parameter F01. Potentiometer will function even when F01 is not opened on the display.

2.3.2 Frequency Command Source to Up / Down Keys

- Keypad Diagram
- Programming N700E Parameters
- Programming Frequency Set Point

❖ ***Diagram***



❖ ***Programming Frequency Command Source to Up / Down Keys on Keypad***

- On Keypad, program following parameters with corresponding values:

Code	Set Value	Description
A01	2	Frequency Command Source to Up / Down Keys on Keypad
F01	--	Program Frequency Setpoint

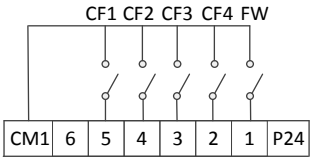
❖ ***Setting Frequency Setpoint***

- Navigate parameter F01
- Press the function key to open F01
- Use Up / Down keys to program the frequency setpoint
- Press the store key to save the value

2.3.3 Frequency Command Source to Input Terminal – Multi Speed Frequency

- Input Terminal Diagram
- Programming N700E Parameters
- Programming Frequency Set Point

❖ ***Diagram***



❖ ***Programming Frequency Command Source***

- On Keypad, program following parameters with corresponding values:

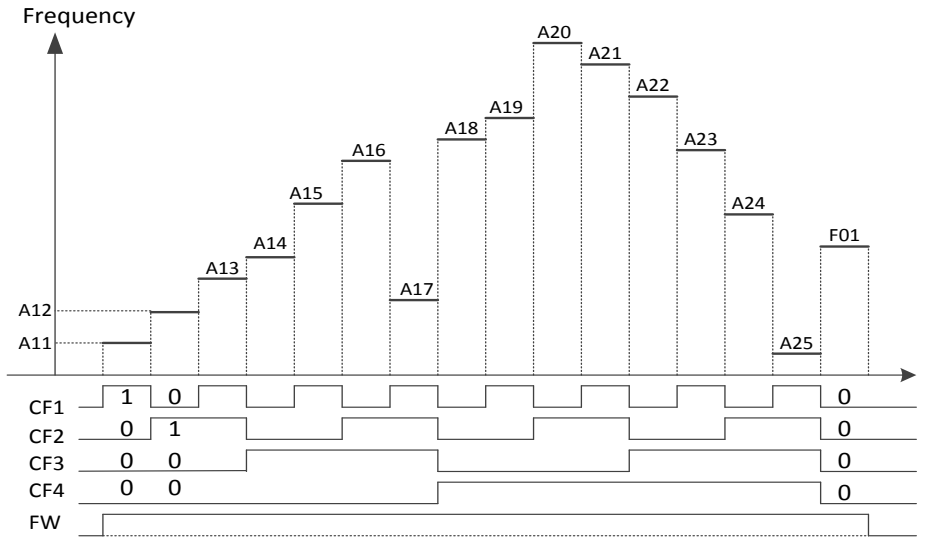
Code	Set Value	Description
A01	2*	Frequency Command Source to Input Terminal
Program Input Terminals for FW operation and 4 Multi Speed Control Connectors		
C02	2	Set Terminal 2 to Multi Speed Set CF1
C03	3	Set Terminal 3 to Multi Speed Set CF2
C04	4	Set Terminal 4 to Multi Speed Set CF3
C05	5	Set Terminal 5 to Multi Speed Set CF4

❖ ***Setting Frequency Setpoint***

- Program following parameters with specified frequency values:

Code	Set Value	Description
F01	--	Frequency Setpoint when All 4 Multi speed sets are open; 0000
A11		Frequency Value Selected when CF4,CF3,CF2,CF1 = 0001
A12		Frequency Value Selected when CF4,CF3,CF2,CF1 = 0010
A13		Frequency Value Selected when CF4,CF3,CF2,CF1 = 0011
A14		Frequency Value Selected when CF4,CF3,CF2,CF1 = 0100
A15		Frequency Value Selected when CF4,CF3,CF2,CF1 = 0101
A16		Frequency Value Selected when CF4,CF3,CF2,CF1 = 0110
A17		Frequency Value Selected when CF4,CF3,CF2,CF1 = 0111
A18		Frequency Value Selected when CF4,CF3,CF2,CF1 = 1000
A19		Frequency Value Selected when CF4,CF3,CF2,CF1 = 1001
A20		Frequency Value Selected when CF4,CF3,CF2,CF1 = 1010
A21		Frequency Value Selected when CF4,CF3,CF2,CF1 = 1011
A22		Frequency Value Selected when CF4,CF3,CF2,CF1 = 1100
A23		Frequency Value Selected when CF4,CF3,CF2,CF1 = 1101
A24		Frequency Value Selected when CF4,CF3,CF2,CF1 = 1110
A25		Frequency Value Selected when CF4,CF3,CF2,CF1 = 1111

- By combination of CF1 ~ CF4, corresponding frequency setpoint of F01, A11 ~ A25 is selected as shown below and applied.

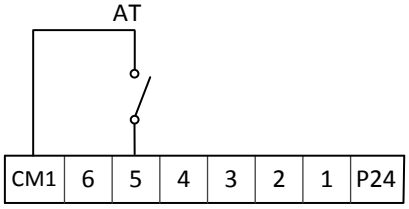


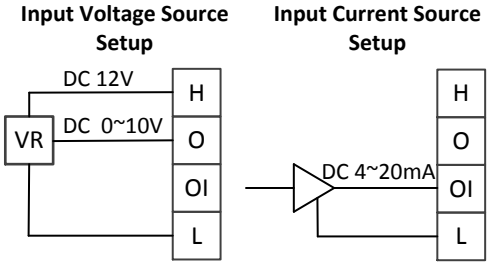
CF4	CF3	CF2	CF1	Frequency
0	0	0	0	F01
0	0	0	1	A11
0	0	1	0	A12
0	0	1	1	A13
0	1	0	0	A14
0	1	0	1	A15
0	1	1	0	A16
0	1	1	1	A17
1	0	0	0	A18
1	0	0	1	A19
1	0	1	0	A20
1	0	1	1	A21
1	1	0	0	A22
1	1	0	1	A23
1	1	1	0	A24
1	1	1	1	A25

2.3.4 Frequency Command Source to Input Analog Voltage / Analog Current

- Input Terminal Diagram
- Programming N700E Parameters
- Programming Frequency Set Point

❖ ***Diagram***





❖ ***Programming Frequency Command Source to Input Voltage Source or Current Source***

- On Keypad, program following parameters with corresponding values

Code	Set Value	Description
A01	1	Frequency Command Source to Input Terminal
C05	13	Set Terminal 5 to AT Operation. If Closed, Select Current Source. If opened, Voltage Source. If function 13 is not programmed to any of the terminals on the terminal strip (C01 ~ C06), frequency setpoint is the sum of current source and voltage source

❖ ***Setting Frequency Setpoint***

- Program following parameters with specified frequency values.

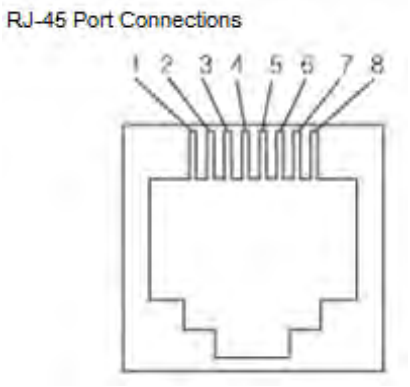
Frequency setpoint follows analog reference (0 ~ 10V / 4 ~ 20 mA) from 0 to 60 Hz. Analog input settings can be modified using A05 ~ A09.

2.3.5 Frequency Command Source to Remote Operator, RJ-45 Modbus

(Except 300LF~750LF)

- Diagram
- Programming N700E Parameters
- Set Frequency Setpoint

❖ ***Diagram***



Pin No.	Signal Descriptions
1	
2	
3	RS - 485+
4	
5	
6	RS - 485-
7	24V
8	24V GND

❖ ***Programming for Frequency Command Source to RJ 45***

On Keypad, program following Parameters with corresponding setpoint:

Code	Set Value	Description
A01	3	Frequency Command by Remote RJ 45
b17	1	Communication node (1 ~ 32)

❖ ***Entering Frequency Setpoint***

- Use Modbus register 4
- Integer data represents 0.01 Hz (ex: 6000 = 60.00 Hz)

2.3.6 Frequency Command Source to Remote Operator (RXP - RXN)

- Use RXP, RXN Terminal
- Programming N700E Parameters Specifying Command Sources
- Entering Frequency Set Point

❖ ***Programming Frequency Command Source to Remote Operator, RXP - RXN***

On Keypad, program following Parameters:

Code	Set Value	Description
A01	4	Frequency Command by Remote (RXP-RXN)
b17	1	Communication node (1 ~ 32)
b31	3	RXP-RXN terminal Communication baud rate(9600bps)

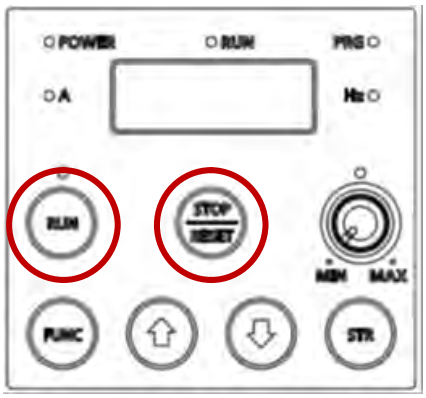
❖ ***Entering Frequency Set Point***

- Use Modbus register 4
- Integer data represents 0.01 Hz (ex: 6000 = 60.00 Hz)

2.3.7 Run Command Source to Run / Stop Keys on Keypad

- Diagram
- Programming N700E Parameters
- Executing RUN command

❖ ***Diagram***



❖ ***Programming Run / Stop Command Source to Keys on Keypad***

On Keypad, program following parameters:

Code	Set Value	Description
A02	0	Run Command Source to RUN / STOP Keys on Keypad

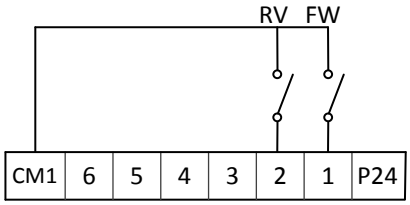
❖ ***Executing Run Command***

- Press RUN Key on the keypad to execute Run command. For stop the VFD.

2.3.8 Run Command Source to Input Terminal

- Diagram
- Programming N700E Parameters
- Executing Run Command

❖ ***Diagram***



❖ ***Programming Run Command Source***

- On Keypad, program following parameters with corresponding values

Code	Set Value	Description
A02	1	Run Command Source to Input Terminal
C01	0	Set Terminal 1 to Forward (FW) Run Operation:
C02	1	Set Terminal 2 to Reverse (RV) Run Operation

❖ ***Executing Run / Stop***

- Closing FW switch, Run command is executed in forward direction; when opened, it stops the VFD.
- Closing RV switch, Run command is executed in reverse direction; when opened, it stops the VFD.
- If both FW and RV switches are closed, nothing will happen.

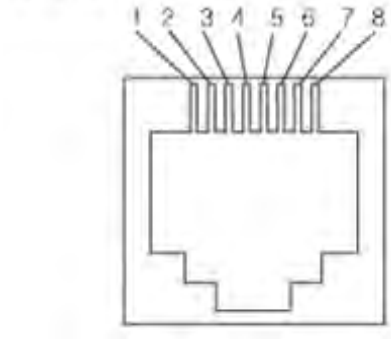
2.3.9 Run Command Source to Remote Operator, RJ-45 Modbus

(Except 300LF~750LF)

- Diagram
- Programming N700E Parameters
- Executing Run Command

❖ ***Diagram***

RJ-45 Port Connections



Pin No.	Signal Descriptions
1	
2	
3	RS - 485+
4	
5	
6	RS - 485-
7	24V
8	24V GND

❖ ***Programming for Frequency Command Source to RJ 45***

On Keypad, program following Parameters with corresponding set point:

Code	Set Value	Description
A02	2	Run Command by Remote RJ 45
b17	1	Communication node (1 ~ 32)

❖ ***Running/Stopping VFD***

- Use Modbus register 2
- Data: 0 = Stop, 1 = Forward Run, 2 = Reverse Run

2.3.10 Run Command Source to Remote Operator (RXP-RXN)

- Use RXP, RXN Terminal
- Programming N700E Parameters
- Running/Stopping VFD

❖ ***Programming Frequency Command Source to Remote Operator, RXP - RXN***

- On Keypad, program following Parameters with corresponding set point

Code	Set Value	Description
A02	3	Frequency Command by Remote (RXP-RXN)
b31	3	RXP-RXN terminal Communication baud rate(9600bps)

❖ ***Running/Stopping VFD***

- Use Modbus register 2
- Data: 0 = Stop, 1 = Forward Run, 2 = Reverse Run

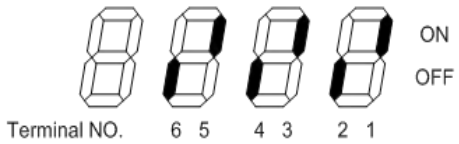
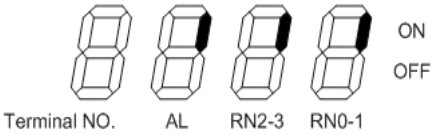
3. N700E Parameters

N700E parameters are organized to various groups as summarized

- d group: Monitoring
- F group: Basic Frequency Setting
- A group: Extended Frequency Setting
- b group: Extended Start/Stop
- C group: Input / Output Terminal
- H group: Motor

3.1 Parameter Group Overview

3.1.1 Monitor Mode (d-group)

Code	Name	Range	Unit
Display Performance Value or Status			
d01	Output Frequency Monitor	0.00 to 400.00	Hz
d02	Output Current Monitor	0.0 to 9999	A
d03	Output Voltage Monitor	0 to 480	V (AC)
d04	Rotation Direction	F = Forward … □ = Stop … r = Reverse Run	-
d05	PID Feedback	0.00 to 100.0	%
d06	Intelligent Input Terminal Status		--
d07	Intelligent Output Terminal Status		--
d08	RPM Output	0 to 65540	RPM
d09	Power Consumption	0 to 999.9	kW
d10	VFD Runtime (Hours)	0 to 9999	Hours
d11	VFD Runtime (Minutes)	0 to 59	Minutes
d12	DC Bus Voltage	0 to 999	V (DC)
Display Trips & Warnings			
d13	Current Fault	--	--
d14	Previous Fault 1	--	--
d15	Previous Fault 2	--	--
d16	Previous Fault 3	--	--
d17	Fault Count	--	--

3.1.2 Basic Function Mode

Code	Name	Edit	Range	Unit	Res	Default
F01	Output Frequency Setpoint	O	0.00 to 400.00 0.00 to 300.00 for Sensorless Vector Control	Hz	0.01	--
F02	Acceleration Time 1	O	0.1 to 3000	Sec	0.1	30.0
F03	Deceleration Time 1	O	0.1 to 3000	Sec	0.1	30.0
F04	Rotation Direction	X	0: Forward Run…1: Reverse Run	--	--	0

Note: If you set the carrier frequency less than 2kHz, the acceleration / deceleration times are delayed approximately 500 msec.

3.1.3 Expanded Function Mode of A Group

Code	Name	Edit	Range	Unit	Res	Default
Basic Parameter Setting						
A01	Frequency Setpoint Source	X	0: Keypad Potentiometer 1: Terminal 2: Keypad Up / Down Keys 3: RJ45 Connector (Except 300LF~750LF) 4: RXP, RXN Terminal 5: Fieldbus (option)	-	-	0
A02	Run Source	X	0: Keypad 1: Input Terminal 2: RJ45 Connector (Except 300LF~750LF) 3: RXP, RXN Terminal 4: Fieldbus (option)	-	-	0
A03	Base Frequency Setpoint	X	0.00 to A04 (Max Frequency)	Hz	0.01	60.00
A04	Maximum Frequency Setpoint	X	A03 to 400.00 (if A31=2): A03 to 300.00	Hz	0.01	60.00
Analog Input Setting						
A05	Frequency at Min. Analog Input	X	0.00 to A04 (Max Frequency)	Hz	0.01	0.00
A06	Frequency at Max. Analog Input	X	0.00 to A04 (Max Frequency)	Hz	0.01	0.00
A07	Minimum Analog Input Offset	X	0.0 to 100.0	%	0.1	0.0
A08	Maximum Analog Input Offset	X	0.00 to 100.0	%	0.1	100.0
A09	Start Frequency	X	0: A05 1: 0 Hz	-	-	0
A10	Low pass Filter Gain	X	1 to 8	-	1	4

Code	Name	Edit	Range	Unit	Res	Default
Multi-speed Frequency Setting						
A11 ~ A25	Multiple Speed Frequency Setpoints	O	0.01 to A04 (Max Frequency)	Hz	0.01	A11:5Hz A12:10Hz A13:15Hz A14:20Hz A15:30Hz A16:40Hz A17:50Hz A18:60Hz A19:0 Hz ▪ A25:0 Hz
A26	Jog Frequency	O	0.50 to 10.00	Hz	0.01	0.50
A27	Jog Stop Mode	X	0: Free Run Stop 1: Deceleration 2: DC Injection Braking	-	-	0
A28	Torque Boost Mode	X	0: Manual 1: Automatic	-	-	0
A29	Manual Torque Boost Voltage Setpoint	O	0.0 to 50.0	%	0.1	1.0
A30	Manual Torque Boost Frequency Setpoint	O	0.0 to 100.0	%	0.1	10.0
A31	Motor Control Method	X	0: Constant Torque 1: Variable Torque 2: Sensorless Vector Control	-	-	0
A32	Voltage Gain Factor	O	20.0 to 110.0	%	0.1	100.0
DC Injection Braking Settings at VFD Stop						
A33	DC Injection Braking	X	0:Disabled 1 :Enabled	-	-	0
A34	DC Injection Braking Frequency Setpoint	X	0.50 to 10.00	Hz	0.01	0.50
A35	DC Injection Braking Delay Time	X	0.0 to 5.0	Sec	0.1	0.0
A36	DC Injection Braking Force at Stop	O	0.0 to 100.0	%	0.1	50.0% (≤30HP) 10.0% (≥40HP) 7.0% (≥250HP)
A37	DC Injection Braking Time at Stop	X	0.0 to 10.0	Sec	0.1	0.0
DC Injection Braking Settings at VFD Start (b42 ~ b46) – extended for better functional control						
Frequency-related Functions						
A38	Frequency Upper Limit	X	A39 to A04 …0 : Disabled	Hz	0.01	0.00
A39	Frequency Lower Limit	X	0.00 to Frequency Upper Limit(A38)	Hz	0.01	0.00
A40 A42 A44	Skip Output Frequencies	X	0.00 to Max Frequency (A04)	Hz	0.01	0.00
A41 A43 A45	Skip Frequency Range	X	0.00 to 10.00	Hz	0.01	0.00

Code	Name	Edit	Range	Unit	Res	Default
Automatic Voltage Regulation (AVR) Function						
A52	Automatic Voltage Regulation (AVR)	X	0: Constant ON 1: Constant OFF 2: OFF during Deceleration	-	-	2
A53	Motor Input Voltage	X	230V class inverter settings: 200/220/230/240 460V class inverter settings: 380/400/415/440/460/480	-	-	LF Model 230V HF Model 460V
2nd Acceleration and Deceleration Functions						
A54	Acceleration Time 2	O	0.1 to 3000	Sec	0.1	30.0
A55	Deceleration Time 2	O	0.1 to 3000	Sec	0.1	30.0
A56	Accel/Decel 2 Command Select	X	0: [2CH] Input Terminal 1: Parameters (A54, A55, A57, A58)	-	-	0
A57	Accel 2 Transition Frequency	X	0.00 to Max Frequency (A04)	Hz	0.01	0.00
A58	Decel 2 Transition Frequency	X	0.00 to Max Frequency (A04)	Hz	0.01	0.00
A59	Acceleration Curve Select	X	0: Linea 1: S-curve 2: U-curve	-	-	0
A60	Deceleration Curve Select	X	0: Linear 1: S-curve 2: U-curve	-	-	0
A61	Analog Input Voltage Offset	O	-10.0 to 10.0	%	0.1	0.0
A62	Analog Input Voltage Gain	O	0.0 to 200.0	%	0.1	100.0
A63	Analog Input Current Offset	O	-10.0 to 10.0	%	0.1	0.0
A64	Analog Input Current Gain	O	0.0 to 200.0	%	0.1	100.0
A65	FAN Operation Mode	X	0: Always ON 1: ON only when VFD is running FAN is running for 30 sec after VFD stop	-	-	0

Code	Name	Edit	Range	Unit	Res	Default
PID Control						
A70	PID Function Select	X	0: PID Control Disabled 1: PID Control Enabled 2: F/F Control Enabled	-	-	0
A71	PID Setpoint	O	0.00 to 100.0	%	00.1	0.00
A72	PID Setpoint Source	X	0: Keypad Potentiometer 1: Control Terminal Input 2: Keypad Up/Down 3: Remote Operator(Communication)	-	-	2
A73	PID Feedback Type	X	0: Current Input "OI" 1: Voltage Input "O"	-	-	0
A74	PID P Gain	O	0.1 to 1000	%	0.1	100.0
A75	PID I Gain Time	O	0.0 to 3600	Sec	0.1	1.0
A76	PID D Gain Time	O	0.00 to 10.00	Sec	0.01	0.0
A77	PID Error Limit	O	0.0 to 100.0	%	0.1	100.0
A78	PID Output High Limit	O	-100.0 to 100.0	%	0.1	100.0
A79	PID Output Low Limit	O	-100.0 to 100.0	%	0.1	0.0
A80	PID Output Invert	X	0: Disabled 1: Enabled	-	-	0
A81	PID Scale Factor	X	0.1 to 1000	%	0.1	100.0
A82	Pre PID Frequency Setpoint	X	0.00 to Max Frequency(A04)	Hz	0.01	0.00
A83	PID Sleep Frequency Setpoint	X	0.00 to Max Frequency(A04)	Hz	0.01	0.00
A84	PID Sleep/Wake Delay Time	X	0.0 to 30.0	Sec	0.1	0.0
A85	PID Wake Frequency Setpoint	X	Sleep Frequency(A83) to Max Frequency (A04)	Hz	0.01	0.00

3.1.4 Expanded Function Mode of b Group

Code	Name	Edit	Range	Unit	Res	Default
Restart Mode						
b01	Restart Select	X	0: No Restart 1: Restart from 0Hz 2: Resume at frequency corresponding motor speed 3: Resume at motor speed; then, decelerated to stop	-	-	0
b02	Line Loss Ride-Through Time	X	0.3 to 1.0	Sec	0.1	1.0
b03	Line Loss Ride-Through Run Delay	X	0.3 to 10.0	Sec	0.1	1.0
Electronic Thermal Overload Fault Setting						
b04	Motor Thermal Overload Level	X	20.0 to 120.0	%	0.1	100.0
b05	Motor Thermal Overload Profile	X	0: Self Cooling 1: Forced Cooling			0
b06	Overload/Overvoltage Restriction Mode	X	0: OLR = OFF, OVR = OFF 1: OLR = ON, OVR = OFF 2: OLR = OFF, OVR = ON 3: OLR = ON, OVR = ON	-	-	3
b07	Overload Restriction Level	X	20.0 to 200.0	%	0.1	HD : 180% ND : 150% (≤200HP) HD : 150% ND : 120% (≥250HP ,300LF~ 750LF)
b08	Overload Restriction Deceleration Rate	X	0.1 to 10.0	Sec	0.1	1.0
Software Lock Mode						
b09	Software Lock Mode	X	0: All Parameters are locked except b09 when SFT terminal input is ON 1: All parameters are locked except b09 and F01 by SFT terminal signal 2: All parameters are locked except b09 3: All parameters are locked except b09 and F01 4: All parameters are locked except b09, F01, F02, and F03	-	-	0

Code	Name	Edit	Range	Unit	Res	Default
Other Functions						
b10	Start Frequency Setpoint	X	0.50 to 10.00	Hz	0.01	0.50
b11	PWM Carrier Frequency	O	1.0 to 16.0	kHz	0.1	2.0~5.0
b12	Initialization Mode	X	0: Clear Trip History 1: Parameter initialization except	-	-	0
b13	Country Code	X	0: Korea 1: Europe 2: US	-	-	2
b14	RPM Display Scale Factor	O	0.01 to 99.99	-	0.01	1.00
b15	Stop Key Function	X	0: Enabled 1: Disabled	-	-	0
b16	Resume Frequency on FRS Cancellation	X	0: Restart from 0 Hz 1: Restart from frequency corresponding motor speed	-	-	0
b17	Modbus Node ID	X	1 to 32	-	1	1
b18	Ground Fault Detection Setpoint	X	0.0 to 100.0	%	0.1	0.0
b19	Speed Search : Current level	O	90 to 180	%	1	100
b20	Speed Search: Voltage Increase	O	10 to 300	%	1	100
b21	Speed Search: Voltage Decrease	O	10 to 300	%	1	100
b22	Speed Search: Speed Decrease	O	1.0 to 200.0 (On display: 10~2000)	%	0.1	100.0 (1000)
b23	Frequency Match	O	0: Start from 0 Hz 1:Start from frequency corresponding motor speed	-	-	0
b24	Fault Relay Select	O	0: Inactive for the Under Voltage trip signal 1: Inactive during auto reset 2: Active every trip 3: Active for the Under Voltage trip signal endlessly	-	-	0
b25	Stop Method	O	0: Ramp to Stop 1: Coast to Stop (Free Run Stop)	-	-	0
b26	HD/ND (Torque Type) Select	X	0: Heavy Load (Constant Torque) 1: Normal Load (Variable Torque)	-	-	0
b27	Input Phase Loss Detection Period	X	0 to 100	Sec	1	10
b28	Communication Time Out Detection	O	0 to 60…0 : Disabled	Sec	1	0
b29	Communication Time Out Detection Mode	O	0: Always Active 1: Active Only when VFD is Running	-	-	0
b30	Display at Power On	O	1 to 13 (for d01 ~ d13)	-	-	1
b31	RXP-RXN terminal Communication Baud Rate	X	1: 2400bps 2: 4800bps 3: 9600bps 4: 19200bps	-	-	3

Code	Name	Edit	Range	Unit	Res	Default
BRD(Dynamic braking) Function						
b32	BRD Mode	X	0: Inactive 1: Active only when VFD is running 2: Active always when running and stopping	-	-	1
b33	BRD Duty Cycle	X	0.0 to 50.0	%	0.1	10.0
Overvoltage Suppression Setting						
b34	Maximum OVS Output Frequency	O	0.0 to 300.0	Hz	0.01	80.00
b35	OVS P Gain	O	0.0 to 10000	-	1	1000
b36	OVS I Gain Time	O	0.0 to 10000	Sec	1	100
b37	OVS D Gain Time	O	0.0 to 10000	Sec	1	0
b38	q-Current Reference	O	-100.0 to 100.0	-	0.1	25.0
b39	Filter Bandwidth	O	0 to 1000	mS	1	1
b40	Overvoltage Suppression	O	0:Disabled 1:Enabled	-	v	0
b41	Limit Time	O	0.0 to 1000	Sec	0.1	0.5
DC Injection Braking Setting						
b42	VFD Start Delay Time after DC Injection Braking	X	0.0 to 60.0	Sec	0.1	0.0
b43	DC Injection Braking Time at Start	O	0.0 to 6000	Sec	0.1	0.0
b44	Current Controller P Gain in DC Braking	O	1.0 to 10000	-	1	1000
b45	Current Controller I Gain Time in DC Braking	O	0.0 to 10000	Sec	1	500
b46	DC Injection Braking Force at Start	O	0.0 to 100.0	%	0.1	50.0 (≤30HP) 10.0 (≥40HP) 7.0 (≥250HP)
Flying Start Gain and Independently Current Limit						
b47	Flying Start P Gain	O	0.01 to 100.0	-	0.01	1.00
b48	Flying Start I Gain Time	O	0.0 to 3600	Sec	0.1	15.3
b49	Overload Restriction Level at Acceleration & Deceleration	X	20.0 to 200.0 (HD) 20.0 to 165.0 (ND)	%	0.1	HD : 180% ND : 150% (≤200HP) HD : 150% ND : 120% (≥250HP ,300LF~ 750LF)

Code	Name	Edit	Range	Unit	Res	Default
Load Balance						
b50	Load Balance Start Frequency	O	0.00 to 60.00	Hz	0.01	0
b52	Load Balance Gain	O	0.00 to 50.00	-	0.01	5.00
b53	Load Balance Start Torque	O	0.0 to 100.0	%	1	0.0
b54	Load Balance Frequency Ramp Time	O	1.0 to 100.0	Sec	0.1	20.0
b55	Load Balance Control Mode	O	0: Disabled 1: Enabled	-	-	0
System Overload/Underload Detection						
b56	System Load Detection Selection	X	0: Disabled 1: Overload Detection 2: Underload Detection 3: Overload/Underload Detection 4: Overload Detection with Fault(E23) 5: Underload Detection with Fault(E24) 6: Overload/Underload Detection with Fault(E23, E24)	-	-	0
b57	System Overload Detection Level	X	20.0 to 200.0	%	0.1	100.0
b58	System Underload Detection Level	X	20.0 to 200.0	%	0.1	100.0
b59	System Overload/Underload Detection Time	X	0.0 to 60.0	Sec	0.1	10.0
b60	System Overload/Underload Detection Safe Zone	X	0 to A04	Hz	0.01	0.00
Dwell						
b61	Dwell Reference at Start	X	0.00 to A04	Hz	0.01	0
b62	Dwell Time at Start	X	0.0 to 10.0	Sec	0.1	0
b63	Dwell Reference at Stop	X	0.00 to A04	Hz	0.01	0
b64	Dwell Time at Stop	X	0.0 to 10.0	Sec	0.1	0

3.1.5 Expanded Function Mode of C Group

Code	Name	Edit	Range	Unit	Res	Default
Input Terminal Function						
C01	Intelligent Input Terminal 1	X	0 : Forward run command(FW) 1 : Reverse run command(RV) 2 : Multi-speed command 1(CF1) 3 : Multi-speed command 2(CF2) 4 : Multi-speed command 3(CF3) 5 : Multi-speed command 4(CF4) 6 : Jogging operation command(JG) 8 : 2-stage accel/decel (2CH) 9 : Free-run stop command(FRS) 10 : External trip(EXT) 11 : Unattended start protection(USP) 12 : Software lock function(SFT) 13 : Analog input current/voltage selection(AT) 14 : Reset(RS) 15 : Start(STA) 16 : Keep(STP) 17 : Forward/reverse(F/R) 18 : Remote control UP(UP) 19 : Remote control DOWN(DOWN) 20 : Local Keypad Override (O/R) 21 : Local Terminal Input Override (T/R) 22 : PID Integral Reset(PIDIR) 23 : PID Disabled(PIDD) 24 : Freq. Override(F.O) 25 : Reset Override(R.O) 26 : External trip2(EXT2) 27 : External trip3(EXT3) 28 : External trip4(EXT4) 29 : External trip5(EXT5) 30 : External trip6(EXT6) 31: UP/DOWN Initial Value Clear	-	-	0
C02	Intelligent Input Terminal 2	X		-	-	1
C03	Intelligent Input Terminal 3	X		-	-	2
C04	Intelligent Input Terminal 4	X		-	-	3
C05	Intelligent Input Terminal 5	X		-	-	13
C06	Intelligent Input Terminal 6	X		-	-	25
Input Terminal Status						
C07	Input Terminal 1 Mode	X	0: Normally Open [NO] 1: Normally Closed [NC]	-	-	0
C08	Input Terminal 2 Mode	X	0: Normally Open [NO] 1: Normally Closed [NC]	-	-	0
C09	Input Terminal 3 Mode	X	0: Normally Open [NO] 1: Normally Closed [NC]	-	-	0
C10	Input Terminal 4 Mode	X	0: Normally Open [NO] 1: Normally Closed [NC]	-	-	0
C11	Input Terminal 5 Mode	X	0: Normally Open [NO] 1: Normally Closed [NC]	-	-	0
C12	Input Terminal 6 Mode	X	0: Normally Open [NO] 1: Normally Closed [NC]	-	-	0

