Building a better future
Global Leader

ISO 9001 REGISTERED
DNV
MGMT.SYS.
RvA C024
DNV Certification B.V., The Netherlands

Hyundai Inverter

HiRUN N 700E

| The Controlling Solution of Powerful Inverter Brand |

HYUNDAI
HEAVY INDUSTRIES CO.,LTD.

Hyundai's Technology for the Best

High performance inverter for efficient business design

the best future with HiRUN N700E series

HiRUN N700E Series with Powerful Control Solution

| Excellent Applicability to Various Loads |

| Easy Maintenance & Simple Repair |

| High Reliability & Durability |

| Compliance with RoHS |

| Lower Audible Noise |

For the highest quality, for the highest customer satisfaction

HYUNDAI N700E series inverter with high durability, elaborate speed controllability and excellent torque responsibility provides superb operability.

The N700E's compact size and sensorless vector control technology provide perfectly optimized performance for industrial equipment.

Certificates of international standards (CE, UL/cUL) of N700E series make its applications ready for global business.

Model Name Indication

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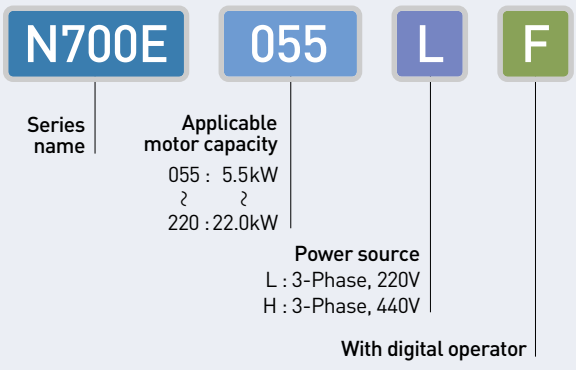


Model Configuration

Applicable motor capacity (kW)	3-Phase, 220V	3-Phase, 440V
5.5	N700E-055LF	N700E-055HF
7.5	N700E-075LF	N700E-075HF
11	N700E-110LF	N700E-110HF
15	N700E-150LF	N700E-150HF
18.5	N700E-185LF	N700E-185HF
22	N700E-220LF	N700E-220HF

Contents

:: Improved Control Performance

High Torque Performance in Ultra Low Speed Zone by Using Sensorless Vector Control

- Hyundai's advanced sensorless vector control technology provides a motor with high torque performance in ultra low speed zone (Sensorless vector control: above 150% at 1Hz).
- In case of fast acceleration/deceleration of motor, N700E series provides powerful torque controllability without trip.
- Sensorless vector control technology expands the range of controlling speed.

Superb Speed Control Performance by Improved Tuning Technology for Motors

- Through technology of compensating the motor time constant while motor tuning minimizes the speed change, stable motor operation can be achieved.
- After auto-tuning operation for motor time constant, N700E series minimizes the controls of speed so that the rate of speed variance can be reduced significantly while running.

Intensified Protective Functions for Safety while Running

- Ground fault protection can prevent accidents.
- Countermeasure for output's phase loss protects motor while running.

Improved PID Control Performance

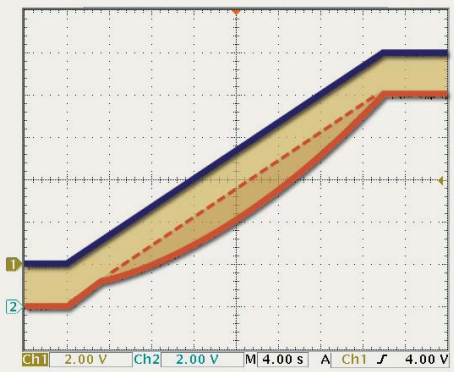
- Built in PID function uniformly controls oil pressure and flow quantity without additional options.

Built-in Regenerative Braking System

- BRD is basically equipped with the inverter so that the easy operation for acceleration/deceleration time is achieved without additional options.
- Driving performance of acceleration and deceleration maximizes efficiency.

Enhanced Flexibility for Various Loads

- Improved torque characteristic, which is reduced to the 1.7th power, perfectly fits with loads for fans and pumps.
- Optimized energy saving according to the characteristics of loads is achieved.



▶ Energy-saving by VP1.7 power

:: Easy Operation and Maintenance

Various Inverter Display Functions

- The operational status of the inverter are displayed on the monitor so that an user can understand the condition of the inverter.
- Cumulative hours of driving time and the actual running time are displayed for easy maintenance.

Compact Size

- Compact size of N700E series utilizes conventional panel even when changing model.
- N700E series has the same size with the N300 series so that there is no need of changing panel while changing inverter models (5.5kW model excluded).

Convenient Maintenance and Repair

- N700E is available to replace the fan without separation.
- Fan on/off function increases fan's durability and minimizes fan's noise.

:: Enhanced Compliance with Global Market Standard

Global Standard Certifications (CE, UL/cUL)

- Range of input voltage expanded to 380~480V for global industrial environment.
- Connection to the external signal is possible regardless of inverter types, SINK (PNP) or SOURCE (NPN), by setting control terminals.

:: Various Load Compatibility

Fan & Pump

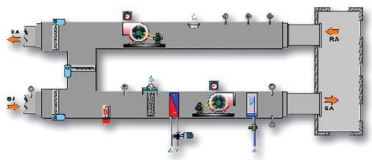
Air Conditioning & Dust Collecting Fan

- Energy saving by selecting torque characteristic of a load
- Restart function in case of momentary power interruption
- Factory automation by PLC
- Machine protection by soft start/stop
- Auto operation by precise PID control function
- Low noise operation
- Quick responsiveness to load change by frequency jump and multi speed operation

Cooling Tower

- Stable operation by supplying high qualified energy
- Energy saving by speed and torque control

Water supply pump
Cooling water circulation pump
Boiler water supply pump



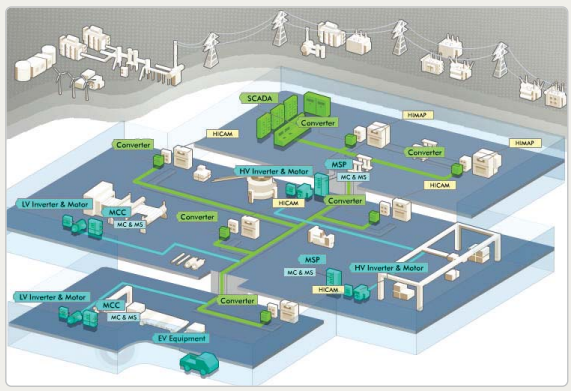
Conveyor & Transport Machine

Conveyor

- Multi relay output terminal
- Accurate acceleration & deceleration
- Overweight prevention by using over-torque signal
- Prevention of load slippage by curve acceleration and deceleration

Factory Automation

- Factory automation with PLC
- High speed torque response to prevent slip down
- Soft start and stop



Textile Machine

Spinning Machine

- Soft start/stop for prevention of snap and cut off
- Unit design for tough circumstances (dust, cotton)
- Improvement of product quality by stable operating speed

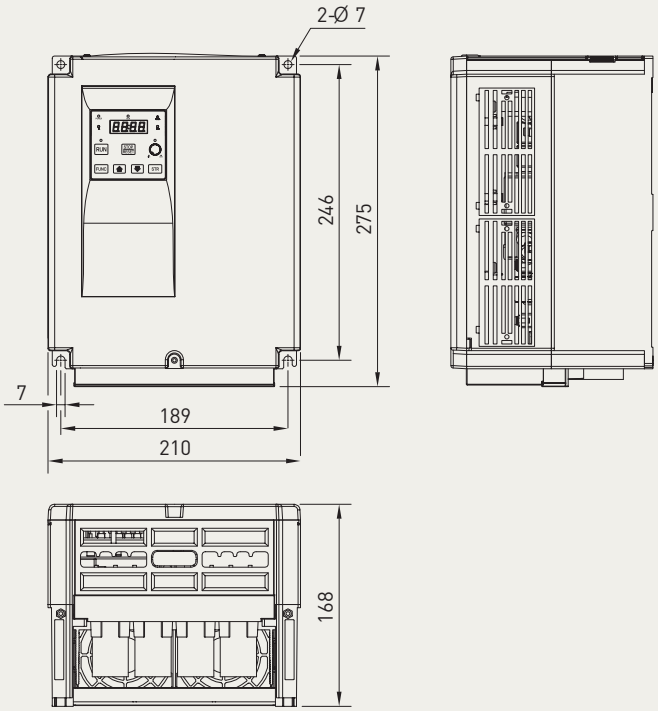
Washing Machine

Washing Machine

- Powerful torque boost function
- Over torque limit function
- Separate setting of acceleration and deceleration time
- Built-in regenerative braking unit (below 22kW)
- Soft start/stop

