Panasonic INSTALLATION MANUAL

Inverter MK300□□□□

Execution Standard No.: Q/320500 SUNX 20 MC-MK300SG-A NO.0048-11V

Thank you very much for purchasing Panasonic products.
Please read this Installation Manual carefully for the correct installation and use of it. After using, keep it in a safe place for reference when required. Refer to the manual for details.

- The general inverter produced by our company is not intended to be used in machines or systmes which may cause serious personnel injuries.
  Before using this product in special applications such as machinery or systems in movable object, medical, aerospace, nuclear energy control, submarine relay equipments or systems, please contact us.
- Although this product was manufactured under strict quality control system, it is strongly recommended to install safety devices to prevent serious accidents when used in facilities where a breakdown of this product is likely to cause a serious injury or major losses.
- Do not use this product for loads other than a 3-phase induction motor.
- Please dispose this product as industrial waste.

1 SAFETY PRECAUTIONS

1.1 CAUTION and DANGER

SAFETY PRECAUTIONS To prevent personal injuries or accidents, be sure to observe the following items.

It is divided into "⚠DANGER" and "⚠CAUTION" according to the risk degree in this Installation Manual.

⚠ DANGER Indicates an imminent hazardous situation where incorrect operation will result in serious personnel injury or death.

⚠ CAUTION Indicates a potentially hazardous situation where incorrect operation will result in personnel injury or property damage.

⚠ CAUTION

- Install the inverter on non-flammable materials such as metal etc. Failure to do so may lead to fire.
- Do not place the inverter near flammable materials. Failure to do so may lead to fire.
- Do not hold the inverter by terminal cover while transporting it. Failure to do so may result in personnel injury by its dropping.
- Do not let foreign matters such as metal sheet enter the inverter. Failure to do so may lead to fire.
- Install the inverter on a place strong enough to support its weight according to the Instruction Manual. Failure to do so may result in personnel injury by its dropping.
- Do not install or operate an inverter that is damaged or with part(s) missing. Failure to do so may result in personnel injury.
- Do not connect an AC power supply to output terminals (U, V, W). Failure to do so may result in personnel injury or fire.
- Make sure that the rated voltage of inverter matches with voltage of AC power supply. Failure to do so may result in personnel injury or fire.
- Tighten terminal screws to the specified tightening torque. Failure to do so may lead to fire.
- Do not connect resistor to DC terminals of P/DB+ and N-. Failure to do so may lead to fire.
- The heat sinks and braking resistors are at high temperature, so do not touch them. Otherwise it may result in burns.
- The inverter can easily be switched to high speed from low speed, so confirm the allowable range of the motor and machine before making settings. Failure to do so may result in personnel injury.
- Set separate holding brakes if required. Failure to do so may result in personnel injury.
- Employ an electrical engineering company to periodically tighten terminal screws. Loosen screws may lead to overheating even fire.

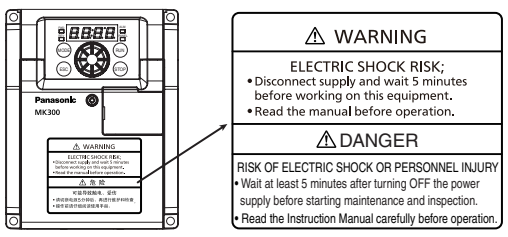
⚠ DANGER

- Make sure that power is turned OFF before starting wiring. Failure to do so may result in an electric shock or fire.
- Always connect ground wire. Failure to do so may result in an electric shock or fire.
- Wiring work should always be carried out by qualified electrician. Failure to do so may result in an electric shock or fire.
- Always install the unit before wiring. Failure to do so may result in an electric shock or personnel injury.
- Always close terminal cover before turning ON the inlet power and do not open terminal cover during power ON.
  Failure to do so may result in an electric shock or fire.
- Do not operate switches or knobs with wet hands. Failure to do so may result in an electric shock.
- Do not touch inverter terminals during Power ON even in stopping status. Failure to do so may result in an electric shock.
- The STOP button is not designed for emergency stop purpose, so set a separate button for emergency stop. Failure to do so may result in personnel injury.
- Depending on the start mode and settings of ride-through function, if operating signal is ON or the power is restored from a power failure, the inverter may start (or restart) suddenly. Keep away from the unit to avoid injury.

[Design the machine so that it can ensure personal safety even if the inverter starts suddenly.]

