

## 9. RS485 Communication (Option)

The communication between inverter and external controller is doing by RS485 using modular connector in cling to inverter controller.

Function code	Minimum	Maximum	Initial Value	Unit	Description
b17	1	32	1	-	Setting the communication number
A01	0	3	0	-	3 : Communication
A02	0	2	0	-	2 : Digital operator

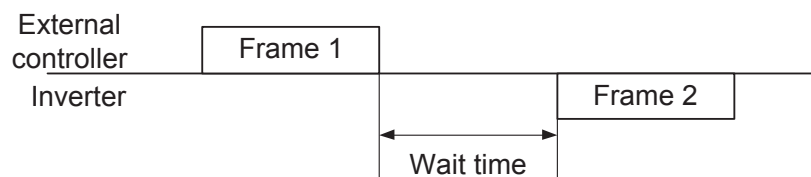
Item	Description	Remark
Interface	RS485	
Communication method	Half duplex	
Communication speed	9600	Fixing
Communication code	Binary code	
Data bits	8	Fixing
Parity	No.	Fixing
Stop bit	1	Fixing
Starting method	External request	Inverter is only slave part.
Wait time	10~1000ms	
Connection type	1 : N (Max32)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

### RS485

DOP	RXP	RXN	CM1
24V	Transmit/Receive +side	Transmit/Receive -side	24V GND

### Communication sequence

The communication sequence is as follows



Frame start : Frame start is recognized by signal line data transmitted.

Frame completion : Frame completion is recognized by no data during correspond 4, 5-character time.

Frame 1: Transmit from external controller to inverter.

Frame 2: Indication reflects from inverter to external controller

## Communication frame type and form

### External controller transmit frame

Communication number	Command	Parameter	Parameter Count	CRC Hi	CRC Lo
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	Description	Data size	Specifications
Communication number	Inverter Communication number	1 byte	1~32
Command	Frame type	1 byte	0x03
Parameter	Parameter	2 byte	1 <sup>st</sup> byte : Group 2 <sup>nd</sup> byte : Index (note1)
Parameter number	Request parameter number	2 byte	1 <sup>st</sup> byte : 0x00 2 <sup>nd</sup> 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
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	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
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	Description	Data size	Specifications
Communication number	Target Inverter Communication number	1 byte	1~32
Command	Frame type	1 byte	0x06
Parameter	Parameter	2 byte	1 <sup>st</sup> byte : Group 2 <sup>nd</sup> 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
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	Description	Data size	Specifications
Communication number	Target Inverter Communication number	1 byte	1~32
Command	Frame type	1 byte	0x06
Parameter	Parameter	2 byte	1 <sup>st</sup> byte : Group 2 <sup>nd</sup> 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

1<sup>st</sup> byte : Each group is setting

Group	1 <sup>st</sup> byte	Group	2 <sup>nd</sup> byte
d	0x01	C	0x05
F	0x02	H	0x06
A	0x03		
b	0x04		

2<sup>nd</sup> byte : Parameter number setting.

Ex) The case of A60 parameter reading or writing

1<sup>st</sup> byte : 0x03

2<sup>nd</sup> 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
1 <sup>st</sup> byte	0x01	0x01	0x01	0x01	0x01
2 <sup>nd</sup> byte	0x0D	0x11	0x15	0x19	0x1D

Trip information items

Trip data	Trip contents	Trip data	Trip contents
1	Over current trip	8	Outside trip
2	Over voltage trip	9	EEPROM trouble
3	Under voltage trip	10	Communication trouble
4	Arm Short trip	11	USP trip
5	Reserved	12	GF trip
6	Inverter over heat trip	15	Input phase loss
7	Electric thermal trip		

(Note2) Data value setting

Data value is transmitted except decimal point.