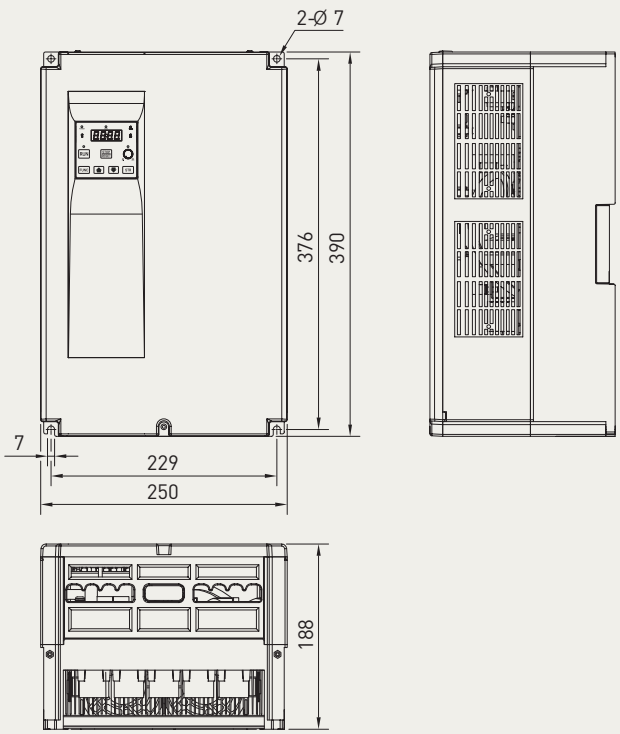
N700E-055LF/055HF, N700E-075LF/075HF, N700E-110LF/110HF

[Unit : mm]



N700E-150LF/150HF, N700E-185LF/185HF, N700E-220LF/220HF

[Unit : mm]



Standard 200V Class

Inverter Model (N700E-□□□LF)		055LF	075LF	110LF	150LF	185LF	220LF
Applicable Motor (4P, kW) [1]		5.5	7.5	11	15	18.5	22
Rated Capacity (kVA)	200V	8.3	11.1	15.6	22.2	26.3	31.2
	240V	10.0	13.3	18.7	26.6	31.6	37.4
Rated Input Voltage (Vac)		3-phase (3line) 200~240V±10%, 50/60Hz±5%					
Rated Output Voltage [2]		3-phase 200~240V (This corresponds to supply voltage)					
Rated Output Current (A)		24	32	45	64	76	90
Braking [3]	Regenerative Braking	Built-in regenerative circuit (Discharging resistor is optional)					
	Available Minimum Value of Register (Ω)	17	17	17	8.7	6	6
Weight (kg)		4.2	4.5	4.5	6.5	7.5	8

Standard 400V Class

Inverter Model (N700E-□□□HF)		055HF	075HF	110HF	150HF	185HF	220HF
Applicable Motor (4P, kW) [1]		5.5	7.5	11	15	18.5	22
Rated Capacity (kVA)	380V	7.9	10.5	15.1	21.1	25.0	29.6
	480V	10.0	13.3	19.1	26.6	31.6	37.4
Rated Input Voltage (Vac)		3-phase (3line) 380~480V±10%, 50/60Hz±5%					
Rated Output Voltage [2]		3-phase 380~480V (This corresponds to supply voltage)					
Rated Output Current (A)		12	16	23	32	38	45
Braking [3]	Regenerative Braking	Built-in regenerative circuit (Discharging resistor is optional)					
	Available Minimum Value of Register (Ω)	70	50	50	30	20	20
Weight (kg)		4.2	4.5	4.5	7	7	7.5

※ 1) Applicable motor represents HYUNDAI 3-phase motor.
When you use other motors, be cautious not to apply over rated current to N700E series inverter.

2) Rated output voltage decreases as supply voltage decreases (AVR option prevents this phenomenon).

3) When capacitor is regenerating, braking torque is the average torque value of single motor when maximum deceleration occurs.
But braking torque is not a continuous regenerating torque (average deceleration torque is dependent on the motor loss).
And N700E series has internal regenerating brake circuit. But use the optional braking resistor when a big regenerative torque is needed.

Standard 200V, 400V Class

Specification			Description
Control Method [4]			Space vector PWM method
Output Frequency Range [5]			0.01~400Hz
Frequency Accuracy [6]			Digital: Max frequency ±0.01% Analogue: Max frequency ±0.1%
Frequency Resolution			Digital setting: 0.01 Hz (<100Hz), 0.1Hz (>100Hz) Analogue: Max frequency / 500 (when DC 5V input), Max frequency / 1,000 (DC 0~10V, 4~20mA)
V/f Characteristic			Base frequency: 0~400Hz free set Torque pattern selection available (constant torque / reduced torque)
Overload Capacity			150%, 1minute
Acceleration/Deceleration Time			0.1~3,000sec (linear/curve selection available) 2nd Acceleration/Deceleration setting available
DC Braking			Performs between min frequency and established braking frequency. Level and time setting available
Input	Frequency Setting	Standard Operator	Set by volume up/down key. 1W, 1~2kΩ variable resistor. DC 0~10V (input impedance 10kΩ), 4~20mA (input impedance 250Ω).
		External Signal	
	Forward Reverse Start/Stop	Standard Operator	Run key / Stop key (change forward/reverse by function command).
		External Signal	Forward run/stop, reverse run/stop set by terminal assignment (1a, 1b selection available)
	Intelligent Input Terminal		FW (Forward), RV (Reverse),CF1~4 (Multi-speed), RS (Reset), AT (Analog input current / voltage Transfer), USP (Unattended Start Protection), EXT (External Trip), FRS (Free Run Stop), JG (Jogging Command), SFT (Software Lock Command), 2CH (2nd Acceleration/Deceleration), SET (2nd Motor Constants Setting)
Output	Intelligent Output Terminal		RUN (Run Signal), FA1 [Frequency Arrival Signal (at the set frequency)], FA2 [Frequency Arrival Signal (at or above the set frequency)], OL (Overload Advanced Notice Signal), OD (Output Deviation of PID Signal), AL (Alarm Signal)
	Frequency Monitor		Analog meter (DC0~10V full scale. Max. 1mA) Analog output frequency signal and analog output current signal Analog output voltage signal selection available.
	Alarm Output Contact		OFF when inverter alarm (b contact output) / Auto switch ON and OFF / Intelligent output terminal use available
Main Functions			Auto-tuning, AVR Function, V/F Setting, Curve Accel./Decel. Selection, Frequency Upper/Lower Limit, 6 Level Multi-speed, Start Frequency Set, Carrier Frequency Setting (0.5~16kHz), PID Control, Frequency Jump, Analog Gain Bias Control, Jogging Run, Electronic Thermal Level Control, Retry, Auto Torque Boost, Trip History Monitor, Software Lock, S-shape Accel./Decel., Frequency Conversion Display, USP, 2nd Control
Protective Functions [7]			Over-current Protection, Overload (electronic thermal), Over-voltage, Communication Error, Under-voltage, Output Short, USP Error, EEPROM Error, External Trip, Ground Fault, Temperature Trip
Environmental Conditions	Ambient Temperature		-10~50°C (over 40°C: set carrier frequency below 2.0kHz)
	Storage Temperature		-20~60°C (while transporting: short time)
	Ambient Humidity		Below 90%RH (non-condensing)
	Vibration		5.9m/s^2 (0.6G). 10~55Hz (JIS C0911 test methodology)
	Location		Less than 1,000m above sea level, Indoor (no corrosive gas, no flammable gas, no oil-drop, no-dust)
Options			Noise filter, DC reactor, AC reactor, Remote operator, Remote operator cable, Regenerative braking resistor

※ 4) Before control method setting A31 is set to 2 (sensorless vector control), the following instructions should be considered.
- Carrier frequency setting b11 should be above 2.1kHz.
- When you use motors below half capacity of max applicable motor capacity, it is hard to get sufficient quality.
- When over 2 motors are about to be operated, sensorless vector control cannot be applied.

5) When you operate motor over 50/60Hz, inquire about maximum available rotational number.

6) For the purpose of stable motor control, output frequency can exceed approximately 1.5kHz at [A04]

7) Protective method is based on JEM1030.

Operations

Run lamp
Light is on when the inverter is generating PWM output or RUN command is entered.