- Depending on the setting of start mode function, when reset fault trip with the operating signal present,the inverter may restart suddenly.
  (Always take measures to ensure personal safety.) Failure to do so may result in personnel injury.
- When retry function is in use, the inverter may automatically start (restart) suddenly, so do not approach it. (Always take measures to ensure personal safety.) Failure to do so may result in personnel injury.
- While auto-tuning function is in use, the inverter will automatically drive the motor in the stand-along mode when the RUN button on the panel is pressed.
  (Always take measures to ensure personal safety.) Failure to do so may result in personnel injury.
- Always confirm and adjust parameters before operation.
  An unexpected operation may occur on some parts.
  (Always take measures to ensure personal safety.) Failure to do so may result in personnel injury.
- If data is changed during operation, the motor and motor load may suddenly start/stop for the great fluctuation.
  (Always take measures to ensure personal safety.) Failure to do so may result in personnel injury.
- Wait at least 5 minutes after turning OFF the power before starting maintenance and inspection. Failure to do so may result in an electric shock.
- Maintenance, inspection and part replacement work must be done only by qualified persons.
  (Remove metal articles such as watch, bracelet(s) etc. before operation.)
  (Use tools treated with insulation.) Failure to do so may result in an electric shock or personnel injury.
- Do not replace cooling fan during power ON. Failure to do so may result in an electric shock.
- Do not make modifications to the inverter. Failure to do so may result in personnel injury.

