






✉john.zuo@hcfa.cn

  
Control

  
Drive

  
Sensor

  
M&E

  
Info.



BETTER WORK, BETTER LIFE 



# E380/E220 Series

Standard Vector Control VFDs

**Zhejiang Hechuan Technology Co.LTD**  
<https://www.hcfaglobal.com/>

**Headquarters address**  
No.9,Fucai Road, Longyou industrial Zone, Quzhou City, Zhejiang Province,  
P.R.China

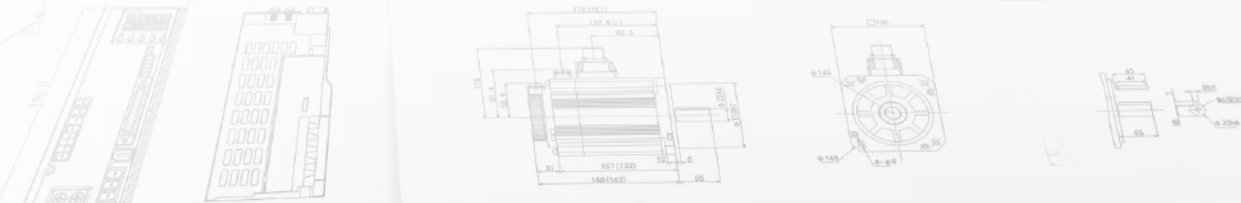
**Headquarters address**  
No. 299, Lixin Road, Qingshanhu Sci-Tech City, Lin'an District, Hangzhou City,  
Hangzhou R&D Centre Zhejiang Province

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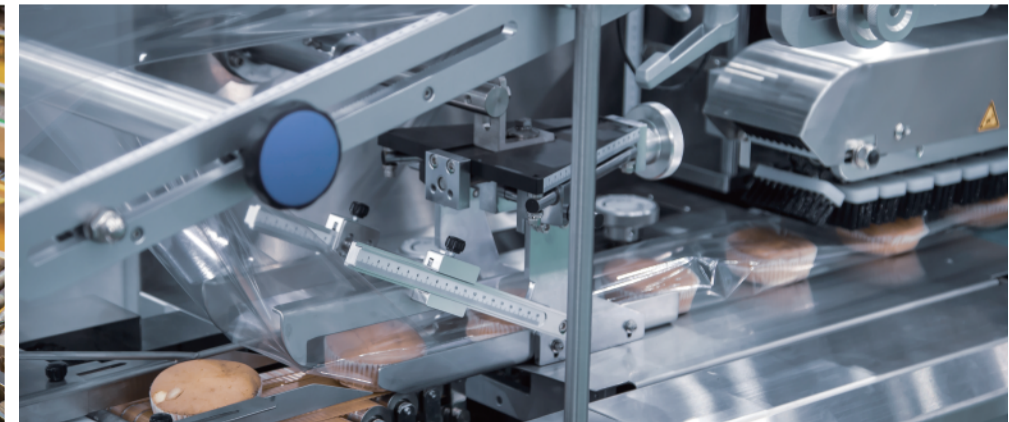
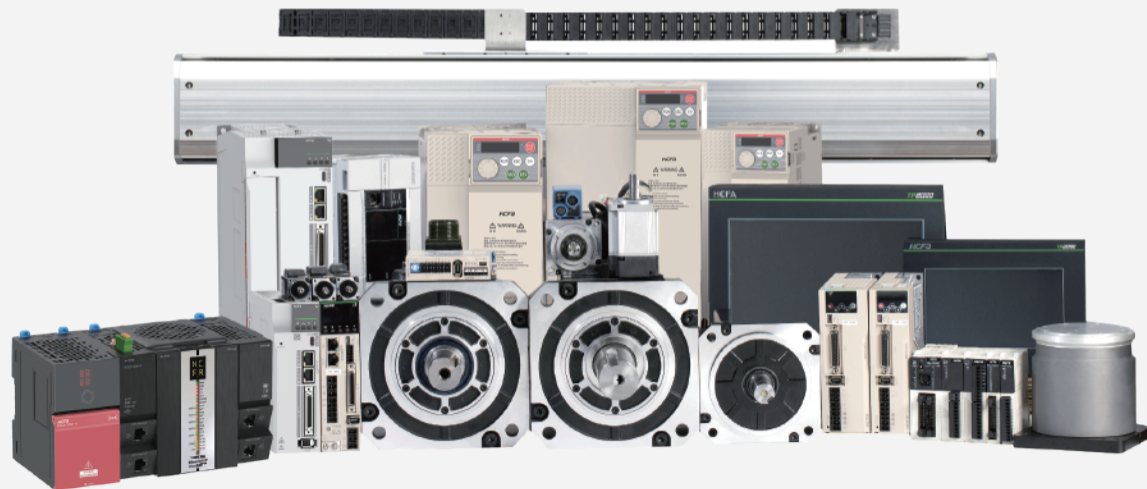
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Due to the delay in updating the paper version,  
please refer to the official website for the latest product information





Be dedicated to creating values in automation industry



Stock code: 688320.SH

R&D Centers

5

Set up nationally

Sales Office

40+

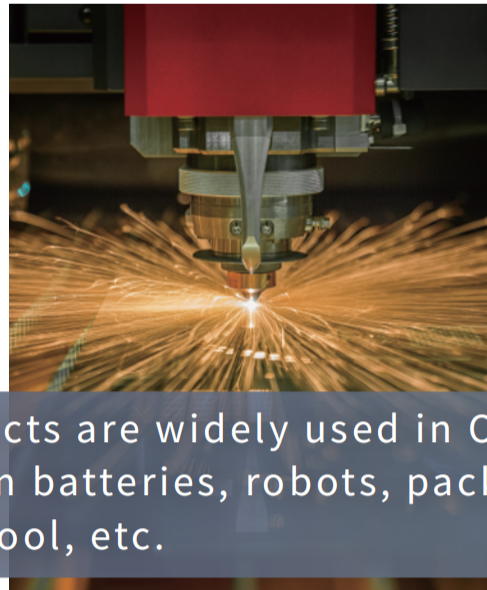
Sales elites gathering

Global Distributor

400+

Products sold worldwide

The products are widely used in OEM fields such as photovoltaic, 3C, lithium batteries, robots, packaging, textiles, logistics, lasers, machine tool, etc.







- New design**  
General-purpose control board, keyboard panel and extension card
- Powerful function**  
Excellent overvoltage suppression capability, Fast acceleration/ deceleration, Over-current protect function
- Exquisite appearance**  
Space reduced by 40%, improve the space utilization
- Stable performance**  
Main components' life expectancy greatly increased, Circuit board 100% coating

**More reliable**  
Extend main parts' life, 100%PCB coating.

Conformal coating  
Greatly improve the capability of insulation, moisture-proof, leakage prevention, dustproof, anti-corrosion, anti-aging, anti-mildew etc.

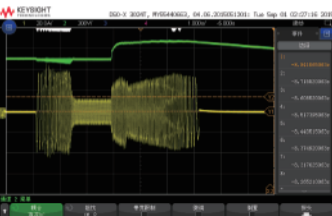
Independent heat dissipation channel  
Effectively prevent environmental impact on products and extend products' lifetime greatly.

anti-corrosion  
moisture-proof  
Dust-proof

**Compact and integrated design**  
Whole series share common parts for control panel, key board and extension card, reduce the inventory and cut down the cost greatly.

**Optimize drive board design**  
Optimize the drive board layout, thermal design, EMC design, and 100% routing ability.

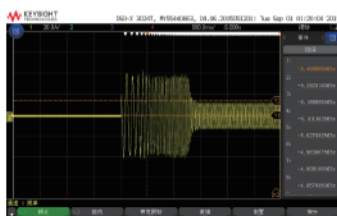
Performance specifications



**Excellent overvoltage suppression capability**  
0. 5s deceleration time. In the absence of external brake resistor, the current and voltage can be controlled more stably and no overvoltage error occurs during the deceleration.



**Fast acceleration/deceleration**  
Excellent current control technology to realize the superior load capacity. The VFD can operate repeatedly at 0.1s acceleration/deceleration without failure.

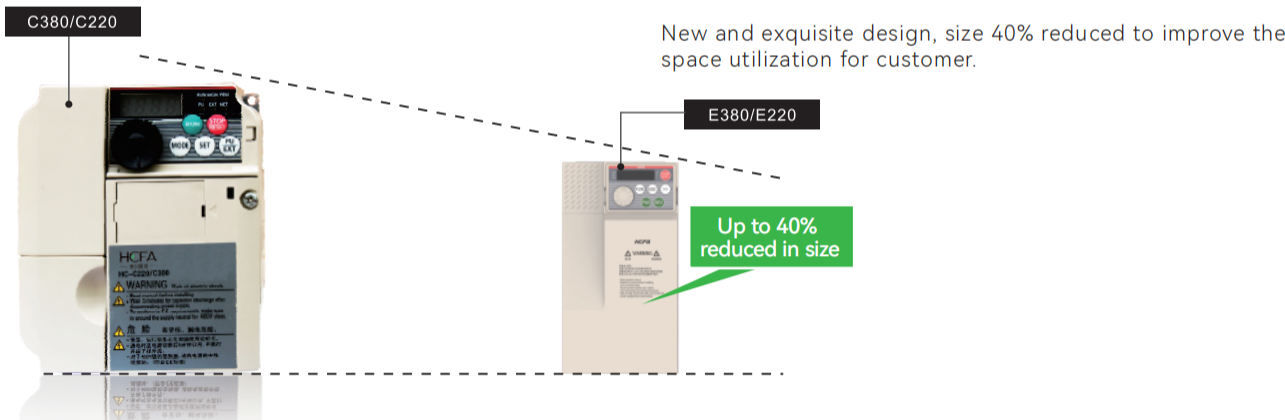


**Over-current protect function**  
The current is controlled stably with acceleration/ deceleration 0.1s start in VF mode. The excellent Over-current protect function can satisfy most applications.