Power lamp
Lamp for the controlling power

Display (LED signal)
Displays frequency, motor current, motor rotational number, alarm setting

Run key
Run the inverter. RUN key is disabled when the inverter is selected to run by terminal. RUN key is available only while the above LED is on.

Function key
Command selecting function.

Up/Down key
Increase/decrease frequency value, and modify set values

PRG lamp
Light is on when the value is entering

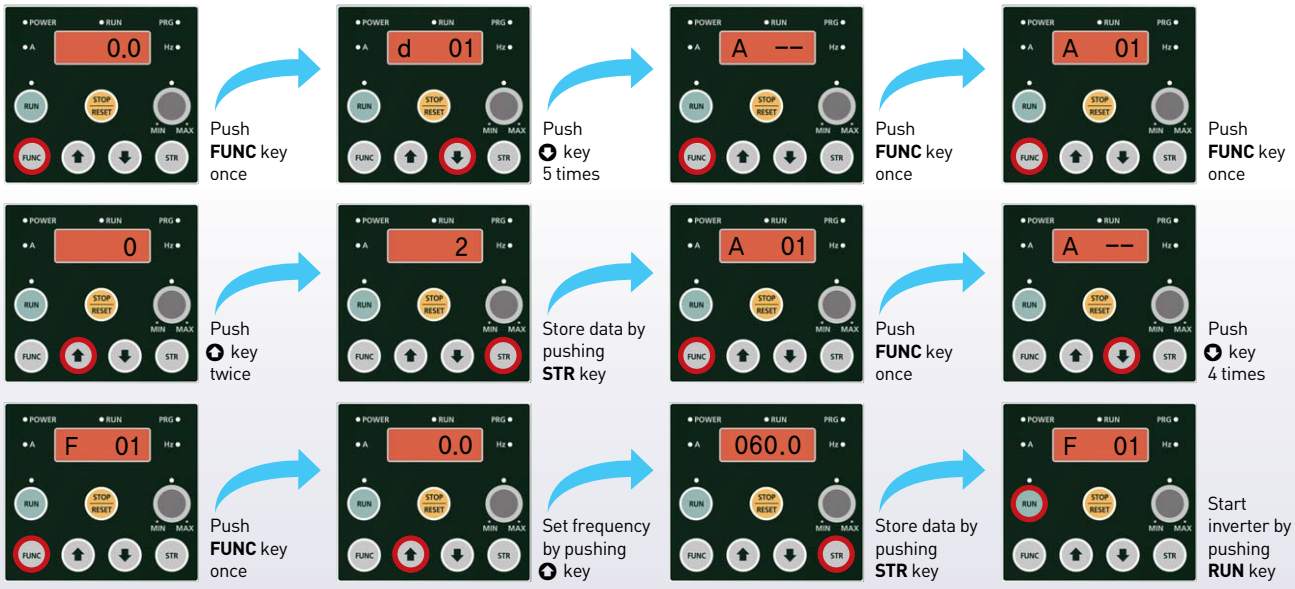
Hz/A lamp
Show whether the displayed data is frequency value or data current value.

Stop/Reset key
Stop operating inverter and cancellation of alarm(available in both sides of operator and terminal) When the inverter is run through b15 terminal, operator can select valid or invalid state.

Volume key
Set output frequency.
(available only when the lamp is on)

Store key
Store the selected data or the set value.

Standard Operator Setting



Display Running Frequency

Monitor Modes (d-group) & Basic Setting Modes (F-group)

Main Function	Code	Function Name	Description	Initial Data	Change Mode on Run
Basic Monitor	d01	Output Frequency Monitor	0.00~400.0Hz ("Hz"LED on)		
	d02	Output Current Monitor	0.0~99.9A ("A"LED on)		
	d03	Output Voltage Monitor	Output voltage display (V)		
	d04	Motor Rotational Direction Monitor	"F": Forward direction, "r" : Reverse direction, "0": Stop		
	d05	PID Feedback Monitor	Display converted value (set to "A 50") Availabe when PID function is selected		
	d06	Terminal Input Monitor	Display the state of Intelligent input terminal display		
	d07	Terminal Output Monitor	Display the state of intelligent input terminal and alarm output terminals		
	d08	Frequency Conversion Monitor	0~99.99/100.0~400.0 (= d01 x b14)		
	d09	Power Consumption Monitor	0~9999 [W]		
	d10	Cumulative Time Monitor During RUN (Hr)	0~9999 [Hr]		
	d11	Cumulative Time Monitor During RUN (Min)	0~59 [Min]		
	d12	DC Link Voltage Monitor	0~999 [V]		
	d13	Trip Monitor	Displays the details of the last trip		
	d14	Trip Monitor 1	Display the details for the last 1 protective trip		
	d15	Trip Monitor 2	Display the details for the last 2 protective trips		
	d16	Trip Monitor 3	Display the details for the last 3 protective trips		
	d17	Trip Counter	Display the number of inverter trips		
Basic Setting	F01	Output Frequency Setting	0.00~400.0 [Hz]	Initial volume value	○
	F02	Accelerating Time Setting 1	0.0~999.9 / 1000~3000 [sec]	30.0sec	○
	F03	Decelerating Time Setting 1	0.0~999.9 / 1000~3000 [sec]	30.0sec	○
	F04	Driving Direction Selection	0--- forward / 1--- reverse	0	X

Expanded Function A Mode

Main Function	Code	Function Name	Description	Initial Data	Change Mode on Run
Basic Setting	A01	Frequency Setting Method (Multi-speed Setting)	0 (main volume) / 1 (control circuit terminal input) / 2 (standard operator) / 3 (remote operator)	0	X
	A02	Run Setting Method	0 (standard operator) / 1 (control circuit terminal input) / 2 (remote operator)	0	X
	A03	Base Frequency Setting	Set base frequency from 0 to max by 0.01Hz unit	60.00Hz	X
	A04	Maximum Frequency	Maximum frequency can be set from base frequency A03~400Hz by 0.1Hz unit.	60.00Hz	X
Analog Input Setting (External Frequency Setting)	A05	External Frequency Start Value	0~400Hz (0.01Hz unit)	0.00Hz	X
	A06	External Frequency End Value	0~400Hz (0.01Hz unit)	0.00Hz	X
	A07	External Frequency Start Value Ratio	0~100 (0.1% unit)	0.0%	X
	A08	External Frequency End Ratio	0~100 (0.1% unit)	100.0%	X
	A09	External Frequency Start Selection	0 (start from start frequency) 1 (start from 0Hz)	0	X
	A10	External Frequency Sampling	Set sampling number on analog input filter from 1 to 8.	4	X
Multilevel and Jogging Setting	A11 ~ A25	Multi-speed Frequency	0.0~400Hz (0.01Hz unit)	-	O
	A26	Jogging Frequency	0.5~10.0Hz (0.01Hz unit)	0.50Hz	O
	A27	Selection of Jogging Stop Operation	0 (free-run stop) / 1 (stop by decelerating) / 2 (stop by DC braking)	0	X
V/F Characteristic	A28	Torque Boost Selection	0 (manual) / 1 (automatic)	0	X
	A29	Manual Torque Boost	Set voltage of manual torque boost.	1.0%	O
	A30	Manual Torque Boost Frequency	Select frequency ratio out of base frequency from 0~100%.	10.0%	O
	A31	Control Method	0 (linear torque characteristic) / 1 (reduced torque characteristic) / 2 (sensorless vector control)	0	X
	A32	Output Voltage Gain	20~110%	100.0%	O
DC Braking Setting	A33	DC Braking Selection	0 (disabled) / 1 (enabled)	0	X
	A34	DC Braking Frequency	0.0~10.0Hz (0.01Hz unit)	0.50Hz	X
	A35	DC Braking Waiting Time	0.0~5.0sec (0.1sec unit)	0.0sec	X
	A36	DC Braking Force	0~50% (0.1% unit)	10.0%	X
	A37	DC Braking Time	0.0~10.0sec (0.1 sec)	0.0sec	X
Frequency Related Setting	A38	Upper Limit of Frequency	A39~A04Hz (0.01Hz unit)	0.00Hz	X
	A39	Lower Limit of Frequency	0.00~A38Hz (0.01Hz unit)	0.00Hz	X
	A40 A42 A44	Frequency Jump	0.00~400Hz (0.01Hz unit)	0.00Hz	X
	A41 A43 A45	Frequency Jump Width	0.00~10.00Hz (0.01Hz unit)	0.00Hz	X