1.2 Warning Label on Inverter

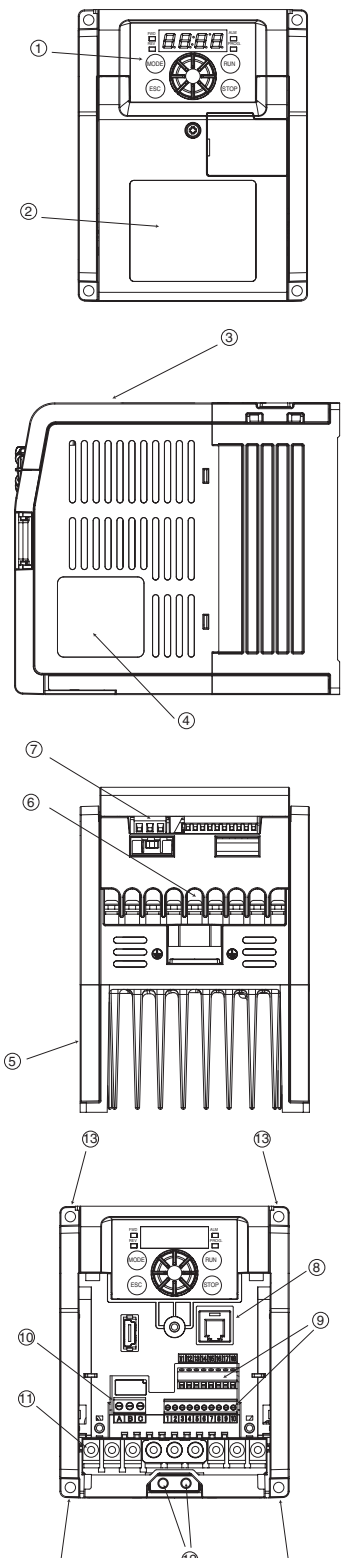


1.3 Special Precautions for Correct Use

- Use the inverter only within allowable ambient temperature range.(-10 to 5°C)
  Since service life of the inverter is greatly affected by ambient temperature, use it within allowable temperature range. Also, observe the installation direction and conditions.
- The inverter will be damaged if the power voltage is applied to its output side. Applying power voltage to the output terminal U, V or W will damage the inverter. Check carefully for faulty wiring and operation sequence (commercial switching circuit, etc.). Never apply a voltage exceeding the allowable range.
- Never touch the inside of inverter during operation.
  Failure to do so could be extremely dangerous, since the inverter contains high-voltage circuit. Before making an internal check, be sure to wait at least 5 minutes after turning OFF the power supply of inverter. Do not touch heat sink or braking resistor during operation as these parts are under high temperature.
- Radio interference
  The main circuit of the inverter contains a high-frequency harmonic component and may interfere with communicating equipment (such as AM radio) nearby. The severity of interference depends on the radio field strength and is hard to be eliminated completely. While it may be reduced by relocating radio antenna, using noise filter, housing the inverter in a metal box or routing cables in conduit. (Please consult with us separately.)
- Do not conduct insulation resistance test between wires of the inverter.
  To measure insulation resistance between power cord and motor wires, please remove cables connected to the inverter and conduct test with them. Do not conduct insulation resistance test on the control circuits. However, insulation resistance test can be performed between charging unit and the ground.
- Do not use a magnetic contactor which is connected to power side or load side of the inverter to start or stop the motor (inverter).
  Frequent ON/OFF switching on the power supply side can cause inverter malfunction. Also, do not conduct ON/OFF switching on load side during inverter operation, or it can cause fault trip of the inverter. Start or stop the motor by operating signals of the inverter only.
- Do not connect a phase advance capacitor or a surge absorber to output side of the inverter.
  Such device can damage the inverter, resulting in broken of capacitors and other parts. Remove it if connected.
- Do not use the inverter for load other than a motor or for a 1-phase motor.
- Precautions for inverter's protection function
  The inverter integrates various protection functions such as stall prevention, current limiting and overcurrent shut-off. These protection functions are functions used to protect the inverter against the sudden abnormal conditions, instead of general control functions. Therefore, avoid using them in applications where they will be activated under normal conditions.
  Failure to do so may reduce the inverter's service life or damage the inverter.
  Always measure the output current, etc. with a meter, check the details of the fault trip memory, and confirm that operation conditions conform to the precautions specified in the Instruction Manual and specifications are correct.
  When ptorection functions are enables, reset the inverter and operate it again after troubleshooting.
  In addition, if the the circuit breaker of at input side of inverter trips, it may be caused by the wiring fault or damage of internal parts of inverter etc.
  Determine the trip reason of circuit breaker and turn it ON again after troubleshooting.
- Take measures against higher harmonics.
  The higher harmonics generated by inverter may cause overheating of or damage to phase advance capacitor or generator.
- Precautions on 400 V series motor
  When 400 V series motor is driven by the inverter, use the motor with reinforced insulation treatment or take measures against the surge voltage.
  If the surge voltage generated on motor terminals due to the connection factor, it may cause the aging of motor insulation.
- Electronic thermal relay may not provide overheating protection for the motor. It is recommended to set the external thermal relay and PTC thermistor for overheating protection at the same time.

2 PART NAME

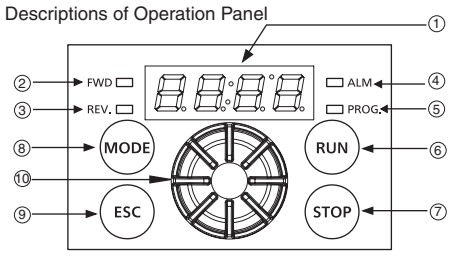
2.1 Part Name



① Operation panel unit
② Waning label
③ Enlosure
④ Rating nameplate (∗1)
⑤ Heat sink
⑥ Inlet hole for main circuit wire
⑦ Inlet hole for control wire
⑧ Port for connecting option unit (RJ45)
⑨ Terminal block for control circuit (signal input/output)
⑩ Terminal block for control circuit (relay output)
⑪ Terminal block for main circuit
⑫ Ground terminal
⑬ Mounting holes
⑭ Terminal cover
⑮ Cover for option unit connection
⑯ Fixing screw for terminal casing
⑰ Terminal casing for main circuit
⑱ Cover of connector for cooling fan (∗2)
⑲ Cooling fan (∗2)
⑳ Casing of Cooling fan (∗2)

∗1 Check that the rating nameplate confirms to your order.
∗2 Models less than 0.75 kW are not equipped with cooling fan (equipped with item ⑱ and ⑳).

2.2 Descriptions of Operation Panel



No	Part name		Function outline
①	Display part		Displays output frequency, current, linear speed, set frequency, communication station No., error details, each mode indication and function setting data.
②	FWD indicator (green)		For indicating forward run (ON during constant-speed running/Flashing during acceleration/deceleration running)
③	REV indicator (green)		For indicating reverse run (ON during constant-speed running/Flashing during acceleration/deceleration running)
④	ALM indicator (red)		Indicates abornality and alarm.
⑤	PROG indicator (green)		Lights up during changing of parameter setting mode.
⑥	RUN button		A button for making inverter running
⑦	STOP button		A button for making inverter stopping
⑧	MODE button		Swithches between "Operation Status Display" and "Function Setting" and displays data. A button for switching to mode display
⑨	ESC button		Returns to the previous operation during parameter setting.
⑩	Knob	Rotate	Switches among the parameter No., set values and direction setting.
		Press down	Pressing it down for confirming the mode, rotation direction, parameter No. and settings. In "Operation Status Display Mode", it is used for the switching between frequency display and current display.

3 INSTALLATION

3.1 Installation Precautions

■ Do not install the inverter in the following locations.