Code	Name	Edit	Range	Unit	Res	Default
Output Terminal and related Function						
C13	Output Relay 1 (AL0, AL1, AL2)	X	0: RUN 1: FA1 2: FA2 3: OL 4: OD 5: FLT 6: Operated by Communication 7: System Overload Detection 8: System Underload Detection 9: System Overload/Underload Detection	-	-	5
C14	Output Relay 2 (RN0-RN1)	X		-	-	1
C15	Output Relay 3 (RN2-RN3)	X		-	-	0
C16	Output Relay 2 (RN0-RN1) Mode	X	0: Normally Open [NO] 1: Normally Closed [NC]	-	-	0
C17	Output Relay 3 (RN2-RN3) Mode	X	0: Normally Open [NO] 1: Normally Closed [NC]	-	-	0
C18	FM Output Setting	X	0: Output Frequency Monitor 1: Output Current Monitor 2: Output Voltage Monitor 3: Output Power Monitor 4: Output Torque Monitor 5: Operated by Communication	-	-	0
C19	FM Gain	O	0.0 to 250.0	%	0.1	100.0%
C20	FM Offset	O	-3.0 to 10.0	%	0.1	0.0%
C21	Motor Overload Alarm	X	10.0 to 200.0	%	0.1	100.0%
C22	FA2 SetPoint at Acceleration	X	0.00 to Max Frequency (A04)	Hz	0.01	0.00Hz
C23	FA2 SetPoint at Deceleration	X	0.00 to Max Frequency (A04)	Hz	0.01	0.00Hz
C24	PID Error Tolerance	X	0.0 to 100.0	%	0.1	10.0%
C25	AMI Output Setting	X	0: Output Frequency Monitor 1: Output Current Monitor 2: Output Voltage Monitor 3: Output Power Monitor 4: Output Torque Monitor 5: Operated by Communication	-	-	1
C26	AMI Gain	O	0.0 to 250.0	%	0.1	100.0%
C27	AMI Offset	O	-99.9 to 100.0	%	0.1	0.0%
C28	UP/DOWN Initial Value Saving	X	0: Disabled 1: Enabled	-	-	0
C29	UP/DOWN Initial Value Setting	X	0.00 to A04	Hz	0.01	60.00
C30	UP/DOWN Reference Arriving Time	X	0.1 to 3000	Sec	0.1	10.0

3.1.6 Expanded Function Mode of H Group

Code	Name	Edit	Range		Unit	Res	Default
Motor Parameters							
H01	Auto Tuning	X	0: OFF 1: ON		-	-	0
H02	Motor Data Select	X	0: Standard Data 1: Auto Tune Data		-	-	0
H03	Motor Capacity	X	3L(3 HP) 5L(5 HP) 7.5L(7.5 HP) 10L(10 HP) 15L(15 HP) 20L(20 HP) 25L(25 HP) 30L(30 HP) 40L(40 HP) 50L(50 HP) 60L(60 HP) 75L(75 HP) 100L(100 HP) 125L(125 HP)	3H(3 HP) 5H(5 HP) 7.5H(7.5 HP) 10H(10 HP) 15H(15 HP) 20H (20 HP) 25H (25 HP) 30H (30 HP) 40H (40 HP) 50H (50 HP) 60H (60 HP) 75H (75 HP) 100H (100 HP) 125H (125 HP) 150H (150 HP) 200H (200 HP) 250H (250 HP) 275H (275 HP)* 300H (300 HP) 350H (350 HP)* 400H (400 HP) 425H (425 HP)* 450H (450 HP) 500H (500 HP)	-	-	-
H04	Motor Poles Setting	X	2 4 6 8				4
H05	Motor Rated Current	X	0.1 to 800.0		A	0.1	-
H06	Motor Flux Current	X	0.1 to 400.0		A	0.1	-
H07	Motor Rated Slip	X	0.01 to 10.0		%	0.1	-
H08	Motor Resistance R1	X	0.1 to 3000.0		mΩ	0.1	-
H09	Transient Inductance	X	0.001 to 30.000		mH	0.001	-
H10	Motor Resistance R1 Auto Tuning Data	X	0.1 to 3000.0		mΩ	0.1	-
H11	Transient Inductance Auto Tuning Data	X	0.001 to 30.000		mH	0.001	-

* When b26 is set to 1, this motor series is displayed.(275H,350H,425H)

3.1.7 Expanded Function Mode of o Group

Code	Name	Edit	Range	Unit	Res	Default
Fieldbus Option Parameters						
o01	Fieldbus Option Type	X	0: Modbus 1: ProfibusDP 2: DeviceNet 3: Ethernet Series (Modbus/TCP, EtherNet/IP, ProfiNet, EtherCAT, BACnet/IP) 4: Reserved	-	-	0
o02	Fieldbus Station Number	X	Maximum value Modbus: 32, Profibus DP: 125, DeviceNet : 63 * Maximum setup for Profibus DP is 99 due to rotary switch setting limit	-	1	1
o03	Fieldbus Byte Swap	X	0: Normal 1: Swap	-	-	0
o08	Fieldbus Input Address 1	X	0x0000 to 0xFFFF	Hex	1	0x0603
o09	Fieldbus Input Address 2	X	0x0000 to 0xFFFF	Hex	1	0x0001
o10	Fieldbus Input Address 3	X	0x0000 to 0xFFFF	Hex	1	0x0202
o11	Fieldbus Input Address 4	X	0x0000 to 0xFFFF	Hex	1	0x0203
o12	Fieldbus Input Address 5	X	0x0000 to 0xFFFF	Hex	1	0x0004
o13	Fieldbus Input Address 6	X	0x0000 to 0xFFFF	Hex	1	0x0101
o14	Fieldbus Input Address 7	X	0x0000 to 0xFFFF	Hex	1	0x0102
o15	Fieldbus Input Address 8	X	0x0000 to 0xFFFF	Hex	1	0x010C
o16	Fieldbus Input Address 9	X	0x0000 to 0xFFFF	Hex	1	0x010D
o17	Fieldbus Input Address 10	X	0x0000 to 0xFFFF	Hex	1	0x0111
o18	Fieldbus Input Address 11	X	0x0000 to 0xFFFF	Hex	1	0x0115
o19	Fieldbus Input Address 12	X	0x0000 to 0xFFFF	Hex	1	0x0000
o20	Fieldbus Output Address 1	X	0x0000 to 0xFFFF	Hex	1	0x0202
o21	Fieldbus Output Address 2	X	0x0000 to 0xFFFF	Hex	1	0x0203
o22	Fieldbus Output Address 3	X	0x0000 to 0xFFFF	Hex	1	0x0004
o23	Fieldbus Output Address 4	X	0x0000 to 0xFFFF	Hex	1	0x0002
o24	Fieldbus Output Address 5	X	0x0000 to 0xFFFF	Hex	1	0x0000
o25	Fieldbus Output Address 6	X	0x0000 to 0xFFFF	Hex	1	0x0000
o26	Fieldbus Output Address 7	X	0x0000 to 0xFFFF	Hex	1	0x0000
o27	Fieldbus Output Address 8	X	0x0000 to 0xFFFF	Hex	1	0x0000
o28	Fieldbus Output Address 9	X	0x0000 to 0xFFFF	Hex	1	0x0000
o29	Fieldbus Output Address 10	X	0x0000 to 0xFFFF	Hex	1	0x0000
o30	Fieldbus Output Address 11	X	0x0000 to 0xFFFF	Hex	1	0x0000
o31	Fieldbus Output Address 12	X	0x0000 to 0xFFFF	Hex	1	0x0000
o32	Fieldbus Status	X	0x0000 to 0xFFFF	Hex	1	0x0000
o33	Fieldbus Version	X	0x0000 to 0xFFFF	Hex	1	0x0000

* Fieldbus card is option to buy addition. More information refer to extra manual of Fieldbus

3.1.8 Expanded Function Mode of U Group

Code	Name	Edit	Range	Unit	Res	Default
User Parameters						
A01	Frequency Setpoint Source	X	0: Keypad Potentiometer 1: Terminal 2: Keypad Up / Down Keys 3: RJ45 Connector (Except 300LF~750LF) 4: RXP, RXN Terminal 5: Fieldbus (option)	-	-	0
A02	Run Source	X	0: Keypad 1: Input Terminal 2: RJ45 Connector (Except 300LF~750LF) 3: RXP, RXN Terminal 4: Fieldbus (option)	-	-	0
F01	Output Frequency Setpoint	O	0.00 to 400.00 0.00 to 300.00 for Sensorless Vector Control	Hz	0.01	--
F02	Acceleration Time 1	O	0.1 to 3000	Sec	0.1	30.0
F03	Deceleration Time 1	O	0.1 to 3000	Sec	0.1	30.0
A53	Motor Input Voltage	X	230V class inverter settings: 200/220/230/240 460V class inverter settings: 380/400/415/440/460/480	-	-	LF 230V HF 460V
H03	Motor Capacity	X	3L(3 HP) 5L(5 HP) 7.5L(7.5 HP) 10L(10 HP) 15L(15 HP) 20L(20 HP) 25L(25 HP) 30L(30 HP) 40L(40 HP) 50L(50 HP) 60L(60 HP) 75L(75 HP) 100L(100 HP) 125L(125 HP) 3H(3 HP) 5H(5 HP) 7.5H(7.5 HP) 10H(10 HP) 15H(15 HP) 20H (20 HP) 25H (25 HP) 30H (30 HP) 40H (40 HP) 50H (50 HP) 60H (60 HP) 75H (75 HP) 100H (100 HP) 125H (125 HP) 150H (150 HP) 200H (200 HP) 250H (250 HP) 275H (275 HP)* 300H (300 HP) 350H (350 HP)* 400H (400 HP) 425H (425 HP)* 450H (450 HP) 500H (500 HP)	-	-	-
H05	Motor Rated Current	X	0.1 to 800.0	A	0.1	-
A03	Base Frequency Setpoint	X	0.00 to A04 (Max Frequency)	Hz	0.01	60.00
A04	Maximum Frequency Setpoint	X	A03 to 400.00 (if A31=2): A03 to 300.00	Hz	0.01	60.00

* This Group is a collection of frequently used parameters

3.2 d Group Parameters

- ***d01*** ***Output Frequency Monitor***
  - *Range: 0.00 ~ 400.00 Hz*

  Real time display of output frequency of the VFD

- ***d02*** ***Output Current Monitor***
  - *Range: 0.0 ~ 9999 Amps*

  Real time display of output current of the VFD

- ***d03*** ***Output Voltage Monitor***
  - *Range: 0 ~ VFD rated voltage*

  Real time display of output voltage of the VFD

- ***d04*** ***Rotation Direction***
  - *F: Forward Run*
  - *□: Stop*
  - *r: Reverse Run*

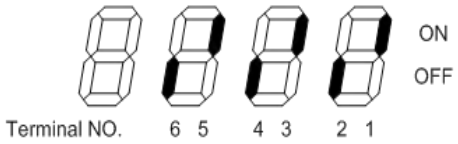
  Real time display of rotation of the VFD

- ***d05*** ***PID Feedback***
  - *Range: 0.00 ~ 100.0 %*

  Scaled PID process variable – feedback value

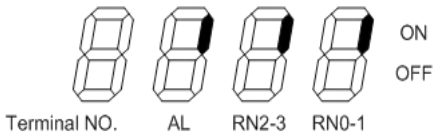
- ***d06*** ***Intelligent Input Terminal Status***
  - *Show the Intelligent Input Terminal Status*

  Meaning: T1 is On, T2 is Off
  T3 is On, T4 is Off
  T5 is On, T6 is Off



- ***d07*** ***Intelligent Output Terminal Status***
  - *Show the Intelligent Output Terminal Status*

  Meaning: RN0 – 1 is On
  RN2 – 3 is On
  AL0 – AL1 is On



- ***d08*** ***RPM Output***
  - *Range: 0 ~ 65,540 RPM*

  Scaled RPM Output determined by equation: (120* d01 * b14) / H04

- ***d09*** ***Power Consumption***
  - *Range: 0 ~ 999.9 kW*

- ***d10*** ***VFD Runtime (Hours)***
  - *Range: 0 ~ 9999 Hr*

  Accumulated VFD runtime in hours

- ***d11 VFD Runtime (Minutes)***
  - *Range: 0 ~ 59 Min*

  Accumulated VFD runtime in minutes
  *** Total run time is a combination of d10 and d11.

- ***d12 DC Bus Voltage***
  - *Range: 0 ~ 999 V*

  Real time voltage on DC bus.

- ***d13 Current Fault***
  -

  When fault occurs, the VFD automatically displays this parameter.
  Additional information of the fault can be accessed by using up arrow key.

  Fault Code
  - Press the UP key
    - Output frequency at time of fault
  - Press the UP key
    - Output current at time of fault
  - Press the UP key
    - DC bus voltage at time of fault
  - Press the FUNC key
    - Back to d13 display

- ***d14 Previous Fault 1***

  Displays last fault that occurred. Additional information can be accessed as shown above in d13.

- ***d15 Previous Fault 2***

  Displays Fault 2 that occurred. Additional information can be accessed as shown above in d13.

- ***d16 Previous Fault 3***

  Displays Fault 3 that occurred. Additional information can be accessed as shown above in d13.

- ***d17 Fault Count***

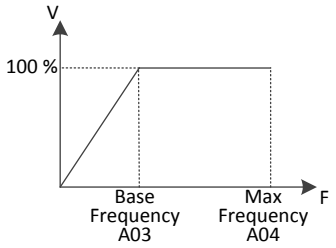
  Displays accumulated fault count.

3.3 F Group Parameters

F group holds very basic frequency related parameter values to operate the N700E VFD.

- ***F01 Output Frequency Setpoint***
  - *Range: 0.00 ~ 400.00 Hz in 0.01 Hz*
  - *Range: 0.00 ~ 300.00 Hz in 0.01 Hz for Sensor-less Vector Control (A31=2)*

  This parameter displays the frequency setpoint for the VFD.
  VFD Frequency can be controlled by various sources set in A01.
  - If A01=0: Use the Volume Key on the panel
  - If A01=1: Use the Terminal (O-L, OI-L)
  - If A01=2: Use Up/Down Keys
  - If A01=3: Use Control Terminal Input (RJ45)
    (Except 300LF~750LF)
  - If A01=4: Use Control Terminal Input,(RXP-RXN)
  - if A01=5: Fieldbus (option)

  - ❖ Related Parameters: A01

- ***F02 Acceleration Time 1***
  - *Range: 0.1 ~ 999.9 Sec in 0.1 Sec*
    1000 ~ 3000 Sec in 1 Sec

  Acceleration time from 0Hz to Maximum Frequency (A04)
  - ❖ Related Parameters: A54, A56, A57,A59

- ***F03 Deceleration Time 1***
  - *Range: 0.1 ~ 999.9 Sec in 0.1 Sec*
    1000 ~ 3000 Sec in 1 Sec

  Deceleration time from Maximum Frequency (A04) to 0Hz
  - ❖ Related Parameters: A55, A56, A58, A60

- ***F04 Rotation Direction***
  - *0: Forward Run*
  - *1: Reverse Run*

  Sets the direction of VFD to forward or reverse at keypad operation only
  - ❖ Related Parameters: A02

3.4 A Group Parameters

A group holds extended frequency control Parameters and VFD operational Parameters.

- ***A01 Frequency Setpoint Source***
  - *0: Potentiometer on keypad*
  - *1: Control Terminal Input (O-L: Voltage, OI-L: Current)*
  - *2: Up/Down Keys on keypad*
  - *3: Remote Operator 1 (RJ45 Port, RS485 Communication), Except 300LF~750LF*
  - *4: Remote Operator 2 (RXP-RXN, RS485 Communication)*
  - *5: Fieldbus (option)*

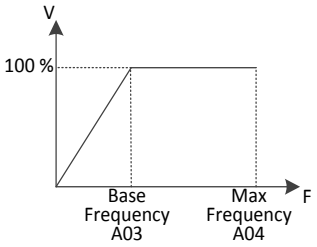
  Determined the source of the frequency command.
  - ❖ Related Parameters: F01, A05~A10, A61~A64, b17, b28~b29, b31

- ***A02 Run Source***
  - *0: Run/Stop Key on keypads*
  - *1: Control Terminal Input ((FW, RV Connect)*
  - *2: Remote Operator 1 (RJ45 Port, RS485 Communication), Except 300LF~750LF*
  - *3: Remote Operator 2 (RXP-RXN, RS485 Communication)*
  - *4: Fieldbus (option)*

  Determined the source of the run command.
  - ❖ Related Parameters: F04, d06, C1~C12, b17, b28~b29, b31

- ***A03 Base Frequency Setpoint***
  - *Range: 0.00 ~ Maximum Frequency(A04) in 0.01 Hz*

  Frequency at which the maximum voltage is reached. Should be set to the motor rated frequency.
  - ❖ Related Parameters: None



- ***A04 Maximum Frequency Setpoint***
  - *Range: A03 ~ 400.00 Hz in 0.01 Hz*
  - *If Sensorless Vector Control (A31=2): Base Frequency (A03) ~ 300 Hz in 0.01 Hz*

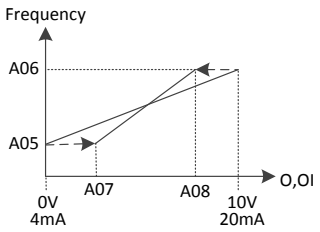
  Maximum frequency the VFD will output.
  - ❖ Related Parameters: F02, F03

- ***A05 Frequency at Min. Analog Input***
  - *Range: 0.00 ~ Maximum Frequency(A04) in 0.01 Hz*

  When Frequency Command Source is set to the terminal input (A01=1), this parameter determines the Frequency Setpoint (F01) at minimum analog input current, 4mA (or voltage, 0 V)
  - ❖ Related Parameters: A01, A07

- ***A06 Frequency at Max. Analog Input***
  - *Range: 0.00 ~ Maximum Frequency(A04) in 0.01 Hz*

  When Frequency Command Source is set to the terminal input (A01=1), this parameter determines the Frequency Setpoint (F01) at maximum analog input current, 20mA (or voltage, 10 V)
  - ❖ Related Parameters: A01, A08



- ***A07 Minimum Analog Input Offset***
  - *Range: 0.0 ~ 100.0 % in 0.1 %*

  Offsets the minimum analog input reference corresponding to A05.
  Example: if set to 10%, minimum analog current value becomes 5.6mA (or 1 V).
  - ❖ Related Parameters: A01, A05, A09

- ***A08 Maximum Analog Input Offset***
  - *Range: 0.00 ~ 100.0 % in 0.1 %*

  Offsets the maximum analog input reference corresponding to A06.
  Example: if set to 90%, maximum analog current value becomes 18.4mA (or 9V)
  For any reference above A08, VFD holds the value in A06.
  - ❖ Related Parameters: A01, A06

- ***A09 Start Frequency***
  - *0: Select Value in A05*
  - *1: Select 0 Hz*

  Determines the Frequency Setpoint (F01) for any analog reference below A05.
  - ❖ Related Parameters: F01, A05, A07

- ***A10 Low Pass Filter Gain***
  - *Range: 1 ~ 8*

  Filter on analog input to help reduce noise on signal.
  - ❖ Related Parameters: None

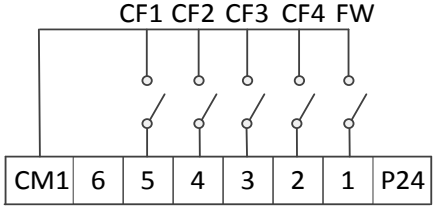
- ***A11~A25 Multiple Speed Frequency Setpoints***
  - *Range: 0.01 ~ Max Frequency (A04)*

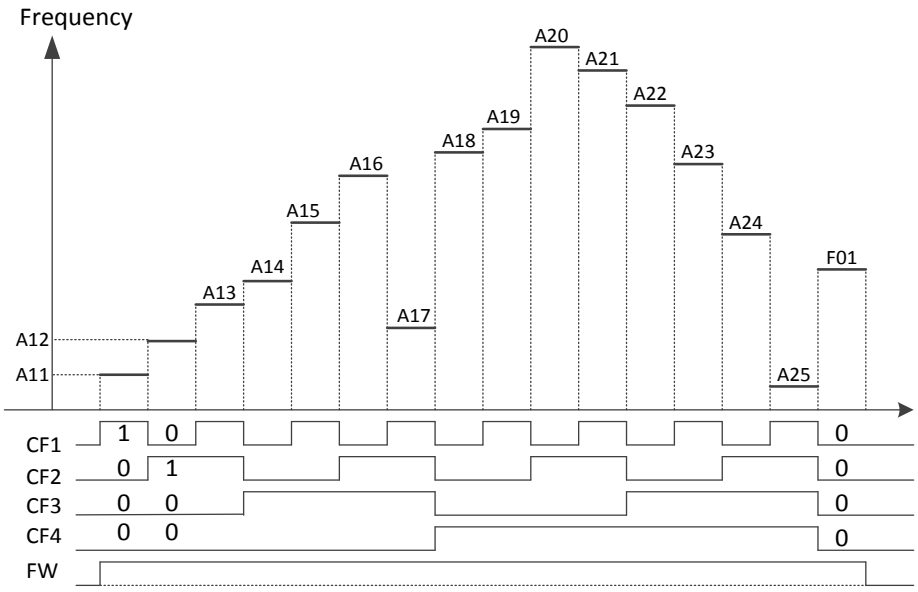
  Programming 15 different frequency values to Parameters, A11~A25: and select by a combination of 4 terminal inputs, CF4~CF1, will further discuss in C group.

  For HVAC system, often multiple heating temperature setting is desired.
  For instance, @ 7 am, set to 65 ^{0}F,
  @ 12 pm, set to 68 ^{0}F
  @ 3 pm, set to 70 ^{0}F
  @ 6 pm, set to 72 ^{0}F
  @ 9 pm, set to 75 ^{0}F, etc.

  - ❖ Related Parameters: F01, C01~C12

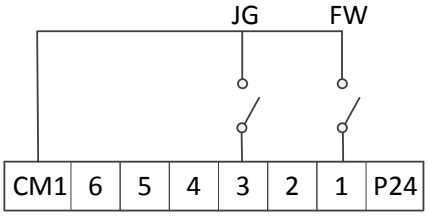
  <u>*Programming Example:*</u>
  - A02 = 1; run by keypad (or A02=2; by Terminal)
  - F01 = Frequency Number @ CF4:CF1 = 0000
  - C01 ~ C05 (Assign to FW, Multi Frequency Pointers)
  - C07 ~ C12 (Assign Close/Open Polarity)
  - A11 ~ A25 (Frequency Values)





- ***A26 Jog Frequency***
  - *Range: 0.50 ~ 10.00 Hz in 0.01 Hz*

Jogging frequency is used to move/rotate the motor in small increment at low frequency. It is selected using input terminal.



- Related Parameters: C01~ C12

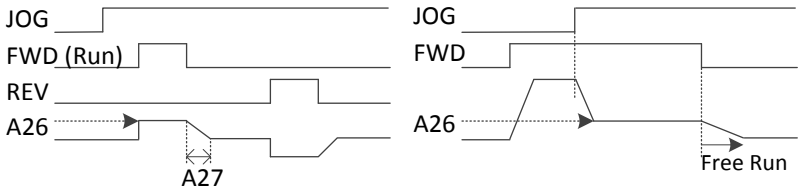
- ***A27 Jog Stop Mode***
  - *0: Free Run to Stop (Coast to Stop)*
  - *1: Deceleration to Stop*
  - *2: DC Injection Braking to Stop*

Jogging frequency is used to move/rotate the motor in small increment at low frequency. It is selected using input terminal.

- Related Parameters: C01~C12

Programming Example:

- A02 = 1; run by keypad (or A02=2; by Terminal)
- F01 = Frequency Number @ CF4:CF1 = 0000
- C01 ~ C05 (Assign to FW, JOG)
- C07 ~ C12 (Assign Close/Open Polarity)
- A11 ~ A25 (Frequency Values)



- ***A28 Torque Boost Mode***
  - *0: Manual Torque Boost (A29, A30)*
  - *1: Automatic Torque Boost (H02)*

Select a torque boost mode. For V/F Control, compensate a beginning torque by increasing the output voltage.
If selected Automatic Torque Boost mode, recommended the following

1. Run “Auto Tuning”
2. Use an auto tuning data(H02=1)

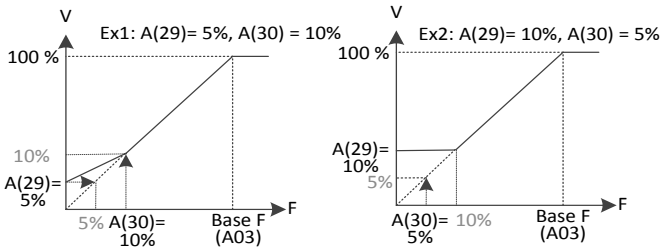
- Related Parameters: H1~H11

- ***A29 Manual Torque Boost Voltage Setpoint***
  - *Range: 0.0 ~ 50.0 % in 0.1 %*

  For Manual Torque Boost mode, program the value in % of an output voltage.
  - ❖ Related Parameters: A30

- ***A30 Manual Torque Boost Frequency Setpoint***
  - *Range: 0.0 ~ 100.0 % in 0.1 %*

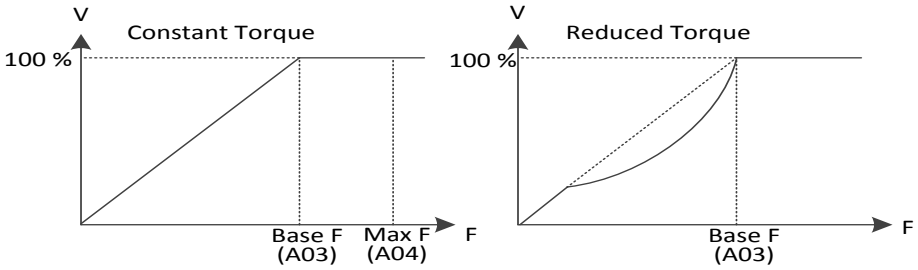
  Program the frequency breakpoint
  - ❖ Related Parameters: A29



- ***A31 Motor Control Method***
  - *0: Constant Torque*
  - *1: Reduced Torque (Variable Torque)*
  - *2: Sensorless Vector Control*

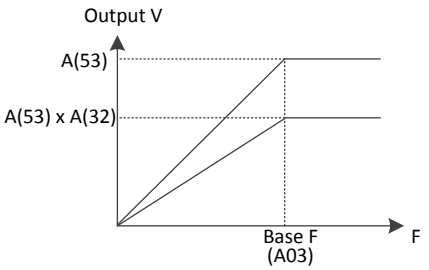
  Reduced torque is effective for fan or pump application which do not require high torque at low frequency. By reducing the output voltage, increased efficiency, lower noise, and lower vibration.

  For Sensorless Vector method, per specified output voltage, current, motor parameters, motor rpm, the corresponding torque value is calculated. At very low frequency up to 0.5 Hz, high torque operation is possible
  - ❖ Related Parameters: A29~A30, H01~H11



- ***A32 Voltage Gain Factor***
  - *Range: 20.0 ~ 110.0 % in 0.1 %*

  The output voltage cannot exceed the input voltage
  - ❖ Related Parameters: A53, A03



- ***A33 DC Injection Braking***
  - *0: Disabled*
  - *1: Enabled*

  Enable or Disable DC Injection Braking Function
  By adding the force to the rotor, slowing the motor to stop.
  - ❖ Related Parameters: A33~A37

- ***A34 DC Injection Braking Frequency Setpoint***
  - *Range: 0.50 ~ 10.00 Hz in 0.01 Hz*

  Program the VFD frequency out when DC injection braking function kicks in. If set A34 to 0.5Hz, when VFD frequency out reaches to 0.5 Hz, DC braking function is activated.
  - ❖ Related Parameters: A33~A37

- ***A35 DC Injection Braking Delay Time***
  - *Range: 0.0 ~ 5.0 Sec in 0.1 Sec*

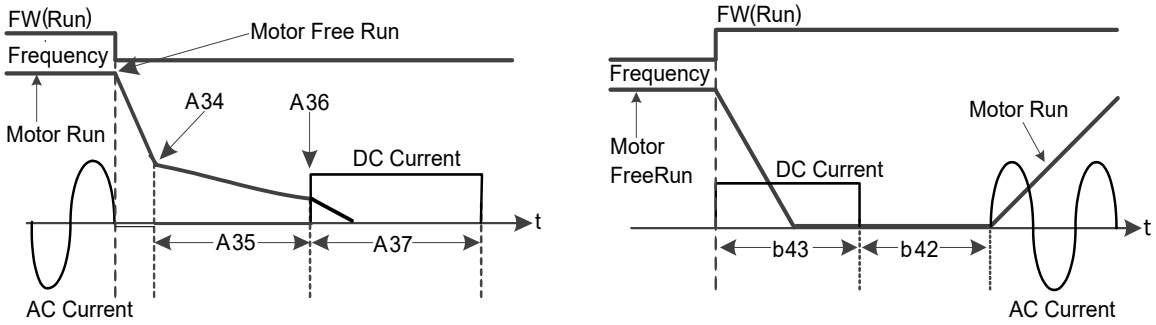
  Program the delay time when the DC braking function actually starts form when VFD out is the frequency value in A34.
  - ❖ Related Parameters: A33~A37

- ***A36 DC Injection Braking Force at Stop***
  - *Range: 0.0 ~ 100.0 % in 0.1 % Depending on the N700E Type*

  Program the level of DC injection braking force of rated electric power of N700E
  - ❖ Related Parameters: A33~A37

- ***A37 DC Injection Braking Time at Stop***
  - *Range: 0.0 ~ 10.0 Sec in 0.1 Sec*

  Program the DC Injection Braking duration
  - ❖ Related Parameters: A33~A37



b42 ~ b46 (Extended A33 ~ A37)

***Note: For independent DC injection braking function control at VFD start and at VFD stop, additional parameters are allocated at b42 ~ b46, listed here for continuity, repeated again in the b Group descriptions.