Main Function	Code	Function Name	Description	Initial Data	Change Mode on Run
PID Control Setting	A46	PID Selection	0 (disabled) / 1 (enabled)	0	X
	A47	P (Proportion) Gain	0.1~100.0% (0.1 unit)	10.0%	O
	A48	I (Integration) Gain	0.0~100.0sec (0.1 unit)	10.0sec	O
	A49	D (Differentiation) Gain	0.0~100.0sec (0.1 unit)	0.0sec	O
	A50	PID Scale Ratio	0.1~1,000.0 (0.1 unit)	100.0	X
	A51	Feed-Back Input Method	0 (current input) / 1 (voltage input)	0	X
AVR Related Setting	A52	AVR Selection	0 (always ON) / 1 (always OFF) / 2 (OFF only when deceleration)	0	X
	A53	Motor Voltage Capacity	200 / 220 / 230 / 240 (200V class) 380 / 400 / 415 / 440 / 460 / 480 (400V class)	220V / 380V	X
2nd Accel /Decel Related Functions	A54	2nd Acceleration Time	0.0~999.9/1,000~3,000sec	10.0sec	O
	A55	2nd Deceleration Time	0.0~999.9/1,000~3,000sec	10.0sec	O
	A56	2 Level Accel./Decel. Switching Method Setting	0 (input from terminal [2CH]) / 1 (switching frequency setting from acc / dec1 to acc / dec2)	0	X
	A57	Frequency Setting for Accel./Decel. Time Switching in Acceleration	0.00-400.0Hz (0.01Hz unit)	0.00Hz	X
	A58	Frequency Setting for Accel./Decel. Time Switching in Deceleration	0.00-400.0Hz (0.01Hz unit)	0.00Hz	X
	A59	Acceleration Pattern Selection	0 (linear) / 1 (S-curve) / 2 (U-curve)	0	X
	A60	Deceleration Pattern Selection	0 (linear) / 1 (S-curve) / 2 (U-curve)	0	X
	A61	Voltage Input (O) Offset Setting	Set voltage offset when external analog signal input is entered..	0.0	O
	A62	Voltage Input (O) Gain Setting	Set voltage gain when external analog signal input is entered.	100.0	O
	A63	Current Input (OI) Offset Setting	Set current offset gain when external analog signal input is entered.	0.0	O
	A64	Current Input (OI) Gain Setting	Set current gain when external analog signal input is entered.	100.0	O
	A65	FAN Setting	0 (always ON) / 1 (ON only when RUN)	0	X

Expanded Function b Mode

Main Function	Code	Function Name	Description	Initial Data	Change Mode on Run
Restart Related Functions	b01	Instant Restart Selection	0 (alarm after trip) / 1 (start from 0Hz when restart) / 2 (start from predefined frequency when restart) / 3 (stop by decelerating from predefined frequency when restart)	0	X
	b02	Allowable Restart Time	0.3~1.0sec (0.1sec unit)	1.0sec	X
	b03	Instant Restart Waiting Time	0.3~3.0sec (0.1sec unit)	1.0sec	X
Electric Thermal Related Functions	b04	Electronic Thermal Level	Set electronic thermal level in 20~120% of inverter rated current.	100.0%	X
	b05	Electronic Thermal Characteristic Selection	0 [SUB(reduced torque)] / 1 [CRT(linear torque)]	1	X
Overload Limiting Related Functions	b06	Overload and Over-voltage Limiting Mode	1. Overload, over-voltage restriction mode OFF 2. Overload limiting mode ON 3. Over-voltage limiting mode ON 4. Overload, over-voltage limiting mode ON	1	X
	b07	Overload Limiting Level Setting	Set overload limiting level in 20~200% of rated current.	150%	X
	b08	Overload Limiting Constant Setting	0.1~10.0sec (0.1 unit)	0.1sec	X
Other Functions	b09	Soft-lock Selection	Soft-lock makes operator be unable to change data.	0	X
	b10	Start Frequnecy Adjustment	0.5~10.0Hz (0.01Hz unit)	0.50Hz	X
	b11	Carrier Frequency	0.5~15.0kHz (0.1kHz unit)	5.0kHz	O
	b12	Initialization Mode	0 (initialization of trip data) / 1 (data initialization)	0	X
	b13	Select Initial Value	0 (for Korea) / 1 (for Europe) / 2 (for USA)	0	X
	b14	Frequency Conversion Coefficient	0.01~99.99 (0.01 unit)	1.00	O
	b15	Stop Key Enable	0 (stop enable) / 1 (stop disable)	0	X
	b16	Stop Free-run Operation	0 (restart from 0Hz) / 1 (restart from predefined frequency) / 2 (stop after free-run)	0	X
	b17	Communication	Set inverter communication code from 1~32 when connect inverter with external control equipment	1	X
	b18	Ground Fault Detection	0 : No detection 0.1~100.0%: Detect ground fault according to the predefined ratio out of the rated inverter current.	0.0	X

Expanded Function C Mode

Main Function	Code	Function Name	Description	Initial Data	Change Mode on Run
Input Terminal Setting	C01	Intelligent Input Terminal 1 Setting	FW (forward direction) RV (reverse direction) CF1 (multi-speed 1) CF2 (multi-speed 2) CF3 (multi-speed 3) CF4 (multi-speed 4) JG (jogging run) SET (2nd control) 2CH (2-level accel/decel command) FRS (free-run stop) EXT (external trip) USP (unattended start protection) SFT (soft lock) AT (analog input voltage / current transferring) RS (reset)	0	X
	C02	Intelligent Input Terminal 2 Setting	(Code) - Same as C01	1	X
	C03	Intelligent Input Terminal 3 Setting	(Code) - Same as C01	2	X
	C04	Intelligent Input Terminal 4 Setting	(Code) - Same as C01	3	X
	C05	Intelligent Input Terminal 5 Setting	(Code) - Same as C01	13	X
	C06	Intelligent Input Terminal 6 Setting	(Code) - Same as C01	14	X
Intput Terminal Status Setting	C07	Contact Setting of a/b of Input Terminal 1 (NO/NC)	Set contacts of a/b of intelligent input terminal 1 0-a contacts (normal open) [NO] 1-b contacts (normal close) [NC]	0	X
	C08	Contact Setting of a/b of Input Terminal 2 (NO/NC)	Set contacts of a/b of intelligent input terminal 2	0	X
	C09	Contact Setting of a/b of Input Terminal 3 (NO/NC)	Set contacts of a/b of intelligent input terminal 3	0	X
	C10	Contact Setting of a/b of Input Terminal 4 (NO/NC)	Set contacts of a/b of intelligent input terminal 4	0	X
	C11	Contact Setting of a/b of Input Terminal 5 (NO/NC)	Set contacts of a/b of intelligent input terminal 5	0	X
	C12	Contact Setting of a/b of Input Terminal 6 (NO/NC)	Set contacts of a/b of intelligent input terminal 6	0	X
Output Terminal Setting	C13	Intelligent Relay Output Terminal RN Setting	(Code) RUN (running signal) FA1 [frequency arrival signal (at the set frequency)] FA2 [frequency arrival signal (at or above the set frequency)] OL (overload advanced notice signal) OD (output deviation of PID signal) AL (alarm signal)	1	X

Expanded Function C Mode

Main Function	Code	Function Name	Description	Initial Data	Change Mode on Run
Output Terminal Setting	C14	a/b Contacts of Intelligent Relay Output Terminal RN Setting	A contacts (normal open) [NO] B contacts (normal close) [NC]	0	X
	C15	Monitor Signal Selection	Sets the intelligent analog output terminal [FM] (Code) Monitors output frequency Monitors output current Monitors output voltage	0	X
Output Terminal Status Setting	C16	Adjustment of Analog Meter GAIN	0~250% (1% unit)	100.0%	O
	C17	Adjustment of Analog Meter OFFSET	-3.0-10.0% (0.1 unit)	0.0%	O
Output Terminal Related Setting	C18	Overload Pre-warning Level Setting	Sets the pre-warning level for overload in 50~200% of rated inverter current	100.0%	X
	C19	Arrival Frequency Setting (Acceleration)	0.00~400.0Hz (0.01Hz unit)	0.00Hz	X
	C20	Arrival Frequency Setting (Deceleration)	0.00~400.0Hz (0.01Hz unit)	0.00Hz	X
	C21	PID Deviation Level Setting	0.0~10.0% (0.1% unit)	1.0%	X