· Locations subject to direct sunlight.
· Locations subject to water vapor or high humidity.
· Locations with large amount of oil mist, dust or fiber dust.
· Locations where rain water, water drops or oil drops may come in contact.
· Locations suject to corrosive gases, explosive gases or flammable gases.
· Installation onto flammable materials such as wood or near flammable materials.
· Locations subject to vibration.

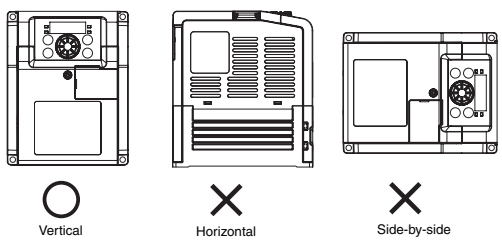
■ Make sure that ambient temperature is within the specifications.

If the inverter is installed near a heat generating device or is housed in a panel, surrounding temperature will increase, thus reducing the life of the inverter.
When housing the inverter in a panel, give sufficient consideration to cooling method and panel size.

○ Allowable ambient temperature: -10 to +50°C
(Ambient temperature should be measured at a point 5 cm away from the inverter.)
○ In case multiple inverters are installed
If multiple inverters are installed side-by-side, ambient temperature should be within -10 to + 40°C.

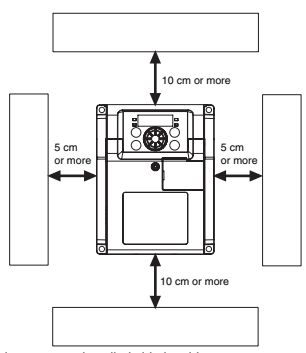
■ Install the inverter vertically.

Installing the inverter in any other way will decrease heat dissipation effect and result in malfunction.

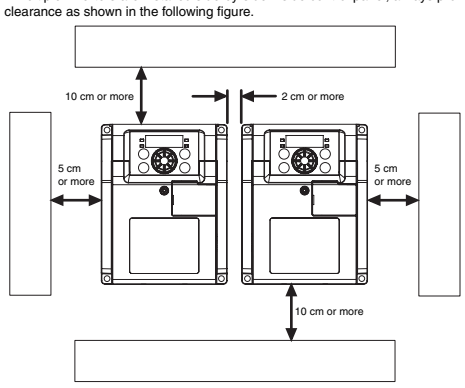


■ Space for installation

When a single inverter is installed
To ensure sufficient space for ventilation (cooling) and wiring of the inverter, always provide a clearance as shown in the following figure.

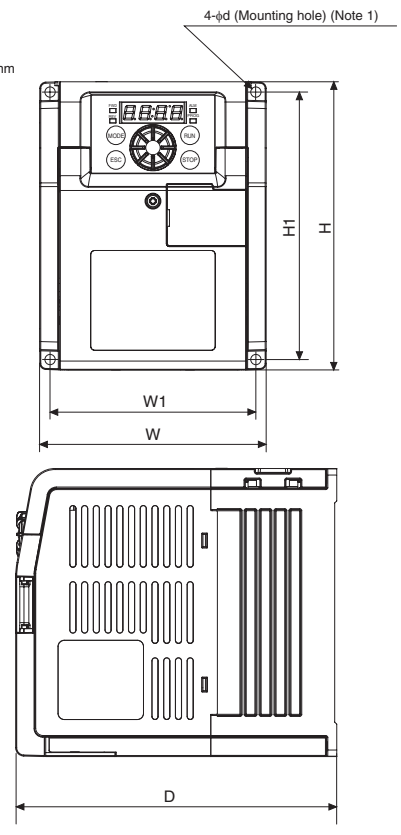


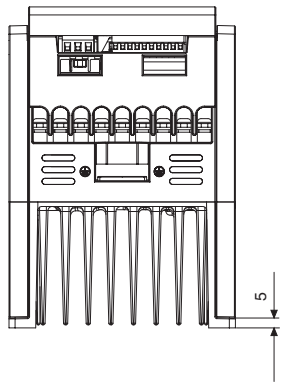
When multiple inverters are installed side-by-side.
If multiple inverters are installed side-by-side inside control panel, always provide a clearance as shown in the following figure.



3.2 Dimensions

Unit: mm





3-phase 400 V input type Unit: mm

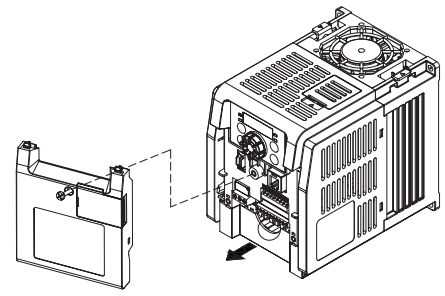
Inverter capacity	W1	W	H1	H	D	ϕd
0.75, 1.5 kW	100	110	130	140	156	5
2.2, 3.7 kW	130	140	130	140	156	5

Note 1) M4 screw is used in mounting holes.