Ex1) Output frequency

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

Ex2) acc/dec time

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

(Note3) Special parameter

Run command

Parameter

1<sup>st</sup> byte : 0x00

2<sup>nd</sup> byte : 0x02

setting data

1<sup>st</sup> byte

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Reserved							

2<sup>nd</sup> 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

1<sup>st</sup> byte : 0x00

2<sup>nd</sup> byte : 0x04

setting data

output frequency \* 100

Ex) the case of output frequency command is 60.00Hz

Data 6000 transmit

1<sup>st</sup> byte : 0x17

2<sup>nd</sup> byte : 0x70

### 16bit CRC generation

The step of CRC generation is as follows:

1. All of 16-bit register is 1.0xffff
2. The exclusive OR of 16-bit register and 8-bit register.
3. Shift right side 1bit 16-bit register
4. If the result of step 3 is 1, exclusive OR 16-bit register 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 REGISTER (Exclusive OR)		MSB			Flag
01	1111	1111	1111	1111	
	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

## 10. Specification

### 10.1 Standard specification list

#### (1) 200V Class Specifications

Inverter Model		N700E-004SF	N700E-007SF	N700E-015SF	N700E-022SF	N700E-004LF	N700E-007LF	N700E-015LF	N700E-022LF	N700E-037LF
Max. Applicable motor (4P, kW) (Note1)		0.4	0.75	1.5	2.2	0.4	0.75	1.5	2.2	3.7
Rated capacity (kVA)	200V	1.0	1.7	2.4	3.8	1.0	1.7	2.4	3.8	5.9
	240V	1.2	2.1	2.9	4.6	1.2	2.1	2.9	4.6	7.1
Rated input voltage		Single-phase 200~240V±10%, 50/60Hz±5%				Three-phase (3 Phase) 200~240V±10%, 50/60Hz±5%				
Rated output voltage (Note2)		Three-phase 200~240V (corresponding to input voltage)								
Rated output current (A)		3	5	7	11	3	5	7	11	17
Dynamic braking approx. % torque, short time stop	Regenerative control	BRD circuit built-in (The discharge resistance is optional)								
	Min. resistive to be connected (Ω)	100	100	50	50	100	100	50	50	35
Weight (Kg)		0.7	0.7	0.7	0.98	0.7	0.7	0.7	0.98	1.2
Protection Design		IP20								

#### (2) 400V Class Specifications

Inverter Model		N700E-004HF	N700E-007HF	N700E-015HF	N700E-022HF	N700E-037HF
Max. Applicable motor (4P, kW) (Note1)		0.4	0.75	1.5	2.2	3.7
Rated capacity (kVA)	380V	1.2	2.2	3.2	4.7	6.1
	480V	1.5	2.8	4.0	6.0	7.6
Rated input voltage		Three-phase (3 Phase) 380~480V±10%, 50/60Hz±5%				
Rated output voltage (Note2)		Three-phase 380~480V (corresponding to input voltage)				
Rated output current (A)		1.8	3.4	4.8	7.2	9.2
Dynamic braking approx. % torque, short time stop	Regenerative control	BRD circuit built-in (The discharge resistance is optional)				
	Min. resistive to be connected (Ω)	180	180	180	100	100
Weight (Kg)		0.98	0.98	0.98	0.98	1.2
Protection Design		IP20				

(3) Common specification for 200V/400V class

Inverter model		Common specification for all model
Control system <sup>(Note3)</sup>		Space vector modulation PWM system
Output frequency range <sup>(Note4)</sup>		0.01 ~ 400Hz
Frequency accuracy <sup>(Note5)</sup>		Digital command $\pm 0.01\%$ for Max. frequency, analog frequency $\pm 0.1\%$ (25 $\pm 10$ °C)
Frequency resolving power		Digital setting : 0.01HZ, Analog setting : Max. frequency / 1,000
Voltage/frequency characteristic		V/f control (constant torque, reduced torque), free V/f control
Overload current rate		150%, 60sec
Acceleration/Deceleration		0.01 ~ 3000.0 sec (Director, curve setting)
DC Braking		On starting and decelerating by stop command, inverter operates under operation setting frequency. Or inverter operates with external input (Breaking power, time, frequency can be set.)
Input Signal	Frequency	Operator Extend signal Setting by up/down key Input voltage : DC0 ~ +10V (Input impedance 10K $\Omega$ ) Input current : 4 ~ 20mA (Input impedance 195 $\Omega$ )
	Run/Stop	Operator Extend signal Run / Stop key (Forward / Reverse function mode) Forward run / stop (1a connect, 1b selection possibility)
	Intelligent input terminal FW(Forward), RV(Reverse), CF1~4(Multi-speed bit 1~4), RS(reset), AT(Analog input current/voltage selection signal), USP(USP function) EXT(external trip), FRS(free-run stop), JG(jogging), SFT(software lock), STA(start), STP(keep), F/R(forward/reverse) UP(remote control UP), DOWN(remote control DOWN)	
Output Signal	Frequency monitor	Analog meter (DC0~10V full scale. Max · 1mA) Output frequency, output current and output voltage
	Intelligent output contact	OFF for inverter alarm(normally closed contact output) (Transition to ON for alarm)/Intelligent output Terminal
Other functions		AVR function, curved accel/decel. 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, V/f characteristic selection, Speed Search automatic torque boost, frequency conversion display, USP function