Motor Constant Setting H Mode

Main Function	Code	Function Name	Description	Initial Data	Change Mode on Run
Motor Constant Setting	H01	Auto-tuning Mode	0 : Auto-tuning OFF 1 : Auto-tuning ON (non-rotational mode)	0	X
	H02	Selection Motor Constant	0 : Standard data 1 : Auto-tuning data	0	X
	H03	Motor Capacity	0 : 220V / 2.2kW 1 : 220V / 3.7kW 2 : 220V / 5.5kW 3 : 220V / 7.5kW 4 : 220V / 11kW 5 : 220V / 15kW 6 : 220V / 18.5kW 7 : 220V / 22kW 8 : 220V / 30kW 9 : 380V / 2.2kW 10 : 380V / 3.7kW 11 : 380V / 5.5kW 12 : 380V / 7.5kW 13 : 380V / 11kW 14 : 380V / 15kW 15 : 380V / 18.5kW 16 : 380V / 22kW 17 : 380V / 30kW	-	X
	H04	Motor Pole Selection	2 / 4 / 6 / 8 poles (P)	4	X
	H05	Motor Rated Current	0.1 - 200.0A	-	X
	H06	Motor No-load Current Io	0.1 - 100.0A	-	X
	H07	Motor Rated Slip	0.01 - 10.0%	-	X
	H08	1st Resistor R1 for Motor Constant	Setting range : 0.001 - 30.00Ω	-	X
	H09	Overloaded Inductance Lsig for Motor Constant	Setting range : 0.01 - 100.00mH	-	X
	H10	R1 Auto-tuning Data for Motor Constant	Setting range : 0.001 - 30.00Ω	-	X
	H11	Lsig Auto-tuning Data for Motor Constant	Setting range : 0.01 - 100.00mH	-	X

Error Codes

Name	Description	Display on Digital Operator
Over-current Protection	When the inverter output is short circuited or motor shaft is locked, excessive current for the inverter flows. To protect inverter from excessive current, inverter output is turned off by operating current protection circuit.	E04
Overload Protection	When an overload of motor is detected by the electronic thermal function, the inverter trips and turns off its output.	E05
Over-voltage Protection	When the DC bus voltage exceeds a threshold, due to regenerative energy from the motor, the inverter trips and turns off its output.	E07
Communication Error	An error between operator and inverter is detected.	E60
Under-voltage Protection	A decrease of internal DC bus voltage below a threshold results in a fault of controlling circuit. This condition can also generate excessive motor heat or cause low torque. The inverter trips and turns off its output when the voltage is below 150~160V (200V class) or below 300~320V (400V class) An instantaneous interruption may cause this error.	E09
Output Short-circuit	When outputs are short circuited, excessive current causes protection circuit to stop inverter output.	E04 or E34
USP Error	If power is on at the same time inverter is being operated in terminal mode, USP error will be seen (in case of USP function is enabled).	E13
EEPROM Error	When the external noise or temperature rise causes internal EEPROM error, an inverter output is turned off. Check the setting data because there is a case of alarm signal failure.	E08
External Trip	When the external equipment makes a failure, inverter receives this failure signal and turns off the output (Intelligent input terminal need to be set for this function).	E12
Temperature Trip	When the inverter internal temperature is higher than the specified value, the thermal sensor in the inverter module detects it and turns off the inverter output.	E21
Ground Fault Protection	The inverter is protected by the detection of ground faults between the inverter output and the motor.	E14

※ Protective functions protect inverter from over-current, over-voltage and under-voltage.
Once protective functions are operated, all outputs of inverter are disconnected and motor is stopped by free-run stop.
Inverter keeps this protective status until reset command is entered.

Explanation of Main Circuit Terminals

Symbol	Terminal Name	Explanation of Content
R, S, T (L1, L2, L3)	Main Power	Connect input power.
U, V, W (T1, T2, T3)	Inverter Output	Connect 3-phase motor.
PD, P (+1, +)	DC Reactor	After removing the short bar between PD and P, connect DC reactor for improvement of power factor.
P, RB (+, B+)	External Braking Resistor	Connect optional external braking resistor.
G	Inverter Earth Terminals	Grounding terminal.

Explanation of Control Circuit Terminals

Signal	Symbol	Terminal Name	Explanation of Content
Input Signal [1]	P24	Power Terminal for Input Signal	24VDC±10%, 35mA
	6 (RS) 5 (AT) 4 (CF2) 3 (CF1) 2 (RV) 1 (FW)	Intelligent Input Terminal : Forward Direction (FW), Reverse Direction (RV), Multi-speed 1-4 (CF1-4), 2-Level Accel/Decel Command (2CH), Reset (RS), Free-run Stop (FRS), External Trip (EXT), Soft Lock (SFT), Jogging Run (JG), Unattended Start Protection (USP), [2] Analog Input Voltage / Current Transferring (AT)	Contact input : Close : On (run) Open : Off (stop) Minimum on time: over 12ms
	CM1	Common Terminal for Input or Monitor Signal	
Monitor Signal	FM	Output Frequency Meter, Output Current Meter, Output Voltage Meter	Analog frequency meter
Frequency Setup Signal	H	Power Supply for Frequency Command	10VDC
	O	Voltage Frequency Command Terminal	0~10VDC, input impedance 10Ω
	OI	Current Frequency Command Terminal	4~20mA, input impedance 210Ω
	L	Common Terminal for Frequency Command	
Output Signal [3]	RN0 RN1	Intelligent Output Terminal : Running Signal (RUN), Frequency Arrival Signal (at the set frequency) (FA1), Frequency Arrival Signal (at or above the set frequency) (FA2), Overload Advanced Notice Signal (OL), Output Deviation of PID Signal (OD), Alarm Signal (AL)	Rated value for contact : AC 250V 2.5A (resisitive load) 0.2A (Induced load) DC 30V 3.0A (resisitive load) 0.7A (induced load)
Trip Alarm Output Signal [4]	AL0 AL1 AL2	Alarm Output Signal : at Normal Operation, Power Off (Initial Condition) : AL0-AL2 Closed at Abnormal : AL0-AL1 Closed	Rated value for contact : AC 250V 2.5A (resisitive load) 0.2A (induced load) DC 30V 3.0A (resisitive load) 0.7A (induced load)

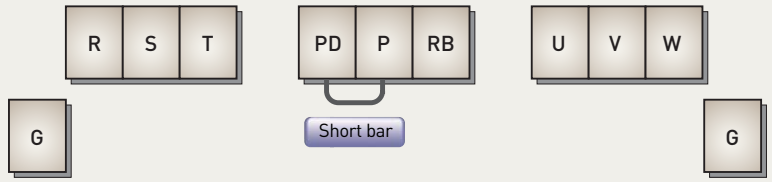
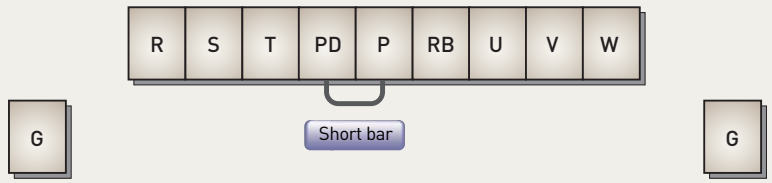
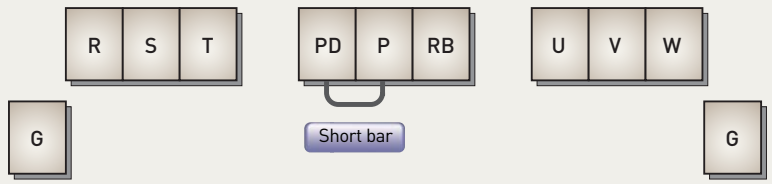
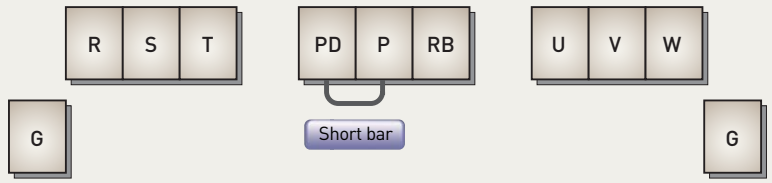
※ 1) Input signal terminals from 1 to 6 are contact "a"s.
When you want to change those terminals to contact "b"s, configuration should be set in C07~C12

2) USP: Protects inverter from restarting when power supply is on.

3) Intelligent relay output terminal RN is "a" contact. When you use RN as "b" contact, please set it to C14.

4) Operator can select 'pre-warning alarm for overload' and 'arrival to the predefined frequency' signals with the intelligent output terminal.