3.3 Removal and Installation of Terminal Casing

■ Removal and installation of terminal cover 1 (terminal casing)

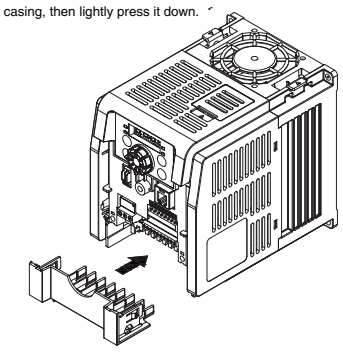
[Removal] ① Loosening the screw first, and pull it up lightly while holding the center bottom edge of the terminal casing.
[Installation] ② Insert the mounting jaw of terminal casing into the slot on the casing, then lightly press down the center bottom edge of the terminal cover 1.



Note) The screw with specially designed structure can not be removed from the casing to prevent dust from entering it.

■ Removal and installation of terminal cover 2 (terminal casing for main circuit)

[Removal] ① While holding the center part of the terminal casing for main circuit, pull it up lightly until the mounting jaw releases.
[Installation] ② Insert the mounting jaw of terminal casing for main circuit into the slot on the casing, then lightly press it down.



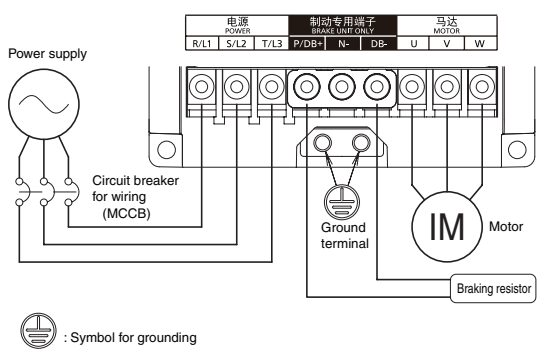
Note) After installation, make sure that the terminal cover 1 and 2 are fitted in position.

4 Wiring

4.1 Wiring (Terminals for Main Circuit)

■ 3-phase 400 V 0.75 to 3.7 kW

To conform to requirements of CE mark , protective devices against overcurrent, short-circuit and current leakage must be set up on the power supply side of the inverter.



⏚ : Symbol for grounding

■ Functions of terminals for main circuit

Terminal No.	Terminal name	Descriptions of terminal function
R/L1, S/L2 ,T/L3	Power supply for main circuit	Connects the electricity for industrial use.
U, V, W	Inverter output	Connects to 3-phase motor.
P/DB+, DB-	Braking resistor connection	Connects to braking resistor.
N-	Internal DC voltage (negative)	Negative terminal of internal DC voltage.
⏚2 pcs.	Ground	Ground terminal. 3-phase 400 V: ground resistance 10 Ω or less Ground the neutral of power supply.

4.2 Precautions on Wiring Main Circuit

■ Precautions on wiring

To avoid mistakes in wiring and operation, be sure to observe the following guides. (Failure to do so may damage the unit.)
· Always connect the power supply to input terminals (R/L1, S/L2, T/L3), and connect the motor to output terminals (U, V, W).In addition, connect the output terminals (U, V, W) in correct order. Otherwise the motor will rotate reversely.
· Use round crimp terminals with sleeve for power supply and motor connections. Select crimp terminals according to wire sizes and screw sizes.
· After wiring main circuit, confirm the tightening condition of terminals.
· Main circuit must be wired prior to control circuit. Otherwise, re-tightening operation is not possible after control circuit wiring is completed.
· When connecting directly to a transformer of large capacity (500 kVA or more), always install an AC reactor on the input side of the inverter.

Note 1) It is recommended to use teflon insulated wire (600 V, Class 2, continuous maximum allowable operating temperature up to 75 °C) for main circuit wiring.
Note 2) Use wires with larger diameter if the wiring distance is long.
Note 3) If the overcurrent trip of the circuit breaker is magnetic type, the device could become overheated due to higher harmonics. Use a load rate of 50% or lower in this case.
Note 4) Do not use a circuit breaker for motor.
Note 5) Always connect protective devices against overcurrent, short-circuit and current leakage on the input side.

■ Precautions on using regenerative braking

· When using regenerative braking, set the parameter P026 to "0". Since the factory setting is "1", the braking will not work.