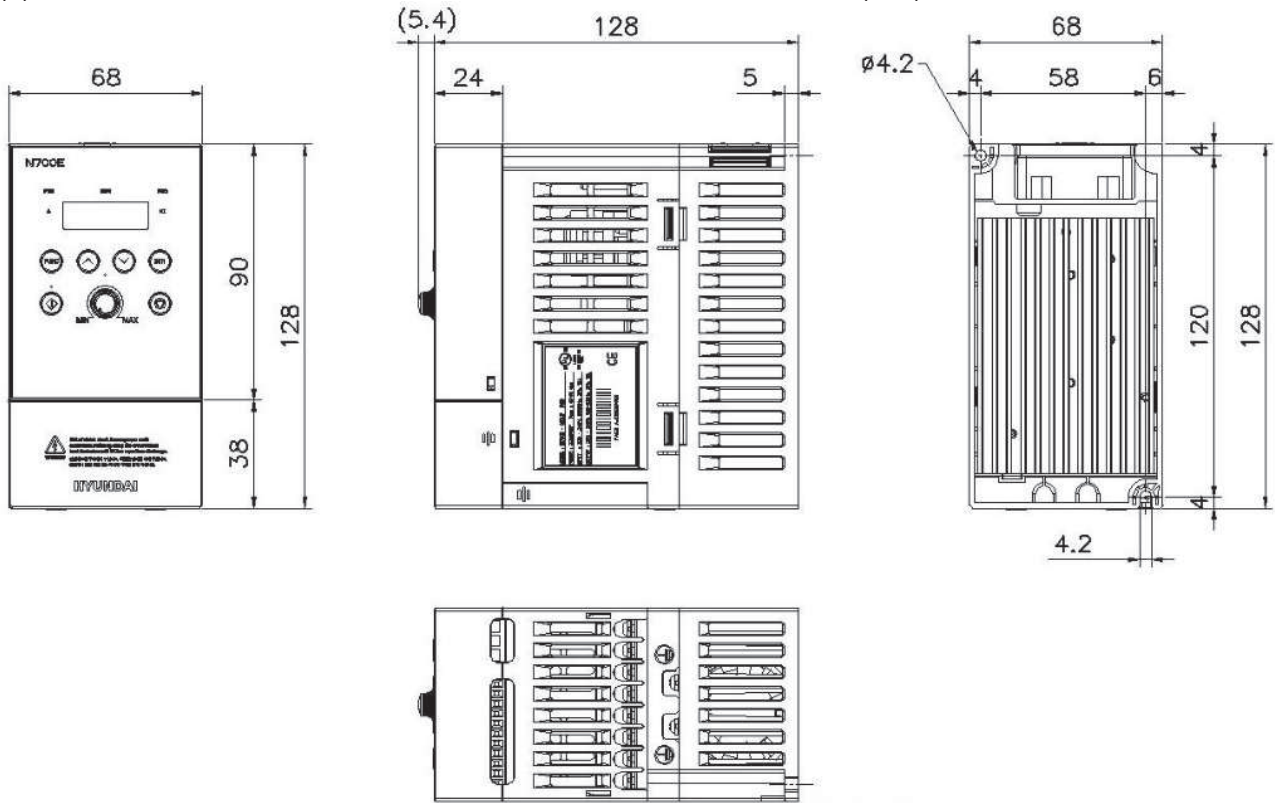
Protection function		Over current, Over load(Electronic thermal), Over voltage, Communication error, Under voltage, Output short circuit detection, USP error, EEPROM error, External error, Ground fault, Over heat, Input phase loss
Standard specification	Ambient temperature	-10~50 °C
	Storage temperature	-20~60 °C
	Ambient humidity	Below 90%RH (Installed with no dew condensation)
	Vibration	5.9m/s <sup>2</sup> (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 <sup>(Note6)</sup>