Main Circuit Terminal Arrangement

Main Circuit Terminal Block	Corresponding Type	Screw Size	Width(mm)
	N700E - 055LF N700E - 075LF N700E - 055HF N700E - 075HF N700E - 110HF	M4	10.6
	N700E - 110LF	M5	13
	N700E - 150LF N700E - 150HF N700E - 185HF N700E - 220HF	M5	13
	N700E - 185LF N700E - 220LF	M6	17

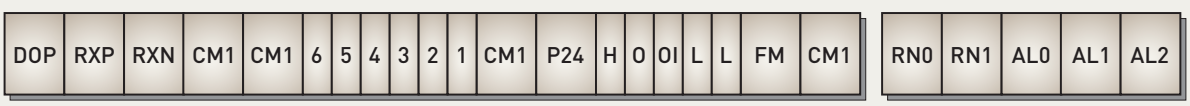
Wiring Order

Step1 Connect 3 phase power to the power input terminals R, S and T shown in the figure

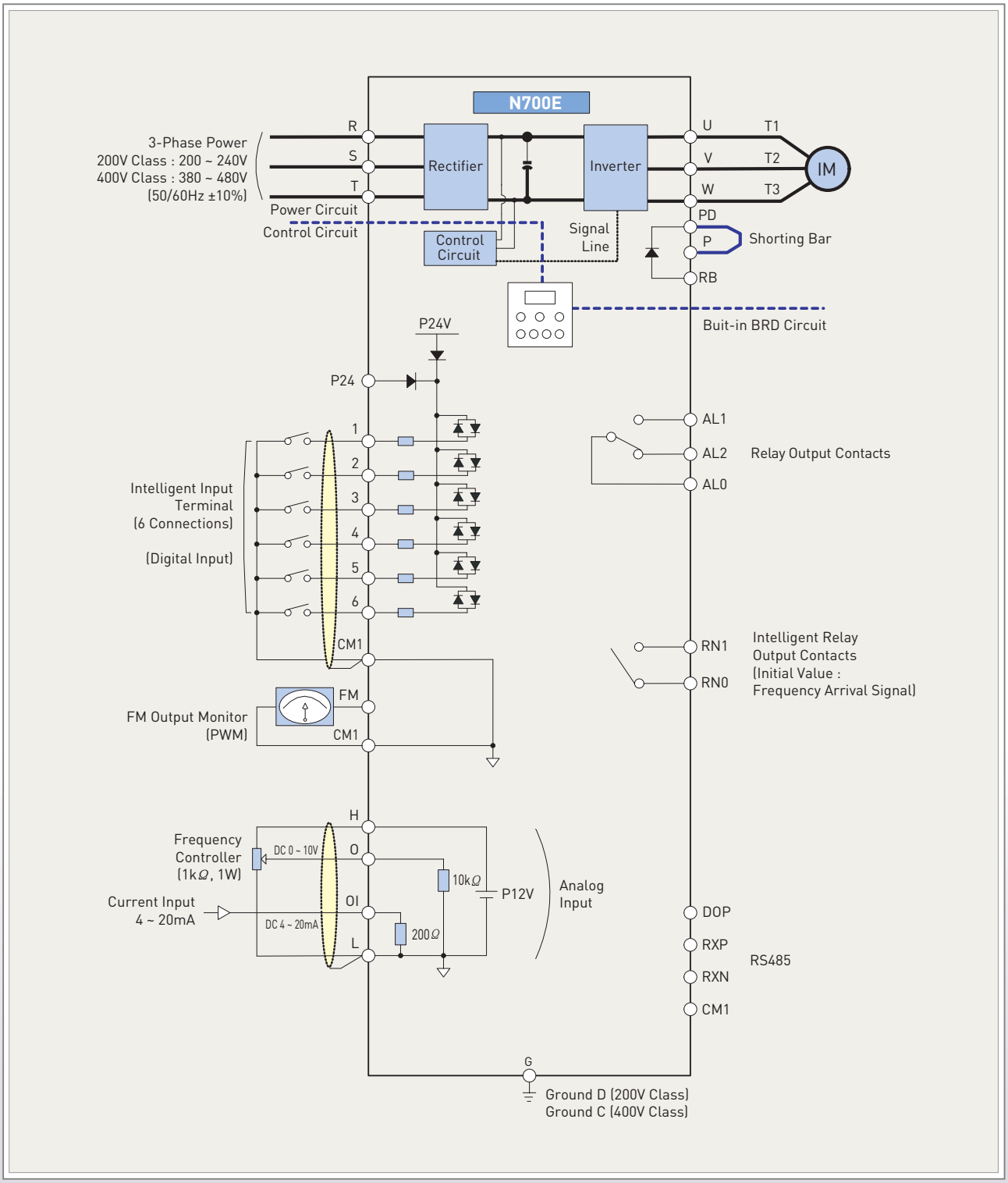
Step2 Connect inverter to the 3 phase motor :
Connect inverter output terminals U, V and W to the input terminal of 3 phase motor.

Step3 Connecting DC reactor (optional)
Connect DC reactor to P and PD terminals (DC reactor is optional).
Please remove shorting bar when connecting DC reactor.

Control Terminal Arrangement



Terminal Connecting Diagram



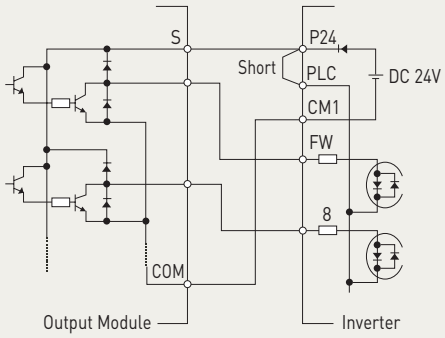
Terminal Name	1, 2, 3, 4, 5, 6, P24, FM	H, O, OI
Common	CM1	L

※ Be careful as there are different kinds of common terminals.

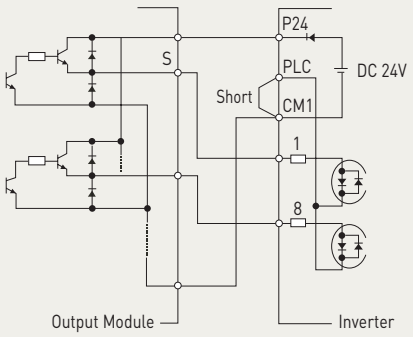
Connection with Input Terminals

Using Interface Power Inside Inverter

■ Sink Type

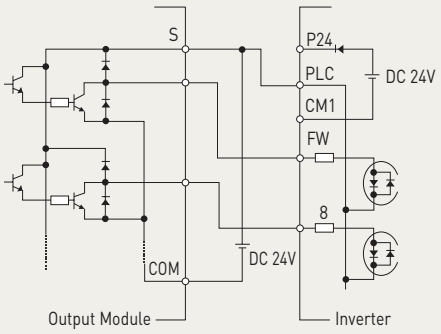


■ Source Type

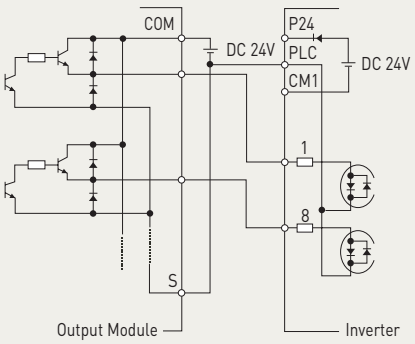


Using External Power

■ Sink Type



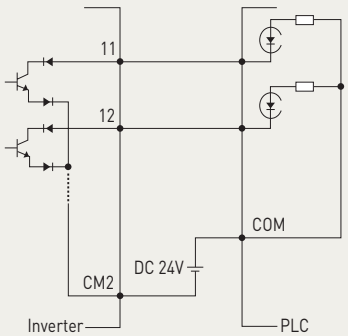
■ Source Type



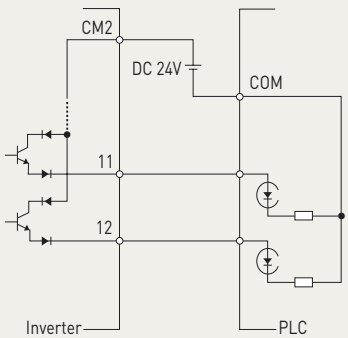
※ Be sure to turn on the inverters after turning on the PLC and its external power source to prevent the parameters in the inverter from being modified.