■ Connected device, wire size and tightening torque (3-phase 400 V)

Inverter capacity	Rated current of circuit breaker (MCCB) for wiring	Wire size		Screw size	Tightening torque	Braking resistor*1		
		R/L1, S/L2 ,T/L3 U, V, W	Ground wire			Allowable braking duty factor	Resistance	Allowable continuous power
0.75 kW	10 A	2 mm² (AWG14)	2 mm² (AWG14)	M4	1.2 N·m	5%	470 Ω	80 W
1.5 kW	15 A					5%	470 Ω	80 W
2.2 kW	20 A		3.5 mm² (AWG12)			5%	320 Ω	120 W
3.7 kW	30 A					5%	190 Ω	220 W

*1) The above data is only for the reference of the condition with braking torque of 100%, maximum time of 5 s and maximum braking duty factor of 5%.

· Precautions on selection of braking resistor by customer himself/herself

1) Resistance (Ω)

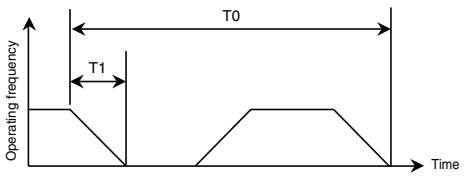
The resistance shown in the reference table during the resistor selection can be increased properly, but it will cause the braking torque reduced accordingly.

2) Allowable continuous power (W)

The allowable power shown in the reference table can be increased properly, but the higher power can make the resistor generate a lot of heat (300°C). Please consult with resistor manufacture, and provide protection during installation.

3) Allowable braking duty factor (%)

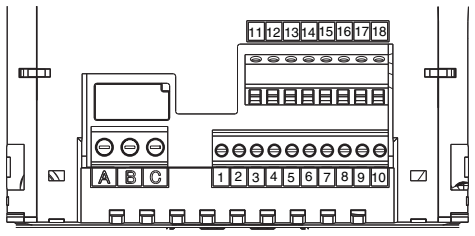
The higher the allowable continuous power for braking resistor is, the higher duty factor can be used theoretically. But the internal resistor of inverter will overheat, therefore please use duty factor of 5% shown in the reference table.

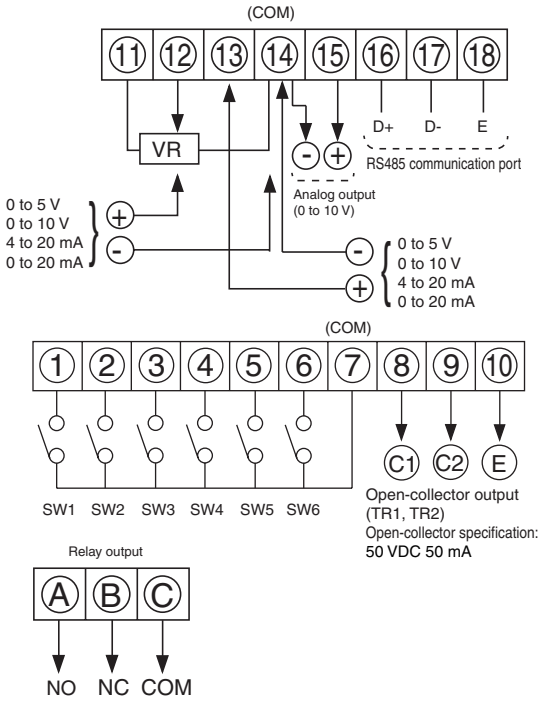


1) Braking torque: 100% min.
2) Maximum working time: T1max = 5 s
3) Maximum duty factor: T1/T0 (%ED) = 5%

4.3 Wiring (Control Circuit)

■ Terminal arrangement





VR specification: 10 kΩ,1/4 W or higher potentiometer

Realy specification: 1c non-voltage contact
230 VAC 0.25 A (resistive load)
30 VDC 1 A (resistive load)