**Superior low-frequency torque performance**  
Output 150% torque at 0. 5Hz in VF mode; Output 160% torque at 0.25Hz in SVC mode; Output 180% torque at 0. 25Hz in FVC mode.

Hardware features

Flexible use of space



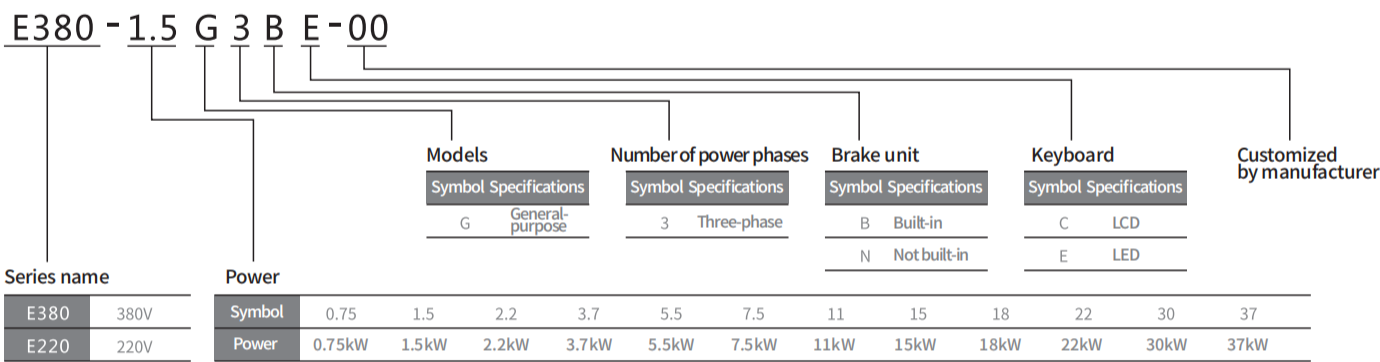
Technical specifications

Items		Specifications	
Power input	Rated voltage	Single-phase 220V: Constant voltage fluctuation $\pm 10\%$ , transient fluctuation $-15\% \sim +10\%$ Three-phase 220V: Constant voltage fluctuation $\pm 10\%$ , transient fluctuation $-15\% \sim +10\%$ Three-phase 380V: Constant voltage fluctuation $\pm 10\%$ , transient fluctuation $-15\% \sim +10\%$ That is 323~437V; Voltage imbalance $<3\%$ , the distortion rate in accordance with IEC61800-2.	
	Rated input current	Refer to 2-1	
	Rated frequency	50Hz/60Hz, fluctuation range $\pm 5\%$	
Power output	Applicable motor	Refer to 2-1	
	Rated capacity	Refer to 2-1	
	Rated current	Refer to 2-1	
Basic functions	Output voltage	Three-phase, 0V to the rated voltage, error less than $\pm 3\%$	
	Max. frequency	0Hz~500Hz, 0Hz~3000Hz, can be customized according to customer needs	
	Carrier frequency	1. 0kHz~16. 0kHz, can be adjusted automatically	
	Input frequency resolution	0.01Hz (Digital setting)	
	Control mode	Speed control (SVC), torque control (SVC), speed control (FVC), torque control (FVC), V/F control	
	Startup torque	0.25Hz/150% (SVC)	0Hz/180% (FVC)
	Speed range	1:100 (SVC)	1:1000 (FVC)
	Speed stability accuracy	$\pm 0.5\%$ (SVC)	$\pm 0.02\%$ (FVC)
	Torque control accuracy	$\pm 5\%$ (FVC) ★	
	Overload capacity	G models: 60s for 150% rated current, 1s for 200% rated current	
	Torque boost	Automatic boost; Customized boost 0.1 % to 30.0 %	
	Acceleration/deceleration curve	Straight-line or S-curve. Four kinds of acceleration/deceleration time, range : 0. 0s~6500. 0s	
	DC injection braking	DC injection braking frequency: 0Hz to max. frequency, DC injection braking active time: 0.0s to 60.0s. Current level of DC injection braking: 0% to 100%	
	Jog running	Frequency range of jog running: 0.00Hz~P00.08, Acceleration/Deceleration time of jog running: 0.0s to 6500.0s	
	Onboard multiple preset speeds	The VFD can realize up to 16 speeds by using simple PLC function or by using digital input signals	
	Onboard PID	The VFD can realize proportional-integral-derivative (PID) function in the closed-loop control	
	Automatic voltage regulation (AVR)	The system maintains a constant output voltage automatically when the grid voltage	
	Overcurrent stall control	The VFD can limit the output current automatically when the load changes in V/F operation	
	Overcurrent fast prevention	The function helps to avoid frequent overcurrent faults to guarantee the VFD operates normally	
	Overvoltage stall control	The system limits the energy feedback automatically during operation to prevent frequent or excessive trips when frequency changes	
	Oscillation suppression	Optimize the V/F oscillation suppression to keep the stable operation	

Technical specifications

Items		Specifications
Individualized functions	Power dip ride-through	Load feedback energy compensates for any voltage reduction, allowing the VFD to continue to operate for a short time during power dips
	Timing control	Timing control: Time setting range 0.0min~6500.0min
	Dual-motor switchover	The VFD have two groups of motor parameters and can control up to two motors
	Multiple fieldbus supported	Multiple fieldbus: Modbus-RTU、CANopen
	Motor overheat protection	Optional I/O extension card★, analog input ,AI3 can accept motor temperature sensor input (PT100/PT1000)★
	Multiple encoder types supported	Support incremental encoders
RUN	Command source	Different methods of switching, such as Operating panel, Terminal I/O control, Serial communication
	Main frequency reference setting channel	Supports up to 10 frequency reference setting channels and allows different methods of switching: Digital setting, Analog voltage reference, Analog current reference, Pulse reference, Communication reference
	Auxiliary frequency reference setting channel	Supports 9 auxiliary frequency sources, and allows fine tuning of the auxiliary frequency and main& auxiliary calculation
	Input terminals	Standard: 7 digital input (DI) terminals, one of which supports up to 100kHz high-speed pulse input. 3 analog input (AI) terminals: AI1: Support 0 to10V voltage input AI2: Support 0 to 10V voltage input or 0 to 20mA current input AI3: Support -10 to 10V voltage input Extension capacity★: Can be customized according to customer needs
Display and operating panel	Output terminals	Standard: 2 analog output terminal, support 0 to 10V voltage output or 0(or 4) to 20mA current output 2 digital output terminal, one of which supports high-speed pulse output terminal for a square-wave signal output in the frequency 0 to 100kHz 1 relay output terminal Extension capacity★: Can be customized according to customer needs
	LED display	Display and operating panel
	LCD display	Can be selected according to user needs
	Parameter copy	The parameters can be quickly copied through the LCD operation panel
Environment	Key locking and function selection	Keys on the LCD control panel can be locked or partially locked electronically to prevent accidental operation. The range of some functions can be limited to a permitted range to prevent incorrect settings
	Protection function	Short-circuit protection, Input/output phase loss protection, Overcurrent protection, Overvoltage protection, Undervoltage protection, Overheat protection, Overload protection
	Optional accessories	LCD operation panel, brake components, I/O extension card★, CANopen communication card, incremental encoder PG card
	Installation location	Install the VFD indoors and protected from direct sunlight, dust, corrosive or combustible gases, oil smoke, vapour, ingress from water or any other liquid, and salt
Environment	Altitude	Below 1000 m (If the altitude exceeds 1000 m, de-rate the VFD )
	Operation temperature	-10℃~+40℃ (If the ambient temperature is 40℃ to 50℃, de-rate the VFD)
	Humidity	Less than 95%RH, non-condensing
	Vibration	Less than 5.9m/s <sup>2</sup> (0.6g)
	Storage temperature	-20℃~+60℃
Protection level		IP20
Cooling method		Forced air cooling