### Footnotes for the preceding tables

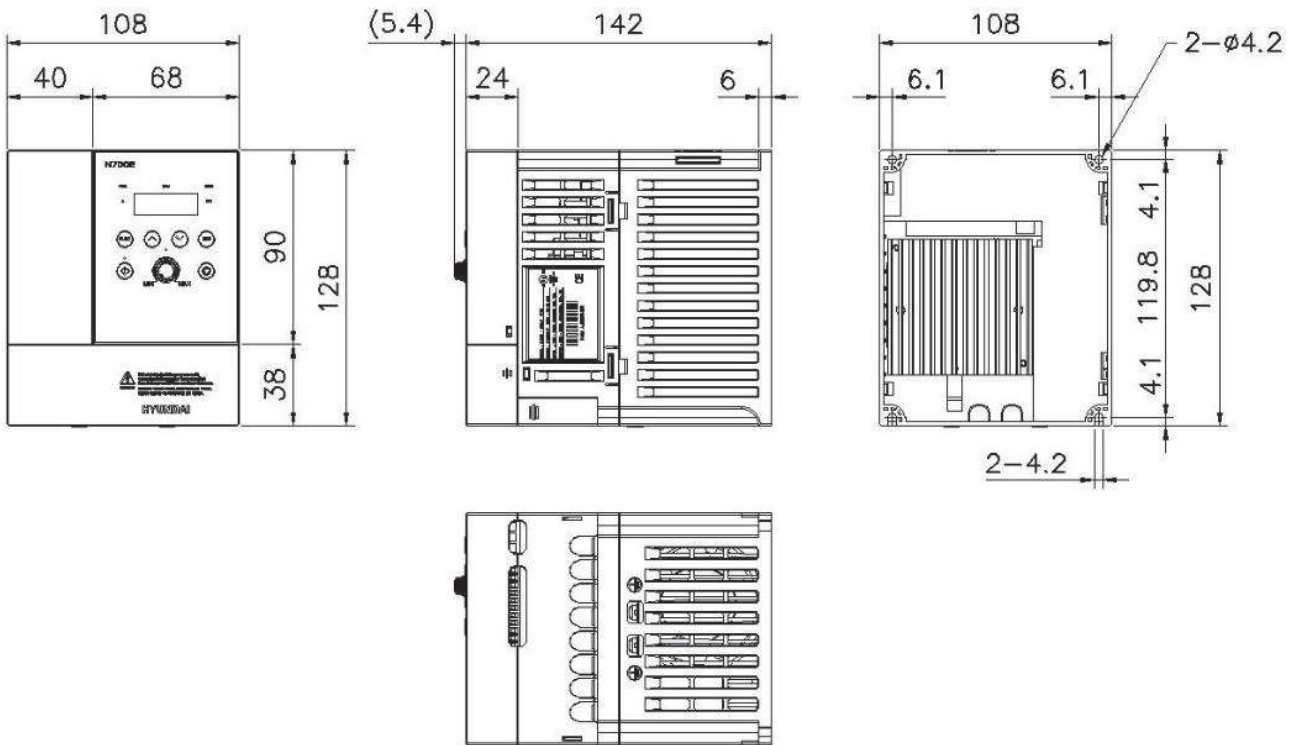
1. The applicable motor refers to HYUNDAI standard 3-phase motor.  
To use other motors, care must be taken to prevent the rated motor current from exceeding the rated output current of the inverter.
2. The output voltage decreases as the main supply voltage decreases (except for use of the AVR function).  
In any case, the output voltage cannot exceed the input power supply voltage.
3. Control method setting A31 to 2 (sensorless vector control) Selected, set carrier frequency (b11) more than 2.1kHz.  
Using motor less than half of the rated capacity, you cannot get enough performance.  
Multiple motors cannot be driven by sensorless vector control.
4. To operate the motor over 50/60Hz, consult the motor manufacturer about the maximum allowable rotation speed. In case of sensorless control mode, it can be 300Hz
5. Inverter frequency could be exceeded 1.5Hz for the maximum frequency [A04] in the case of motor stabilization is required.
6. The braking torque via capacitive feedback is the average deceleration torque at the shortest deceleration (stopping from 50/60Hz as indicated). It is not continuous regenerative braking torque. And, the average deceleration torque varies with motor loss. This value decreases when operating beyond 50 Hz. If a large regenerative torque is required, the optional regenerative braking resistor should be used.