- ***b42 VFD Start Delay Time after DC Injection Braking***
  - *Range: 0.0 ~ 60.0 Sec in 0.1 Sec*

  Program the VFD start delay time after braking time at start is done
  - ❖ Related Parameters: A33, b42~b46

- ***b43 DC Injection Braking Time at Start***
  - *Range: 0.0 ~ 6000 Sec in 0.1 Sec*

  Program the DC Injection Braking duration before VFD start
  - ❖ Related Parameters: A33, b42~b46

- ***b44 Current Controller P Gain in DC Braking***
  - *Range: 1.0 ~ 10,000 in 1.0*

  Program the current controller P gain in DC braking
  - ➢ This value is applied both brake modes (start and stop)
  - ➢ If motor speed has a large overshoot at DC braking, decrease this value
  - ➢ If value is too big, motor can be vibrated or can't be stopped

  ❖ Related Parameters: A33, b42~b46

- ***b45 Current Controller I Gain Time in DC Braking***
  - *Range: 0.0 ~ 10,000 Sec in 1.0 Sec*

  Program the current controller I gain in DC braking
  - ➢ This value is applied both brake modes (start and stop)
  - ➢ If motor is vibrated or not stop at DC braking, decreased this value
  - ➢ If value is too big, DC braking force can be weak

  ❖ Related Parameters: A33, b42~b46

- ***b46 DC Injection Braking Force at Start***
  - *Range: 0.0 ~ 100.0 % in 0.1 %*

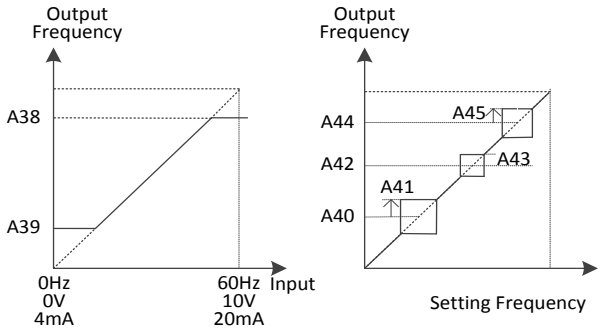
  Program the level of DC injection braking force of rated electric power of N700E
  - ❖ Related Parameters:

- ***A38 Frequency Upper Limit***
  If 0 disable Frequency Limit Function
  - *Range: Frequency Lower Limit(A39) ~ Max Frequency(A04) in 0.01 Hz*

  Program upper limit of an output frequency
  - ❖ Related Parameters:

- ***A39 Frequency Lower Limit***
  - *Range: 0.00 ~ A38 Hz in 0.01 Hz*

  Program lower limit
  - ❖ Related Parameters:



- ***A40, 42, 44 Skip Output Frequencies***
  - *Range: 0.00 ~ Max Frequency(A04) Hz in 0.01 Hz*

  Program 3 output frequency values to mitigate different resonance points at which vibration can cause damages to the equipment such as fans or pumps.
  - ❖ Related Parameters: A41, A43, A45,

- ***A41, 43, 45 Skip Frequency Range***
  - *Range: 0.00 ~ 10.00 Hz in 0.01 Hz*

  Program skip frequency ranges for A40, A42, and A44 respectively.
  - ❖ Related Parameters:

- ***A52 Automatic Voltage Regulation (AVR)***
  - *0: Constant ON*
  - *1: Constant OFF*
  - *2: OFF During Deceleration (On otherwise)*

  AVR enables the constant output regardless input power fluctuation.
  - ❖ Related Parameters:

- ***A53 Motor Input Voltage***
  - *230V Class Setting: 200/220/230/240 LF Models*
  - *460V Class Setting: 380/400/415/440/460/480 HF Models*

  Select input voltage for respective N700E VFD Models
  - ❖ Related Parameters:

- ***A54 Acceleration Time 2***
  - *Range: 0 .1 ~ 999.9 Sec in 0.1 Sec*
  - *Range: 1000 ~ 3000 Sec in 1.0 Sec*

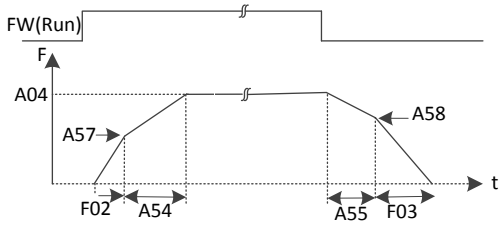
  In addition to Acceleration Time 1 in F02, Second acceleration time can be specified. Its value can also be entered by input terminal 2CH
  - ❖ Related Parameters:

- ***A55 Deceleration Time 2***
  - *Range: 0 .1 ~ 999.9 Sec in 0.1 Sec*
  - *Range: 1000 ~ 3000 Sec in 1.0 Sec*

  In addition to deceleration Time 1 in F03, Second acceleration time can be specified. Its value can also be entered by input terminal 2CH
  - ❖ Related Parameters:

- ***A56 Accel/Decel 2 Command Select***
  - *0: 2CH from Input Terminal*
  - *1: Parameters (A54,A55, A57,A58)*

  Select the transition frequency point about acceleration/deceleration by input terminal or frequency
  - ❖ Related Parameters: C01~C12, A57~A60



- ***A57 Accel 2 Transition Frequency***
  - *Range: 0 .00 ~ Max Frequency(A04) in 0.01Hz*

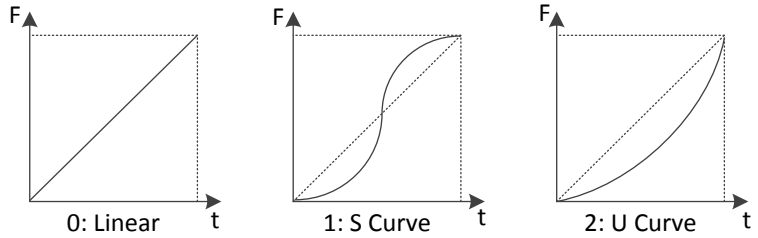
  In addition to Acceleration Time 1 in F02, Acceleration Time 2 can be specified. Its value can also be entered by input terminal 2CH
  - ❖ Related Parameters:

- ***A58 Decel 2 Transition Frequency***
  - *Range: 0 .00 ~ Max Frequency(A04) in 0.01Hz*

  In addition to Deceleration Time 1 in F03, Deceleration Time 2 can be specified. Its value can also be entered by input terminal 2CH
  - ❖ Related Parameters:

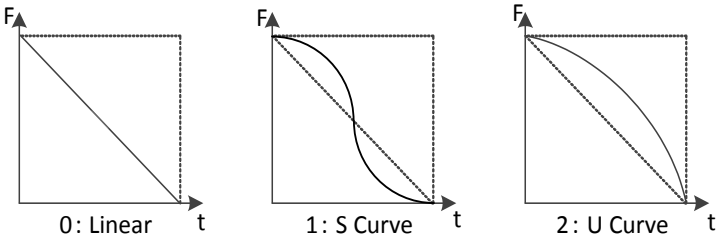
- ***A59 Acceleration Curve Select***
  - *0: Linear*
  - *1: S Curve*
  - *2: U Curve*

  Select Acceleration Curve Type
  - ❖ Related Parameters:



- ***A60 Deceleration Curve Select***
  - *0: Linear*
  - *1: S Curve*
  - *2: U Curve*

  Select Deceleration Curve Type
  - ❖ Related Parameters:



- ***A61 Analog Input Voltage Offset***
  - *Range: -10.0 ~ 10.0 % in 0.1%*

  Real time editable offset factor for analog input voltage.
  - ❖ Related Parameters: A05~A08

- ***A62 Analog Input Voltage Gain***
  - *Range: 0.0 ~ 200.0 % in 0.1%*

  Real time editable gain factor for analog input voltage
  - ❖ Related Parameters: A05~A08

- ***A63 Analog Input Current Offset***
  - *Range: -10.0 ~ 10.0 % in 0.1%*

  Real time editable offset factor for analog input current.
  - ❖ Related Parameters: A05~A08

- ***A64 Analog Input Current Gain***
  - *Range: 0.0 ~ 200.0 % in 0.1%*

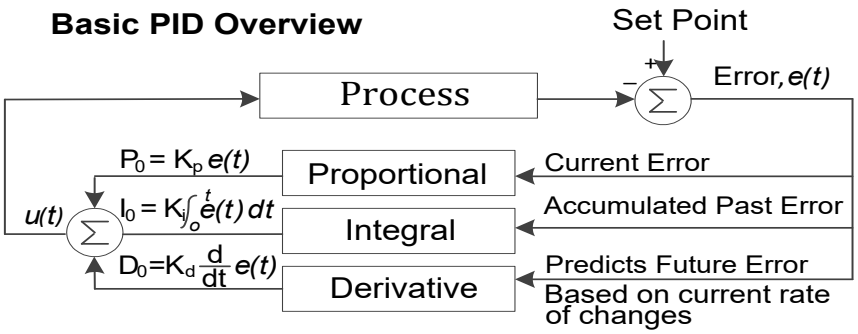
  Real time editable gain factor for analog input current
  - ❖ Related Parameters: A05~A08

- ***A65 Fan Operation Mode***
  - *0: Always On*
  - *1: On Only when VFD is running FAN is running for 30 sec after VFD stop*

  Select fan operation
  - ❖ Related Parameters:

- ◆ ***A70 ~ A85 Proportional, Integral, Differential (PID) Function***

The PID function enables the system running at the set point automatically by regulating the process using the system feedback, error term. It is used for Cubic Feet of Air it moves per minute (CFM) for fan application, Gallons per minute (GPM) for pump application, pressure control, heating application, etc.



$$u(t) = K_p e(t) + K_j \int_o^t e(t)\,dt + K_d \frac{d}{dt} e(t)$$

PID Functional Description

- Set Point: Desired System Output Value
- Error: Difference between System output and Set Point
- Proportional (P) Term: Current Error
- Integral (I) Term: Accumulated Past Error
- Derivative (D) Term: Predicted Future Error based on current rate of changes

- ***A70 PID Function Select***
  - *0: PID Control Disabled*
  - *1: PID Control Enabled*
  - *2: Forward Feed Enabled*

  Select PID function type
  - ❖ Related Parameters: A70~A85

- ***A71 PID Setpoint***
  - *Range: 0.00 ~ 100.0 % in 0.01 %*

  PID target value setpoint
  - ❖ Related Parameters: A70~A85

- ***A72 PID Setpoint Source***
  - *0: Keypad Potentiometer*
  - *1: Input Terminal*
  - *2: Keypads(Up/Down Keys)*
  - *3: Remote Control (Communication)*

  Select PID Setpoint Source
  - ❖ Related Parameters: A70~A85

- ***A73 PID Feedback Type***
  - *0: "OI" Current Input (DC 4~20mA)*
  - *1: "O" Voltage Input (DC 0~10V)*

  Select the source how to enter the PID set point in A72.
  - ❖ Related Parameters: A70~A85

- ***A74 PID P Gain***
  - *Range: 0.1 ~ 1000 % in 0.1 %*

  Select the PID P gain value
  - ➢ It sets the output rate of error between set point value and the feedback value
  - ➢ For faster response speed, enlarge the P gain value
  - ➢ If P gain is set too large, oscillation or over shooting may occur
  - ❖ Related Parameters: A70~A85

[Input method of target value signal and feedback signal]

Set the reference signal according to the PID reference setting method (A72).
Set the feedback signal according to the PID feedback source (A73)
If A73=0, input terminal being set [AT] has to be ON.

- ***A75 PID I Gain Time***
  - *Range: 0.0 ~ 3600 Sec in 0.1 Sec*

  Select the integral time to accumulate PID error value
  - ➢ For faster response speed, shorten the accumulate time
  - ➢ If I Gain time is set too short, oscillation or over shooting may occur

  - ❖ Related Parameters:

- ***A76 PID D Gain Time***
  - *Range: 0.0 ~ 10.00 Sec in 0.01 Sec*

  Program the derivative time for PID function
  - ➢ For faster response speed, lengthen the D gain time
  - ➢ If D gain time is set too long, system may become unstable

  - ❖ Related Parameters:

PID Gain Adjustment Example

If the response is not stabilized in a PID control operation, adjust the gains as follows according to the symptom

- The change of controlled variable is slow even when the target value is changed.
  - ⇨ Increase P gain [A74]
- The change of controlled variable is fast, but not stable.
  - ⇨ Decrease P gain[A74]
- It is difficult to make the target value match with the controlled variable.
  - ⇨ Decrease I time [A75]
- Both the target value and the controlled variable are not stable.
  - ⇨ Increase I time[A75]
- The response is slow even when the P gain is increased.
  - ⇨ Increase D time[A76]
- The response is not stabilized due to oscillation even when the P gain is increased.
  - ⇨ Decrease D time[A76]

- ***A77 PID Error Limit***
  - *Range: 0.0 ~ 100.0 % in 0.1 %*

  Program error limit level, ratio to the maximum error

  - ❖ Related Parameters:

- ***A78 PID Output High Limit***
  - *Range: -100.0 ~ 100.0 % in 0.1 %*

  Program the maximum PID output as a percentage of the maximum output frequency
  Related Parameters: A04

- ***A79 PID Output Low Limit***
  - *0.00: Disabled the Low Limit*
  - *Range: -100.0 ~ 100.0 % in 0.1 %*

  Program the minimum PID output as a percentage of the maximum output frequency
  - ❖ Related Parameters: A04

- ***A80 PID Output Invert***
  - *0: PID Output Invert Disabled*
  - *1: PID Output Invert Enabled*

  Program to enable the PID Output Invert
  - ❖ Related Parameters:

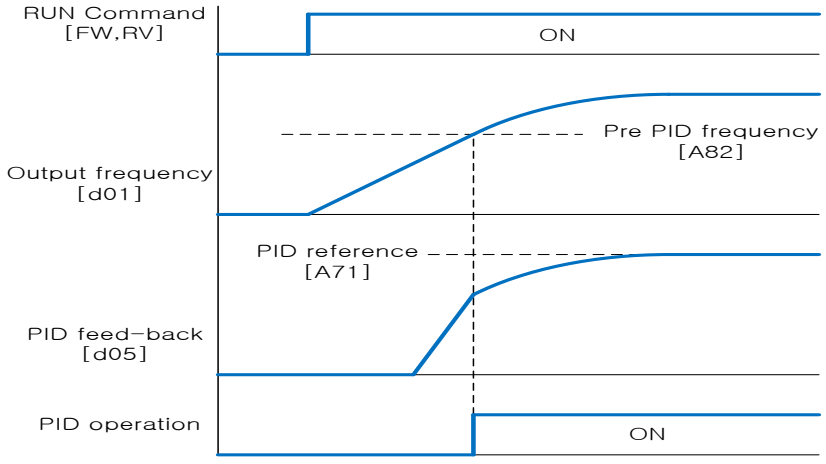
- ***A81 PID Scale Factor***
  - *Range: 0.1~ 1000 % in 0.1 %*

  Program the minimum PID output as a percentage of the maximum output frequency(A04)
  - ❖ Related Parameters: A04

- ***A82 Pre PID Frequency Setpoint***
  - *0.00: Disabled Pre PID Function*
  - *Range: 0.00 ~ Max Frequency(A04) in 0.01 Hz*

  Program the frequency setpoint when PID function is activated. Once the VFD frequency out reaches this value in A82, PID control function is enabled and the VFD is operated in closed loop control.

  - ❖ Related Parameters: A04



Pre-PID

- ***A83 PID Sleep Frequency Setpoint***
  - *Range: 0.00 ~ Max Frequency(A04) in 0.01 Hz*

  Program the frequency setpoint when the VFD goes to Sleep.
  - ❖ Related Parameters:

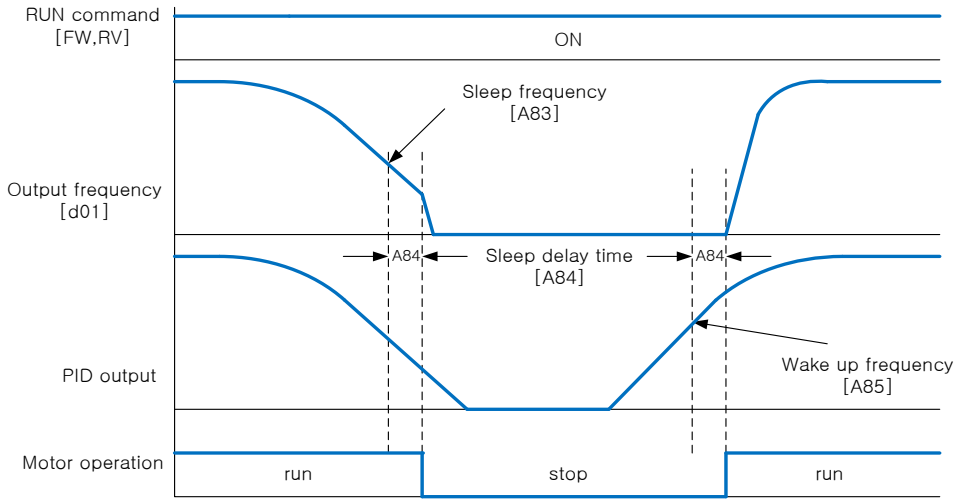
- ***A84 PID Sleep/Wake Delay Time***
  - *Range: 0.0 ~ 30.0 Sec in 0.1 Sec*

  Program the delay time when the VFD actually goes to Sleep/Wake from reaching the sleep frequency or wake frequency.

  - ❖ Related Parameters: A04

- ***A85 PID Wake Frequency Setpoint***
  - *Range: Sleep Frequency (A83) ~ Max Frequency (A04) in 0.01 Hz*

  Program the frequency setpoint when the VFD wakes up from the Sleep mode for the specified operation.
  - ❖ Related Parameters:



Sleep and Wake Function

PID Control Diagram

- The overall PID control diagram with respective parameters is shown in Figure 3-1

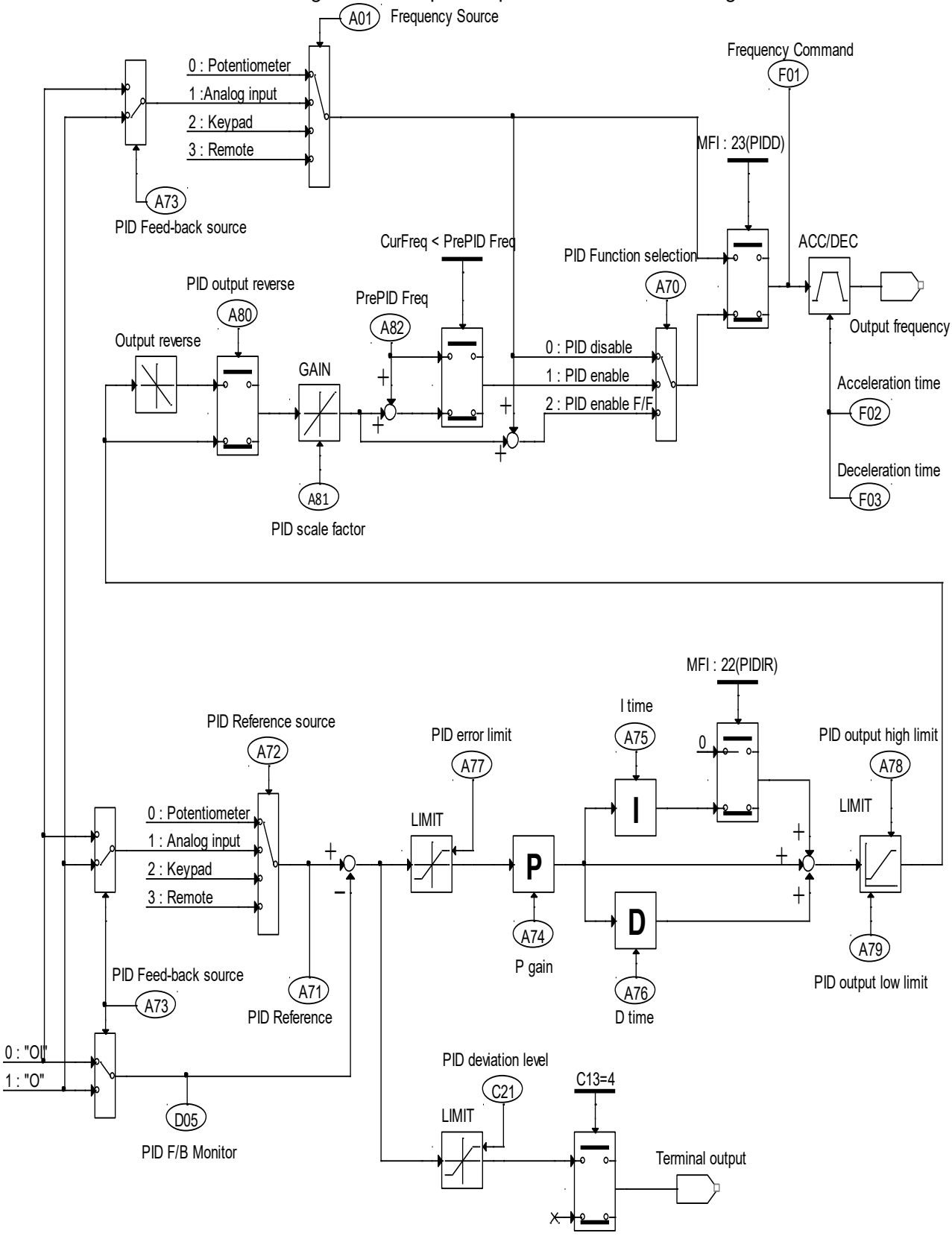


Figure 3-1: PID diagram

3.5 b Group Parameters

- ***b01 Restart Select***
  - *0: No Restart*
  - *1: Restart from 0Hz*
  - *2: Restart from the frequency at time of fault*
  - *3: Restart from the frequency at time of fault; then slow down to stop*

  Select what action to take when a trip occurs for Over current (OC), Overvoltage (OV), and Under voltage (UV). Restart attempts up to 3 times for OC and OV since there is liability issues to consider. However, in case of UV, it attempts 10 times. For trip count, if the consecutive trip does not occur within 60 seconds, an accumulated trip count is reset to 0. See b24 section.
  - ❖ Related Parameters: b24

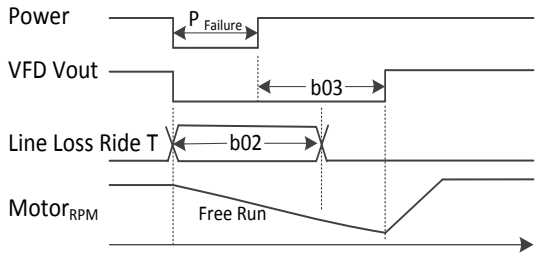
- ***b02 Line Loss Ride-Through Time***
  - *Range: 0.3 ~ 1.0 Sec in 0.1 Sec*

  Program the period for VFD go through under voltage condition without UV trip. This time varies depending upon the loading. Thus, a user must perform the test prior to entering the time value.
  - ❖ Related Parameters:

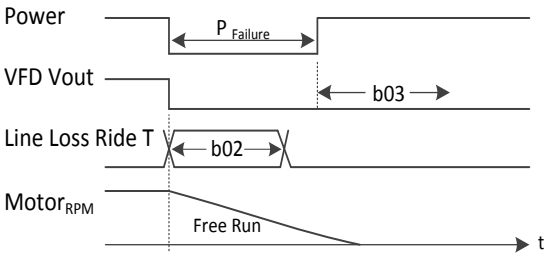
- ***b03 Line Loss Ride-Through Run Delay***
  - *Range: 0.3 ~ 10.0 Sec in 0.1 Sec*

  Frequency value of VFD output Voltage.
  It is the value specified on the Motor nameplate.
  - ❖ Related Parameters:

i) Momentary Power Failure Period < b02



ii) Momentary Power Failure Period > b02

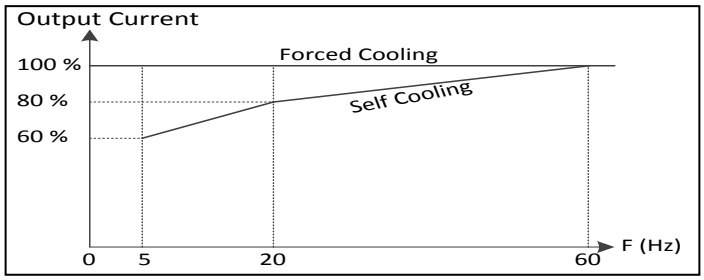


- ***b04 Motor Thermal Overload Level***
  - *Range: 20.0 ~120.0 % in 0.1 %*

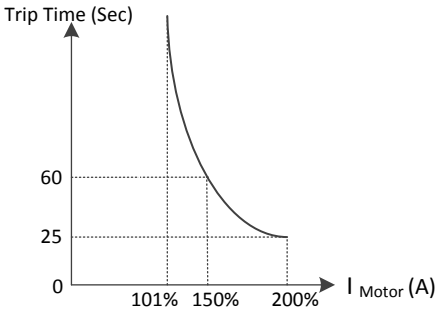
  Program a level of the rated motor current (INV Rated Current)
  - ❖ Related Parameters:

- ***b05 Motor Thermal Overload Profile***
  - *0: Self Cooling – Fan is mounted on the motor shaft*
  - *1: Forced Cooling – Fan is powered by external power source*

  Select a cooling method
  - ❖ Related Parameters:

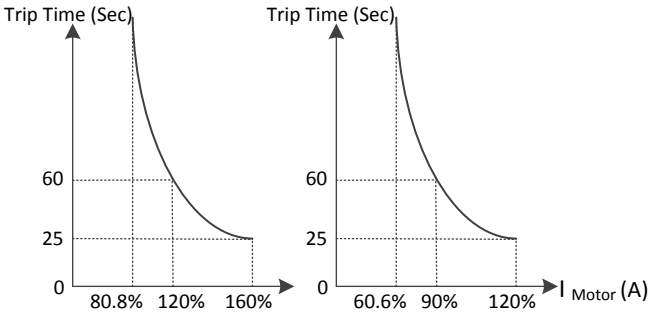


i) b05 = 1: Trip Time vs. Motor Current



ii) b05 = 0: Trip Time vs. Motor Current

Output Frequency = 20 Hz *Output Frequency = 5 Hz*



- ***b06 Overload/Overvoltage Restriction Mode***
  - *0: Overload Restriction Mode=Off, Overvoltage Restriction Mode=Off*
  - *1: Overload Restriction Mode=On, Overvoltage Restriction Mode=Off*
  - *2: Overload Restriction Mode=Off, Overvoltage Restriction Mode=On*
  - *3: Overload Restriction Mode=On, Overvoltage Restriction Mode=On*

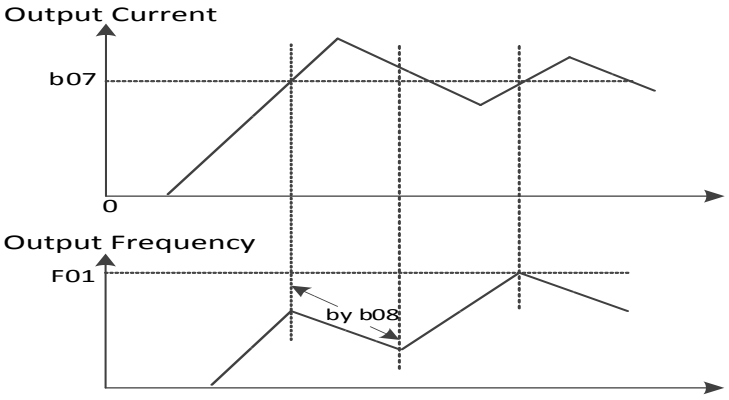
  Select a overload or overvoltage restriction modes
  - ❖ Related Parameters:

- ***b07 Overload Restriction Level***
  - *Range: 20.0 ~ 200.0 % in 0.1 %*

  Program the level for overload restriction % of the VFD rated current
  - ❖ Related Parameters:

- ***b08 Overload Restriction Deceleration Rate***
  - *Range: 0.1~10.0 Sec in 0.1 Sec*

  Program the deceleration time for the rate when the VFD detects the overload
  - ❖ Related Parameters:



- ***b09 Software Lock Mode***
  - *0: All Parameters are locked except b09 when SFT terminal input is ON*
  - *1: All Parameters are locked except b09 and F01 by SFT terminal Signal*
  - *2: All Parameters are locked except b09*
  - *3: All Parameters are locked except b09 and F01*
  - *4: All parameters are locked except b09, F01, F02, and F03*

  Software Lock mode to prevent any un-intentional modification of set parameter values
  - ❖ Related Parameters:

- ***b10 Start Frequency Setpoint***
  - *Range 0.50 ~ 10.00 Hz in 0.01 Hz*

  Setting the starting frequency from the VFD output
  - ❖ Related Parameters:

- ***b11 PWM Carrier Frequency***
  - *Range 1.0 ~ 16.0 Hz in 0.1 kHz*

  Select Heavy Duty or Normal Duty factory setting per VFD model and loading type
  - ❖ Related Parameters:

Model	b26=0(Heavy Duty)	B26=1(Normal Duty)	Range(kHz)
N700E: 055LF/075LFP~150LF/185LFP	5.0 kHz	2.0 kHz	1.0~16.0
N700E: 185LF/220LFP	5.0 kHz	2.0 kHz	1.0~10.0
N700E: 220LF	3.0 kHz	2.0 kHz	1.0~10.0
N700E: 300LF/370LFP~750LF/900LFP	3.0 kHz	2.0 kHz	1.0~10.0
N700E: 055HF/075HFP~150HF/185HFP	5.0 kHz	2.0 kHz	1.0~16.0
N700E: 185HF/220HFP	5.0 kHz	2.0 kHz	1.0~10.0
N700E: 220HF/300HFP~1320HF/1600HFP	3.0 kHz	2.0 kHz	1.0~10.0
N700E: 1600HF/2000HFP~3500HF/3800HFP	2.0 kHz	2.0 kHz	1.0~4.0

- ***b12 Initialization Mode***
  - *0: Clear Trip History*
  - *1: Parameters except b13(Country Code) and A53(Motor Input Voltage)*

  Select an initialization mode
  - ❖ Related Parameters:

- ***b13 Country Code***
  - *0: Korea*
  - *1: Europe*
  - *2:US*

  Select a country code of which default parameter values to use
  - ❖ Related Parameters:

- ***b14 RPM Display Scale Factor***
  - *Range: 0.01 ~ 99.99 in 0.01*

  Program RPM Scale factor for d08 Display
  - ❖ Related Parameters: d08

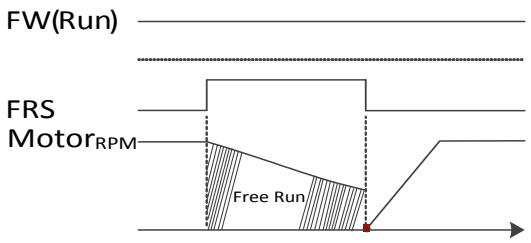
- ***b15 Stop Key Function***
  - *0: Enabled*
  - *1: Disabled*

  To avoid un-desired stop by pressing the STOP key on the panel by some other operator when the main operation is being performed by terminal or remotely.
  - ❖ Related Parameters:

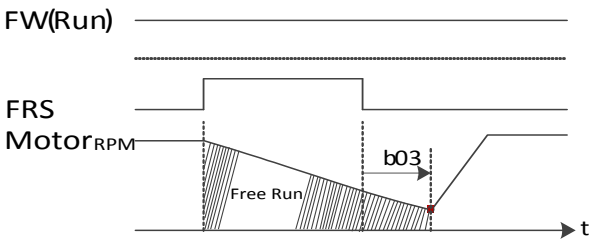
- ***b16*** ***Resume Frequency on FRS Cancellation***
  - *0: Start from 0Hz*
  - *1: Restart from frequency corresponding motor speed*

  Select what frequency VFD to resume its operation when the Free Run Sop (FRS) is cancelled.
  - ❖ Related Parameters: b03

i) When b16=0



i) When b16=1



- ***b17*** ***Modbus Node ID***
  - *Range: 1~32*

  Node ID for Modbus Communication
  - ❖ Related Parameters:

- ***b18*** ***Ground Fault Detection Setpoint***
  - *Range: 0.0 ~ 100.0 % in 0.1 %*
  - *0: Disabled*

  Program to enable the Ground fault detection and its fault level as a percentage of rated current. For N700E models under 3.7 kW(5 HP), this function is turned off from the Factory
  - ❖ Related Parameters:

- ***b19*** ***Speed Search: Current Level***
  - *Range: 90 ~ 180 % in 1%*

  Controls the starting current level during speed search motion on the basis of the motor rated current
  - ❖ Related Parameters: b19~b23

- ***b20*** ***Speed Search: Voltage Increase***
  - *Range: 10 ~ 300 % in 1 %*

  In case of the lower starting current level during speed search motion on the basis of the motor rated current, the increase level of the output voltage is set from 10% to 300%
  - ❖ Related Parameters: b19~b23

- ***b21*** ***Speed Search: Voltage Decrease***
  - *Range: 10 ~ 300 % in 1 %*

  In case of the higher starting current level during speed search motion on the basis of the motor rated current, the decrease level of the output voltage is set from 10% to 300%
  - ❖ Related Parameters: b19~b23

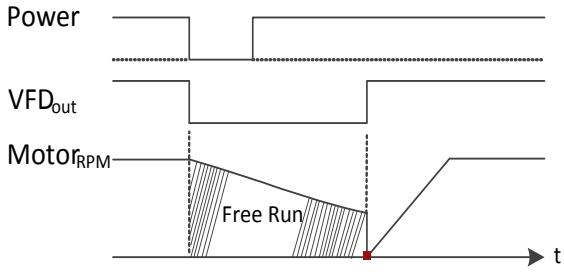
- ***b22 Speed Search: Speed Decrease***
  - *Range: 1.0 ~ 200.0 % in 0.1 %*