Naming rules

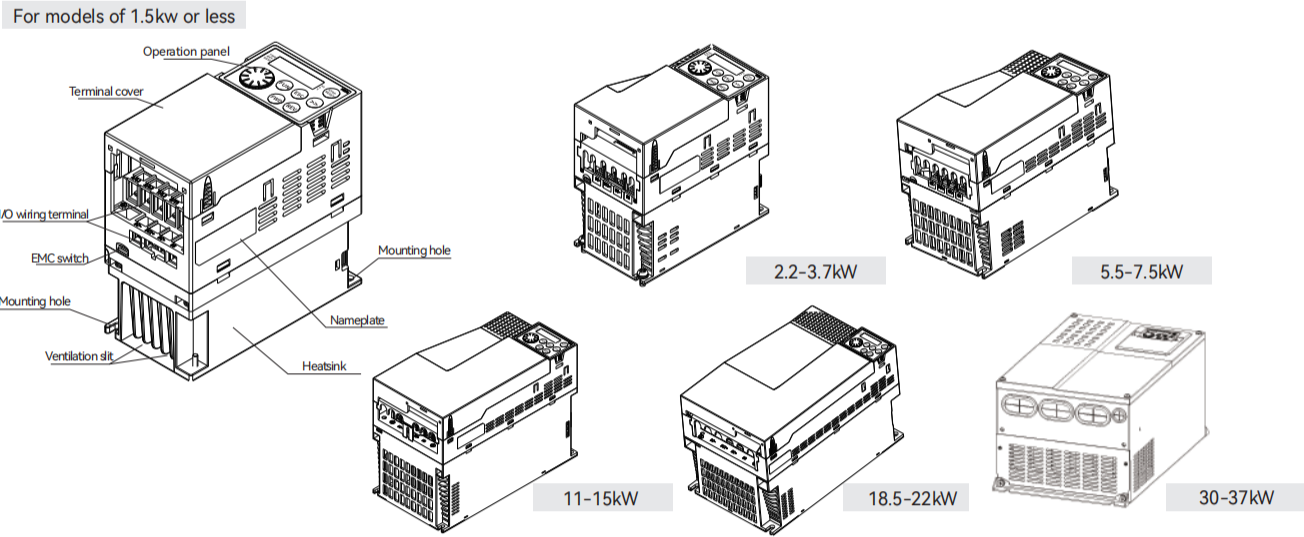


Product specifications table 2-1

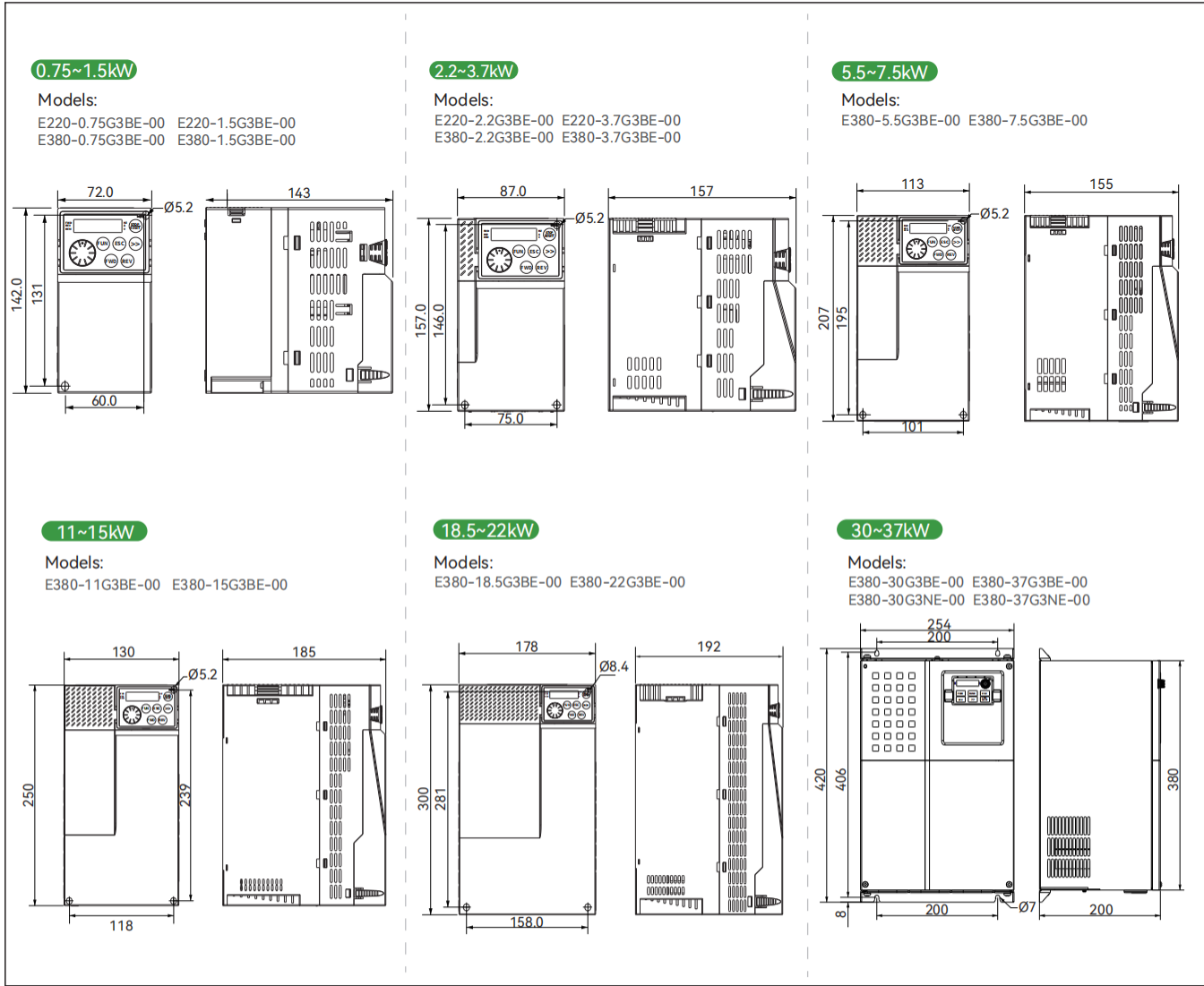
Classifications		Model name	Power capacity kVA	Input current A	Output current A	Applicable motor	
						kW	HP
E220V	Single-phase power 220V(-15%~+10%), 50/60Hz	E220-0.75G3BE-00	1.5	8.2	4	0.75	1
		E220-1.5G3BE-00	3	14	7	1.5	2
		E220-2.2G3BE-00	4	23	9.6	2.2	3
	Three-phase power 220V(-15%~+10%), 50/60Hz	E220-0.75G3BE-00	3	5	4	0.75	1
		E220-1.5G3BE-00	4	8	7	1.5	2
		E220-2.2G3BE-00	6	10.5	9.6	2.2	3
E380V	Three-phase power 380V(-15%~+10%), 50/60Hz	E220-3.7G3BE-00	8.9	14.6	13	3.7	5
		E380-0.75G3BE-00	1.5	3.4	2.1	0.75	1
		E380-1.5G3BE-00	3	5	3.7	1.5	2
		E380-2.2G3BE-00	4	5.8	5	2.2	3
		E380-3.7G3BE-00	5.9	10.5	9	3.7	5
		E380-5.5G3BE-00	8.9	14.6	13	5.5	7.5
		E380-7.5G3BE-00	11	20.5	17	7.5	10
		E380-11G3BE-00	17	26	25	11	15
		E380-15G3BE-00	21	35	32	15	20
		E380-18.5G3BE-00	24	38.5	37	18.5	25
		E380-22G3BE-00	30	46.5	45	22	30
		E380-30G3NE-00	40	62	60	30	40
		E380-37G3NE-00	50	76	75	37	50
		E380-30G3BE-00	40	62	60	30	40
		E380-37G3BE-00	50	76	75	37	50