## 10.2 Dimension

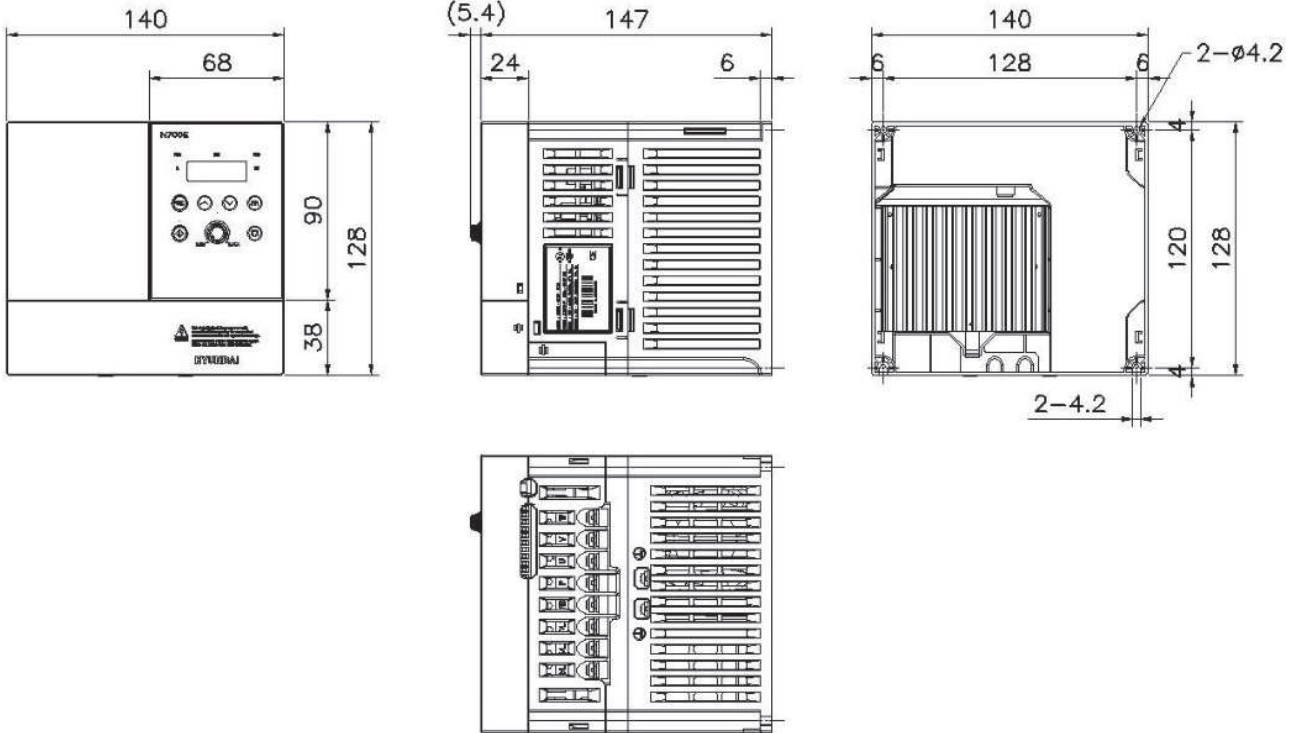
(1) N700E-004LF/004SF/007LF/007SF/015LF model external dimension.(mm)



(2) N700E-015SF/004HF/007HF/015HF/022SF/022LF/022HF model external dimension.(mm)



(3) N700E-037LF/037HF model external dimension.(mm)



Model	W(Width) [mm]	W1 [mm]	H(Height) [mm]	H1 [mm]	D(Depth) [mm]	Ø [mm]	Weight [kg]
N700E 004 SF	68	58	128	120	128	4.2	0.7
N700E 007 SF	68	58	128	120	128	4.2	0.7
N700E 015 SF	108	96	128	120	142	4.2	0.7
N700E 022 SF	108	96	128	120	142	4.2	0.98
N700E 004 LF	68	58	128	120	128	4.2	0.7
N700E 007 LF	68	58	128	120	128	4.2	0.7
N700E 015 LF	68	58	128	120	128	4.2	0.7
N700E 022 LF	108	96	128	120	142	4.2	0.98
N700E 037 LF	140	128	128	120	147	4.2	1.22
N700E 004 HF	108	96	128	120	142	4.2	0.98
N700E 007 HF	108	96	128	120	142	4.2	0.98
N700E 015 HF	108	96	128	120	142	4.2	0.98
N700E 022 HF	108	96	128	120	142	4.2	0.98
N700E 037 HF	140	128	128	120	147	4.2	1.22