■ Descriptions of terminals for control circuit

Terminal No.	Terminal function
①	Input terminal for multi-function control signal SW1
②	Input terminal for multi-function control signal SW2
③	Input terminal for multi-function control signal SW3
④	Input terminal for multi-function control signal SW4
⑤	Input terminal for multi-function control signal SW5
⑥	Input terminal for multi-function control signal SW6
⑦	COM terminal for input signals (① to ⑥)
⑧	Output terminal for open-collector (TR1) (C1: Collector)
⑨	Output terminal for open-collector (TR2) (C2: Collector)
⑩	COM terminal for open-collector output (E: Emitter)
⑪	Connection terminal for frequency setting potentiometer(+5 V)
⑫	Input terminal for analog signal of frequency setting
⑬	Input terminal for 2nd analog signal
⑭	COM terminal for analog signals (⑪, ⑫ , ⑬ , ⑮)
⑮	Output terminal for multi-function analog signal (0 to 10 V)
⑯	Positive terminal for RS485 communication transmission line (D+)
⑰	Negative terminal for RS485 communication transmission line (D-)
⑱	Terminal for terminal station of RS485 communication (E)
A	Output terminal for relay contact (NO: factory setting)
B	Output terminal for relay contact (NC: factory setting)
C	Output terminal for relay contact (COM)

Note 2) COM terminals ⑦, ⑩ and ⑭ are connected internally. Do not ground them.

4.4 Common Precautions on Terminals for Control Circuit

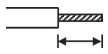
■ Precautions on wiring

· For wiring of terminals for control circuit, strip specified length of insulation coating before connecting.
· Loosen terminal screws and insert wires from bottom of the terminal block, and tighten screws to specified tightening torque.
· Any loose connection could cause wire to come off and lead to malfunction. Also, over-tightening could cause short-circuit due to broken of screws or the unit, thus leading to malfunction.
· Use shielded cables for all control signal lines and separate them from power lines or high-voltage circuits (20 cm or more).
· Wiring length of control signal lines should be within 30 m.
· Since input signals of control circuit are feeble, use dedicated contact for feeble signals to avoid poor contact during contact input.

■ Wire size and tightening torque for control circuit terminal

Terminal symbol	Screw size	Tightening torque N·m	Wire size	Stripped length of cable sheath
A,B,C	M3	0.5 to 0.6	0.25 to 0.75 mm² (AWG24 to AWG18)	6 mm
① to ⑱	M2	0.22 to 0.25	0.25 to 0.75 mm² (AWG24 to AWG18)	5 mm

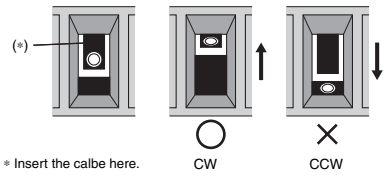
· Screwdriver: Small-size ⊖ screwdriver
· Stripped length of wire sheath
(Thickness of the edge: 0.4 mm/ Width of the edge: 2.5 mm)



· Terminal block for main curcuit:
The maximam number of the conductors: 2 *1
· Terminal block for control circuit (Relay output):
· Terminal block for control circuit (Signal input/output):
The maximam number of the conductors: 2 *1
*1 The maximam number of the conductors should be made in the reach of the suitable electric wire size.

■ Precautions on wiring

Observe the following items to prevent wire breakage.
· Do not damage the core wire when tearing the insulation layer off.
· Connect the core wire together.
· Do not lift up the welded part of core wire. It may be broken by vibration.
· Do not apply force to cables after wiring.
· If the tightening direction of calbe in terminal block is CCW, it is wrong. Remove the cable, and confirm the terminals before reconnect it.

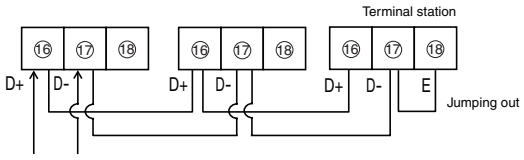


■ Wiring for analog signal terminals (Terminal No.11 to 14)

· When parameter P004 is set to "1", frequency setting will be made through external potentiometer.
· When parameter P004 is set to "4" (4 to 20 mA) or "5" (0 to 20 mA), frequency setting will be made through analog current signal.
· When the analog current signal is used, no resistor is required to be connected between external terminals. (Resistor is built in.)

■ Wiring for RS485 communication terminals (Terminal No.16 to 18)

The following figure shows the terminals used when connection is made between PC and PLC via RS485 communication lines.



· Use the shielded twisted-pair cable as communication cable, and separate it from power lines or high-voltage circuits (20 cm or more).
· The total wiring length of the communication cables must not exceed 500 m.
· Jump out the terminal "D-" and "E" of inverter used as terminal station. Jumping is not allowed for any other device.