Main structures diagram



External dimensions

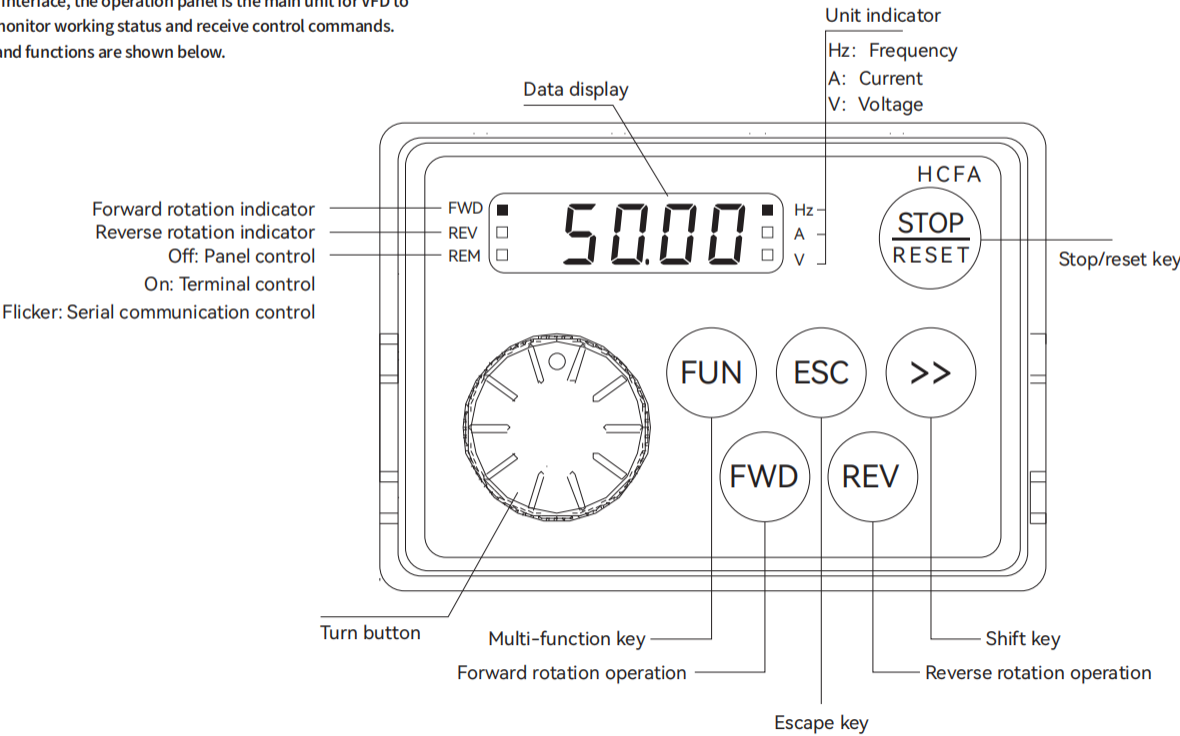


Product installation size

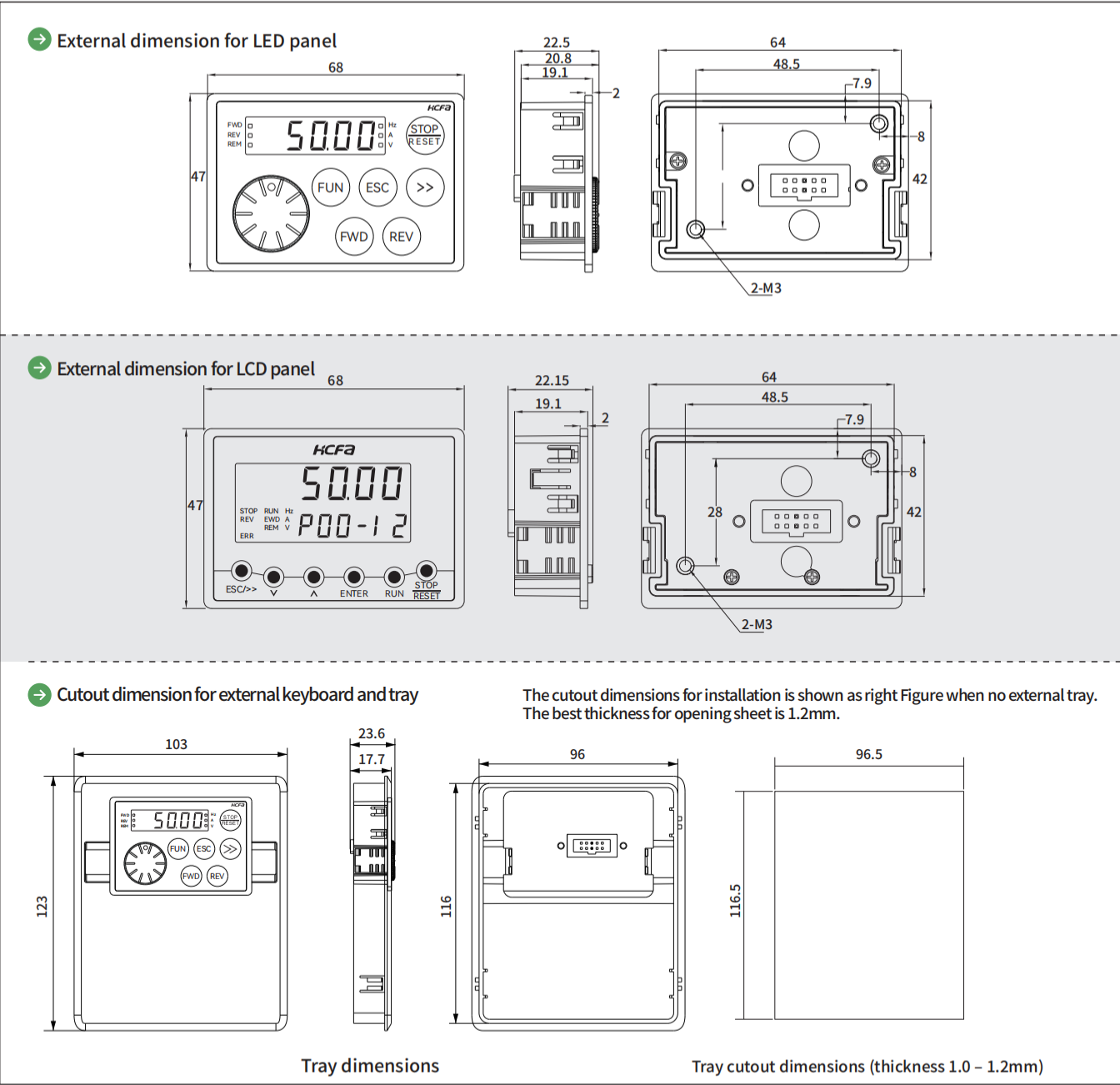
Classifications	Model name	Mounting hole mm		External dimensions mm			Mounting hole mm	Weight kg
		W1	H1	H	W	D		
E220V	Single-phase 220V, 50/60Hz	60	131	142 (wall-mounting)	72	143	5.2	2
				157 (wall-mounting)	87	153	5.2	3
		75	146	142 (wall-mounting)	72	143	5.2	2
				157 (wall-mounting)	87	153	5.2	3
	Three-phase 220V, 50/60Hz	60	131	142 (wall-mounting)	72	143	5.2	2
				157 (wall-mounting)	87	153	5.2	3
		75	146	142 (wall-mounting)	72	143	5.2	2
				157 (wall-mounting)	87	153	5.2	3
E380V	Three-phase 380V, 50/60Hz	60	131	142 (wall-mounting)	72	143	5.2	2
				157 (wall-mounting)	87	153	5.2	3
		75	146	142 (wall-mounting)	72	143	5.2	2
				157 (wall-mounting)	87	153	5.2	3
		101	195	207 (wall-mounting)	113	155	5.2	5
				250 (wall-mounting)	130	185	5.5	8
		118	239	300 (wall-mounting)	178	192	8.4	10
				350 (wall-mounting)	225	192	6	15
		158	281	300 (wall-mounting)	178	192	8.4	10
				350 (wall-mounting)	225	192	6	15
		195	335	350 (wall-mounting)	225	192	6	15
				350 (wall-mounting)	225	192	6	15
		195	335	350 (wall-mounting)	225	192	6	15
				350 (wall-mounting)	225	192	6	15

Operation panel introduction

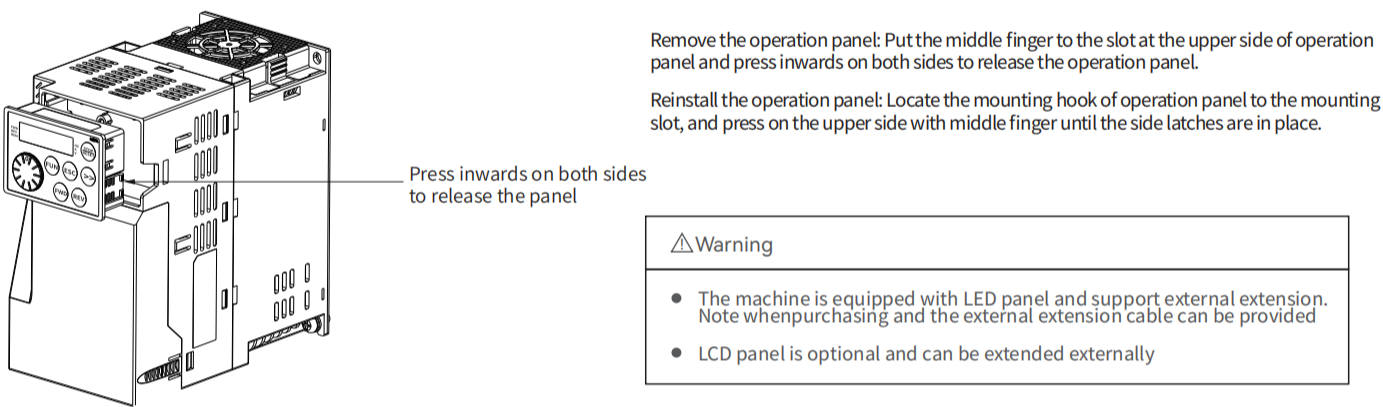
As a human-machine interface, the operation panel is the main unit for VFD to modify parameters, monitor working status and receive control commands. The outline drawing and functions are shown below.



External dimension for operation panel



Remove and reinstall the operation panel



Selection guide of braking unit

Resistance selection

The motor and load's regenerative energy is almost completely consumed on the braking resistor when braking.

According to the formula  $U \cdot U/R = BR$ :

U refers to the braking voltage at system stable braking.

Different systems select different braking voltages. The 380 VAC system usually selects 700 V braking voltage.