  Controls the speed decrease level during speed search motion.
  - ❖ Related Parameters: b19~b23

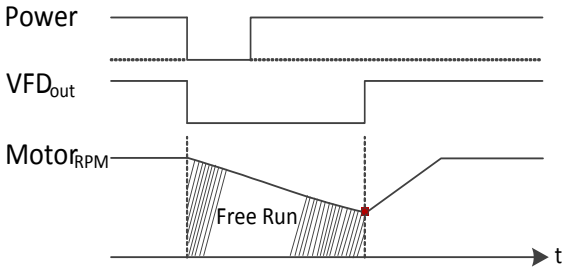
- ***b23 Frequency Match***
  - *0:* Start from 0 Hz
  - *1:* Start from frequency corresponding motor speed

  In case of inverter starting operation, the start frequency of the inverter can be selected as follows
  - ❖ Related Parameters: b19~b23

i) When b23 = 0



i) When b23 = 1



- ***b24 Fault Relay Select***
  - *0: Inactive*
  - *1: Active only when a long steady trip signal*
  - *2: Active for every trip*
  - *3:Active only when a long steady trip signal, then auto reset*

  Combined with Restart, b01 select, various method can be selected as summarized for "Overvoltage and Over current" trip and "Under voltage" trip respectively.
  - ❖ Related Parameters:

Table 3-1: Restart and Relay 1 Operation When Over Voltage or Over Current Trip

*case (b24=0) & (b24=3) are modified from the original design concept shown in Under Voltage case due to the safety concerns Thus, both cases look exactly the same as (b24=1). A first user may be confused by many different cases show the same outcome.

b24: Relay 1 Select / b01: Restart Select	**b24 = 0 *** No Relay 1 Activated originally, but, for OV & OC, Activated for Safety	**b24 = 1** Yes, Relay 1 is activated when long steady Trip signal	**b24 = 2** Yes, Relay 1 for every Trip signal	**b24 = 3 *** Relay 1 activated when long Trip signal Auto Reset to Restart is banned for safety
b01 = 0 No Restart	Trip (OV, OC) Relay 1	Trip (OV, OC) Relay 1	Trip (OV, OC) Relay 1	Trip (OV, OC) Relay 1
b01 = 1 Yes Restart @ 0 Hz	1st 2nd 3rd 4th Trip Restart Relay 1 @ 1st Trip, No Relay 1 but Restart from 0 Hz But if Trips Again @ 2nd Trip, No Relay 1 & Restart from 0 Hz @ 3rd Trip, No Relay 1 & Restart from 0 Hz @ 4th Trip, Yes Relay 1 & Wait for User Act	1st 2nd 3rd 4th Trip Restart Relay 1 @ 1st Trip, No Relay 1 but Restart from 0 Hz But if Trips Again @ 2nd Trip, No Relay 1 & Restart from 0 Hz @ 3rd Trip, No Relay 1 & Restart from 0 Hz @ 4th Trip, Relay 1 On & Wait for User Act	1st 2nd 3rd 4th Trip Restart Relay 1 @ 1st Trip, Relay 1 On & Restart from 0 Hz But if Trips Again @ 2nd Trip, Relay 1 On & Restart from 0 Hz @ 3rd Trip, Relay 1 On & Restart from 0 Hz @ 4th Trip, Relay 1 On & Wait for User Act	1st 2nd 3rd 4th Trip Restart Relay 1 @ 1st Trip, Relay 1 On & Restart from 0 Hz But if Trips Again @ 2nd Trip, Relay 1 On & Restart from 0 Hz @ 3rd Trip, Relay 1 On & Restart from 0 Hz @ 4th Trip, Relay 1 On & Wait for User Act
b01 = 2 Yes Restart @ M' Hz	1st 2nd 3rd 4th Trip Restart Relay 1 @ 1st Trip, No Relay 1 but Restart @ M' Hz But if Trips Again @ 2nd Trip, No Relay 1 & Restart @ M' Hz @ 3rd Trip, No Relay 1 & Restart @ M' Hz @ 4th Trip, Relay 1 On & Wait for User Act	1st 2nd 3rd 4th Trip Restart Relay 1 @ 1st Trip, No Relay 1 but Restart @ M' Hz But if Trips Again @ 2nd Trip, No Relay 1 & Restart @ M' Hz @ 3rd Trip, No Relay 1 & Restart @ M' Hz @ 4th Trip, Relay 1 On & Wait for User Act	1st 2nd 3rd 4th Trip Restart Relay 1 @ 1st Trip, Relay 1 On & Restart @ M' Hz But if Trips Again @ 2nd Trip, Relay 1 On & Restart @ M' Hz @ 3rd Trip, Relay 1 On & Restart @ M' Hz @ 4th Trip, Relay 1 On & Wait for User Act	1st 2nd 3rd 4th Trip Restart Relay 1 @ 1st Trip, Relay 1 On & Restart @ M' Hz But if Trips Again @ 2nd Trip, Relay 1 On & Restart @ M' Hz @ 3rd Trip, Relay 1 On & Restart @ M' Hz @ 4th Trip, Relay 1 On & Wait for User Act
b01 = 3 Yes Restart @ M' Hz & Stop	Trip Restart VFD to STOP Relay 1 @ 1st Trip, VFD Restart from M' Hz But Slow down to stop @ Stop, Trip goes back on and Relay 1 Activated	Trip Restart VFD to STOP Relay 1 @ 1st Trip, VFD Restart from M' Hz But Slow down to stop @ Stop, Trip goes back on and Relay 1 Activated	Trip Restart VFD to STOP Relay 1 @ 1st Trip, VFD Restart from M' Hz But Slow down to stop @ Stop, Trip goes back on and Relay 1 Activated	Trip Restart VFD to STOP Relay 1 @ 1st Trip, VFD Restart from M' Hz But Slow down to stop @ Stop, Trip goes back on and Relay 1 Activated

Table 3-2: Restart and Relay 1 Operation When Under Voltage Trip

b24: Relay 1 Select b01: Restart Select	**b24 = 0** No Relay 1 Activated	**b24 = 1** Yes, Relay 1 is activated when long steady Trip signal	**b24 = 2** Yes, Relay 1 for every Trip signal	**b24 = 3** Relay 1 activated when long Trip signal then auto Reset to Restart
b01 = 0 No Restart	Trip (UV) Relay 1	Trip (UV) Relay 1	Trip (UV) Relay 1	Trip (UV) Relay 1
b01 = 1 Yes Restart @ 0 Hz	1st 2nd 10th 11th Trip Restart Relay 1 @ 1st Trip, No Relay 1 but Restart from 0 Hz But if Trips Again @ 2nd Trip, No Relay 1 & Restart from 0 Hz @11th Trip, No Relay 1 & Wait for User Act	1st 2nd 10th 11th Trip Restart Relay 1 @ 1st Trip, No Relay 1 but Restart from 0 Hz @ 2nd Trip, No Relay 1 & Restart from 0 Hz @11th Trip, No Relay 1 & Wait for User Act	1st 2nd 10th 11th Trip Restart Relay 1 @ 1st Trip, Relay 1 On & Restart from 0 Hz @ 2nd Trip, Relay 1 On & Restart from 0 Hz @11th Trip, Relay 1 On & Wait for User Act	1st 2nd 10th 11th Trip Restart Relay 1 @ 1st Trip, No Relay 1 but Restart from 0 Hz @ 2nd Trip, No Relay 1 & Restart from 0 Hz @11th Trip, Relay 1 On then Auto Reset and Restart from 0 Hz
b01 = 2 Yes Restart @ M' Hz	1st 2nd 10th 11th Trip Restart Relay 1 @ 1st Trip, No Relay 1 but Restart @ M' Hz But if Trips Again @ 2nd Trip, No Relay 1 & Restart @ M' Hz @11th Trip, No Relay 1 & Wait for User Act	1st 2nd 10th 11th Trip Restart Relay 1 @ 1st Trip, No Relay 1 but Restart @ M' Hz But if Trips Again @ 2nd Trip, No Relay 1 & Restart @ M' Hz @11th Trip, No Relay 1 & Wait for User Act	1st 2nd 10th 11th Trip Restart Relay 1 @ 1st Trip, Relay 1 On & Restart @ M' Hz @ 2nd Trip, Relay 1 On & Restart @ M' Hz @11th Trip, Relay 1 On & Wait for User Act	1st 2nd 10th 11th Trip Restart Relay 1 @ 1st Trip, No Relay 1 but Restart @ M' Hz But if Trips Again @ 2nd Trip, No Relay 1 & Restart @ M' Hz @11th Trip, Relay 1 On then Auto Reset and Restart from 0 Hz
b01 = 3 Yes Restart @ M' Hz & Stop	Trip Restart VFD to STOP Relay 1 @ 1st Trip, VFD Restart from M' Hz But Slow down to stop @ Stop, Trip goes back on and Relay 1 NOT Activated	Trip Restart VFD to STOP Relay 1 @ 1st Trip, VFD Restart from M' Hz But Slow down to stop @ Stop, Trip goes back on and Relay 1 Activated	Trip Restart VFD to STOP Relay 1 @ 1st Trip, VFD Restart from M' Hz But Slow down to stop @ Stop, Trip goes back on and Relay 1 Activated	Trip Restart VFD to STOP Relay 1 @ 1st Trip, VFD Restart from M' Hz But Slow down to stop @ Stop, Trip goes back on and Relay 1 Activated

- ***b25 Stop Method***
  - *0: Ramp to Stop*
  - *1: Coast to Stop (Free Run to Stop)*

  Select a stop method when Stop command is given.
  - ❖ Related Parameters:

- ***b26 HD/ND (Torque Type) Select***
  - *0: Heavy Duty (HD): Constant Torque Load Type*
  - *1: Normal Duty (ND): Variable Torque Load Type*

  Select a torque type for appropriate “Rated Power” and “Overload Tolerance” values. For instance, for Fans, or centrifugal pump applications, select ND and Hoists, conveyors, pump process, select HD. Factory setting of Carrier Frequency value for HD and ND in the table.
  - ❖ Related Parameters: b11

Model	b26=0(Heavy Duty)	B26=1(Normal Duty)	Range(kHz)
N700E: 055LF/075LFP~150LF/185LFP	5.0 kHz	2.0 kHz	1.0~16.0
N700E: 185LF/220LFP	5.0 kHz	2.0 kHz	1.0~10.0
N700E: 220LF	3.0 kHz	2.0 kHz	1.0~10.0
N700E: 300LF/370LFP~750LF/900LFP	3.0 kHz	2.0 kHz	1.0~10.0
N700E: 055HF/075HFP~150HF/185HFP	5.0 kHz	2.0 kHz	1.0~16.0
N700E: 185HF/220HFP	5.0 kHz	2.0 kHz	1.0~10.0
N700E: 220HF/300HFP~1320HF/1600HFP	3.0 kHz	2.0 kHz	1.0~10.0
N700E: 1600HF/2000HFP~3500HF/3800HFP	2.0 kHz	2.0 kHz	1.0~4.0

- ***b27 Input Phase Loss Detection Period***
  - *0: Disabled*
  - *Range: 0 ~ 100 Sec in 1 Sec*

  Enables & sets the time period to determine if an Input Phase Loss occurs. The VFD monitors the ripple on the DC bus voltage and if it occurs for the programmed magnitude and time period an Input Phase Loss fault will occur. The ripple on the DC bus will cause heating to the DC Bus capacitors which will shorten their life.
  - ❖ Related Parameters:

- ***b28 Communication Time Out Detection***
  - *0: Disabled*
  - *Range: 0 ~ 60 Sec in 1 Sec*

  Select a time out detection period when communication discontinues. If no communication event occurs during this time period, a communication fault will occur.
  - ❖ Related Parameters:

- ***b29 Communication Time Out Detection Mode***
  - *0: Always Running*
  - *1: Only during VFD is Running*

  Select a time out detection mode.
  - ❖ Related Parameters:

- ***b30 Display at Power On***
  - *Range: 1 ~ 13 (for d01 ~ d13)*

  Select an initial display parameter at power on
  - ❖ Related Parameters:

- ***b31 RXP-RXN terminal Communication Baud Rate***
  - *1: 2,400 bps*
  - *2: 4,800 bps*
  - *3: 9,600 bps*
  - *4: 19,200 bps*

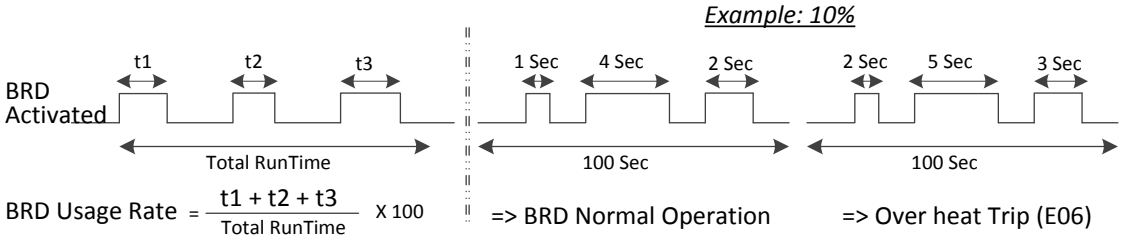
  Select a baud rate for the RXP-RXN terminal communication RS485 channel
  - ❖ Related Parameters:

- ***b32 BRD Mode***
  - *0: Disabled*
  - *1: Only during VFD Running*
  - *2: Always*

  This BRD function is only applicable to N700E models under 22kW(30 HP)
  Regenerative energy from the motor is dissipated by the heat through this braking resistor module.
  - ❖ Related Parameters:

- ***b33 BRD Duty Cycle***
  - *Range: 0.0 ~ 50.0 % in 0.1 %*

  Select a percentage value of total BRD on time before the overheating fault occurs
  - ❖ Related Parameters:

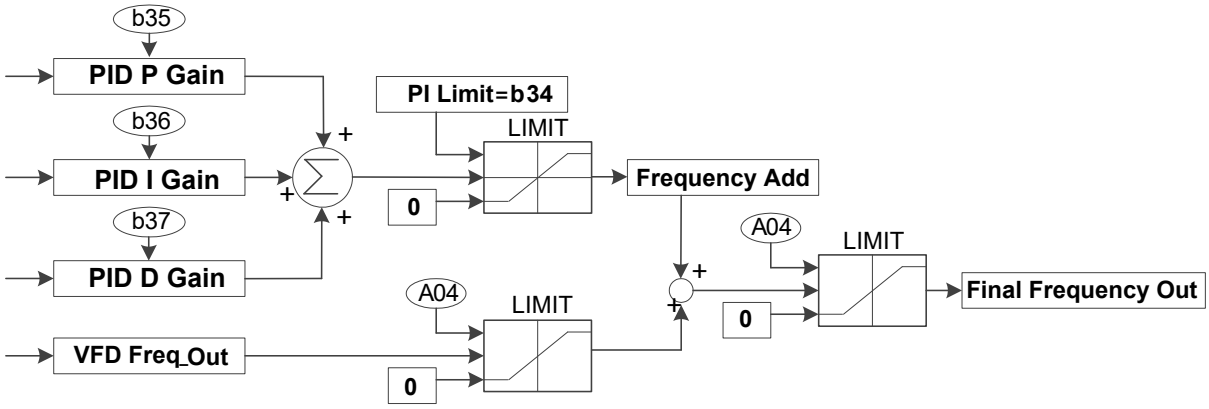


- ***b34 ~ 41 Overvoltage Suppression(OVS) Function***

The Overvoltage Suppression (OVS) feature will over speed the motor up to the Maximum OVS Output Frequency (b34) to prevent motor regeneration and creating an Overvoltage Fault. If the OVS runs at maximum frequency for longer than the Limit Time (b41), the unit will fault on E02.

OVS Functional Description

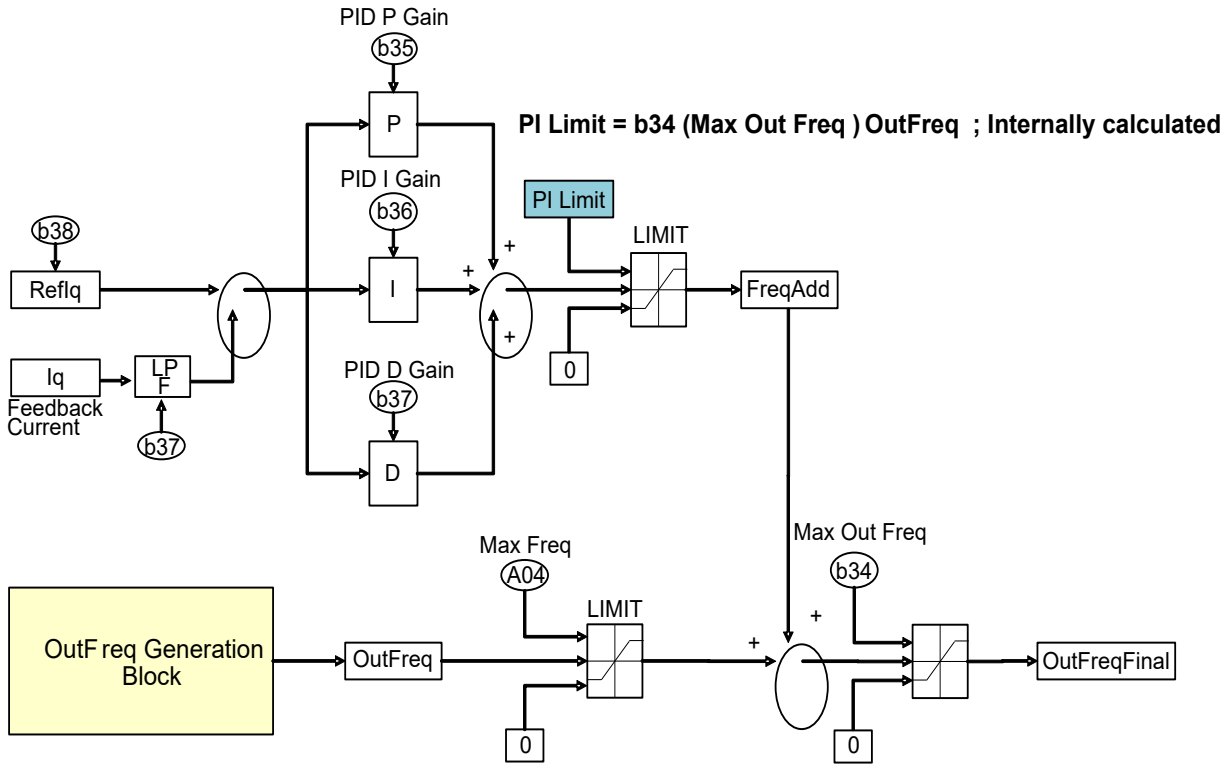
- By calculating torque in real time, reduce regeneration energy by increasing speed.
- For speed control, PI controller is applied.
- If torque is bigger than 0, “PI Out” become 0 by “PI Limiter”; no increase in frequency value
- If torque is lower than 0, “PI Out” would be increased to “Max Add Req”; frequency value increased
- If output of PI controller is reached to b34(Max Add Freq) The counter is started.
- When the value of counter is reached to b41 (wRegen Time), the trip(E02) will be occur.



Parameters

Code	Name	Range	Default	Unit	Run-time edit
b34	Maximum OVS Output Frequency	0.00 ~ 300.0	80.00	Hz	O
b35	PID P Gain (Voltage suppression P gain)	0.0 ~ 10000	1000	-	O
b36	PID I Gain Time (Voltage suppression I gain)	0.0 ~ 10000	100	Sec	O
b37	PID D Gain Time (Voltage suppression D gain)	0.0 ~ 10000	0	Sec	O
b38	q-Current Reference(q axis reference current)	-100.0~100.0	25.0	-	O
b39	Filter Bandwidth(q axis LPF coefficient)	0.0~1000	1	mS	O
b40	Overvoltage Suppression(wDec Mode)	0: Disabled 1:Enabled	0	-	O
b41	Limit Time(wRegen Time)	0.0~1000	0.5	Sec	O

Setting Parameters



Meaning of b34 is changed from Max Add Freq to Max Out Freq

- ***b34 Maximum OVS Output Frequency***
  - *Range: 0.0 ~ 300.0 Hz in 0.1 Hz*

  Real time editable a maximum frequency limit for OVS function
  - ❖ Related Parameters:

- ***b35 OVS P Gain***
  - *Range: 0 ~ 10,000 in 1*

  - Real time editable P gain for OVS PID loop
  - PIOut = err * Kp
  - Hz = err(%) * Kp * scalefactor(50 * 1e-6)

  Example
  - err 10%, Kp = 1000
    - ⇨ PIOut = 0.5Hz
  - ✓ Recommended Value in test bench
    - ⇨ 1000 or less than 5000

  - ❖ Related Parameters

- ***b36 OVS I Gain Time***
  - *Range: 0 ~ 10,000 Sec in 1 Sec*

  Real time editable I gain for OVS PID loop
  - PIOut = ∫(err * Ki)
  - Hz += err(%) * Ki * scalefactor(50 *1e-6), dT = 1msec

  Example (Integration Time to 10Hz on Error)
  - err 10%, Ki = 1000
    - ⇨ Time to 10Hz on 10% Error = 20msec
  - err 10%, Ki = 100
    - ⇨ Time to 10Hz on 10% Error = 200msec
  - err 10%, Ki = 10
    - ⇨ Time to 10Hz on 10% Error = 2000msec
  - ✓ Recommended Value in test bench
    - ⇨ 100 or less than 500

  - ❖ Related Parameters:

- ***b37 OVS D Gain Time***
  - *Range: 0 ~ 10,000 Sec in 1 Sec*

  Real time editable D gain for OVS PID loop. Its value depends on b39; filter bandwidth. Thus, if b39 is not changed, no need to change OVS PID D Gain value. Most application, this value should not be set over 3000
  - ✓ Recommended Value as a function of b39
    - ⇨ If b39 < 10 → b37: 0 ~ 500
    - ⇨ If b39 < 30 → b37: 500 ~ 1000
    - ⇨ If b39 < 50 → b37: 1000 ~ 1500

  - ❖ Related Parameters:

- ***b38 q-Current Reference(q axis reference current)***
  - *Range: -100.0 ~ 100.0 in 0.1*

  Real time editable q axis reference current compensates Torque Estimate Error.

  - If Torque estimate offset is bigger than 0
    - ⇨ No increase in output frequency even if regeneration is occurred.
    - ⇨ This situation could be end with OV Trip.
    - ⇨ If so, set b38 to a positive value
  - If Torque estimation offset smaller than 0
    - ⇨ No increase in output frequency even if regeneration is not occurred.
    - ⇨ Output Frequency could be increased to Max. Freq (Reference Frequency + b34) and end up with E02 (OVS Fail)
    - ⇨ If so, set b38 to a negative value

  ❖ Related Parameters

- ***b39 Filter Bandwidth (q axis LPF coefficient)***
  - *Range: 0 ~ 1000 milliseconds in 1 mSec*

  Real time editable Iq feedback Low Pass Filter time constant

  - If output Frequency is not stable,
    - ⇨ Increase b39 value
  - ➢ Recommended Value as a function of (b39); (b37) value should be set accordingly
    - ⇨ Not set over 50

  ❖ Related Parameters:

- ***b40 Overvoltage Suppression (wDec Mode)***
  - *0: Disabled*
  - *1: Enabled*

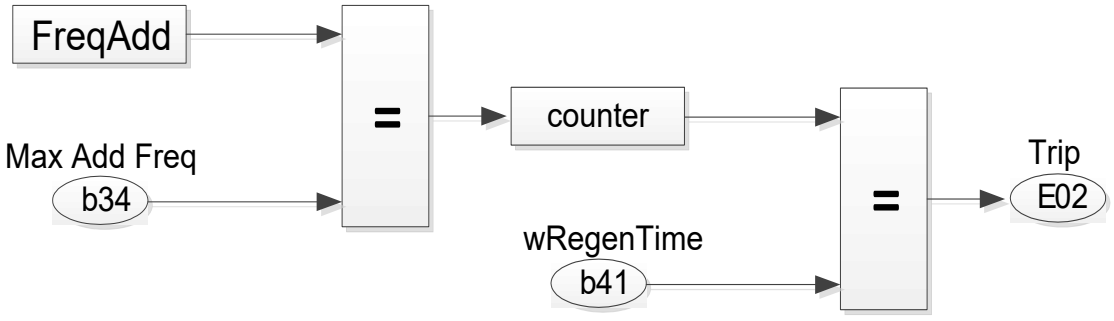
  Select to enable the Voltage Suppression Control function.

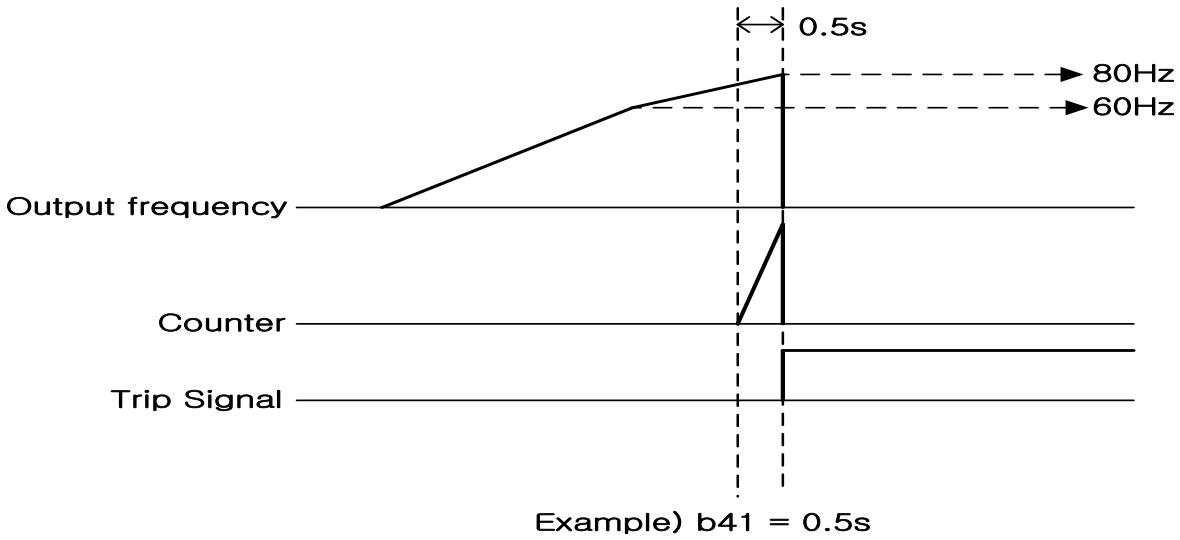
  ❖ Related Parameters:

- ***b41 Limit Time (wRegen Time)***
  - *Range: 0.0 ~ 1000 Sec in 0.1 Sec*

  Real time editable OVS control fail check time. If PID output is saturated to Maximum OVS output Frequency (b34) during this time period, VFD will stop and E02 will be occurred.

  ❖ Related Parameters:





Case1) If frequency is increased at no regeneration condition,

- Cause: when a current feedback value is corrupted by noise.
- Measures:
  - ✓ Change a b39(Filter of current F/B) and b37(D gain)
    Please set the b39 between 5 and 30 (ex 5, 10, 20, 30ms)
    Increasing b39 results the delay in calculating torque so b37 should be set .
    Please set the b37 between 500 to 1000
  - ✓ Experimental values on MG-Set test are
    b39: 30, b37: 1000

Case2) If overvoltage trip is occurred at normal operation,

- Cause: Torque is over estimated due to motor parameter error or current sensing error.
- Measures :
  - ✓ Change a b38(Reference Current)
    Please set the b39 between 30 to 100
    If this value is set too high, Frequency output can be saturated to maximum frequency.

Calculated torque output

User can monitor calculated torque by 2 methods

■ Parameters

Code	Name	Description	default	Run-time Edit
C18	wAODef (FM Output selection)	0 ~ 4	0	X
C25	wAODef2(AM Output selection)	0 ~ 4	1	X

- Analog output (DC voltage)
  - C18 (FM Output selection)

    Set "C18=4" display calculated torque value (-150%~+150%) by analog output.

FM output	Torque
0V	-150%
5V	0%
10V	+150%

(※ C18 = 0~3 are the same as existed function)

- Analog output (current)
  - C25 (AM Output selection)

    Set "C25=4" display calculated torque value (-150%~+150%) by analog output.

AM output	Torque
4mA	-150%
12mA	0%
20mA	+150%

(※ C25 = 0~3 are the same as existed function)

  - Special parameter: Calculated torque read frame by Modbus

    - CMD : 03 (Read)
    - Parameter : 10 (Calculated Torque)

	Communication Number	CMD	Parameter	Data Quantity	CRC
TX	01	03	000A	0001	2byte

	Communication Number	CMD	Byte Quantity	Data	CRC
RX	01	03	02	Torque value	2byte

※This document are written by result of test bench.

Field engineer should be tuned for each field situation by consider above case study.

b42 ~ b46 (Extended A33 ~ A37) – Also Explained in A -Group

- ***b42 VFD Start Delay Time after DC Injection Braking***
  - *Range: 0.0 ~ 60.0 Sec in 0.1 Sec*

  Program the VFD start delay time after braking time at start is done
  - ❖ Related Parameters: A33, b43~b46

- ***b43 DC Injection Braking Time at Start***
  - *Range: 0.0 ~ 6000 Sec in 0.1 Sec*

  Program the DC Injection Braking duration before VFD start
  - ❖ Related Parameters: A33, b42~b46

- ***b44 Current Controller P Gain in DC Braking***
  - *Range: 1 ~ 10,000 in 1*

  Program the current controller P gain in DC braking
  - ➢ This value is applied both brake modes (start and stop)
  - ➢ If motor speed has a large overshoot at DC braking, decrease this value
  - ➢ If value is too big, motor can be vibrated or can't be stopped
  - ❖ Related Parameters: A33, b42~b46

- ***b45 Current Controller I Gain Time in DC Braking***
  - *Range: 0 ~ 10,000 Sec in 1 Sec*

  Program the current controller I gain in DC braking
  - ➢ This value is applied both brake modes (start and stop)
  - ➢ If motor is vibrated or not stop at DC braking, decreased this value
  - ➢ If value is too big, DC braking force can be weak
  - ❖ Related Parameters: A33, b42~b46

- ***b46 DC Injection Braking Force at Start***
  - *Range: 0.0 ~ 100.0 % in 0.1 %*

  Program the level of DC injection braking force of rated electric power of N700E
  - ❖ Related Parameters:

- ***b47 Flying Start P Gain***
  - *Range: 0.01 ~ 100.0 in 0.01*

  P gain is used to tune flying start operation. This parameter is only applicable when b23 = 1. If P gain is increased, the time of speed searching is reduced. If P gain is increased too much, it can cause motor current overshoot. If P gain is decreased too much, it may not work normally
  - ❖ Related Parameters: b23

- ***b48 Flying Start I Gain Time***
  - *Range: 0.0 ~ 3600.0 in 0.1*

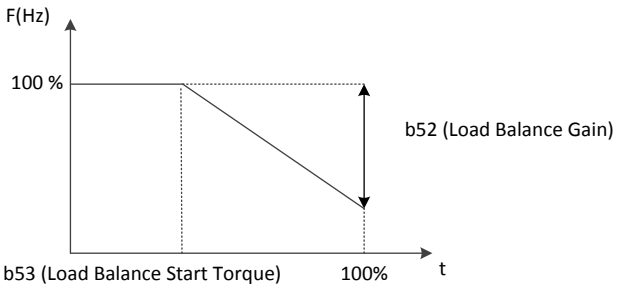
  I gain is used to tune flying start operation. If I gain is 0, only P gain will be used. If the time of speed searching is slow, and b47 has already been tuned to its optimal value, decrease (b48) value. If over current or overvoltage occurs during speed search, increase I gain or set to 0.
  - ❖ Related Parameters: b23

- ***b49 Overload Restriction Level at Acceleration & Deceleration***
  - *Range: 20.0 ~ 200.0 (HD)*
  - *Range: 20.0 ~ 165.0 (ND)*

  Separately programmable overload restriction is that applies only during the acceleration and deceleration periods. This function works the same as b07, but can be configured to a different value to account for the difference in current draw during normal operation and flying start.
    - ❖ Related Parameters:b06, b07, b23

◆ ***b50 ~ 55 Load Balance Function***

Load Balance is a feature that automatically shares the load level between two independent motors driving the same load. The Output Frequency of each motor is independently changed by the amount of torque it is applying. The amount of the increase/decrease is dependent on the amount of torque being applied.



$$\text{Control Frequency} \times \frac{(\text{Output Torque} - \text{Load Balance Start Torque})}{100\% - \text{Load Balance Start Torque}} \times \text{Load Balance Gain} \times \text{Load Balance Target Frequency}$$

- ***b50 Load Balance Start Frequency***
  - *Range: 0.00 ~ 60.00 Hz in 0.01 Hz*

  Sets the frequency where the Load Balance Start Frequency feature is enabled.
  When running below this frequency the feature is disabled.