Connection with Output Terminals

■ Sink Type



■ Source Type



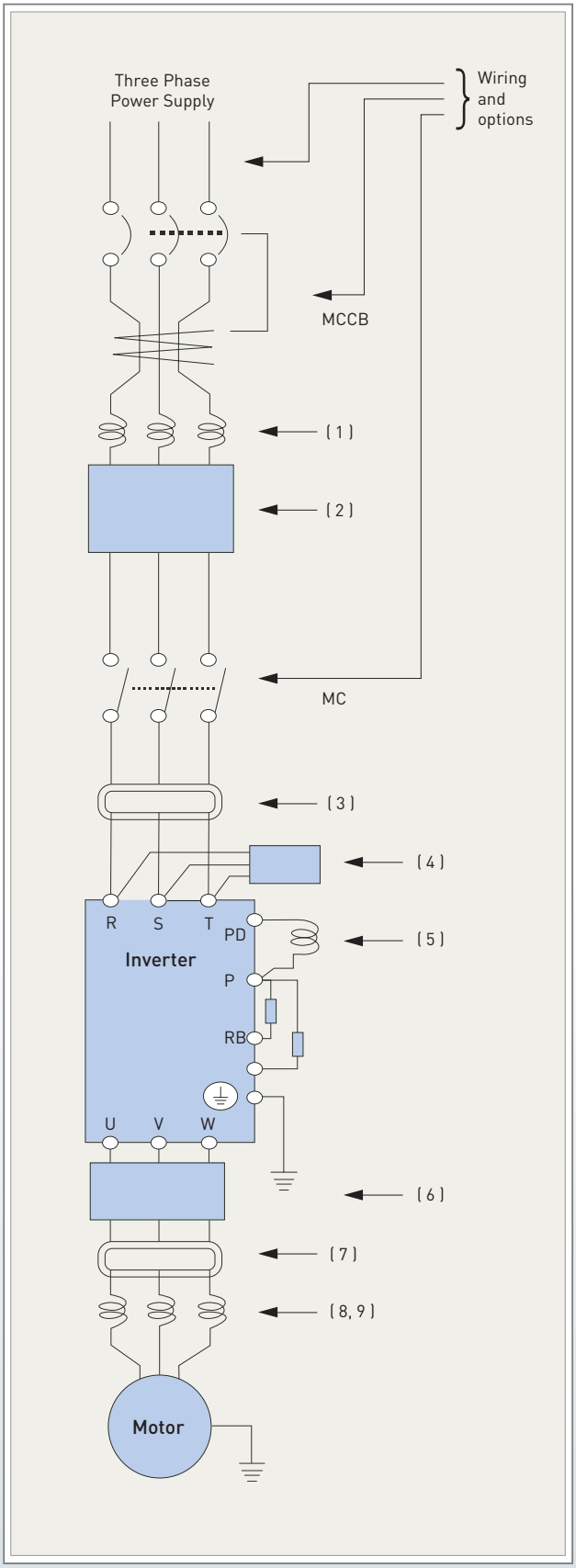
Common Applicable Tools

Class	Motor Output (kW)	Inverter Model	Power Cable (mm^2) 1) R,S,T,U,V,W,PD,P	External Resistor between P and RB (mm^2)	Screw Size of Terminal	Torque (N·m)	Applicable Tools		
							Circuit Breaker (MCCB)		Magnetic Contactor (MC)
200V Class	5.5	N700E-055LF	More than 6	6	M4	1.2	HBS60N	50A	HiMC32
	7.5	N700E-075LF	More than 10	6	M4	1.2	HBS60N	50A	HiMC32
	11	N700E-110LF	More than 16	6	M5	3.0	HBS100N	75A	HiMC50
	15	N700E-150LF	More than 25	16	M5	3.0	HBS100N	100A	HiMC65
	18.5	N700E-185LF	More than 30	16	M6	4.5	HBS225N	150A	HiMC80
	22	N700E-220LF	More than 35	16	M6	4.5	HBS225N	150A	HiMC110
400V Class	5.5	N700E-055HF	More than 4	4	M4	1.2	HBS30N	30A	HiMC18
	7.5	N700E-075HF	More than 4	4	M4	1.2	HBS30N	30A	HiMC18
	11	N700E-110HF	More than 6	6	M4	1.2	HBS60N	50A	HiMC32
	15	N700E-150HF	More than 10	10	M5	3.0	HBS100N	50A	HiMC40
	18.5	N700E-185HF	More than 16	10	M5	3.0	HBS100N	75A	HiMC40
	22	N700E-220HF	More than 25	10	M5	3.0	HBS100N	75A	HiMC50

※ 1) Use 600V, 75°C copper wire.

HYUNDAI
INVERTER
N700E Series

Wiring and Options



The sensitivity of circuit breaker (MCCB) should be differentiated by the sums of wiring distances (inverter-power supply and inverter-motor).

Wiring Distance	Sensitive Current(mA)
Under 100m	50
Under 300m	100

※ Applied wiring equipment represents HYUNDAI 3-phase 4-poles motor.
※ Braking capacity should be considered for circuit breaker.
※ When wiring distance is over 20m, there is need to apply large power cable.
※ Use circuit breaker (MCCB) for safety.
※ Do not perform ON/OFF function of electromagnetic contactor while inverter is in normal operating condition.
※ Use 0.75mm^2 for alarm output contact.
※ When wiring with metal tube using CV line, there exists 30mA/km current.
※ IV line has high non-dielectric constant: current increases 8 times. Therefore, 8 times greater sensitivity current , as shown in the table above, should be applied. When wiring distance is over 100m, use CV line.
※ ON/OFF operation is prohibited at the output side by using electromagnetic contactor. when it is necessary to apply electromagnetic contactor at the output side by using bypass circuit, protective circuit that prevents electromagnetic contactor from operating ON/OFF function should be applied while inverter is in normal operation.

Order	Function Name	Description
(1)	Input-side AC Reactor (Harmonic Control, Electrical Coordination, Power-factor Improvement)	As a measure of suppressing harmonics induced on the power supply lines, it is applied when imbalance of the main power voltage exceeds 3% (and power source capacity is more than 500kVA), or when the power voltage is rapidly changed. It also improves the power factor.
(2)	Noise Filter for Inverter	This reduces common noise that is generated between input power and ground. Connect this filter to 1st side (input side) of inverter.
(3)	Radio Noise Filter (Zero-phase Reactor)	Electrical noise interference may occur on nearby equipment such as a radio receiver. This magnetic choke filter helps reduce radiated noise (can also be used on output).
(4)	Input Radio Noise Filter	This reduces radiated noise from Input power wirings.
(5)	DC Reactor	Suppresses harmonics generated by the inverter
(6)	Output-side Noise Filter	This reduces radiated noise from wiring in the inverter output side. This also reduces wave fault to radio and TV, and it is used for preventing malfunction of sensor and measuring instruments.
(7)	Radio Noise Filter (0-phase Reactor)	Electrical noise interference may occur on nearby equipment such as a radio receiver. This magnetic choke filter helps reduce radiated noise (can also be used on input).
(8)	Output AC Reactor to Reduce Vibration and Prevent Thermal Relay Misapplication	This reactor reduces the vibration in the motor caused by the inverter's switching waveforms, by smoothing the waveforms to approximate commercial power quality. When wiring from the inverter to the motor is more than 10m in length, inserting a reactor prevents thermal relay's malfunction by harmonic generated by inverter's high switching.
(9)	LCR Filter	Sine-wave shaping filter for the output side.

* Before use, be sure to read through the Instruction manual to insure proper use of the inverter.
* Note that the inverter requires electrical wiring; a trained specialist should carry out the wiring.
* The inverter in this catalogue is designed for general industrial applications. For special applications in fields such as aircraft, nuclear power, transport, vehicles, clinics, and underwater equipment, please consult us in advance.
* For application in a facility where human life is involved or serious losses may occur, make sure to provide safety devices to avoid a serious accident.
* The inverter is intended for use with a three-phase AC motor. For use with a load other than this, please consult with us.

■ Application to Motors | Application to General-purpose Motors

Operating Frequency	The overspeed endurance of a general-purpose motor is 120% of the rated speed for 2minutes (JIS C4004). For operation at higher than 60Hz, it is required to examine the allowable torque of the motor, useful life of bearings, noise, vibration, etc. In this case, be sure to consult the motor manufacturer as the maximum allowable rpm differs depending on the motor capacity, etc.
Torque Characteristics	The torque characteristics of driving a general-purpose motor with an inverter differ from those of driving it using commercial power (starting torque decreases in particular). Carefully check the load torque characteristic of a connected machine and the driving torque characteristic of the motor.
Motor Loss and Temperature Increase	An inverter-driven general-purpose motor heats up quickly at lower speeds. Consequently, the continuous torque level (output) will decrease at lower motor speeds. Carefully check the torque characteristics and speed range requirements.
Noise	When run by an inverter, a general-purpose motor generates noise slightly greater than by commercial power.
Vibration	When run by an inverter at variable speeds, the motor may generate vibrations, especially because of (a) unbalance of the rotor including a connected machine, or (b) resonance caused by the natural vibration frequency of a mechanical system. Particularly, be careful of (c) when a machine previously fitted with a constant speed is operated at variable speed. Vibration can be minimized by (1) avoiding resonance points by using the frequency jump function of the inverter, (2) using a tire-shaped coupling, or (3) placing a rubber shock absorber under the motor base.
Power Transmission Mechanism	Under continued, low-speed operation, oil lubrication can deteriorate in a power transmission mechanism with an oil type gear box (gear motor) or transmission. Check with the motor manufacturer for the permissible range of continuous speed. To operate at more than 60Hz, confirm the machine's ability to withstand the centrifugal force generated.