The 220 VAC system usually selects 380 V braking voltage BR refers to the braking power

Selection of power of braking resistor

In theory, the power of the braking resistor is consistent with the braking power.

But in consideration that the de-rating is 70%, you can calculate the power of the braking resistor according to the formula  $0.7 \cdot Pr = BR \cdot D$ .

Pr refers to the power of resistor

D refers to the braking frequency (percentage of the regenerative process to the whole working process)

Elevator---20%~30%

Winding and unwinding---20%~30%

Centrifuge---50%~60%

Occasional braking load---5%

General application---10%

Single-phase 220V 50/60HZ				
E220-0.75G3BE-00	150W	$\geq 80\Omega$	Built-in brake	No special description
E220-1.5G3BE-00	150W	$\geq 50\Omega$		
E220-2.2G3BE-00	250W	$\geq 50\Omega$		

Three-phase 220V 50/60HZ				
E220-0.75G3BE-00	150W	$\geq 80\Omega$	Built-in brake	No special description
E220-1.5G3BE-00	150W	$\geq 50\Omega$		
E220-2.2G3BE-00	250W	$\geq 50\Omega$		
E220-3.7G3BE-00	300W	$\geq 30\Omega$		

Three-phase 380V 50/60HZ				
E380-0.75G3BE-00	150W	$\geq 150\Omega$	Built-in brake	No special description
E380-1.5G3BE-00	150W	$\geq 150\Omega$		
E380-2.2G3BE-00	250W	$\geq 100\Omega$		
E380-3.7G3BE-00	300W	$\geq 80\Omega$		
E380-5.5G3BE-00	400W	$\geq 40\Omega$		
E380-7.5G3BE-00	500W	$\geq 30\Omega$		
E380-11G3BE-00	800W	$\geq 25\Omega$		
E380-15G3BE-00	1000W	$\geq 25\Omega$		
E380-18.5G3BE-00	1300W	$\geq 20\Omega$	External braking unit	No special description
E380-22G3BE-00	1500W	$\geq 20\Omega$		
E380-30G3NE-00	2500W	$\geq 16\Omega$		
E380-37G3NE-00	3700W	$\geq 16\Omega$	Built-in brake	No special description
E380-30G3BE-00	2500W	$\geq 16\Omega$		
E380-37G3BE-00	3700W	$\geq 16\Omega$		

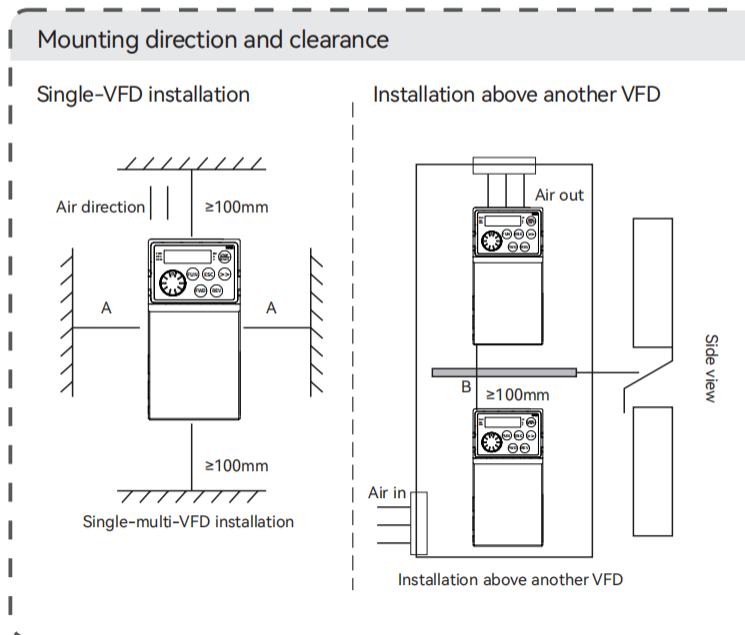
⚠ Warning

- ※The Table above provides data for reference. You can select different resistance and power based on actual needs. However, the resistance must not be lower than the recommended value. The power may be higher than the recommended value.
- ※The braking resistor model is dependent on the generation power of the motor in the actual system and is also related to the system inertia, deceleration time and potential energy load.
- ※For systems with high inertia, and/or rapid deceleration times, or frequent braking sequences, the braking resistor with higher power and lower resistance value should be selected.



## VFD installation

Install the VFD indoors, with good ventilation, and generally vertically. The installation clearance that need to be reserved is shown as below.



### Installation environment

- The ambient temperature should be around -10°C~40°C. When temperature exceeds 40°C, the external forced cooling or de-rating is required.
- Install the VFD on the surface of an incombustible object, and ensure that there is sufficient space around for heat dissipation.
- Free from the direct sun.
- Free from the location with high humidity and condensation, humidity less than 95%
- Free from the vibration (less than 5.9m/s<sup>2</sup> (0.6g))
- Free from oil dirt, dust and metal powder
- Free from corrosive, explosive and combustible gas.

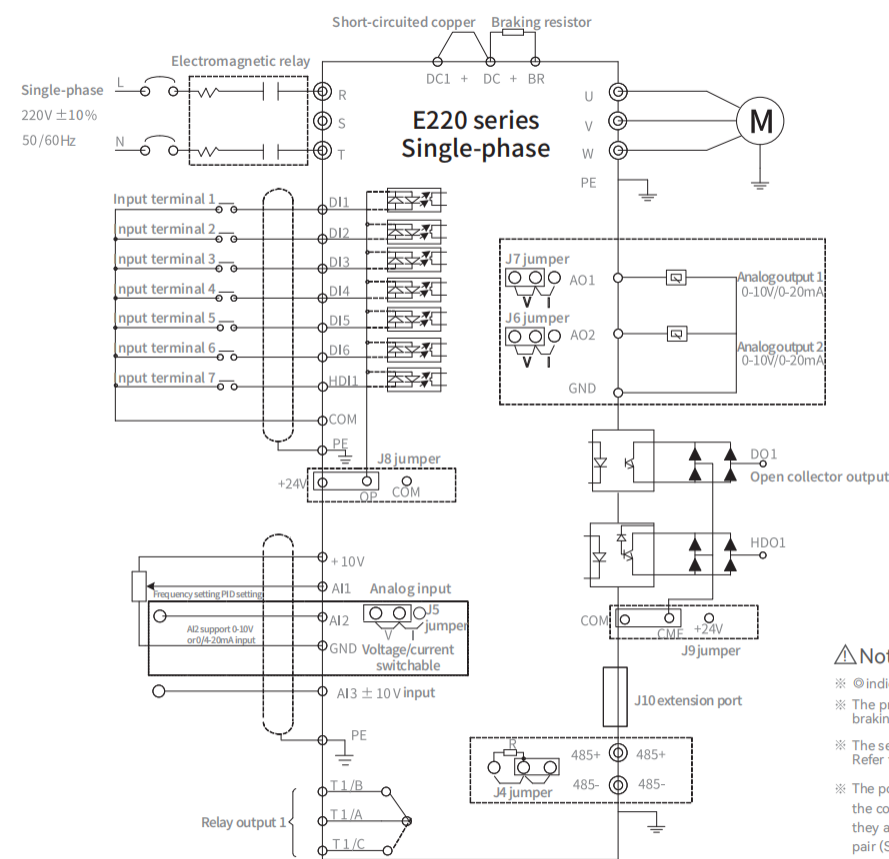
### Precautions for installation

- When single VFD installed: Do not consider the clearance A when power is less than 15kW. Clearance A should be greater than 50mm if power exceed 15kW.
- When installed on another VFD: If VFD needs to be installed above another one, install an insulation guide plate.

Power class	When installed on another VFD	
	B	A
≤15kW	≥100mm	
18.5kW—30kW	≥200mm	≥50mm
≥37kW	≥300mm	

## Standard wiring

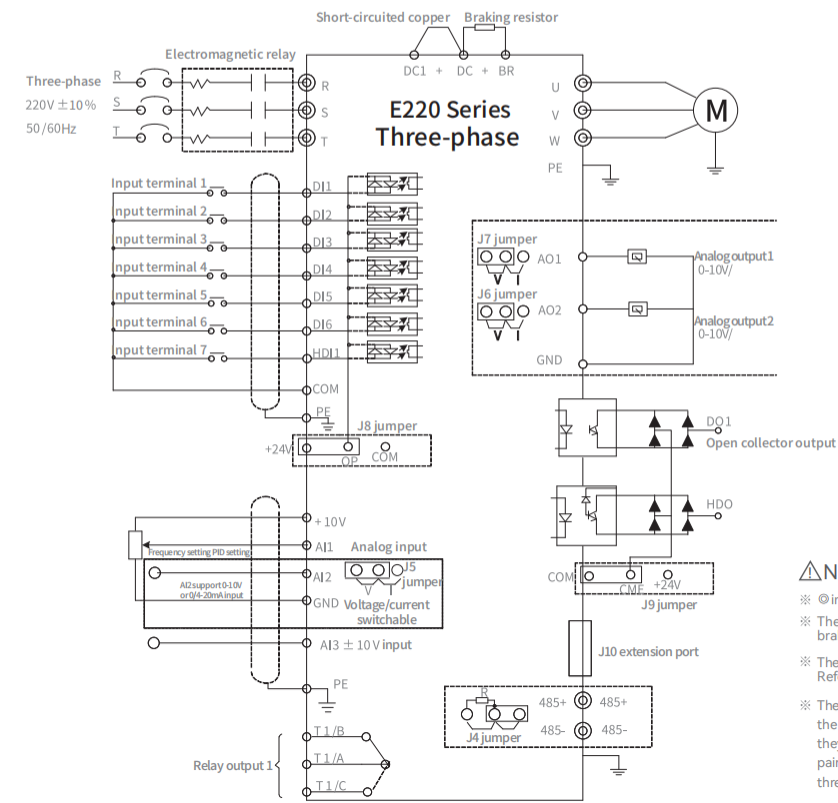
### Standard wiring for single-phase 220V VFD