- ***b52 Load Balance Gain***
  - *Range: 0.00 ~ 50.00 in 0.01*

  Sets the rate of change when this feature is functioning.
  It is based on a percentage of the output torque being applied.

- ***b53 Load Balance Start Torque***
  - *Range: 0.0 ~ 100.0 % in 0.1 %*

  Sets the amount of output torque applied at start when the Load Balance function is enabled.

- ***b54 Load Balance Ramp Time***
  - *Range: 1.0 ~ 100.0 Sec in 0.1 Sec*

  Sets the ramp rate applied to the output frequency when the Load Balance function is enabled.

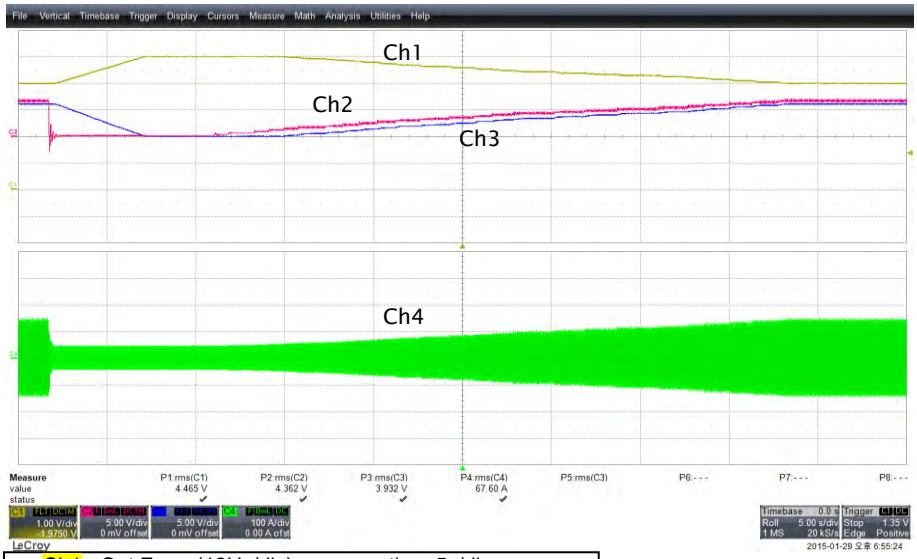
- ***b55 Load Balance Mode***
  - *0: Disabled*
  - *1: Enabled*

  - ***Set 0: Disabled***
    Load balance is disabled

  - ***Set 1: Enabled***
    Load balance works without any feedback

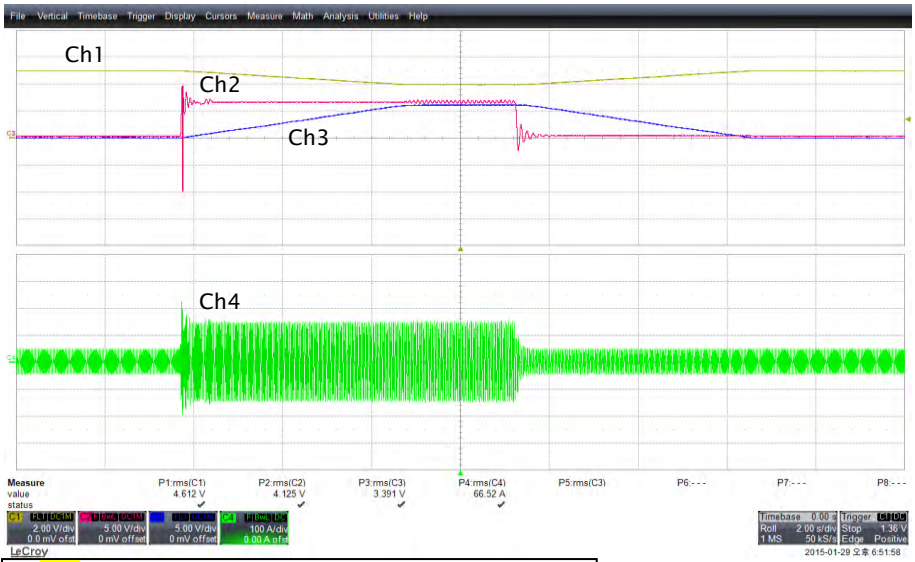
Example

1) Increased the load ratio up to 100%
Output frequency decreased by the amount of load



Ch1 : Out Freq. (12Hz/div) time 5s/div
Ch2 : Estimated Torque
Ch3 : Calculated Load Balance Freq
Ch4 : Output Current(100A/div)

2) Put 100% step load and removed 100% load in a moment
Put the step load (100%) for 8 seconds and then remove the step load.
The Load Balance control decreased the output frequency for b54 value (5sec) at step load.
The Load Balance control increased the output frequency for b54 value (5sec) at no step load.



Ch1 : Out Freq. (12Hz/div) time 5s/div
Ch2 : Estimated Torque
Ch3 : Calculated Load Balance Freq
Ch4 : Output Current(100A/div)

◆ ***b56 ~ 60 System Load Detection Function***

The drive provides two independent torque detection functions that trigger an alarm or fault signal when the load is too heavy or suddenly drops

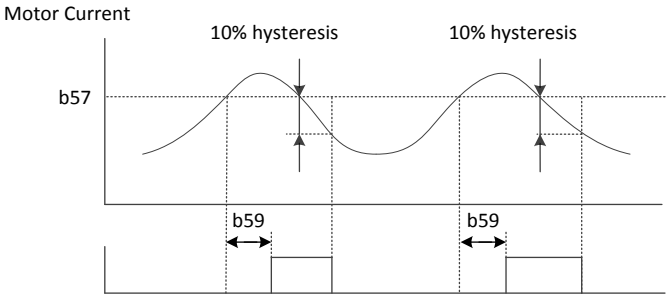
- ***b56 System Load Detection Selection***
  - *0: Disabled*
  - *1: Overload Detection*
  - *2: Underload Detection*
  - *3: Overload/Underload Detection*
  - *4: Overload Detection with Fault (E23)*
  - *5: Underload Detection with Fault (E24)*
  - *6: Overload/Underload Detection with Fault (E23, E24)*

  For settings, 1~6 allows a relay contact to alert an external device, related parameters C13, C14, C15. In addition, setting 4~6 triggers trip signals display on the keypad

- ***b57 System Overload Detection Level***
  - *Range: 20.0 ~ 200.0 % in 0.1 %*

  Sets the System Overload level. This feature is triggered when the motor current exceeds this level. 100% level is based off of the value in H05.

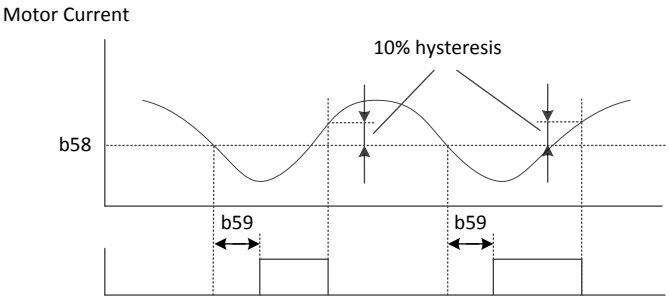
System Overload Detection



- ***b58 System Underload Detection Level***
  - *Range: 20.0 ~ 200.0 % in 0.1 %*

  Sets the System Underload level. This feature is triggered when the motor current exceeds this level. 100% level is based off of the value in H05.

System Underload Detection



- ***b59 System Overload/Underload Detection Time***
  - *Range: 0.0 ~ 60.0 Sec in 0.1 Sec*

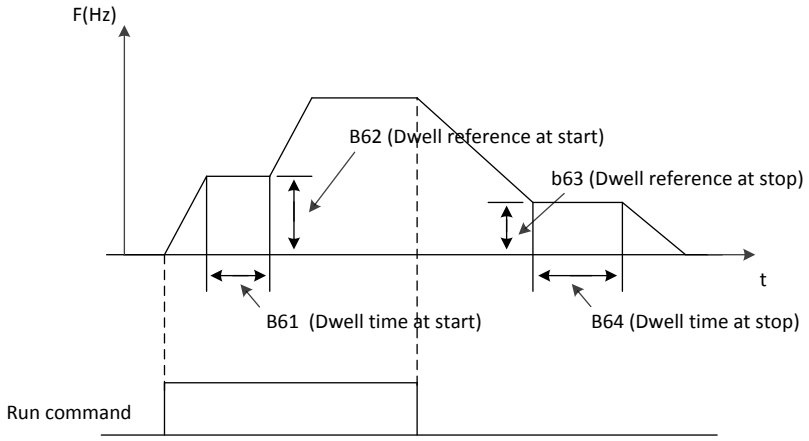
  Sets the System Overload/Underload Detection time.

- ***b60 System Overload/Underload Detection safe zone***
  - *Range: 0.00 ~ Max frequency (A04) in 0.01 Hz*

  Sets the level at which this feature is disabled.
  System Overload/Underload detection doesn't work below b60 value

◆ ***b61 ~ 64 Dwell Function***

The Dwell Function temporarily holds the output frequency at a predetermined value for a predetermined time before accelerating or decelerating to the current frequency reference. The Dwell function helps preventing speed loss when starting and stopping a heavy load



- ***b61 Dwell Reference at Start***
  - *Range: 0.00 ~ Max frequency (A04) in 0.01 Hz*

  Program Dwell frequency at start

- ***b62 Dwell Time at Start***
  - *Range: 0.0 ~ 10.0 Sec in 0.1 Sec*

  Program Dwell time at start

- ***b63 Dwell Reference at Stop***
  - *Range: 0.00 ~ Max frequency (A04) in 0.01 Hz*

  Program Dwell frequency at stop

- ***b64 Dwell Time at Stop***
  - *Range: 0.0 ~ 10.0 Sec in 0.1 Sec*

  Program Dwell time at stop

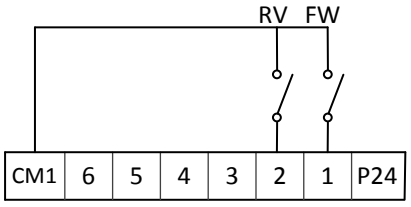
3.6 C Group Parameters

INPUT

- ***C01~C06 Intelligent Input Terminals 1~6***
  These input terminals can be programmed one of following functions.

  - *0: FW Forward Run Command*
  - *1: RV Reverse Run Command*
  - *2: CF1 Multiple Speed Command 1*
  - *3: CF2 Multiple Speed Command 2*
  - *4: CF3 Multiple Speed Command 3*
  - *5: CF4 Multiple Speed Command 4*
  - *6: JG Jogging Operation Command*
  - *8: 2CH Acceleration 2/Deceleration 2 Command*
  - *9: FRS Free Run Stop Command*
  - *10: EXT External Trip 1*
  - *11: USP Unattended Start Protection*
  - *12: SFT Software Lock Function*
  - *13: AT Analog Input Current/Voltage Selection*
  - *14: RS Reset*
  - *15: STA Start*
  - *16: STP Keep*
  - *17: F/R Forward / Reverse*
  - *18: Up Remote Control Up*
  - *19: Down Remote Control Down*
  - *20: O/R Local Keypad Operation*
  - *21: T/R Local Terminal Input Operator*
  - *22: PIDIR PID Integral Reset*
  - *23: PIDD PID Disabled*
  - *24: FO Frequency Override*
  - *25: RO Reset Override*
  - *26: EXT2 External Trip 2*
  - *27: EXT3 External Trip 3*
  - *28: EXT4 External Trip 4*
  - *29: EXT5 External Trip 5*
  - *30: EXT6 External Trip 6*
  - *31: UP/DOWN Initial Value Clear*

- ***C07~C012 Input Terminal Mode 1~6***
  - *0: Normally Open (NO)*
  - *1: Normally Closed (NC)*



- ***Set 0: Forward Run/Stop (FW)***
- ***Set 1: Reverse Run/Stop (RV)***

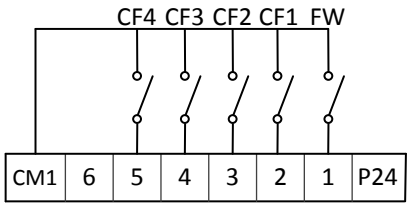
Code	Set Value	Description
A01	1	Frequency Command by Terminal Input
A02	1	Run Command by Terminal Input
C01	0	Set Terminal 1 to FW Operation
C02	1	Set Terminal 2 to RV Operation
C07	0	FW Operation: Terminal 1 to Normal Open When shorted(Closed); FW Run, When Open, FW Stop
C08	0	FW Operation: Terminal 1 to Normal Open When Shorted(Closed): FW Run; When Open, FW Stop

Caution * If Terminal 1 and Terminal2 are closed at the same time, VFD will stop

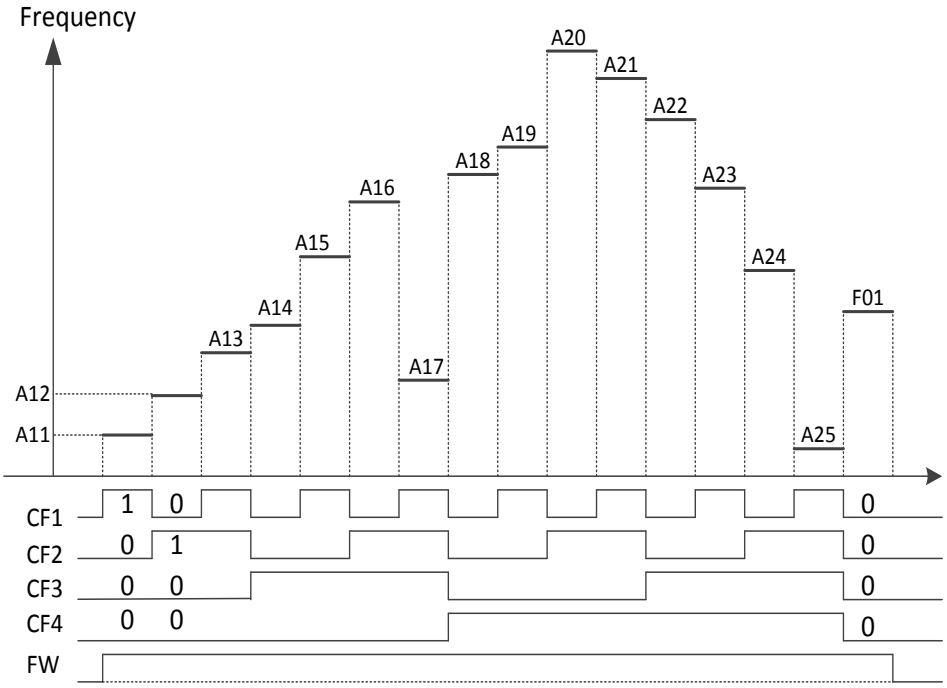
** If Run Connection and Command are set prior to the power up, as soon as power is on, motor will be running. Check if any command is set prior to the power is applied.

- ***Set 2: Multiple Speed Command 1 (CF1)***
- ***Set 3: Multiple Speed Command 2 (CF2)***
- ***Set 4: Multiple Speed Command 3 (CF3)***
- ***Set 5: Multiple Speed Command 4 (CF4)***

By combining CF4 ~ CF1, a frequency value can be selected From A11 ~ A25.



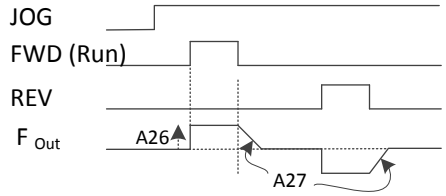
Code	Set Value	Description
A02	1	Run Command by Terminal Input
C01	0	Set Terminal 1 to FW Operation
C02	2	Set Terminal 2 to Multi Speed Command 1
C03	3	Set Terminal 3 to Multi Speed Command 2
C04	4	Set Terminal 4 to Multi Speed Command 3
C05	5	Set Terminal 5 to Multi Speed Command 4
C07~C11	0	Set Terminal 1 to 5 Normal Open When shorted(Closed); FW Run, When Open, FW Stop
F01	60	Set Output Frequency to 60Hz, but user programmable from 0 to 400 Hz
A11~A25	Hz	Program values for respective parameters. Refer to A Group.

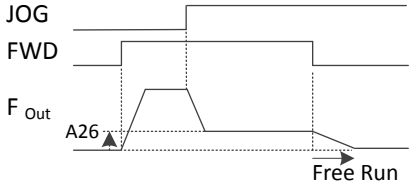


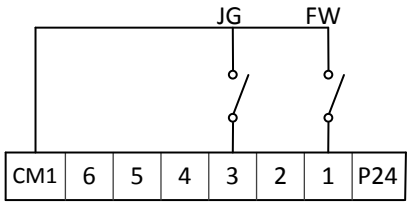
CF4	CF3	CF2	CF1	Frequency
0	0	0	0	F01
0	0	0	1	A11
0	0	1	0	A12
0	0	1	1	A13
0	1	0	0	A14
0	1	0	1	A15
0	1	1	0	A16
0	1	1	1	A17
1	0	0	0	A18
1	0	0	1	A19
1	0	1	0	A20
1	0	1	1	A21
1	1	0	0	A22
1	1	0	1	A23
1	1	1	0	A24
1	1	1	1	A25

- ***Set 6:*** ***Jogging Operation Command (JG)***
  Jogging frequency is used to move/rotate the motor in small increment at low frequency.

Code	Set Value	Description
A02	1	Run Command by Terminal Input
C01	0	Set Terminal 1 to FW Operation
C03	6	Set Terminal 3 to JG Operation
C07	0	Set Terminal 1 to Normally Open
		When shorted(Closed); FW Run, When Open, FW Stop
C09	0	Set Terminal 3 to Normally Open
A26	[0.5~10Hz]	Jog Frequency Setpoint
A27	[0,1,2]	Jog Stop Mode (0:Free Run, 1: Deceleration, 2: DC Braking)

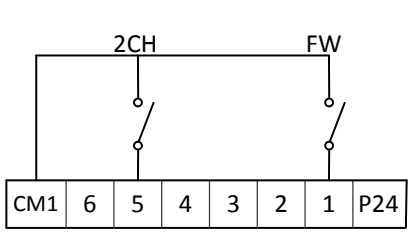


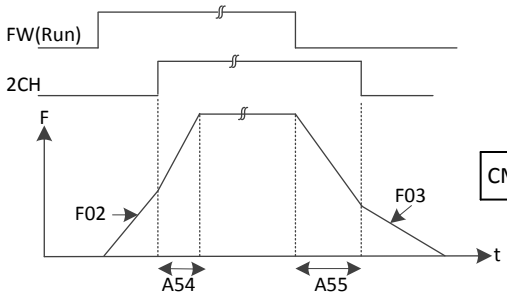


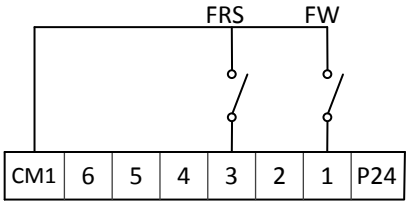


- ***Set 8:*** ***2 Stage Acceleration/Deceleration (2CH)***
  By activating FRS command, second set of frequency acceleration and deceleration values can be selected.

Code	Set Value	Description
A02	1	Run Command by Terminal Input
C01	0	Set Terminal 1 to FW Operation
C05	6	Set Terminal 5 to 2CH Operation
C07	0	Set Terminal 1 to Normal Open
		When shorted(Closed); FW Run, When Open, FW Stop
C11	0	Set Terminal 5 to Normal Open
A54	[0.1~3000]	Acceleration Time 2
A55	[0.1~3000]	Deceleration Time 2
A56	0	Accel/Decel 2 Command Select to Teminal (if 1: use A57 & A58 F setpoint)
A57		Accel Time 2 Transition Frequency Setpoint
A58		Decel Time 2 Transition Frequency Setpoint



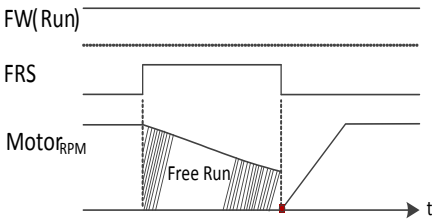




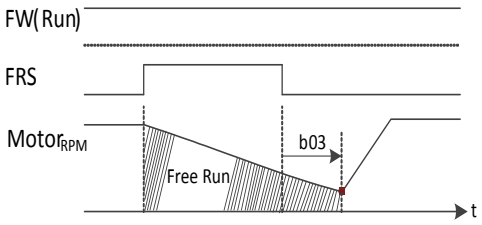
- ***Set 9:*** ***Free Run Stop Command (FRS)***
  By activating FRS command, VFD stops the output and the motor coasts to stop.

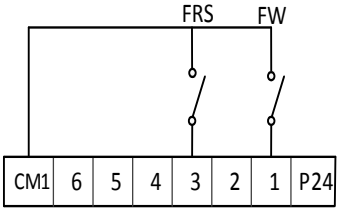
Code	Set Value	Description
A02	1	Run Command by Terminal Input
C01	0	Set Terminal 1 to FW Operation
C03	9	Set Terminal 3 to FRS Operation
C07	0	Set Terminal 1 to Normal Open
		When shorted(Closed); FW Run, When Open, FW Stop
C09	0	Set Terminal 3 to Normal Open
b03	[0.1~10]	Delay Time to VFD Restart
b16	0	Restart Frequency Set to 0Hz on FRS Cancellation (1: Resume M-Fre)

i) When b16 = 0



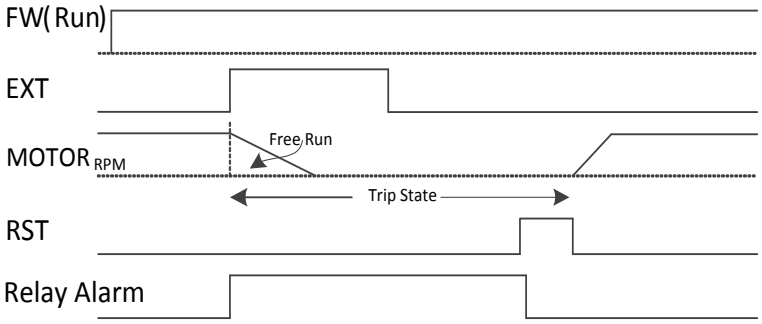
i) When b16 = 1

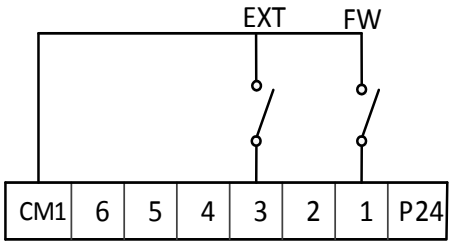




- ***Set 10:*** ***External Trip 1 (EXT)***
  By asserting a trip signal, it forces the VFD to stop and generates E12. Even when EXT becomes inactive by opened the switch, the VFD remains the trip state. Thus, activating reset signal or recycle the power must be done to clear the error state.

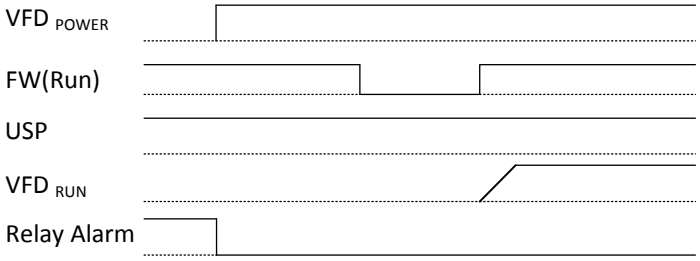
Code	Set Value	Description
A02	1	Run Command by Terminal Input
C01	0	Set Terminal 1 to FW Operation
C03	10	Set Terminal 3 to FRS Operation
C07	0	Set Terminal 1 to Normal Open
		When shorted(Closed); FW Run, When Open, FW Stop
C09	0	Set Terminal 3 to Normal Open

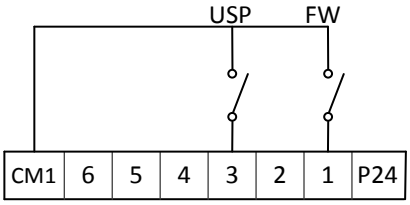




- ***Set 11: Unintended Start Protection (USP)***
  USP function is to prevent the automatic start up at power on. If the Run(FW/RV) command is activated prior to the power up, as soon as the power is applied, the VFD starts to run immediately. If USP is enabled, the VFD would not run till VFD is reset.

Code	Set Value	Description
A02	1	Run Command by Terminal Input
C01	0	Set Terminal 1 to FW Operation
C03	11	Set Terminal 3 to USP Operation
C07	0	Set Terminal 1 to Normal Open When shorted(Closed); FW Run, When Open, FW Stop
C09	0	Set Terminal 3 to Normal Open





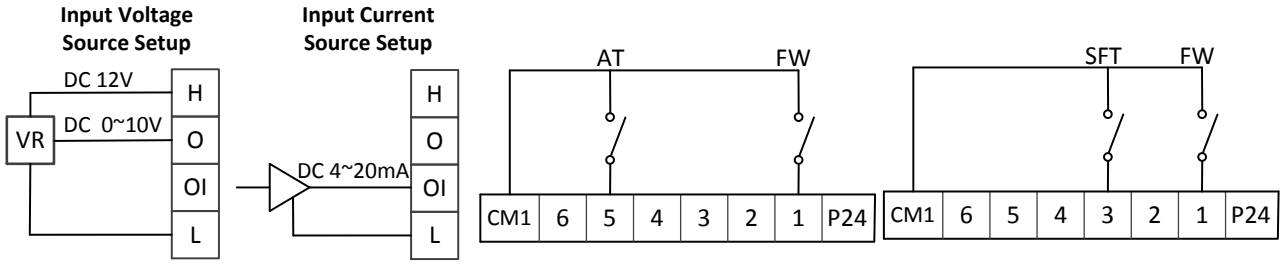
- ***Set 12: Software Lock Function (SFT)***
  Software lock function disables all the parameter value editing except b09

Code	Set Value	Description
A02	1	Run Command by Terminal Input
C01	0	Set Terminal 1 to FW Operation
C03	12	Set Terminal 3 to SFT Operation
C07	0	Set Terminal 1 to Normal Open When shorted(Closed): FW Run, When Open: FW Stop
C09	0	Set Terminal 3 to Normal Open

- ***Set 13: Analog Input Current / Voltage Select (AT)***
  If Shorted: Select Current Source
  If Opened: Select Voltage Source

Code	Set Value	Description
A02	1	Run Command by Terminal Input
A01	1	Frequency Command by Terminal Input
C01	0	Set Terminal 1 to FW Operation
C05	13	Set Terminal 5 to AT Operation
C07	0	Set Terminal 1 to Normal Open When shorted(Closed), Select Current Source; When Open, Voltage Source
C11	0	Set Terminal 5 to Normal Open

Caution * If A01 is programmed to 1, but AT is not assigned on the terminal, VFD uses internal algebraic sum of the voltage and the current inputs for the frequency value

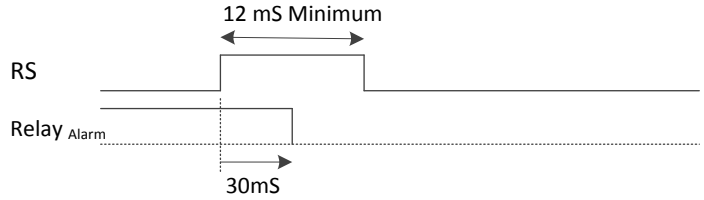


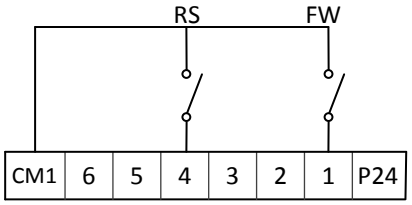
- ***Set 14: Reset (RS)***

Code	Set Value	Description
A02	1	Run Command by Terminal Input
C01	0	Set Terminal 1 to FW Operation
C04	14	Set Terminal 4 to ST Operation
C07	0	Set Terminal 1 to Normal Open When shorted(Closed): FW Run, When Open: FW Stop
C10	0	Set Terminal 4 to Normal Open

Danger *When Reset is asserted to clear the fault, if the RUN command is executed by FW/RV terminal set, the motor will immediately run to the speed. Be sure to set the RS after RUN command is disconnected in order to prevent

Caution *If longer than 4 second is continued to be ON, E60, communication error will be displayed. Reset by disconnect RS terminal to OFF or press STOP/RESET Key and resume VFD operation to normal.



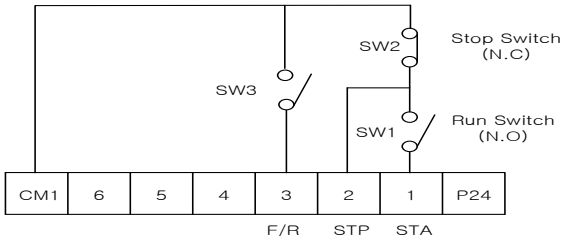


Danger: **When Reset is asserted to clear the fault, if the RUN command is executed by FW/RV terminal set, the motor will immediately run to the speed. Be sure to set the RS after RUN command is disconnected in order to prevent any injury*

Caution: **If longer than 4 second is continued to be ON, E60, communication error will be displayed. Reset by disconnect RS terminal to OFF or press STOP/RESET Key and resume VFD operation to normal.*

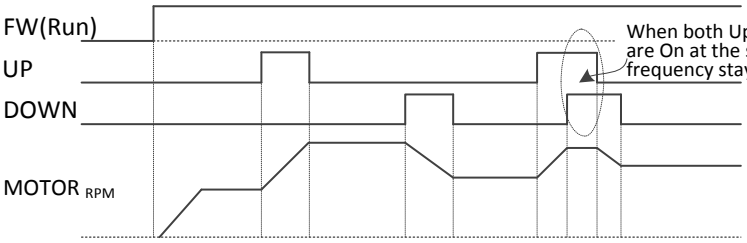
- ***Set 15: Start (STA) 3 Wire Run/Stop Application***
- ***Set 16: Keep (STP)***
- ***Set 17: Forward / Reverse (F/R)***

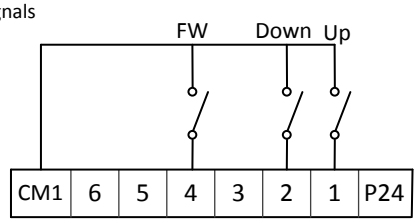
Code	Set Value	Description
A02	1	Run Command by Terminal Input
C01	15	Set Terminal 1 to STA Operation
C02	16	Set Terminal 2 to STP Operation
C03	17	Set Terminal 3 to F/R Operation
C07	0	FW Operation: Terminal 1 to Normal Open
		When shorted(Closed): FW Run, When Open: FW Stop
C08	0	FW Operation: Terminal 2 to Normal Open
C09	0	FW Operation: Terminal 3 to Normal Open



- ***Set 18: Remote Control Up (UP)***
- ***Set 19: Remote Control Down (DOWN)***

Code	Set Value	Description
A02	1	Run Command by Terminal Input
A01		Frequency Setting
C01	18	Set Terminal 1 to UP Operation
C02	19	Set Terminal 2 to Down Operation
C04	1	Set Terminal 3 to F/R Operation
C07	0	FW Operation: Terminal 1 to Normal Open
		When shorted(Closed): FW Run, When Open: FW Stop
C08	0	FW Operation: Terminal 2 to Normal Open





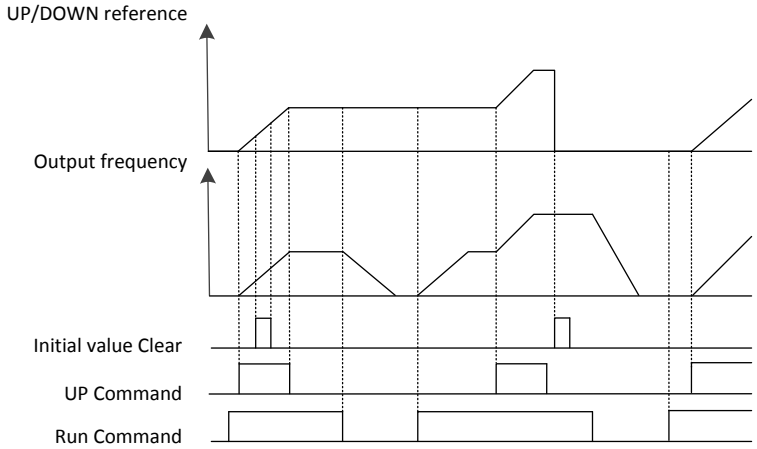
- ***C28 UP/DOWN Initial Value Saving***

  Selects if the Initial Value is going to be saved or not when power is removed.