■ Application to Motors | Application to Special Motors

Gear Motor	The allowable rotation range of continuous drive varies depending on the lubrication method or motor manufacturer (Particularly in case of oil lubrication, pay attention to the low frequency range). Grease lubrication has no degradation of lubrication ability even when the number of rotation decreases (Allowable frequency range: 6~120Hz).
Brake-equipped Motor	For use of a brake-equipped motor, power supply for braking operation should be separately prepared. Connect the braking power supply to the primary side power of the inverter. Use brake operation (inverter stop) and free run stop (FRS) terminal to turn off inverter power.
Pole-change Motor	There are different kinds of pole-change motors (constant output characteristic type, constant torque characteristic type, etc.), with different rated current values. In motor selection, check the maximum allowable current for each motor of a different pole count. At the time of pole change, be sure to stop the motor.
Submersible Motor	The rated current of a submersible motor is significantly larger than that of the general-purpose motor. In inverter selection, be sure to check the rated current of the motor.
Explosion-proof Motor	Inverter drive is not suitable for a safety-enhanced explosion-proof type motor. The inverter should be used in combination with a pressure-proof and explosion-proof type of motor. ※ Explosion-proof verification is not available for N700E series.
Synchronous (MS) Motor / High-speed (HFM) Motor	In most cases, the synchronous (MS) motor and the high-speed (HFM) motor are designed and manufactured to meet the specifications suitable for a connected machine. As to proper inverter selection, consult the manufacturer.
Single-phase Motor	A single-phase motor is not suitable for variable-speed operation by an inverter drive. Therefore, use a three-phase motor.

■ Application to Motors | Application to the 400V-class Motor

A system applying a voltage-type PWM inverter with IGBT may have surge voltage at the motor terminals resulting from the cable constants including the cable length and the cable laying method. Depending on the surge current magnification, the motor coil insulation may be degraded. In particular, when a 400V class motor is used, a longer cable is used, and critical loss can occur. Take the following countermeasures : (1) install the LCR filter between the inverter and the motor,(2) install the AC reactor between the inverter and the motor, or (3) enhance the insulation of the motor coil.

■ Notes on Use | Drive

Run/Stop	Run or stop of the inverter must be done with the keys on the operator panel or through the control circuit terminal. Installing an electromagnetic contactor (Mg) should not be used as a switch of run/stop.
Emergency Motor Stop	When the protective function is operating or the power supply stops, the motor enters the free run stop state. When emergency stop or protection of motor is required, use of a mechanical brake should be considered.
High-frequency Run	N700E series can be set up to 400Hz. However it is extremely dangerous for rotational speed of two-pole motor to reach up to approx 24,000rpm. Therefore, carefully make selection and settings after checking the mechanical strength of the motor and connected machines. Consult the motor manufacturer when it is necessary to drive a standard (general-purpose) motor above 60Hz.

■ Notes on Use | Installation Location and Operating Environment

Avoid installation in areas of high temperature, excessive humidity, or easy condensation of dew, as well as areas that are dusty, subject to corrosive gases, residue of grinding solution, or salt. Install the inverter away from direct sunlight in a well-ventilated room that is free of vibration.
The inverter can be operated in the ambient temperature range from -10°C to 50°C

■ Notes on Use | Main Power Supply

Installation of an AC reactor on the Input Side	In the following examples involving a general-purpose inverter, a large peak current flows on the main power supply side, and could destroy the converter module. When such situations are predictable or connected crucial device is required to meet high reliability, install an AC reactor between the power supply and the inverter. Also, when influence of indirect lightning strike is possible, install a lightning arrester. A) The unbalance factor of the power supply is 3% or higher1.[1)] B) The power supply capacity is at least 10 times greater than the inverter capacity (the power supply capacity is 500kVA or more). C) Abrupt power supply changes are expected. Examples)① Several inverters are interconnected with a short bus. ② A thyristor converter and an inverter are interconnected with a short bus. ③ Junction and disjunction of installed phase advance capacitor. In cases (A), (B) and (C), it is recommended to install an AC reactor on the main power supply side. 1) Example of how to calculate voltage unbalanced ratio. (voltage between lines on RS: VRS=205V, voltage between lines on ST : VST=201V, voltage between lines on TR: VTR=200V), max voltage between lines-average between lines= VRS-(VRS+VST+VTR)/3=205-202 · Voltage unbalanced ratio = $\frac{\text{Max. voltage between lines - Average voltage between lines}}{\text{Average voltage between lines}} \times 100 = \frac{\text{VRS-(VRS+VST+VTR)/3}}{\text{(VRS+VST+VTR)/3}} \times 100 = \frac{205-202}{202} \times 100 = 1.5(\%)$
Using an Independent Electric Power Plant	If an inverter is run by an independent electric power plant, harmonic current can cause to overheat the generator or distort output voltage waves of the generator. Generally, the generator capacity should be five times that of the inverter (kVA) in a PWM control system, or six times greater in a PAM control system.

■ Notes on Peripheral Equipment Selection

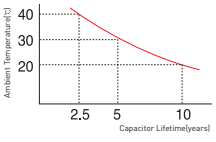
Wiring Connections		(1) Be sure to connect main power wires with R (L1), S (L2), and T (L3) (input) terminals and motor wires to U (T1), V (T2), and W (T3) terminals (output). (Incorrect connection will cause an immediate failure.) (2) Be sure to provide a grounding connection with the ground terminal (⏚)
Wiring between Inverter and Motor	Electromagnetic Contactor	When an electromagnetic contactor is installed between the inverter and the motor, do not perform on-off switching during running.
	Thermal Relay	When used with standard output motors (standard three-phase squirrel cage four pole motors), the N700E series does not need a thermal relay for motor protection due to the internal electronic protective circuit. A thermal relay, however, should be used: during continuous running out of a range of 30Hz to 60Hz for motors exceeding the range of electronic thermal adjustment (rated current). When several motors are driven by the same inverter, install a thermal relay for each motor. The RC value of the thermal relay should be more than 1.1times the rated current of the motor. Where the wiring length is 10m or more, the thermal relay tends to turn off readily. In this case, provide an AC reactor on the output side or use a current sensor.
Installing a Circuit Breaker		Install a circuit breaker on the main power input side to protect inverter wiring and ensure personal safety. Choose a circuit breaker compatible with inverter.
Wiring Distance		The wiring distance between the inverter and the remote operator panel should be 20meters or less. When this distance is exceeded, use CVD-E (current-voltage converter) or RCD-E (remote control device). Shielded cable should be used on the wiring. Beware of voltage drops on main circuit wires (A large voltage drop reduces torque).
Earth Leakage Relay		If the earth leakage relay (or earth leakage breaker) is used, it should have a sensitivity level of 15mA or more (per inverter). Leakage current is depending on the length of the cable.
Phase Advance Capacitor		Do not use a capacitor for improvement of power factor between the inverter and the motor because the high-frequency components of the inverter output may overheat or damage the capacitor

■ High-frequency Noise and Leakage Current

(1) High-frequency components are included in the input/output of the inverter main circuit, and they may cause interference in a transmitter, radio, or sensor if used near the inverter. The interference can be minimized by attaching noise filters (option) in the inverter.
(2) The switching of an inverter causes an increase of leakage current. Be sure to ground the inverter and the motor.

■ Lifetime of Primary Parts

Because a DC bus capacitor deteriorates as it undergoes internal chemical reaction, it should normally be replaced every five years. Be aware, however, that its life expectancy is considerably shorter when the inverter is subject to such adverse factors as high temperatures or heavy loads exceeding the rated current of the inverter. The figure at the right shows the approximate lifetime of the capacitor when it is used 24hours. Also, such moving parts as a cooling fan should be replaced. Maintenance, inspection and replacing parts must be performed by only specified professional engineers.



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