### Notes

- ⊙ indicates the main circuit terminal, ○ indicates control circuit terminal;
- The product model name with "B" indicates the standard model is built-in braking unit;
- The selection of braking resistor is determined by user's actual needs. Refer to Table 2-4 for the selection of braking unit;
- The power cables must be laid far away from control cables. If the control cable must run across the power cable, make sure they are arranged at an angle of close to 90°. Shielded twisted pair (STP) cable is recommended for analog signal lines and three-core shielded cable is for power cables.

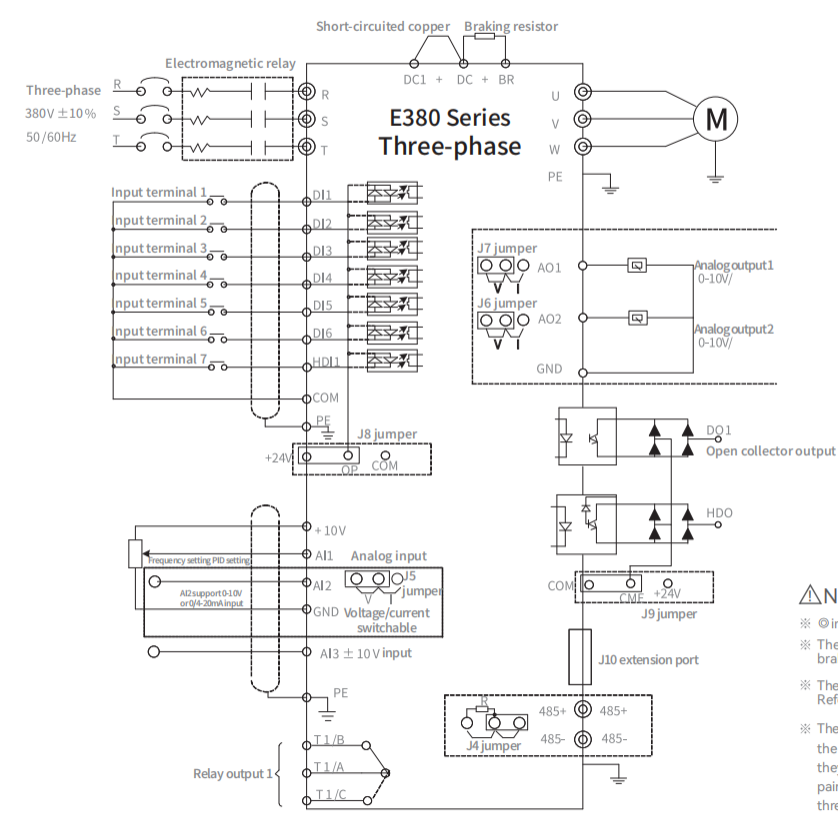
### Standard wiring for three-phase 220V VFD



### Notes

- ⊙ indicates the main circuit terminal, ○ indicates control circuit terminal;
- The product model name with "B" indicates the standard model is built-in braking unit;
- The selection of braking resistor is determined by user's actual needs. Refer to Table 2-4 for the selection of braking unit;
- The power cables must be laid far away from control cables. If the control cable must run across the power cable, make sure they are arranged at an angle of close to 90°. Shielded twisted pair (STP) cable is recommended for analog signal lines and three-core shielded cable is for power cables.

### Standard wiring for three-phase 380V VFD



### Notes

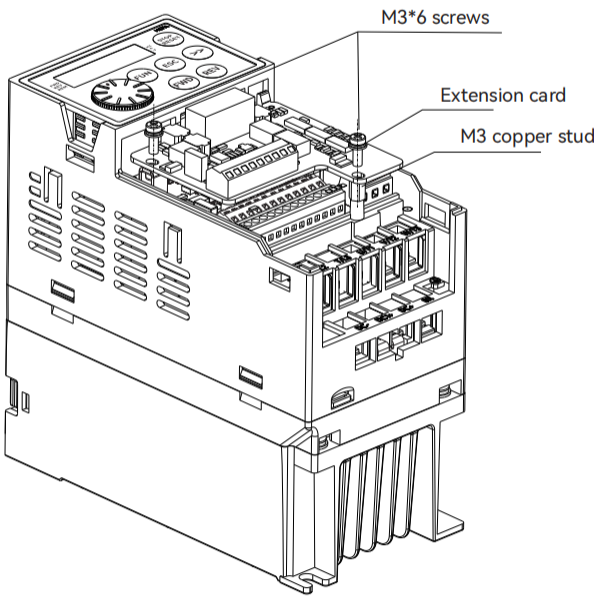
- ⊙ indicates the main circuit terminal, ○ indicates control circuit terminal;
- The product model name with "B" indicates the standard model is built-in braking unit;
- The selection of braking resistor is determined by user's actual needs. Refer to Table 2-4 for the selection of braking unit;
- The power cables must be laid far away from control cables. If the control cable must run across the power cable, make sure they are arranged at an angle of close to 90°. Shielded twisted pair (STP) cable is recommended for analog signal lines and three-core shielded cable is for power cables.

Selection Guide

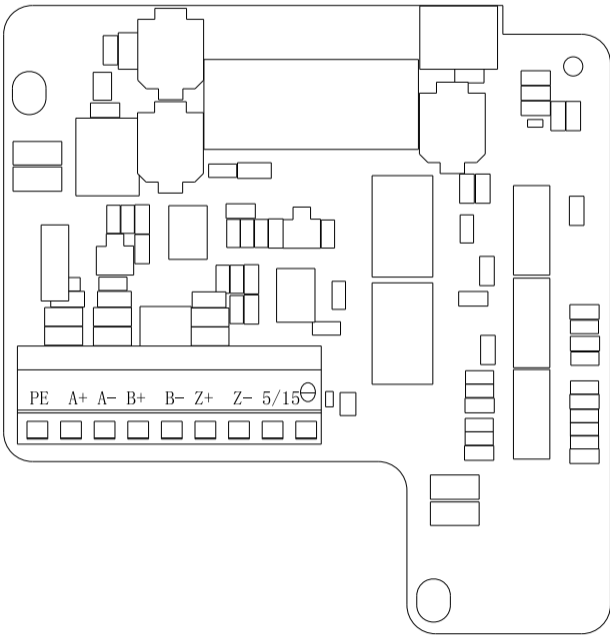
Model name	Power	Input voltage	Input terminal	Function description
E220-0.75G3BE-00	0.75kW	Three-phase 220V (-15%~+10%) 50/60Hz [Models of 2.2kW or less support single phase operation]	Standard :  7 digital input terminals, one terminal support at most 100kHz high-speed pulse input, 3 analog input terminals;  AI1 supports 0V~10V voltage input;  AI2 supports 0V~10V voltage input or 0/4mA~20mA current input;  AI3 supports -10V~+10V voltage input;  Extension abilities★:  Can be customized according to customer needs	1) Control mode: No PG vector speed control, No PG vector torque control★, PG vector speed control★, PG vector torque control★, V/F control 2) Timing control function: 0.0~6500.0 minutes 3) Instantaneous power-failure: Load feedback energy compensates for any voltage reduction, allowing the drive to continue to operate for a short time during power dips 4) Multi-motor switchover: The drive have two groups of motor parameters and can control up to two motors. 5) Motor overheat protection: The optional I/O extension card ★enables AI3 to receive the motor temperature sensor input (PT100, PT1000) ★so as to realize motor overheat protection 6) Overload capacity: G models : 60s for 150% rated current, 1s for 200% rated current 7) Torque boost: Automatic boost; manual boost 0.1% to 30.0% 8) Acceleration/deceleration curve: Straight-line or S-curve. Four kinds of acceleration /deceleration time, range: 0.0s~6500.0s 9) DC braking: DC braking frequency: 0Hz to max. frequency, DC injection braking active time: 0.0s to 60.0s. Current level of DC injection braking: 0% to 100% 10) Simple PLC, multi-stage operation: It implements up to 16 speeds via the simple PLC function or combination of DI terminal states 11) Onboard PID: It realizes process-controlled closed loop control system easily. 12) Overcurrent suppression: The system limits the output current automatically when the load changes in V/F operation. 13) Rapid current limit: The function helps to avoid frequent overcurrent faults to guarantee the VFD operate normally.. 14) Overvoltage stall control: The system limits the energy feedback automatically during operation to prevent frequent or excessive trips when frequency changes. 15) Oscillation on suppression: Optimize the V/F oscillation suppression to keep the stable operation
E220-1.5G3BE-00	1.5kW			
E220-2.2G3BE-00	2.2kW			
E220-3.7G3BE-00	3.7kW			
E380-0.75G3BE-00	0.75kW	Three-phase 380V (-15%~+10%) 50/60HZ		
E380-1.5G3BE-00	1.5kW			
E380-2.2G3BE-00	2.2kW			
E380-3.7G3BE-00	3.7kW			
E380-5.5G3BE-00	5.5kW			
E380-7.5G3BE-00	7.5kW			
E380-11G3BE-00	11kW			
E380-15G3BE-00	15kW			
E380-18.5G3BE-00	18.5kW			
E380-22G3BE-00	22kW			
E380-30G3BE-00	30kW			
E380-37G3BE-00	37kW			
E380-30G3NE-00	30kW			
E380-37G3NE-00	37kW			