  - *0: Disabled*
  - *1: Enabled*

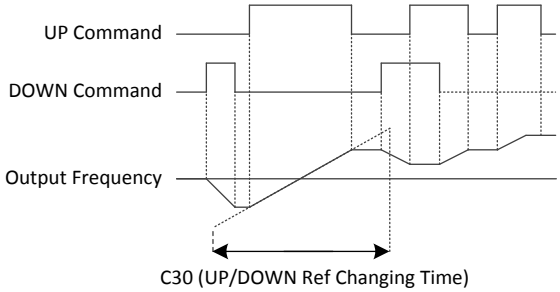
- ***C29 UP/DOWN Initial Value Setting***
  - *Range: 0.00 ~ Max Frequency(A04) in 0.01 Hz*

  Sets the UP/DOWN Initial Value. This value is then used as the starting frequency reference when the next Run Command is given.



- ***C30 UP/DOWN Reference Arriving Time***
  - *Range: 0.1 ~ 3000 Sec in 0.1 Sec*

  Sets the rate of change for the reference when this feature is applied.

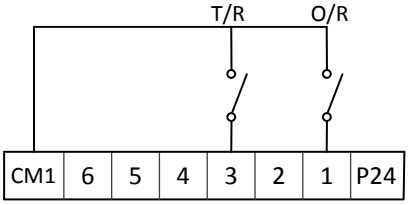


- ***Set 20: Local Keypad Override (O/R)***
- ***Set 21: Local Terminal Override (T/R)***

Even when the frequency command (A01) and run command (A02) are set for VFD operation, Keypad (or local terminal input) can override these commands by activating these terminal bits.

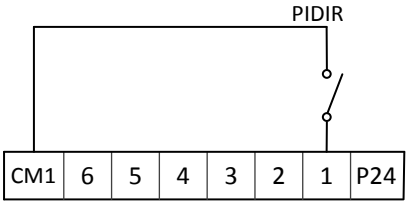
Code	Set Value	Description
C01	20	Set Terminal 1 to O/R (Keypad Override)
C03	21	Set Terminal 3 to T/R (Terminal Override)
C07	0	FW Operation: Terminal 1 to Normal Open
		When shorted(Closed): FW Run, When Open: FW Stop
C09	0	FW Operation: Terminal 3 to Normal Open

***Caution**: If O/R and T/R switched on simultaneously, O/R has a priority than T/R. If switched on during VFD running, the VFD will stop and then operate by given command.*



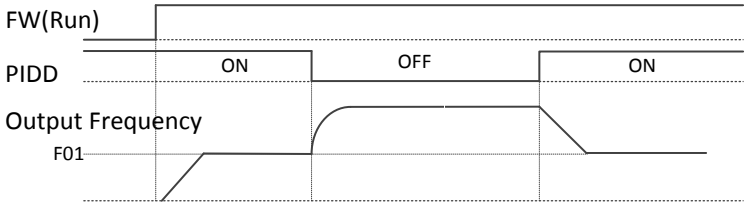
- ***Set 22: PID Integral Reset Override (PIDIR)***
  Even when the PID controller is activated, PIDIR can force resetting an accumulated integral term.

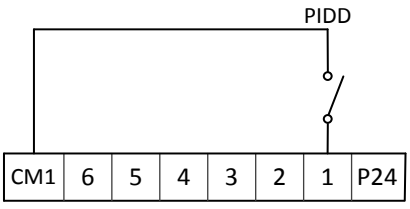
Code	Set Value	Description
C01	22	Set Terminal 1 to PIDIR
C07	0	FW Operation: Terminal 1 to Normal Open
		When shorted(Closed): FW Run, When Open: FW Stop
A70	1 or 2	PID Control or F/F Control



- ***Set 23: PID Disabled (PIDD)***
  Even when the PID controller is activated, PIDD can override disable the function. When PIDD becomes activated, VFD Frequency setpoint follows the value in A01.

Code	Set Value	Description
C01	22	Set Terminal 1 to PIDIR
C07	0	FW Operation: Terminal 1 to Normal Open
		When shorted(Closed): FW Run, When Open: FW Stop
A70	1 or 2	PID Control or F/F Control
A01		Frequency Command
F01	60	Output Frequency Setpoint

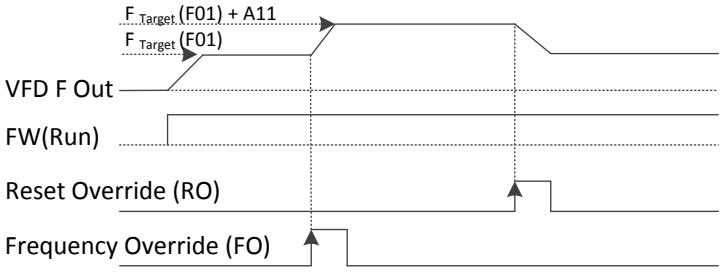


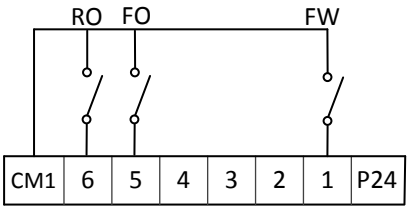


- ***Set 24: Frequency Override (FO)***
- ***Set 25: Reset Override (RO)***

Frequency Override is a manual frequency adder enables adding a frequency value to the target frequency setpoint. Since it is an edge triggered signal, it stays activated till Reset Override signal is provided. Once RO is activated, VFD frequency output follows back to the target value in F01.

Code	Set Value	Description
A02	1	Run command by Terminal Input
C01	0	Set Terminal 1 to Forward Run
C05	24	Set Terminal 5 to Manual Frequency Adder
C06	25	Set Terminal 6 to Reset Override
C07	0	Terminal 1 to Normal Open When Shorted(Closed): FW Run, When Open: FW Stop
C11	0	Terminal 5 to Normal Open
C12	0	Terminal 6 to Normal Open
F01	[0.5 ~ Max Hz]	Output Frequency Setting
A11	[0.5 ~ F04 Hz]	1st Multi Speed Frequency (Shared with this function)

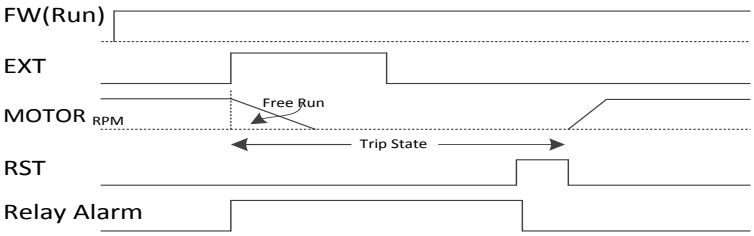


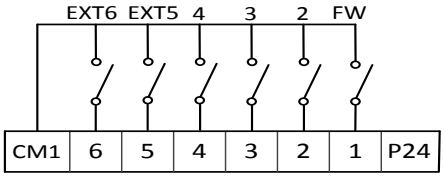


- ***Set 26: External Trip 2 (EXT2)***
- ***Set 27: External Trip 3 (EXT3)***
- ***Set 28: External Trip 4 (EXT4)***
- ***Set 29: External Trip 5 (EXT5)***
- ***Set 30: External Trip 6 (EXT6)***

In addition to External Trip in Set 10, five more external trip signals are provided for flexible control of corresponding function.

Code	Set Value	Description
C01	1	Run command by Terminal Input
C02	26	Set Terminal 2 to External Trip 2
C03	27	Set Terminal 3 to External Trip 3
C04	28	Set Terminal 4 to External Trip 4
C05	29	Set Terminal 5 to External Trip 5
C06	30	Set Terminal 6 to External Trip 6
C07~C12	0	Terminal 1~6 Normal Open When Shorted(Closed): FW Run, When Open: FW Stop



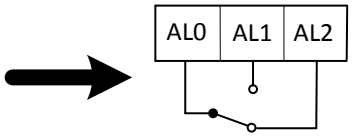


OUTPUT

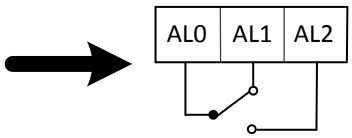
- ***C13 Output Relay 1 (AL0, AL1, AL2)***
  Program one of following output command

  - *0: RUN VFD Run Signal*
  - *1: FA1 Frequency Arrival 1*
  - *2: FA2 Frequency Arrival 2*
  - *3: OL Overload Warning Signal*
  - *4: OD Output Deviation Excess for PID Control*
  - *5: AL Fault Signal*
  - *6: COM Operation by Communication*
  - *7: SOD System Overload Detection*
  - *8: SUD System Underload Detection*
  - *9: SOD/SUD System Overload/Underload Detection*

If C13 = 0: When VFD is not Running
If C13 = 1: When Frequency is not Arrival 1
If C13 = 2: When Frequency is not Arrival 2
If C13 = 3: When Overload condition isn't occurred
If C13 = 4: When PID Error does not Exceed the Set Level
If C13 = 5: No fault condition is occurred
If C13 = 6: When it is not operated by modbus
If C13 = 7: When System Overload is not detected
If C13 = 8: When System Underload is not detected
If C13 = 9: When System Overload and Underload are not detected



If C13 = 0: When VFD is Running
If C13 = 1: When Frequency is at Arrival 1
If C13 = 2: When Frequency is at Arrival 2
If C13 = 3: When Overload condition occurred
If C13 = 4: When PID Error does Exceed the Set Level
If C13 = 5: Fault condition is occurred
If C13 = 6: When it is operated by modbus
If C13 = 7: When System Overload is detected
If C13 = 8: When System Underload is detected
If C13 = 9: When System Overload and Underload are detected



- ***C14 Output Relay 2 (RN0-RN1)***
- ***C15 Output Relay 3 (RN2-RN3)***
  Program one of following output command below. These intelligent relay out terminals can be configured to Form A or B type by programming C16 and C17 to 0 or 1.

  - *0: RUN VFD Run Signal*
  - *1: FA1 Frequency Arrival 1*
  - *2: FA2 Frequency Arrival 2*
  - *3: OL Overload Warning Signal*
  - *4: OD Output Deviation Excess for PID Control*
  - *5: AL Fault Signal*
  - *6: COM Operation by Communication*
  - *7: SOD System Overload Detection*
  - *8: SUD System Underload Detection*
  - *9: SOD/SUD System Overload/Underload Detection*

- ***C16~C17 Output Relay 2, 3 (RN0-RN1, RN2-RN3) Mode***
  - *0: Normally Open (NO) – Form A Configuration*

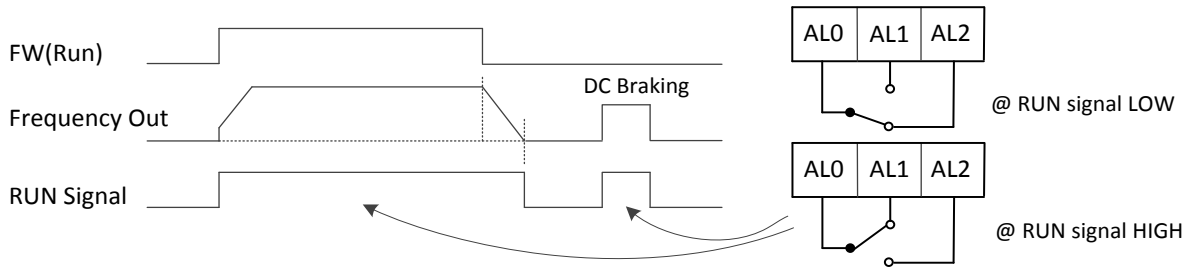
- *1: Normally Closed (NC) – Form B Configuration*

Contact specification

Maximum	Minimum
AC250V, 2.5A(Resistor load), 0.2A(Inductive load)	AC100V, 10mA
DC30V, 3.0A(Resistor load), 0.7A(Inductive load)	DC5V, 100mA

- ***Set 0: RUN***
  Even when the PID controller is activated, PIDD can override disable the function. When PIDD becomes activated, VFD Frequency setpoint follows the value in A01.

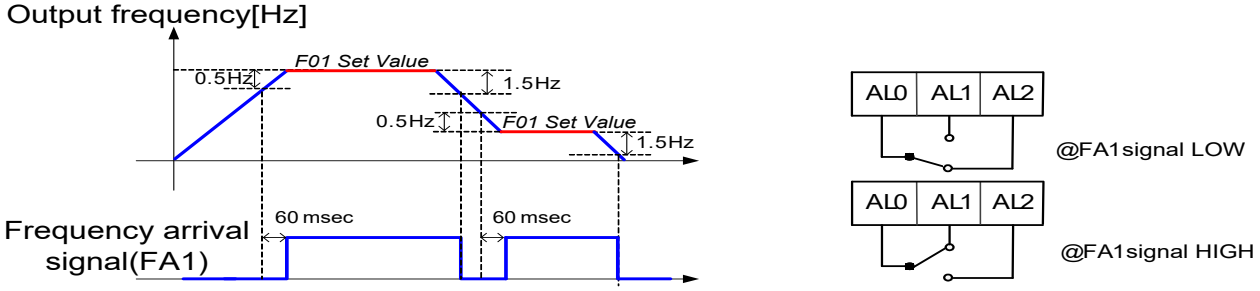
Code	Set Value	Description
C13	0	Set Intelligent Relay Out 1 Terminal to RUN Mode
C14	0	Set Intelligent Single Pole Single Throw (SPST) Relay Out Terminal to RUN Mode
C16	0	Set C14 to Normally Open to Form A configuration If set to 1, Form B configuration (Normally Closed)

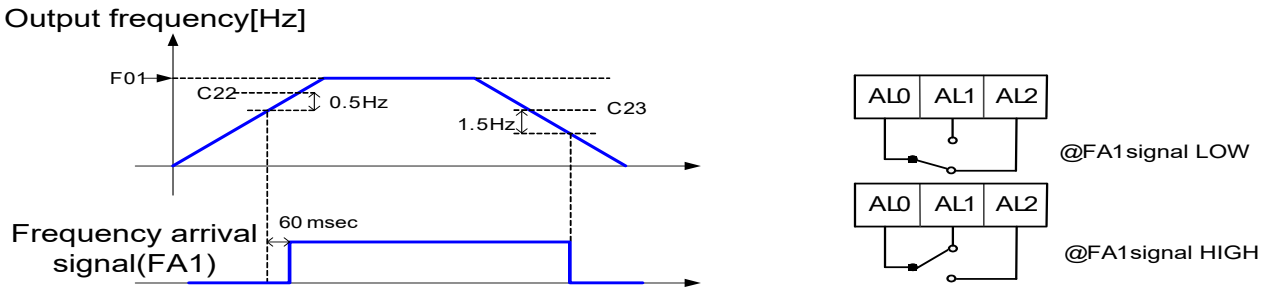


- ***Set 1: Frequency Arrival Signal 1 (FA1)***
- ***Set 2: Frequency Arrival Signal 2 (FA2)***

Frequency Arrival signals indicate if the VFD output frequency reaches the set frequency specified in F01. FA1 (FA2) becomes triggered active from 0.5Hz lower set frequency value during acceleration and 1.5Hz lower during deceleration. But there is 60mS of delay time from the beginning of its activation.

Code	Set Value	Description
C13	1	Set Intelligent Relay Out 1 Terminal to FA1
C15	0	Set C13 to Normally Open to Form A configuration If set to 1, Form B configuration (Normally Closed)
F01	0~ Max F	VFD Out Target Frequency
C22	[0 ~ A04] Hz	Target Frequency Setpoint during Acceleration for Frequency Arrival Signal
C23	[0 ~ A04] Hz	Target Frequency Setpoint during Deceleration for Frequency Arrival Signal

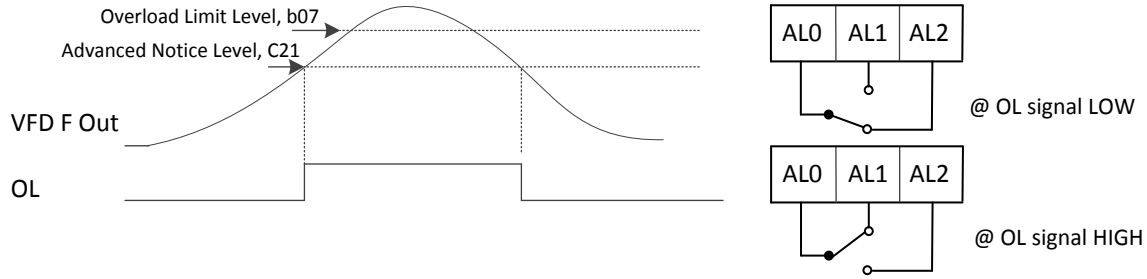




- ***Set 3: Overload Advanced Notice Signal (OL)***

  Before the VFD becomes overload, N700E generates an advanced warning signal to prevent any damage by the excessive output current. Overload detection circuit is designed to operate during powered motor operation and regenerative braking operation. The OL signal becomes ACTIVE High when the output current exceeds the setpoint programmed in C21, Overload Advance Notice Signal Setting

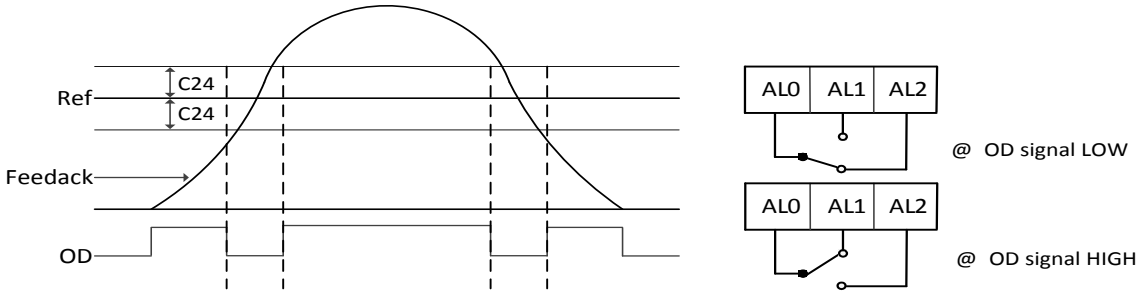
Code	Set Value	Description
C13	3	Set Intelligent Relay Out 1 Terminal to OL
C16	0	Set C13 to Normally Open to Form A configuration
		If set to 1, Form B configuration (Normally Closed)
C21	[10~200] %	Overload Advanced Notice Signal Setting; % x VFD rated current



- ***Set 4: Output Deviation Excess for PID Control (OD)***

  The PID loop error is defined as the magnitude of the difference between the set point and process variable. When the error magnitude exceeds the value of C24, the OD terminal signal turns on

Code	Set Value	Description
C13	3	Set Intelligent Relay Out 1 Terminal to OD
C16	0	Set C13 to Normally Open to Form A configuration
		If set to 1, Form B configuration (Normally Closed)
C24	[0.0~100] %	PID Deviation level Setting



- ***Set 5: Alarm Signal (AL)***

  The inverter fault signals is active when a fault has occurred

Code	Set Value	Description
C13	3	Set Intelligent Relay Out 1 Terminal to AL
C16	0	Set C13 to Normally Open to Form A configuration
		If set to 1, Form B configuration (Normally Closed)

- ***Set 6: Operation by Communication (COM)***
  The digital outputs can be controlled by modbus communication

Parameter	Address	Description
Digital Output (Relay Output)	0x1001	Refer to below bit table 0: Stop Write Command has to set C13~C16 = 6

Digital Output Bit Table

1st byte

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Reserved							

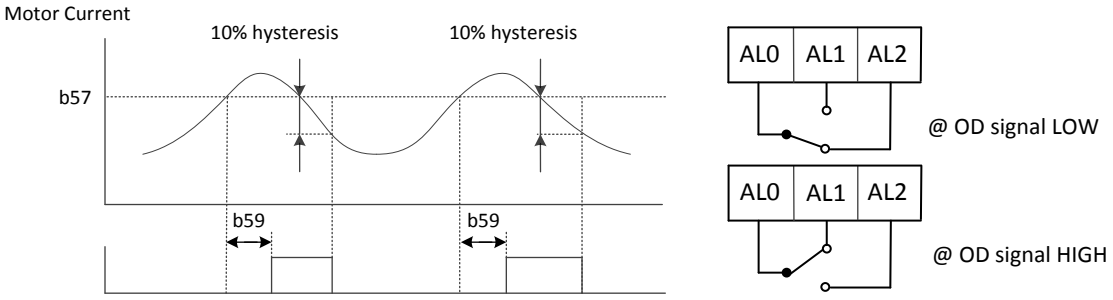
2nd byte

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Reserved					AL0~2	RN2~3	RN0~1

- ***Set 7: System Overload Detection (SOD)***
  The inverter System Overload is active by b57 level

Code	Set Value	Description
C13	7	Set Intelligent Relay Out 1 Terminal to SOD
C16	0	Set C13 to Normally Open to Form A configuration
		If set to 1, Form B configuration (Normally Closed)
b56	1 or 4 or 6	System Overload Detection or Detection with Fault (E23)
b57	[20~200] %	System Overload Detection Level

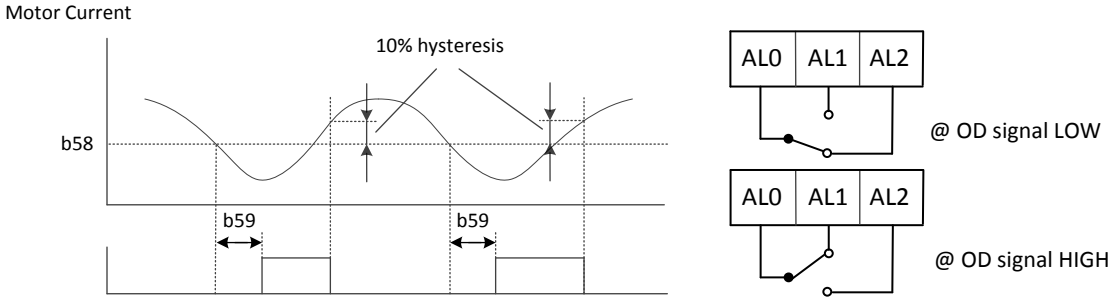
System Overload Detection



- ***Set 8: System Underload Detection (SUD)***
  The inverter System Underload is active by b58 level

Code	Set Value	Description
C13	8	Set Intelligent Relay Out 1 Terminal to SUD
C16	0	Set C13 to Normally Open to Form A configuration
		If set to 1, Form B configuration (Normally Closed)
b56	2 or 5 or 6	System Underload Detection or Detection with Fault (E24)
b58	[20~200] %	System Underload Detection Level

System Underload Detection



- ***Set 9: System Overload/Underload Detection (SOD/SUD)***
  The inverter System Overload/Underload is active by the each(b57, b58) level

Code	Set Value	Description
C13	9	Set Intelligent Relay Out 1 Terminal to SOD/SUD
C16	0	Set C13 to Normally Open to Form A configuration
		If set to 1, Form B configuration (Normally Closed)
b56	6	System Underload/Overload Detection with Fault (E23, E24)
b57	[20~200] %	System Underload Detection Level
b58	[20~200] %	System Underload Detection Level

- ***C18 FM Output Setting***
  Program what output performance to be monitored from following selections

  - *0: Output Frequency Monitor*
  - *1: Output Current Monitor*
  - *2: Output Voltage Monitor*
  - *3: Output Power Monitor*
  - *4: Output Torque Monitor*
  - *5: Operation by Communication*

  - ***Set 0: Output Frequency Monitor***
    Monitor the VFD output frequency value. The highest analog output value is the maximum frequency value. The indicator accuracy after the adjustment is about +/- 5%.

  - ***Set 1: Output Current Monitor***
    Monitor the VFD output current value. The highest analog value is the 200% of rated VFD current. The indicator accuracy after the adjustment is about +/- 10%.

  - ***Set 2: Output Voltage Monitor***
    Monitor the VFD output voltage value. The highest analog value is the 100% of rated VFD voltage out. The indicator accuracy after the adjustment is about +/- 10%.

  - ***Set 3: Output Power Monitor***
    Monitor the VFD output power value. The highest analog value is the 200% of rated VFD power out. The indicator accuracy after the adjustment is about +/- 10%.

  - ***Set 4: Output Torque Monitor***
    Monitor the VFD output torque value. The highest analog value is the 150% of rated VFD output torque. The indicator accuracy after the adjustment is about +/- 10%

FM output	Torque
0V	-150%
5V	0%
10V	+150%

  - ***Set 5: Operation by Communication***
    It can control FM output value (0~10V) by Modbus command

Parameter	Address	Description
Analog Output (FM)	0x1004	0 ~ 10000 (0.1 scale, 0 ~ 10V, 0 ~ 100%) Write Command has to set C18 = 5

Digital Output Bit Table

1st byte

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Reserved							

2nd byte

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Reserved					AL0~2	RN2~3	RN0~1

- ***C19 FM Gain***

- *Range: 0.0 ~ 250.0 % in 0.1*
  Program the gain factor to FM motoring setting

- ***C20 FM Offset***
  - *Range: -3.0 ~10.0 % in 0.1*
    Program the offset factor to FM monitoring setting

- ***C21 Motor Overload Alarm***
  - *Range: 10.0 ~200.0 % in 0.1*
    Program a level of the rated motor current

- ***C22 FA2 SetPoint at Acceleration***
  - *Range: 0.00 ~ A04 Hz in 0.01*
    Program the frequency arrival threshold during acceleration

- ***C23 FA2 SetPoint at Deceleration***
  - *Range: 0.00 ~A04 Hz in 0.01*
    Program the frequency arrival threshold during deceleration
- ***C24 PID Error Tolerance***
  - *Range: 0.0 ~100.0 % in 0.1*
    Program the allowable PID loop error magnitude

- ***C25 AMI Output Setting***
  Program what output performance to be monitored from following selections

  - *0: Output Frequency*
  - *1: Output Current*
  - *2: Output Voltage*
  - *3: Output Power*
  - *4: Output Torque Monitor*
  - *5: Operation by Communication*

  - ***Set 0: Output Frequency Monitoring***
    Monitor the VFD output frequency value. The highest analog output value is the maximum frequency value. The indicator accuracy after the adjustment is about +/- 5%.

  - ***Set 1: Output Current Monitoring***
    Monitor the VFD output current value. The highest analog value is the 200% of rated VFD current. The indicator accuracy after the adjustment is about +/- 10%.

  - ***Set 2: Output Voltage Monitoring***
    Monitor the VFD output voltage value. The highest analog value is the 100% of rated VFD voltage out. The indicator accuracy after the adjustment is about +/- 10%.

  - ***Set 3: Output Power Monitoring***
    Monitor the VFD output power value. The highest analog value is the 200% of rated VFD power out. The indicator accuracy after the adjustment is about +/- 10%

  - ***Set 4: Output Torque Monitor***
    Monitor the VFD output torque value. The highest analog value is the 150% of rated VFD output torque. The indicator accuracy after the adjustment is about +/- 10%

AMI output	Torque
4mA	-150%
12mA	0%
20mA	+150%

  - ***Set 5: Operation by Communication***

It can control AMI output value(4~20mA) by Modbus command

Parameter	Address	Description
Analog Output (AMI)	0x1005	0 ~ 10000 (0.1 scale, 4 ~ 20mA, 0 ~ 100% Write Command has to set C25 = 5

Digital Output Bit Table

1st byte

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Reserved							

2nd byte

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Reserved					AL0~2	RN2~3	RN0~1

- ***C26 AMI Gain***
  - *Range: 0.0 ~ 250.0 % in 0.1*
    Program the gain factor to AMI motoring setting

- ***C27 AMI Offset***
  - *Range: -99.9 ~100.0 % in 0.1*
    Program the offset factor to AMI monitoring setting

.

H Group Parameters

N700E VFD offers Sensorless Vector control, enabling high starting torque and high precision operations. Motor data required for Sensorless Vector control design can be selected from standard motor data or auto-tuning algorithm. If VFD size is more than twice the motor size, the required torque characteristics or speed control characteristics are not well controlled.