PG card appearance and installation

Installation drawing



PG card



PG card installation

Model name	Power
E380-PG2	Differential input
E380-PG3	Open collector, push-pull input

Model name	Description	Notes
E380-PG2	Encoder signal input terminal	Refer to Pin definition of encoder signal input terminal
E380-PG3	Encoder power supply selection jumper, 5V or 15V output can be selected	Factory default: 5V

Specifications

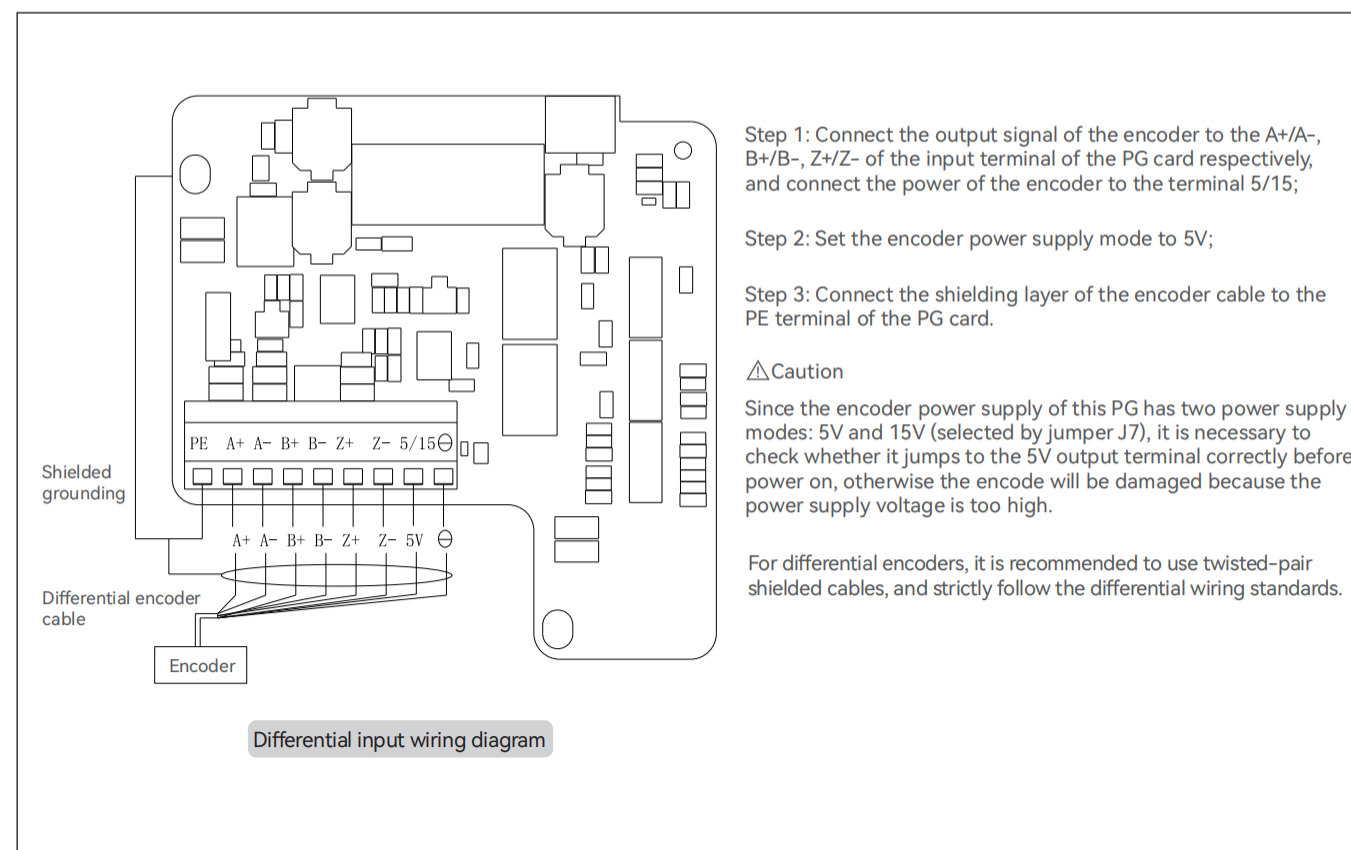
Items	Specifications
Encoder power supply	5V/200mA, 15V/200mA
Encoder interface type	Support differential and open collector
AWG	For specific wire gauge of 16~26AWG, please refer to the manual
Terminal pitch	3.5mm
Terminal screw	Slotted
Terminal type	Oblique terminal block

Pins definition

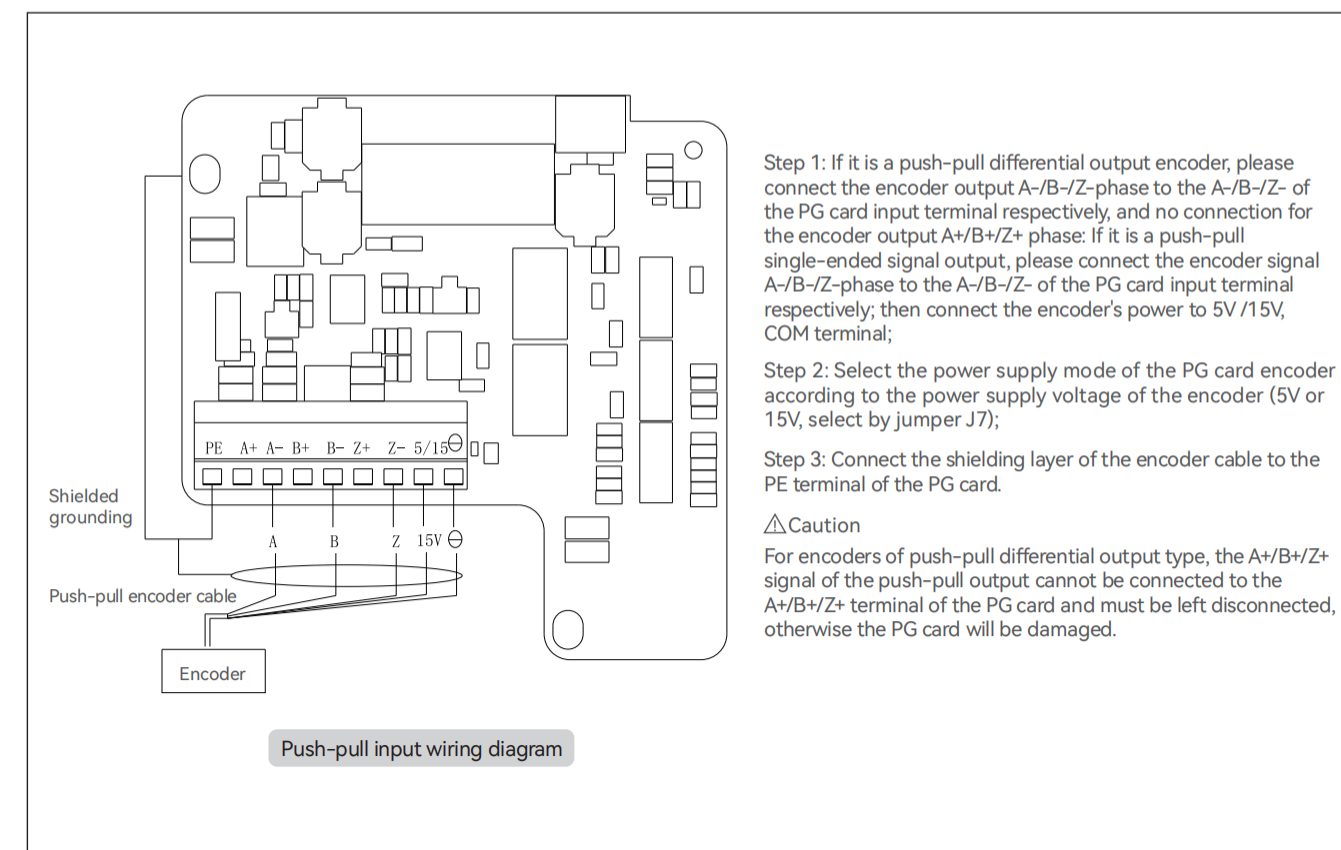
Items	Specifications				
Pins No.	1	2	3	4	
Terminal name	A+	A-	B+	B-	
Description	Encoder output A signal positive	Encoder output A signal negative	Encoder output B signal positive	Encoder output A signal positive	
Pins No.	5	6	7	8	9
Terminal name	Z+	Z-	5/15	⊖	PE
Description	Encoder output Z signal positive	Encoder output Z signal negative	Encoder 5V/15V powersupply	Encoder power supply grounding	Shielded terminal