- ***H01 Auto Tuning***
  - *0: Disabled*
  - *1: Enabled*

  Program to enable auto tuning function. Motor parameters are calculated using the internal auto tuning algorithm and automatically set for Sensorless Vector control design.
  - ❖ Related Parameters: A31 (2: Sensorless Vector Control)

- ***H02 Motor Data Select***
  - *0: Standard Motor Data*
  - *1: Auto Tuning Data*

  Program to select between standard motor data and auto tuned motor data.
  - ❖ Related Parameters:

- ***H03 Motor Capacity***

3L:	220V / 2.2kW (3 HP)	3H:	380V / 2.2kW (3 HP)
5L:	220V / 3.7kW (5 HP)	5H:	380V / 3.7kW (5 HP)
7.5L:	220V / 5.5kW (7.5 HP)	7.5H:	380V / 5.5kW (7.5 HP)
10L:	220V / 7.5kW (10 HP)	10H:	380V / 7.5kW (10 HP)
15L:	220V / 11kW (15 HP)	15H:	380V / 11kW (15 HP)
20L:	220V / 15kW (20 HP)	20H:	380V / 15kW (20 HP)
25L:	220V / 18.5kW (25 HP)	25H:	380V / 18.5kW (25 HP)
30L:	220V / 22kW (30 HP)	30H:	380V / 22kW (30 HP)
40L:	220V / 30kW (40 HP)	40H:	380V / 30kW (40 HP)
50L:	220V / 37kW (50 HP)	50H:	380V / 37kW (50 HP)
60L:	220V / 45kW (60 HP)	60H:	380V / 45kW (60 HP)
75L:	220V / 55kW (75 HP)	75H:	380V / 55kW (75 HP)
100L:	220V / 75kW (100 HP)	100H:	380V / 75kW (100 HP)
125L:	220V / 90kW (125 HP)	125H:	380V / 90kW (125 HP)
		150H:	380V / 110kW (150 HP)
		200H:	380V / 132kW (200 HP)
		250H:	380V / 160kW (250 HP)
		275H:	380V / 200kW (275 HP)
		300H:	380V / 220kW (300 HP)
		350H:	380V / 250kW (350 HP)
		400H:	380V / 280kW (400 HP)
		425H:	380V / 320kW (425 HP)
		450H:	380V / 350kW (450 HP)
		500H:	380V / 375kW (500 HP)

* When b26 is set to 1, this motor series is displayed.(275H, 350H, 425H)
Program the corresponding N700E model used for the current application.
- ❖ Related Parameters:

- ***H04 Motor Poles Setting***
  - *2: 2 Poles for 3600 RPM (60 Hz), 3000 RPM (50 Hz)*
  - *4: 4 Poles for 1800 RPM (60 Hz), 1500 RPM (50 Hz)*
  - *6: 6 Poles for 1200 RPM (60 Hz), 1000 RPM (50 Hz)*
  - *8: 8 Poles for 900 RPM (60 Hz), 750 RPM (50 Hz)*

  Program a number of poles to the corresponding motor used with the VFD.
  - ❖ Related Parameters:

- ***H05 Motor Rated Current***
  - *Range: 0.1 ~ 800.0 A in 0.1 A*

    Program a rated current off of the motor nameplate (Motor FLA)
    - ❖ Related Parameters:

- ***H06 Motor Flux Current***
  - *Range: 0.1 ~ 400.0 A in 0.1 A*

    Program the no load (flux) current value. Not all motors will have this information on the nameplate.
    - ❖ Related Parameters:

- ***H07 Motor Rated Slip***
  - *Range: 0.01 ~ 10.0 % in 0.1 %*

    Program the slip percent of the motor rated nameplate rpm.
    ie- [(1800 rpm – 1750 rpm) / 1800 rpm] x 100 = 2.78%
    - ❖ Related Parameters:

- ***H08 Motor Resistance R1***
  - *Range: 0.1 ~ 3000.0 mOhms in 0.1 mOhms*

    Hyundai motor data
    - ❖ Related Parameters:

- ***H09 Transient Inductance***
  - *Range: 0.001 ~ 30.000 mH in 0.001 mH*

    Hyundai motor data
    - ❖ Related Parameters:

- ***H10 Motor Resistance R1 Auto Tuning Data***
  - *Range: : 0.1 ~ 3000.0 mOhms in 0.1 mOhms*

    Value determined during Auto Tuning process
    - ❖ Related Parameters:

- ***H11 Transient Inductance Auto Tuning Data***
  - *Range: 0.001 ~ 30.000 mH in 0.001 mH*

    Value determined during Auto Tuning process

******Auto Tuning Application***

Setting Procedures

- *H02:*
- *H03:*
- *H04:*
- *H05:*
- *H06*
- *H07*

Execution: Press "Run" Key

Successful Completion ; --oK (if failed: Err on display)

- *H01: Select the latest to 1*

Auto Tuning

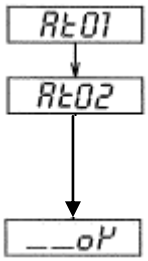
Function description

The auto tuning procedure automatically sets the motor parameters related to sensorless vector control and automatic torque boost. Since these functions are dependent upon specific motor parameters, default motor parameters have been set at the factory.
An auto tune is recommended before running in sensorless vector or automatic torque boost mode in order to achieve optimal performance

Auto-Tune Procedure

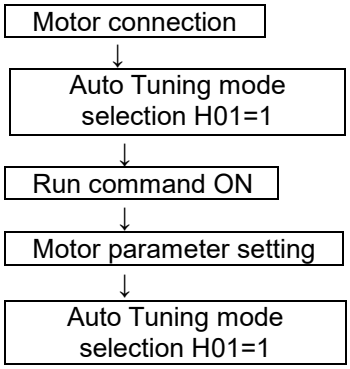
Follow the steps below to auto tune the inverter, finally set the parameter H01.

1. F02, F03: Set to 30 s, the default for each parameter
2. H03: Set the motor rating
3. H04: Set the motor poles
4. A01: Set to 0 (frequency command source at potentiometer)
5. A03: Set the base frequency (default is 60Hz)
6. F01: Set the target frequency to 0Hz by turning the potentiometer all the way down. Verify this setting by looking at the value in F01.
7. A53: Select the output voltage to the motor.
8. A33: Set to 0 (disables DC injection braking).
9. H01: Set to 1 (turns auto tuning mode on).
10. After setting above parameters, press the RUN key on the standard operator.
11. The VFD will run the auto tuning procedure on the motor. During this procedure the motor may run up to 80% of full speed. During the auto tune you will see the following messages on the screen:



12. When you see the last screen (__oY , for " OK") the auto tune has successfully completed.
    a. If the display shows Err instead, the auto tune has failed. Verify that the motor is wired properly
13. H02: Set to 1 (uses auto tune data)

Auto Tuning method



① DC excitation(no rotation)
② Single phase excitation.

End display
Auto Tuning process completed : -on

Auto Tuning process failed : Err

Note : The default motor parameters of the N700E use standard data of a HYUNDAI 4-pole motor.
If using sensorless vector or auto-torque boost with a different motor type, use the auto tune feature to set the motor data.

Fine Tuning

1. If satisfactory performance through auto tuning cannot be fully obtained,
   adjust the motor constants for the observed symptoms according to the table below.

Symptom		Adjustment	Parameter
At Motoring Status	When low frequency (a few Hz) torque is insufficient.	Slowly increase the motor constant 1.2 times the auto tune data.	H08/H10
	When the speed deviation is negative.	Slowly increase the rated motor slip up to 1.5 times original setting.	H07
	When the speed deviation is positive.	Slowly decrease the rated motor slip down to 0.5 times original setting	H07
	When Over current Fault occurs as the load is applied	Slowly increase the motor no load current in up to 1.2 times original setting.	H06
At Regeneration Status	When low frequency (a few Hz) torque is insufficient.	Slowly increase the motor constant R1 1.2 times the auto tune data	H08/H10
		Slowly increase the motor no load current in up to 1.2 times original setting	H06
		Decrease the carrier frequency.	b11

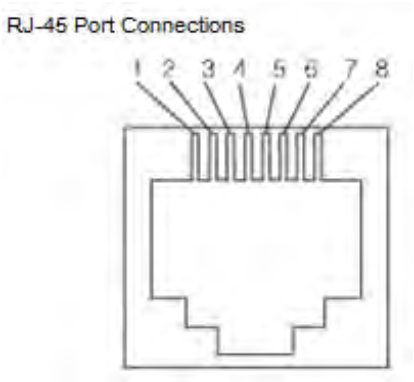
2. If the inverter capacity is more than twice the capacity of the motor in setting of A28=1, A31=2, the VFD may not achieve its full performance specifications.
3. When DC injection braking is enabled (A33 = 1), the motor constant will not be accurately set. Therefore, disable DC injection braking (A33 = 0) before starting the auto tuning procedure.
4. The motor and load must be stationary before initiating the auto tune. Auto tuning while the motor is rotating may produce inaccurate results.
5. If the auto tuning procedure is interrupted by the stop command, the auto tuning constants may be stored in the inverter incorrectly. It will be necessary to reset the inverter to factory defaults (b12 = 1 *NOTE: This will reset all inverter parameter back to the factory default).

3.7 RS485 Communication

N700E offers two communication interfaces between the VFD and external controller through RS 485.

- RJ45 Connector (Except 300LF~750LF)
- RXP/RXN Connector.

3.7.1 RJ 45 Port Connections and Pin Description (Except 300LF~750LF)



Pin Number	Signal Description
1	
2	
3	RS - 485+
4	
5	
6	RS - 485 -
7	24 V
8	24 GND

3.7.2 RXP / PXN Connector

- RXP: + Transmit/Receive Port
- RXN: - Transmit/Receive Port

Program N700E Parameters to enable remote control

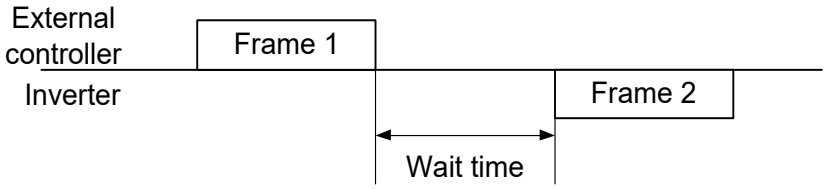
Code	Minimum	Maximum	Initial Value	Unit	Description
b17	1	32	1	-	Setting the communication number
b31	1	4	3	-	9600bps
A01	0	4	0	-	4: Remote Operator(Terminal)
A02	0	3	0	-	3: Remote Operator(Terminal)

3.7.3 RS485 Interface Description

Item	Description	Remark
Interface	RS485	
Communication method	Half duplex	
Communication speed	9600	Fixing
Communication code	Binary code	
Data bits	8	Fixing
Parity	No.	Fixing
Stop bit	1	Fixing
Starting method	External request	Inverter is only slave part.
Wait time	10～1000ms	
Connection type	1 : N (Max32)	
Error check	Frame / CRC / CMD / MAXREQ / parameter	Communication number is selected at b17

Communication sequence

The communication sequence is as follows



- Frame Start: Frame start is recognized by signal line data transmitted
- Frame Complete: Frame completion is recognized by no data during 4, 5-character time.
- Frame 1: Transmit from external controller to VFD.
- Frame 2: Indication reflects from VFD to external controller

3.7.4 Communication Frame Type and Form

External Controller Transmit Frame

Communication number	Command	Parameter	Parameter Count	CRC Hi	CRC Lo

	Description	Data size	Specifications
Communication number	Inverter Communication number	1 byte	1~32
Command	Frame type	1 byte	0x03
Parameter	Parameter	2 byte	1st byte : Group 2nd byte : Index(Note1)
Parameter number	Request parameter number	2 byte	1st byte : 0x00 2nd byte : N(0x01~0x08)
CRC Hi	-	1 byte	Higher 8bit of 16bit CRC
CRC Lo	-	1 byte	Lower 8bit of 16bit CRC

Inverter response frame

Communication number	Order	Byte Number	Data 1	• • • •	Data N	CRC Hi	CRC Lo

	Description	Data size	Specifications
Communication number	Inverter Communication number	1 byte	1~32
Command	Frame type	1 byte	0x03
Byte Number	Data Byte number	1 byte	Request parameter number x 2
Data 1	Parameter 1	2 byte	Parameter value
Data N	Parameter N	2 byte	Nth parameter value
CRC Hi	-	1 byte	Higher 8bit of 16bit CRC
CRC Lo	-	1 byte	Lower 8bit of 16bit CRC

∗ Frame Size = 5 + Request parameter number x 2

External transmit frame

Communication number	Order	Parameter	Data	CRC Hi	CRC Lo

	Description	Data size	Specifications
Communication number	Target VFD Communication number	1 byte	1~32
Command	Frame type	1 byte	0x06
Parameter	Parameter	2 byte	1st byte : Group 2nd byte : Index (Note1)
Data	Data	2 byte	Setting value(Note 2)
CRC Hi	-	1 byte	Higher 8bit of 16bit CRC
CRC Lo	-	1 byte	Lower 8bit of 16bit CRC

Inverter response frame

Communication number	Order	Parameter	Data	CRC Hi	CRC Lo

	Description	Data size	Specifications
Communication Number	Target VFD Communication Number	1 byte	1~32
Command	Frame type	1 byte	0x06
Parameter	Parameter	2 byte	1st byte : Group 2nd byte : Index (Note1)
Data	Data	2 byte	Setting value is response (Note4)
CRC Hi	-	1 byte	Higher 8bit of 16bit CRC
CRC Lo	-	1 byte	Lower 8bit of 16bit CRC

Note1: Parameter setting

Basic parameter
1st byte :Each group is setting

Group	1st byte	Group	1st byte
d	0x01	C	0x05
F	0x02	H	0x06
A	0x03	o	0x08
b	0x04		

2nd byte :Parameter number setting.
Ex) The case of A60 parameter reading or writing
1st byte : 0x03
2nd byte : 0x3C

Trip information
Trip information is 4 parameter: output frequency, output current, DC link voltage at trip occurs

	Trip Information	Previous first trip	Previous second trip	Previous third trip	Trip count
1st byte	0x01	0x01	0x01	0x01	0x01
2nd byte	0x0D	0x11	0x15	0x19	0x1D

Trip information items

Fault Data	Fault Contents	Fault data	Fault Contents
1	Over current	15	Input Phase Loss
2	Over voltage	18	Braking Resistor Overload
3	Under voltage	19	OVS Fail
4	Output Short Circuit	22	External Trip 2
5	Reserved	23	External Trip 3
6	Inverter Over Temperature	24	External Trip 4
7	Motor Overload	25	External Trip 5
8	External Trip 1	26	External Trip 6
9	EEPROM error	27	Fan Fault (Only 300~750LF)
10	Communication Error	28	Profibus Fault (Option)
11	USP Error	29	DeviceNet Fault (Option)
12	Ground Fault	30	System Overload Detection Fault
14	Inverter Overload	31	System Underload Detection Fault

Note2: Data value setting

Data value is transmitted except decimal point.

Ex1) Output frequency

Parameter value	Communication data	Conversion hexadecimal
60.0Hz	6000	1st byte : 0x17 2nd byte : 0x70

Ex2) acc/dec time

Parameter value	Communication data	Conversion hexadecimal
10.0sec	100	1st byte : 0x00 2nd byte : 0x64

Note3: Special parameter

Run command

Parameter

1st byte : 0x00

2nd byte : 0x02

setting data

1st byte

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Reserved							

2nd byte

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Reserved					RST	REV	FWD

Bit 0 :Forward command
Bit 1 :Reverse command
Bit 2 :Reset command
Frequency command

Parameter

1st byte : 0x00
2nd byte : 0x04
setting data
output frequency * 100
Ex) the case of output frequency command is 60.00Hz
Data 6000 transmit
1st byte : 0x17
2nd byte : 0x70

Note4: Read Only Command

Parameter	Address	Description
VFD Status	0x0001	0: Stop 1: Acceleration 2: Steady 3: Deceleration 4: Trip
Q-axis Current	0x000A	-2000 ~ 2000 (0.1 scale, -200.0 ~ 200.0 %)
Digital Input (1~6)	0x1000	Refer to below bit table
Analog Input (O)	0x1002	0 ~ 10000 (0.1 scale, 0 ~ 10V, 0 ~ 100%)
Analog Input (OI)	0x1003	0 ~ 10000 (0.1 scale, 4 ~ 20mA, 0 ~ 100%)

Digital Input Bit Table

1st byte

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Reserved							

2nd byte

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Reserved		6	5	4	3	2	1

Note5: Read/Write Command

Parameter	Address	Description
Digital Output (Relay Output)	0x1001	Refer to below bit table 0: Stop Write Command has to set C13~C16 = 6
Analog Output (FM)	0x1004	0 ~ 10000 (0.1 scale, 0 ~ 10V, 0 ~ 100%) Write Command has to set C18 = 5
Analog Output (AMI)	0x1005	0 ~ 10000 (0.1 scale, 4 ~ 20mA, 0 ~ 100% Write Command has to set C25 = 5

Digital Output Bit Table

1st byte

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Reserved							

2nd byte

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Reserved					AL0~2	RN2~3	RN0~1

16bit CRC generation

The step of CRC generation is as follows:

1. All of 16-bit Parameter is 1.0xffff
2. The exclusive OR of 16-bit Parameter and 8-bit Parameter.
3. Shift right side 1bit 16-bit Parameter
4. If the result of step 3 is 1, exclusive OR 16-bit Parameter and 0xa001.
5. Execute 8 times step 3 and step 4.
6. Execute step 2～6 until data completion.
7. Exchange the step 6 result of higher 8bit and lower 8bit.

Ex)The case of d01 output frequency reading.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6
Communication Number	Command	Parameter		Parameter number	
0x01	0x03	0x01	0x01	0x00	0x01

The sequence of addition Byte (01x01)

16-BIT PARAMETER		MSB			Flag
(Exclusive OR)	1111	1111	1111	1111	
01	0000	0001			
	1111	1111	1111	1110	
Shift 1	0111	1111	1111	1111	
Shift 2	0011	1111	1111	1111	1
Polynomial	1010	0000	0000	0001	
	1001	1111	1111	1110	
Shift 3	0100	1111	1111	1111	
Shift 4	0010	0111	1111	1111	1
Polynomial	1010	0000	0000	0001	
	1000	0111	1111	1110	
Shift 5	0100	0011	1111	1111	
Shift 6	0010	0001	1111	1111	1
Polynomial	1010	0000	0000	0001	
	1000	0001	1111	1110	
Shift 7	0100	0000	1111	1111	
Shift 8	0010	0000	0111	1111	1
Polynomial	1010	0000	0000	0001	
	1000	0000	0111	1110	

Byte 1~6	CRC of operation results
0x01	0x807e
0x03	0x3364
0x01	0x30e1
0x01	0x8831
0x00	0xd449
0x01	0x36d4

Change upper and lower 8 bit of result 0x36d4 : 0xd436
Byte7 :Upper 8 bit of CRC = 0xd4
Byte8 :Lower 8 bit of CRC = 0x36

3.7.5 ModBus Address Table

N700E

*Eu : Europe, *Am : America

FS : Factory Setting

*Data Type is unsigned integer16

Code Number	Function Name	Address (Hex)	Address (Dec)	R/W attribute	Init. Value	Min. Value	Max. Value	Scale	Unit
d01	Output Frequency Monitor	0x0101	258	R	0	0	40000	0.01	Hz
d02	Output Current Monitor	0x0102	259	R	0	0	40000	0.1	A
d03	Output Voltage Monitor	0x0103	260	R	0	0	40000	1	V
d04	Rotation Direction	0x0104	261	R	0	0	40000		
d05	PID Feedback	0x0105	262	R	0	0	40000		
d06	Intelligent Input Terminal Status	0x0106	263	R	0	0	40000		
d07	Intelligent Output Terminal Status	0x0107	264	R	0	0	40000		
d08	RPM Output	0x0108	265	R	0	0	40000		
d09	Power Consumption	0x0109	266	R	0	0	40000		W
d10	VFD Runtime (Hours)	0x010a	267	R	0	0	40000		Hour
d11	VFD Runtime (Minutes)	0x010b	268	R	0	0	40000		Minute
d12	DC Bus Voltage	0x010c	269	R	0	0	40000	1	V
d13	Current Fault, Fault Code	0x010d	270	R	0	0	40000		
	Trip Monitor 1, Frequency at Trip	0x010e	271	R	0	0	40000	0.01	Hz
	Trip Monitor 1, Current at Trip	0x010f	272	R	0	0	40000	0.1	A
	Trip Monitor 1, Vdc at Trip	0x0110	273	R	0	0	40000	1	V
d14	Previous Fault 1, Fault Code	0x0111	274	R	0	0	40000		
	Trip Monitor 2, Frequency at Trip	0x0112	275	R	0	0	40000	0.01	Hz
	Trip Monitor 2, Current at Trip	0x0113	276	R	0	0	40000	0.1	A
	Trip Monitor 2, Vdc at Trip	0x0114	277	R	0	0	40000	1	V
d15	Previous Fault 2, Fault Code	0x0115	278	R	0	0	40000		
	Trip Monitor 3, Frequency at Trip	0x0116	279	R	0	0	40000	0.01	Hz
	Trip Monitor 3, Current at Trip	0x0117	280	R	0	0	40000	0.1	A
	Trip Monitor 3, Vdc at Trip	0x0118	281	R	0	0	40000	1	V
d16	Previous Fault 3, Fault Code	0x0119	282	R	0	0	40000		
	Trip Monitor 4, Frequency at Trip	0x011a	283	R	0	0	40000	0.01	Hz
	Trip Monitor 4, Current at Trip	0x011b	284	R	0	0	40000	0.1	A
	Trip Monitor 4, Vdc at Trip	0x011c	285	R	0	0	40000	1	V
d17	Fault Count	0x011d	286	R	0	0	60000		
Intelligent input, output	Binary value input : (b15~b6 : reserved, b5: input 6, b4: input 5, b3: input 4, b2: input 3, b1: input 2, b0: input 1 output : (b15~b3 : reserved, b2: Alarm, b1: output 2, b0: output 1								
Source of Trip	1: Over current, 2: Overvoltage, 3: Under voltage, 4: Output Short Circuit, 5: reserved, 6: VFD Over Temperature, 7: Motor Overload , 8: External trip1, 9: EEPROM Error, 10: Communication Error,11: USP Error, 12: Ground Fault ,13: Reserved,14: Inverter thermal overload, 15: Input phase loss, 18: BRD Fault, 19: OVS Fail, 22~26: External trip2~6, 27: Fan fault, 28: Profibus Fault(Option), 29: DeviceNet Fault(Option), 30: System Overload Detection Fault, 31: System Underload Detection Fault								

N700E

*Eu : Europe, *Am : America

FS : Factory Setting

*Data Type is unsigned integer16

Code Number	Function Name	Address (Hex)	Address (Dec)	R/W attribute	Init. Value	Min. Value	Max. Value	Scale	Unit
F01	Output Frequency SetPoint	0x0201	514	R/W	6000 0:*Eu 0:*Am	0	A04	0.01	Hz
F02	Acceleration Time 1	0x0202	515	R/W	300	1	30000	0.1	Sec
F03	Deceleration Time 1	0x0203	516	R/W	300	1	30000	0.1	Sec
F04	Rotation Direction	0x0204	517	R/W	0	0	1		
Init value of F02,F03	F02 : 30000(A59=0), 390(A59=1), 290(A59=2) F03 : 30000(A60=0), 390(A60=1), 290(A60=2)								

N700E

*Eu : Europe, *Am : America

FS : Factory Setting

*Data Type is unsigned integer16

Code Number	Function Name	Address (Hex)	Address (Dec)	R/W attribute	Init. Value	Min. Value	Max. Value	Scale	Unit
A01	Frequency Setpoint Source	0x0301	770	R/W	1 1:*Eu 0:*Am	0	5		
A02	Run Source	0x0302	771	R/W	1 1:*Eu 0:*Am	0	4		
A03	Base Frequency Setpoint	0x0303	772	R/W	6000 5000:*Eu	0	A04	0.01	Hz
A04	Maximum frequency Setpoint	0x0304	773	R/W	6000 5000:*Eu	A03	40000	0.01	Hz
A05	Frequency at Min. Analog Input	0x0305	774	R/W	0	0	A04	0.01	Hz
A06	Frequency at Max. Analog Input	0x0306	775	R/W	0	0	A04	0.01	Hz
A07	Minimum Analog Input Offset	0x0307	776	R/W	0	0	1000	0.1	%
A08	Maximum Analog Input Offset	0x0308	777	R/W	1000	0	1000	0.1	%
A09	Start Frequency	0x0309	778	R/W	0 1:*Eu 0:*Am	0	1		
A10	Low pass Filter Gain	0x030a	779	R/W	4	1	8		
A11	Multi speed frequency Setpoint 1	0x030b	780	R/W	500	0	A04	0.01	Hz
A12	Multi speed frequency Setpoint 2	0x030c	781	R/W	1000	0	A04	0.01	Hz
A13	Multi speed frequency Setpoint 3	0x030d	782	R/W	1500	0	A04	0.01	Hz
A14	Multi speed frequency Setpoint 4	0x030e	783	R/W	2000	0	A04	0.01	Hz
A15	Multi speed frequency Setpoint 5	0x030f	784	R/W	3000	0	A04	0.01	Hz
A16	Multi speed frequency Setpoint 6	0x0310	785	R/W	4000	0	A04	0.01	Hz
A17	Multi speed frequency Setpoint 7	0x0311	786	R/W	5000	0	A04	0.01	Hz
A18	Multi speed frequency Setpoint 8	0x0312	787	R/W	6000 5000:*Eu	0	A04	0.01	Hz
A19	Multi speed frequency Setpoint 9	0x0313	788	R/W	0	0	A04	0.01	Hz
A20	Multi speed frequency Setpoint 10	0x0314	789	R/W	0	0	A04	0.01	Hz
A21	Multi speed frequency Setpoint 11	0x0315	790	R/W	0	0	A04	0.01	Hz
A22	Multi speed frequency Setpoint 12	0x0316	791	R/W	0	0	A04	0.01	Hz
A23	Multi speed frequency Setpoint 13	0x0317	792	R/W	0	0	A04	0.01	Hz
A24	Multi speed frequency Setpoint 14	0x0318	793	R/W	0	0	A04	0.01	Hz
A25	Multi speed frequency Setpoint 15	0x0319	794	R/W	0	0	A04	0.01	Hz
A26	Jog Frequency	0x031a	795	R/W	50 100:*Eu 50:*Am	50	1000	0.01	Hz
A27	Jog Stop Mode	0x031b	796	R/W	0	0	2		
A28	Torque Boost Mode	0x031c	797	R/W	0	0	1		
A29	Manual Torque Boost Voltage Setpoint	0x031d	798	R/W	10	0	500	0.1	%
A30	Manual Torque Boost Frequency Setpoint	0x031e	799	R/W	100	0	1000	0.1	%
A31	Motor Control Method	0x031f	800	R/W	0 2:*Eu 0:*Am	0	2		
A32	Voltage Gain Factor	0x0320	801	R/W	1000	200	1000	0.1	%

N700E

*Eu : Europe, *Am : America

FS : Factory Setting

*Data Type is unsigned integer16

Code Number	Function Name	Address (Hex)	Address (Dec)	R/W attribute	Init. Value	Min. Value	Max. Value	Scale	Unit
A33	DC Injection Braking	0x0321	802	R/W	0	0	1		
A34	DC Injection Braking Frequency Setpoint	0x0322	803	R/W	50	50	1000	0.01	Hz
A35	DC Injection Braking Delay Time	0x0323	804	R/W	0	0	50	0.1	Sec
A36	DC Injection Braking Force at Stop	0x0324	805	R/W	500 (≤30 HP) 100 (≥40 HP) 70 (≥250 HP)	0	500	0.1	%
A37	DC Injection Braking Time at Stop	0x0325	806	R/W	0	0	100	0.1	Sec
A38	Frequency Upper Limit	0x0326	807	R/W	0	0	A04	0.01	Hz
A39	Frequency Lower Limit	0x0327	808	R/W	0	0	A04	0.01	Hz
A40	Skip Output Frequencies	0x0328	809	R/W	0	0	A04	0.01	Hz
A41	Skip Frequency Range	0x0329	810	R/W	0	0	1000	0.01	Hz
A42	Skip Output Frequencies	0x032a	811	R/W	0	0	A04	0.01	Hz
A43	Skip Frequency Range	0x032b	812	R/W	0	0	1000	0.01	Hz
A44	Skip Output Frequencies	0x032c	813	R/W	0	0	A04	0.01	Hz
A45	Skip Frequency Range	0x032d	814	R/W	0	0	1000	0.01	Hz
A46	Reserved Data	0x032e	815	R/W					
A47	Reserved Data	0x032f	816	R/W					
A48	Reserved Data	0x0330	817	R/W					
A49	Reserved Data	0x0331	818	R/W					
A50	Reserved Data	0x0332	819	R/W					
A51	Reserved Data	0x0333	820	R/W					
A52	Automatic Voltage Regulation(AVR)	0x0334	821	R/W	2 2::*Eu 2:*Am	0	2		
A53	Motor Input Voltage	0x0335	822	R/W	220	200	480	1	V
A54	Acceleration Time 2	0x0336	823	R/W	300	1	30000	0.1	Sec
A55	Deceleration Time 2	0x0337	824	R/W	300	1	30000	0.1	Sec
A56	Accel/Decel 2 Command Select	0x0338	825	R/W	0	0	1		
A57	Accel 2 Transition Frequency	0x0339	826	R/W	0	0	A04	0.01	Hz
A58	Decel 2 Transition Frequency	0x033a	827	R/W	0	0	A04	0.01	Hz
A59	Acceleration Curve Select	0x033b	828	R/W	0	0	2		
A60	Deceleration Curve Select	0x033c	829	R/W	0	0	2		
A61	Analog Input Voltage Offset	0x033d	830	R/W	0	-100	100	0.1	
A62	Analog Input Voltage Gain	0x033e	831	R/W	1000	0	2000	0.1	
A63	Analog Input Current Offset	0x033f	832	R/W	0	-100	100	0.1	
A64	Analog Input Current Gain	0x0340	833	R/W	1000	0	2000	0.1	
A65	FAN Operation Mode	0x0341	834	R/W	0	0	1		

N700E

*Eu : Europe, *Am : America

FS : Factory Setting

*Data Type is unsigned integer16

Code Number	Function Name	Address (Hex)	Address (Dec)	R/W attribute	Init. Value	Min. Value	Max. Value	Scale	Unit
A70	PID Function Select	0x0346	839	R/W	0	0	2		
A71	PID Setpoint	0x0347	840	R/W	0	0	10000	0.01	%
A72	PID Setpoint Source	0x0348	841	R/W	2	0	3		
A73	PID Feedback Type	0x0349	842	R/W	0	0	1		
A74	PID P Gain	0x034a	843	R/W	1000	1	10000	0.1	%
A75	PID I Gain Time	0x034b	844	R/W	10	0	36000	0.1	Sec
A76	PID D Gain Time	0x034c	845	R/W	0	0	1000	0.01	Sec
A77	PID Error Limit	0x034d	846	R/W	1000	0	1000	0.1	%
A78	PID Output High Limit	0x034e	847	R/W	1000	0	1000	0.1	%
A79	PID Output Low Limit	0x034f	848	R/W	0	-999	1000	0.1	%
A80	PID Output Invert	0x0350	849	R/W	0	0	1		
A81	PID Scale Factor	0x0351	850	R/W	1000	1	10000	0.01	%
A82	Pre PID Frequency Setpoint	0x0352	851	R/W	0	0	A04	0.01	Hz
A83	PID Sleep Frequency Setpoint	0x0353	852	R/W	0	0	A04	0.01	Hz
A84	PID Sleep/Wake Delay Time	0x0354	853	R/W	0	0	A04	0.01	Sec
A85	PID Wake Frequency Setpoint	0x0355	854	R/W	0	0	A04	0.01	Hz
A61, A63 Data Type	*signed integer16								
Init value of A54,A55	A54 : 30000(A59=0), 390(A59=1), 290(A59=2) A55 : 30000(A60=0), 390(A60=1), 290(A60=2)								

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*Eu : Europe, *Am : America

FS : Factory Setting

*Data Type is unsigned integer16

Code Number	Function Name	Address (Hex)	Address (Dec)	R/W attribute	Init. Value	Min. Value	Max. Value	Scale	Unit
b01	Restart Select	0x0401	1026	R/W	0	0	3		
b02	Line Loss Ride-Through Time	0x0402	1027	R/W	10	3	10	0.1	Sec
b03	Line Loss Ride-Through Run Delay	0x0403	1028	R/W	10	3	100	0.1	Sec
b04	Motor Thermal Overload Level	0x0404	1029	R/W	1000	200	1200	0.1	%
b05	Motor Thermal Overload Profile	0x0405	1030	R/W	0	0	1		
b06	Overload/Overvoltage Restriction Mode	0x0406	1031	R/W	3	0	3		
b07	Overload Restriction Level	0x0407	1032	R/W	HD:1800 ND:1500 (≤200 HP) HD:1500 ND:1200 (≥250 HP, 300LF ~750LF)	200	5.5kW(7.5 HP) ~350kW(500 HP) HD:2000 ND:1650	0.1	%
b08	Overload Restriction Deceleration Rate	0x0408	1033	R/W	10	1	100	0.1	Sec
b09	Software Lock Mode	0x0409	1034	R	0	0	9999		
b10	Start Frequency Setpoint	0x040a	1035	R/W	50	50	1000	0.1	Hz
b11	PWM Carrier Frequency	0x040b	1036	R/W	50	5	055LF~150LF MAX:160 055HF~150HF MAX:160 185LF~750LF MAX:100 185HF~1320HF MAX:100 1600HF above MAX:40	0.1	kHz
b12	Initialization Mode	0x040c	1037	R/W	0	0	1		
b13	Country Code	0x040d	1038	R/W	0 1:*Eu 2:*Am	0	2		
b14	RPM Display Scale Factor	0x040e	1039	R/W	100	1	9999	0.01	
b15	Stop Key Function	0x040f	1040	R/W	0	0	1		
b16	Resume Frequency on FRS Cancellation	0x0410	1041	R/W	0	0	1		
b17	Modbus Node ID	0x0411	1042	R/W	1	1	32		
b18	Ground Fault Detection Setpoint	0x0412	1043	R/W	0	0	1000	0.1	%
b19	Speed Search: Current level	0x0413	1044	R/W	100	90	180		%
b20	Speed Search: Voltage Increase	0x0414	1045	R/W	100	10	300	0.01	%
b21	Speed Search: Voltage Decrease	0x0415	1046	R/W	100	10	300	0.01	%
b22	Speed Search: Speed Decrease	0x0416	1047	R/W	1000	10	2000	0.1	%
b23	Frequency Match	0x0417	1048	R/W	0	0	1		
b24	Fault Relay Select	0x0418	1049	R/W	0	0	1		

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*Data Type is unsigned integer16

Code Number	Function Name	Address (Hex)	Address (Dec)	R/W attribute	Init. Value	Min. Value	Max. Value	Scale	Unit
b25	Stop Method	0x0419	1050	R/W	0	0	1		
b26	HD/ND (Torque Type) Select	0x041a	1051	R/W	0	0	1	1	
b27	Input Phase Loss Detection Period	0x041b	1052	R/W	10	0	30	1	Sec
b28	Communication Time Out Detection	0x041c	1053	R/W	0	0	60		Sec
b29	Communication Time Out Detection Mode	0x041d	1054	R/W	0	0	1		
b30	Display at Power On	0x041e	1055	R/W	1	1	13		
b31	RXP-RXN terminal Com.Baud Rate	0x041f	1056	R/W	3	1	4		
b32	BRD Mode	0x0420	1057	R/W	1	0	2		
b33	BRD Duty Cycle	0x0421	1058	R/W	100	0	500		%
b34	Maximum OVS Output Frequency	0x0422	1059	R/W	8000	A04	30000	0.01	Hz
b35	OVS P Gain	0x0423	1060	R/W	1000	0	10000		
b36	OVS I Gain Time	0x0424	1061	R/W	100	0	10000		
b37	OVS D Gain Time	0x0425	1062	R/W	0	0	10000		
b38	q-Current Reference	0x0426	1063	R/W	250	-1000	1000	0.01	%
b39	Filter Bandwidth	0x0427	1064	R/W	1	0	1000		
b40	Overvoltage Suppression	0x0428	1065	R/W	0	0	1		
b41	Limit Time	0x0429	1066	R/W	5	0	1000	0.1	Sec
b42	VFD Start Delay Time after DC Injection Braking	0x042a	1067	R/W	0	0	600	0.1	Sec
b43	DC Injection Braking Time at Start	0x042b	1068	R/W	0	0	60000	0.1	Sec
b44	Current Controller P Gain in DC Braking	0x042c	1069	R/W	1000	1	10000		
b45	Current Controller I Gain Time in DC Braking	0x042d	1070	R/W	500	0	10000		
b46	DC Injection Braking Force at Start	0x042e	1071	R/W	500 (≤30 HP) 100 (≥40 HP) 70 (≥250 HP)	0	1000	0.1	%
b47	Flying Start P Gain	0x042f	1072	R/W	100	1	10000	0.01	%
b48	Flying Start I Gain Time	0x0430	1073	R/W	153	0	36000	0.1	Sec
b49	Overload Restriction Level at Acceleration & Deceleration	0x0431	1074	R/W	HD:1800 ND:1500 (≤200 HP) HD:1500 ND:1200 (≥250 HP)	200	5.5kW(7.5 HP) ~350kW(500 HP) HD:2000 ND:1650	0.1	%

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*Data Type is unsigned integer16

Code Number	Function Name	Address (Hex)	Address (Dec)	R/W attribute	Init. Value	Min. Value	Max. Value	Scale	Unit
b50	Load Balance Start Frequency	0x0432	1075	R/W	0	0	40000	0.01	Hz
b51	Reserved Data	0x0433	1076	R/W					
b52	Load Balance Gain	0x0434	1077	R/W	500	0	5000	0.01	
b53	Load Balance Start Torque	0x0435	1078	R/W	0	0	1000	0.1	%
b54	Load Balance Frequency Ramp Time	0x0436	1079	R/W	200	10	1000	0.1	Sec
b55	Load Balance Control Mode	0x0437	1080	R/W	0	0	1		
b56	System Load Detection Selection	0x0438	1081	R/W	0	0	6		
b57	System Overload Detection Level	0x0439	1082	R/W	1000	200	2000	0.1	%
b58	System Underload Detection Level	0x043a	1083	R/W	1000	200	2000	0.1	%
b59	System Detection Time	0x043b	1084	R/W	100	0	600	0.1	Sec
b60	System Detection Safe Zone	0x043c	1085	R/W	0	0	A04	0.01	Hz
b61	Dwell Reference at Start	0x043d	1086	R/W	0	0	40000	0.01	Hz
b62	Dwell Time at Start	0x043e	1087	R/W	0	0	100	0.1	Sec
b63	Dwell Reference at Stop	0x043f	1088	R/W	0	0	40000	0.01	Hz
b64	Dwell Time at Stop	0x0440	1089	R/W	0	0	100	0.1	Sec

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Code Number	Function Name	Address (Hex)	Address (Dec)	R/W attribute	Init. Value	Min. Value	Max. Value	Scale	Unit
C01	Intelligent Input Terminal 1	0x0501	1282	R/W	0	0	31		
C02	Intelligent Input Terminal 2	0x0502	1283	R/W	1	0	31		
C03	Intelligent Input Terminal 3	0x0503	1284	R/W	2	0	31		
C04	Intelligent Input Terminal 4	0x0504	1285	R/W	3	0	31		
C05	Intelligent Input Terminal 5	0x0505	1286	R/W	13	0	31		
C06	Intelligent Input Terminal 6	0x0506	1287	R/W	25	0	31		
C07	Input Terminal 1 Mode	0x0507	1288	R/W	0	0	1		
C08	Input Terminal 2 Mode	0x0508	1289	R/W	0	0	1		
C09	Input Terminal 3 Mode	0x0509	1290	R/W	0	0	1		
C10	Input Terminal 4 Mode	0x050a	1291	R/W	0	0	1		
C11	Input Terminal 5 Mode	0x050b	1292	R/W	0	0	1		
C12	Input Terminal 6 Mode	0x050c	1293	R/W	0	0	1		
C13	Output Relay 1 (AL0, AL1, AL2)	0x050d	1294	R/W	5	0	9		
C14	Output Relay 2 (RN0-RN1)	0x050e	1295	R/W	1	0	9		
C15	Output Relay 3 (RN2-RN3)	0x050f	1296	R/W	0	0	9		
C16	Output Relay 2 (RN0-RN1) Mode	0x0510	1297	R/W	0	0	1		
C17	Output Relay 3 (RN2-RN3) Mode	0x0511	1298	R/W	0	0	1		
C18	FM Output Setting	0x0512	1299	R/W	0	0	5		
C19	FM Gain	0x0513	1300	R/W	1000	0	2500	0.1	%
C20	FM Offset	0x0514	1301	R/W	0	-30	100	0.1	%
C21	Motor Overload Alarm	0x0515	1302	R/W	1000	100	2000	0.1	%
C22	FA2 Setpoint at Acceleration	0x0516	1303	R/W	0	0	A04	0.01	Hz
C23	FA2 Setpoint at Deceleration	0x0517	1304	R/W	0	0	A04	0.01	Hz
C24	PID Error Tolerance	0x0518	1305	R/W	100	0	1000	0.1	%
C25	AMI Output Setting	0x0519	1306	R/W	1	0	5		
C26	AMI Gain	0x051a	1307	R/W	1000	0	2500	0.1	%
C27	AMI Offset	0x051b	1308	R/W	0	-999	1000	0.1	%

Code Number	Function Name	Address (Hex)	Address (Dec)	R/W attribute	Init. Value	Min. Value	Max. Value	Scale	Unit
C28	UP/DOWN Initial Value Saving	0x051c	1309	R/W	0	0	1		
C29	UP/DOWN Initial Value Setting	0x051d	1310	R/W	6000	0	A04	0.01	Hz
C30	UP/DOWN Reference Arriving Time	0x051e	1311	R/W	100	1	30000	0.1	Sec

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*Data Type is unsigned integer16

Code Number	Function Name	Address (Hex)	Address (Dec)	R/W attribute	Init. Value	Min. Value	Max. Value	Scale	Unit
H01	Auto Tuning	0x0601	1538	R/W	0	0	1		
H02	Motor Data Select	0x0602	1539	R/W	0	0	1		
H03	Motor Capacity	0x0603	1540	R/W	F.S.	0	112		
H04	Motor Poles Setting	0x0604	1541	R/W	4	2	8		
H05	Motor Rated Current	0x0605	1542	R/W	F.S.	1	8000	0.1	A
H06	Motor Flux Current	0x0606	1543	R/W	F.S.	1	4000	0.1	A
H07	Motor Rated Slip	0x0607	1544	R/W	F.S.	1	1000	0.001	Hz
H08	Motor Resistance R1	0x0608	1545	R/W	F.S.	1	30000	0.1	mOhm
H09	Transient Inductance	0x0609	1546	R/W	F.S.	1	10000	0.001	mH
H10	Motor Resistance R1 Auto Tuning Data	0x060a	1547	R/W	F.S.	1	30000	0.1	mOhm
H11	Transient Inductance Auto Tuning Data	0x060b	1548	R/W	F.S.	1	10000	0.001	mH
H03 Table	24: 3L(3 HP), 25: 5L(5 HP), 26: 7.5L(7.5 HP), 27: 10L(10 HP), 28: 15L(15 HP), 29: 20L(20 HP), 30: 25L(25 HP), 31: 30L(30 HP), 32: 40L(40 HP), 33: 50L(50HP), 34: 60L(60HP), 35: 75L(75HP), 36: 100L(100HP), 37: 125L(125HP)								230V class
	0: 3H(3 HP), 1: 5H(5 HP), 2: 7.5H(7.5 HP), 3: 10H(10 HP), 4: 15H(15 HP), 5: 20H(20 HP), 6: 25H(25HP), 7: 30H(30 HP), 8: 40H(40 HP), 9: 50H(50 HP), 10: 60H(60 HP), 11: 75H(75 HP), 12: 100H(100 HP), 13: 125H(125 HP), 14: 150H(150 HP), 15: 200H(200 HP), 16: 250H(250 HP), 17: 275H(250HP), 18: 300H(300HP), 19: 350H(350HP), 20: 400H(400HP), 21: 425H(425HP), 22: 450H(450HP), 23: 500H(500HP)								460V class

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FS : Factory Setting

*Data Type is unsigned integer16

Code Number	Function Name	Address (Hex)	Address (Dec)	R/W attribute	Init. Value	Min. Value	Max. Value	Scale	Unit
o01	Fieldbus Option Type	0x0801	1794	R/W	0	0	4	-	-
o02	Fieldbus Station Number	0x0802	1795	R	1	0	125	-	-
o03	Fieldbus Byte Swap	0x0803	1796	R/W	0	0	1	-	-
o08	Fieldbus Input Address 1	0x0804	1797	R	0x0603	0x0000	0xFFFF	bit	hex
o09	Fieldbus Input Address 2	0x0805	1798	R	0x0001	0x0000	0xFFFF	bit	hex
o10	Fieldbus Input Address 3	0x0806	1799	R	0x0202	0x0000	0xFFFF	bit	hex
o11	Fieldbus Input Address 4	0x0807	1800	R	0x0203	0x0000	0xFFFF	bit	hex
o12	Fieldbus Input Address 5	0x0808	1801	R	0x0004	0x0000	0xFFFF	bit	hex
o13	Fieldbus Input Address 6	0x0809	1802	R	0x0101	0x0000	0xFFFF	bit	hex
o14	Fieldbus Input Address 7	0x080a	1803	R	0x0102	0x0000	0xFFFF	bit	hex
o15	Fieldbus Input Address 8	0x080b	1804	R	0x010c	0x0000	0xFFFF	bit	hex
o16	Fieldbus Input Address 9	0x080c	1805	R	0x100d	0x0000	0xFFFF	bit	hex
o17	Fieldbus Input Address 10	0x080d	1806	R	0x0111	0x0000	0xFFFF	bit	hex
o18	Fieldbus Input Address 11	0x080e	1807	R	0x0115	0x0000	0xFFFF	bit	hex
o19	Fieldbus Input Address 12	0x080f	1808	R	0x0000	0x0000	0xFFFF	bit	hex
o20	Fieldbus Output Address 1	0x0810	1809	W	0x0202	0x0000	0xFFFF	bit	hex
o21	Fieldbus Output Address 2	0x0811	1810	W	0x0203	0x0000	0xFFFF	bit	hex
o22	Fieldbus Output Address 3	0x0812	1811	W	0x0004	0x0000	0xFFFF	bit	hex
o23	Fieldbus Output Address 4	0x0813	1812	W	0x0002	0x0000	0xFFFF	bit	hex
o24	Fieldbus Output Address 5	0x0814	1813	W	0x0000	0x0000	0xFFFF	bit	hex
o25	Fieldbus Output Address 6	0x0815	1814	W	0x0000	0x0000	0xFFFF	bit	hex
o26	Fieldbus Output Address 7	0x0816	1815	W	0x0000	0x0000	0xFFFF	bit	hex
o27	Fieldbus Output Address 8	0x0817	1816	W	0x0000	0x0000	0xFFFF	bit	hex
o28	Fieldbus Output Address 9	0x0818	1817	W	0x0000	0x0000	0xFFFF	bit	hex
o29	Fieldbus Output Address 10	0x0819	1818	W	0x0000	0x0000	0xFFFF	bit	hex
o30	Fieldbus Output Address 11	0x081a	1819	W	0x0000	0x0000	0xFFFF	bit	hex
o31	Fieldbus Output Address 12	0x081b	1820	W	0x0000	0x0000	0xFFFF	bit	hex
o32	Fieldbus Status	0x081c	1821	R	0x0000	0x0000	0xFFFF	bit	hex
o33	Fieldbus Version	0x081d	1822	R	0x0000	0x0000	0xFFFF	bit	hex

4. Diagnostics/Trouble Shooting

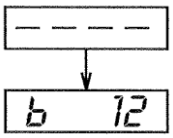
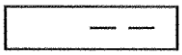
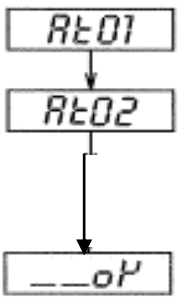
The fault codes listed below are provided to protect both the VFD and the motor from damage. Some of the codes identify when a condition is occurring that may cause more damage.

4.1 Fault Codes

Name	Cause(s)	Error Code
Over current	The VFD output current exceeds the rated current by more than 200%. This may occur if the motor is locked or the load is excessive.	E04
Motor Overload	When the FLA (Full Load Amp) rating of the motor is exceeded, the internal electronic thermal overload protection circuit is activated to protect the motor.	E05
Overvoltage	If the regenerative energy from the motor or the main power supply voltage exceeds the DC link specification, the protective circuit activates to shut off the VFD output.	E07
Communication Error	Communication error between inverter and its operator for all optional cards. When the Reset signal persists for more than 4 seconds or reading invalid parameter address will cause the error	E60
Under voltage	If the input voltage drops below the low voltage detection level, the control circuit may not function properly. So when the input voltage is below the specified level, the inverter output will shut off.	E09
Output Short Circuit	This occurs when excessive current is seen at the output terminals of the VFD. This condition causes the VFD to shut off it's output.	E04 or E34
USP Error	The USP error is indicated when the power is turned on with the Inverter in RUN state. (Enabled when the USP function selected)	E13
EEPROM	The VFD output is shut off when the EEPROM in the VFD has an error. The condition can occur due to external noise, excessive temperature, or other factors.	E08
External Interlock 1	An Intelligent Input terminal has been programmed to monitor an external condition and that input has went low(false). When this input goes false a fault condition occurs.	E12
External Interlock 2	An Intelligent Input terminal has been programmed to monitor an external condition and that input has went low(false). When this input goes false a fault condition occurs.	EE2
External Interlock 3	An Intelligent Input terminal has been programmed to monitor an external condition and that input has went low(false). When this input goes false a fault condition occurs.	EE3
External Interlock 4	An Intelligent Input terminal has been programmed to monitor an external condition and that input has went low(false). When this input goes false a fault condition occurs.	EE4
External Interlock 5	An Intelligent Input terminal has been programmed to monitor an external condition and that input has went low(false). When this input goes false a fault condition occurs.	EE5
External Interlock 6	An Intelligent Input terminal has been programmed to monitor an external condition and that input has went low(false). When this input goes false a fault condition occurs.	EE6

Input Phase Loss	This function detects a phase loss on the input AC source. Detection is performed by monitoring the voltage ripple on the DC bus. This voltage ripple causes heat to the Bus Capacitors which shortens their life.	E20
Inverter Over Temperature	When the temperature in the main circuit exceeds a pre-defined level the VFD faults. Usually caused by a cooling fan failure or by a clogged heatsink or filter.	E21
Ground Fault	This condition occurs when the leakage current to ground exceeds a pre-defined level. Fault is only detected when the VFD is running.	E14
Inverter Overload	When the current rating of the VFD is exceeded, the internal thermal overload protection circuit is activated to protect the output transistors. The time it takes the VFD to trip is dependent upon the carrier frequency, the load, the ambient temperature and the power rating.	E17
Braking Resistor Overload	When the BRD exceeds the duty cycle of the braking resistor this fault will occur. The circuit is designed to calculate and protect the braking resistor from thermally overheating.	E06
OVS Fail	The OVS output frequency is higher than maximum OVS output frequency during the setting time when the OVS function is enabled	E02
Fan Fault (300~750LF Only)	The Fan fault is indicated when the fan is not rotated	E33
System Overload Detection Fault	The output current of the drive is greater than the detection level set for this feature when it is enabled	E23
System Underload Detection Fault	The output current of the drive is less than the detection level set for this feature when it is enabled.	E24
ProfibusDP Fault (Option)	ProfibusDP optional card only. Host disconnection, or invalid host setting cause this error	E40
DeviceNet Fault (Option)	DeviceNet optional card only. Communication cable power loss, disconnect to host, or invalid host setting cause this error	E41

Other display

Contents	Display
It is displayed when initialization of data is processing (It is not displayed when initialization of history is processing.)	
There is no data available (Trip history, PID feedback data)	
The auto tuning process has successfully completed.	

4.2 Troubleshooting

Symptom, probable cause and countermeasure have been summarized in this section.

Symptom/Condition		Probable Cause	Countermeasure
The motor will not move	The inverter outputs U,V and W are not supplying voltage.	•Is the Frequency Setpoint Source (A01) parameter set correctly? •Is the Run Source (A02) parameter set correctly?	•Make sure the parameter (A01) is set correctly? •Make sure the parameter (A02) is set correctly?
		•Is power being supplied to the AC Input terminals R, S and T? If so, the power lamp should be on.	•Check terminals R, S and T for rated AC voltage. Voltage will only be present at U, V, W if a Run command is present. •Turn on the power supply or check the input circuit breaker or fuses.
		•Is there an error code E□□displayed?	•Press the Func key and determine the error type. Then clear the error(Reset).
		•Are the signals to the intelligent input terminals correct? •Is the Run Command active? •Is the[FW] terminal (or [RV]connected to CM1 or CM(via switch, etc.)	•Verify the terminal functions for C01-C06 are correct. •Turn on Run Command •Supply 24V to [FW] or [RV] terminal, if configured. (Terminal mode selection)
		•Has the frequency setting for F01 been set greater than zero? •Are the control circuit terminals H, O, and L connected to the potentiometer?	•Set the parameter (F01) to a safe, non-zero value. •If the potentiometer is the Frequency Setpoint Source, verify that the DC voltage at "O" ＞0V
		•Is the RS(reset) function or FRS (free-run stop)function on?	•Turn off the command(s)
	Inverter outputs U,V,W are supplying voltage.	•Is the motor load too heavy? •Is the motor locked?	•Reduce load, and test the motor independently.
The direction of the Motor is reversed		•Are the connections at the output terminals U, V, W correct? •Is the phase sequence of the motor forward or reverse with respect to U, V, and W?	•Make connections according to the phase sequence of the motor. In general: FWD=U-V-W, and REV=U-W-V.
		•Are the control terminals [FW] and [RV] wired correctly? •Is parameter (F04) properly set?	•Use terminal [FW] forward [RV] reverse. •Set motor direction in (F04).
The motor speed will not reach the target frequency (desired speed)		•If using an analog input reference, is voltage or current present at "O" or "OI" respectively?	•Check the wiring •Check the potentiometer voltage signal or the source supplying the current reference.
		•Is the load too heavy?	•Reduce the load. •Heavy loads activate the overload restriction feature. (reduces output as needed)
The rotation is unstable		•Is the load fluctuation too great? •Is the supply voltage unstable? •Is the reference signal unstable? •Is the problem occurring at a particular frequency?	•Increase the motor capacity (both inverter and motor) •Fix power supply problem. •Change the output frequency slightly, or use the jump frequency setting to skip the problem frequency.

Symptom/Condition		Probable Cause	Countermeasure
The RPM of the motor does not match the inverter output frequency setting		•Is the Maximum Frequency Setting (A04) correct? •Does the monitor function (d01) display the expected output frequency?	•Verify the V/F settings match motor specifications •Make sure all scaling is properly set
VFD data is not correct	No down load save occurred.	•Was power turned off after a parameter edit but before pressing the store key?	•Edit the data and press the store key once
		•Edits to data are permanently stored at power down. Was the time from power off to power on less than six seconds?	•Wait six seconds or more before turning power off after editing data.
A param-eter will not change after an edit (reverts to old setting)	The frequency setting will not change. Run/Stop does not operate.	•Was the standard operator mode and terminal mode changed correctly?	•Make sure the setting mode of [A01], [A02] is changed
	True for all parameters.	•If you're using an Intelligent Input Terminal configured as “SFT”?	•Change the state of the SFT input, and check (b09) parameter. (b09=0)

Precautions for data setting

Make sure to hit the “STR” key after parameter values have been changed. Also do not use the equipment for 6 seconds after the changes have been made to ensure that the parameter changes have occurred. If any key is pressed, or the reset operation is performed, or the power is turned off within the 6 second window, the data may be corrupted

4.3 Maintenance and Inspection

DANGER

•Wait at least five (5) minutes after turning off the input power supply before performing maintenance or an inspection to prevent a danger of electric shock.

•Make sure a qualified personnel performs the maintenance, inspection, and par replacement.

- Before starting to work, remove any metallic objects such as wrist watch, bracelet, etc.
- Be sure to use tools with insulated handles to prevent electric shock and/or personal injury.

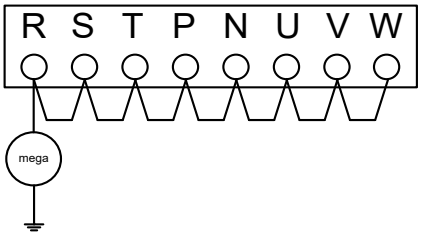
4.3.1 General Precautions and Notes

•Always keep the unit clean so that dust of other foreign matter does not enter the VFD.
•Take special care in regard to loose or broken wires and of making wiring errors.
•Firmly connect terminals and connectors.
•Keep electronic equipment away from moisture and oil. Dust, steel filings and other foreign matter can damage insulation, causing unexpected failures.
•When removing connectors, never pull by the wires (ie: wires for the cooling fan and logic P.C. board.) This may cause product failure and/or injury to personnel.

4.3.2 Inspection Items

(1)Daily inspection
(2)Periodic inspection (approximately once a year)
(3)Insulation resistance test (approximately once every two years)

Conduct the insulation resistance test by short circuiting the terminals as shown below.



• NEVER perform the withstand voltage test with wires connected to the VFD.
The VFD has a surge protector between the main circuit terminals and the chassis ground.

4.3.3 Spare Parts

Part description	Symbol	Quantity		Note
		Used	Spare	
Cooling FAN	FAN	2	2	7.5 HP(HD) ~ 75 HP(HD) 10 HP(ND) ~ 100 HP(ND)
		3	3	100 HP(HD) ~ 200 HP(HD) 125HP(ND) ~ 250HP(ND)
		4	4	250 HP(HD)~300 HP(HD) 275 HP(ND)~350 HP(ND)
		5	5	400 HP(HD)~450HP(HD) 425 HP(ND)~500 HP(ND)
Case	-	1	1	Front case Main case Bottom cover

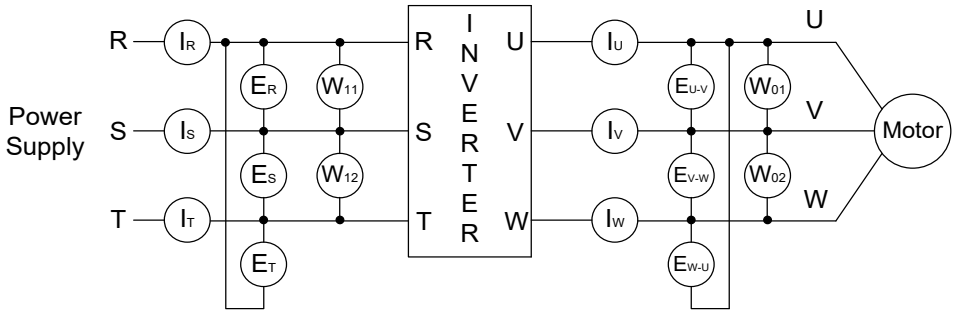
Monthly and Yearly Inspection Chart

Item Inspected		Check for…	Inspection Cycle		Inspection Method	Criteria
			Month	Year		
Overall	Ambient environment	Extreme temperatures & humidity	V		Thermometer, hygrometer	Ambient temperature between -10 to 40℃, non-condensing
	Major devices	Abnormal vibration noise	V		Visual and aural	Stable environment for electronic controls
	Power supply insulation	Voltage tolerance	V		Digital volt meter, measure between inverter terminals R, S, T	230V class: 200 to 240V 50/60Hz 460V class: 400 to 480V 50/60Hz
Main circuit	Ground Insulation	Adequate resistance		V	Digital volt meter, GND to terminals	1000V class Mega ohm meter
	Mounting	No loose screws		V	Torque wrench	• M3: 0.8~1.0Nm • M4: 1.2~1.5Nm • M5: 2.0~2.5Nm • M6: 2.5~3.0Nm • M8: 15.2~21.5Nm • M10: 28.0~33.0Nm • M12: 39.0~50.0Nm
	Components	Overheating		V	Thermal trip events	No trip events
	Housing	Dirt, dust		V	Visual	Vacuum dust and dirt
	Terminal block	Secure connections		V	Visual	No abnormalities
	Smoothing capacitor	Leaking swelling	V		Visual	No abnormalities
	Relay(s)	Chattering		V	Aural	Single click when switching On or Off
	Resistors	Cracks or discoloring		V	Visual	Use Ohm meter to check braking resistors
	Cooling FAN	Noise	V		Power down, manually rotate	Rotation must be smooth
		Dust	V			Vacuum to clean
Control circuit	Overall	No odor, discoloring corrosion		V	Visual	No abnormalities
	Capacitor	No leaks or deformation	V		Visual	Undistorted appearance
Display	LEDs	Legibility	V		Visual	All LED segments work

Note1: The life of a capacitor is affected by the ambient temperature.
Note2: The VFD must be cleaned periodically.
If dust accumulates on the fan and heat sink, it can cause overheating of the VFD.

4.3.4 General Inverter Electrical Measurements

The following table specifies how to measure key system electrical parameters.
The diagrams on the next page show inverter-motor systems the location of measurement points for these parameters.



Parameter	Circuit location of measurement	Measuring instrument	Notes	Reference Value
Supply voltage E_1	R-S, S-T, T-R (E_R) (E_S) (R_T)	Moving-coil type voltmeter or rectifier type voltmeter	Fundamental AC Waveform	Commercial supply voltage (230V class) 200-220V 50Hz 200-240V 60Hz (460Vclass) 380-415V 50Hz 400-480V 60Hz
Supply current I_1	R, S, T, Current (I_R) (I_S) (I_T)	Moving-coil type Ammeter	Total effective value	
Supply power W_1	R-S, S-T (W_{11}) + (W_{12})	Electronic type wattmeter		
Supply power factor P_{f1}	Calculate the output power factor from the output voltage E_1, output current I_1, and output power W_1 $P_{f1} = \frac{W_1}{\sqrt{3} \cdot E_1 \cdot I_1} \times 100(\%)$			
Output voltage E_0	U-V, V-W, W-U (E_U) (E_V) (E_W)	Rectifier type voltmeter	Total effective value	PWM Output Voltage
Output current I_0	U, V, W Current (I_U) (I_V) (I_W)	Moving-coil type Ammeter	Total effective value	
Output power W_0	U-V, V-W (W_{01}) + (W_{02})	Electronic type wattmeter	Total effective value	
Output power factor P_{f0}	Calculate the output power factor from the output voltage E_0, output current I_0, and output power W_0 $P_{f0} = \frac{W_0}{\sqrt{3} \cdot E_0 \cdot I_0} * 100(\%)$			

Note1: Use a meter indicating a fundamental wave effective value for voltage, and meters indicating total effective values for current and power.
Note2: The inverter output has a PWM waveform, and low frequencies may cause erroneous readings. However, the measuring instruments and methods listed above provide comparably accurate results.
Note3: A general-purpose digital volt meter (DVM) is not usually suitable to measure a PWM waveform (not pure sinusoid)

4.4 Warranty of the Unit

4.4.1 Questions on Unit

• If you have any questions regarding damage to the unit, unknown parts or for general inquiries, please contact World Wide Electric with the following information.

(1) Inverter Model
(2) Production Number (Serial No.)
(3) Date of purchase
(4) Reason for Calling
① Damaged part and its condition etc.
② Unknown parts and their contents etc.

4.4.2 Warranty for the unit

(1) The warranty period of the unit is one year after the purchase date. However the warranty will be void if the fault is due to;

③ Incorrect use as directed in this manual, or attempted repair by unauthorized personnel.
④ Any damage sustained other than from transportation (Which should be reported immediately).
⑤ Using the unit beyond the limits of the specifications.
⑥ Natural Disasters : Earthquakes, Lightning, etc

(2) The warranty is for the inverter only, any damage caused to other equipment by malfunction of the inverter is not covered by the warranty.

(3) Any examination or repair after the warranty period (one-year) is not covered. And within the warranty period any repair and examination which results in information showing the fault was caused by any of the items mentioned above, the repair and examination costs are not covered. If you have any questions regarding the warranty, please contact WorldWide Electric.

N700E INSTRUCTION MANUAL REVISION HISTORY TABLE

LOG ELECTRO ELECTRIC SYSTEMS

No.	Revision contents	Data Issues	Version No.
1	First edition	12. 04	HHIS-WZ-PE-086(00)
2	B group function code (b02) changed	12. 06	HHIS-WZ-PE-086(01)
3	Fuse table changed	12. 10	HHIS-WZ-PE-086(02)
4	PID Function addition	13. 01	HHIS-WZ-PE-086(03)
5	BRD Function addition	13. 04	HHIS-WZ-PE-086(04)
6	A revised edition of N700E EIO	13. 06	HHIS-WZ-PE-086(05)
7	Function code description changed	13. 12	HHIS-WZ-PE-086(06)
8	Add jogging command by RS485	14. 02	HHIS-WZ-PE-086(07)
9	Over Voltage Suppression function added	15. 03	HHIS-WZ-PE-086(08)
10	300LF~750LF models are added	16. 01	HHIS-WZ-PE-086(09)
11	Fieldbus, Load sharing and OL/UL functions added	16. 06	HHIS-WZ-PE-086(10)
12	Change company name to HYUNDAI ELECTRIC	17.03	HHIS-WZ-PE-086(11)