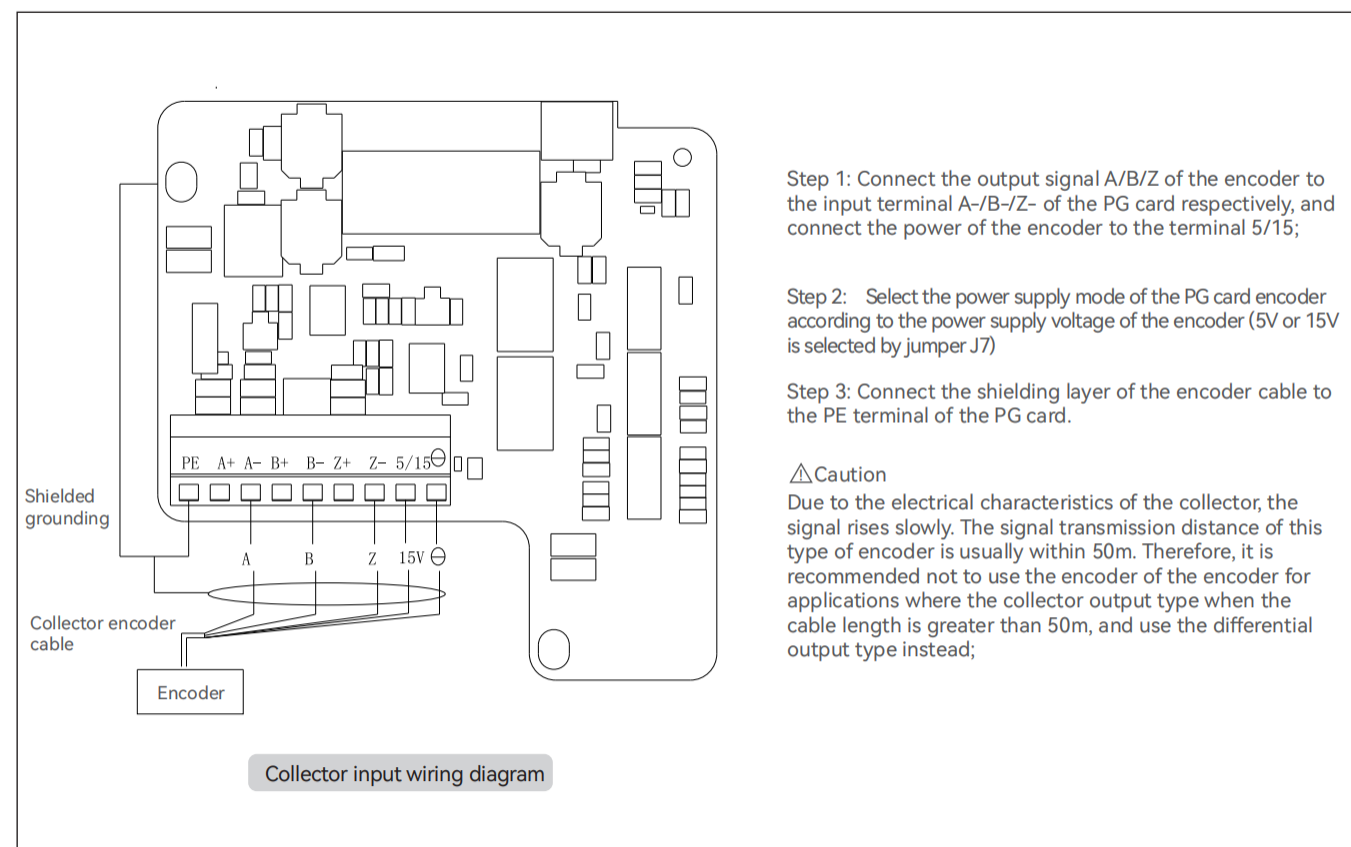
## Differential input wiring diagram



## Push-pull input wiring diagram



## Collector input wiring diagram



### Relationship between encoder cable length and cables

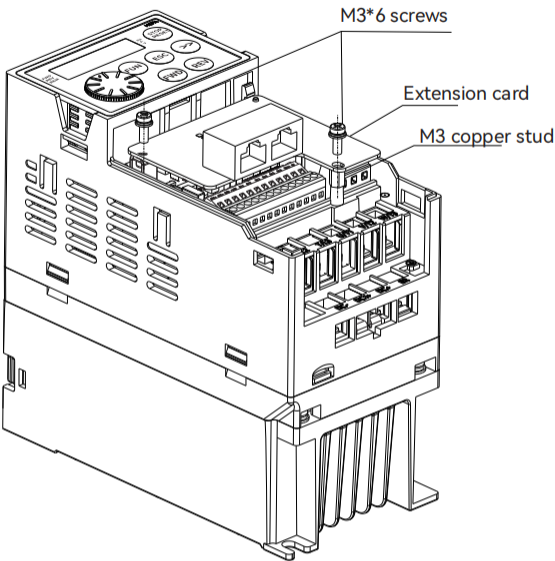
The longer the encoder cable, the greater the cable resistance, so the encoder power supply and encoder signal voltage drop across the cable resistance will be greater.  
For long-distance applications, if the wire gauge selection is unreasonable, the encoder and PG will not work normally due to the signal attenuation caused by the cable resistance.  
Please refer to the table below to select the appropriate wire gauge based on the length of the on-site cable (wire gauge: the standard for distinguishing wire diameters, here use AWG).

Cable length (unit: m)	AWG	Cable length (unit: m)	AWG
10	≤26	60	≤22
20		70	≤21
30	≤24	80	
40		90	≤20
50	≤22	100	

### EMC directives

- For installing and debugging, separate the signal line (such as the encoder cable) and the power cable into different trunking. It is strictly forbidden to bundle the encoder cable and the power cable together, otherwise it may cause encoder interference;
- The servo motor shell must be connected to the ground terminal (PE terminal) of the VFD, and the ground wire on the side of the motor shel must be well connected; otherwise, a good grounding effect will not be achieved
- For some large equipment, the VFD is far away from the servo motor, and the motor cable is very long (>10m). The cable inductance will affect the grounding effect and the grounding effect will be worse. At this time, the encoder shield cannot be connected to the VFD grounding terminal (PE terminal).

### E380-CAN1 extension card installation instructions

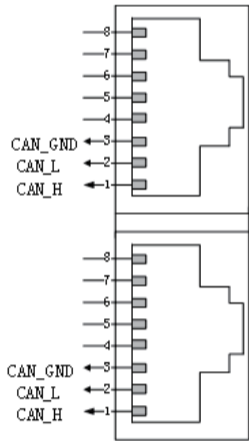


### E380-CAN1 network connection

#### Communication network interface definition

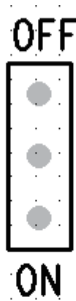
The network port of this product uses the standard RJ45 interface 8-pin network port.

Pins	Definition
1	CAN_H
2	CAN_L
3	CAN_GND
4	N/A
5	N/A
6	N/A
7	N/A
8	N/A



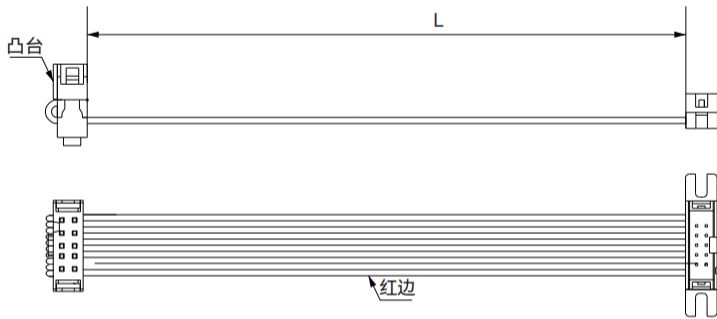
### Terminal resistance setting

In order to facilitate the on-site use, the E380-CAN1 card is equipped with terminal resistors, which can be set by the jumper .  
When the jumper cap is close to the OFF end, it means the terminal resistance (120Ω) is not connected, and when the jumper cap is close to the ON end, it means the terminal resistance (120Ω) is connected.



Terminal resistance jumper

### Extension cable for E380(E220) series operation panel



Model name	Specifications
CAB-E380FQV001-1M	operation panel extension cable
CAB-E380FQV001-3M	operation panel extension cable
CAB-E380FQV001-5M	operation panel extension cable
CAB-E380FQV001-10M	operation panel extension cable
CAB-E380FQV001-20M	operation panel extension cable
CAB-E380FQV001-50M	operation panel extension cable