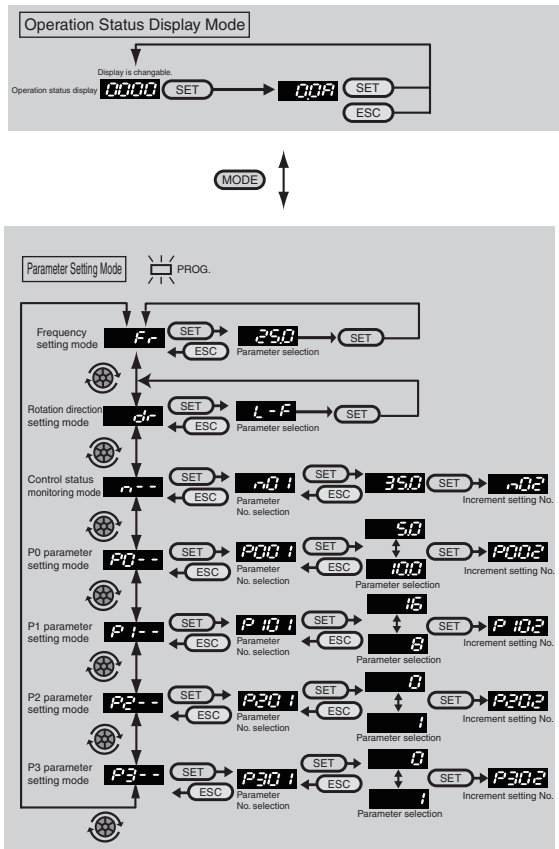
4.5 Operation Modes

■ Functions of operation modes

Mode	Description	Contents displayed on panel
① Operation Status Display Mode	For displaying output frequency and output current	0000 / 0.0A
② Frequency Setting Mode	For digital setting of frequency and frequency command monitoring	Fr / 50.0
③ Rotation Direction Setting Mode	For rotation direction setting of panel operation and control status (operation panel/external control/communication) monitoring	dr / L-F (RUN command status / Rotation direction)
④ Control Status Monitoring Mode	For monitoring of control status and abnormality	-n01
⑤ P0** to P3** Parameter Setting Mode	For changing and monitoring parameter data as well as using copy function of parameter data.	P001

■ Switching method among various modes

· When MODE button is pressed, switching is enabled between Operation Status Display Mode and Parameter Setting Mode.
(In Parameter Setting Mode,PROG LED lights up.)
· In each mode, if Operation Knob button is pressed, data monitoring or changing function will be enabled; and if ESC button is pressed, it will return to the previous screen. Therefore, if "Operation Knob" button is pressed by mistake, just press "ESC" button to return to the previous screen.



* Flashing indicates that parameter is selected.

SET : Confirm selection by pressing this panel knob down.

MODE : Perform mode switching between Operation Status Display Mode and other modes.

: Make mode changing/switching of selected parameter by rotating the panel knob.

5 ABNORMALITY DIAGNOSTIC FUNCTION AND RESET METHOD

7.1 Details and Remedies for Various Fault Trips

The fault trip memory stores the causes of trip in monitor modes n20 to n23.
Even if the power is cut off, the fourth to the latest causes of trip will still be held. (Details of factory inspection are stored in the memory before delivery.)

Display	Details and causes of abnormality	Remedies
SC1	· Instantaneous overcurrent during acceleration	· Check for any shorted output or ground. · Eliminate sharp fluctuation at load side. · Extend acceleration/deceleration time (parameters P001, P002 and P317 to P322). · Stop ON/OFF operation of magnetic contactor at load side.
SC2	· Instantaneous overcurrent at constant speed	
SC3	· Instantaneous overcurrent during deceleration	
SC4	· Instantaneous overcurrent during acceleration/deceleration/constant speed	
SC5	· Shorted output or overcurrent during startup	· Check for any shorted output or ground.
SC6	· Failure detected during startup	· Check the internal switching module (Welcome to consult with us.)
OC1	· Overcurrent during acceleration	· Check output for open phase and eliminate sharp fluctuations at load side. · Extend acceleration/deceleration time (parameters P001, P002 and P317 to P322). · Adjust torque boost level (parameter P011). · Check for restart operation during normal operation. · Stop ON/OFF operation of magnetic contactor at load side.
OC2	· Overcurrent at constant speed	
OC3	· Overcurrent during deceleration	
OU1	· Internal DC overvoltage during acceleration	· Extend acceleration time (parameters P001, P317, P319 and P321).
OU2	· Internal DC overvoltage at constant speed	· Eliminate sharp fluctuations at load side.
OU3	· Internal DC overvoltage during deceleration	· Extend deceleratin time (parameters P002, P318, P320 and P322)
LU	· Power supply voltage below 85% of its rating	· Measure power supply voltage and check input for open phase. · Check ride-through restart function.
OL	· The output current exceeds 125% of electronic thermal setting current or 140% of rated current of inverter for more than 1 minute.	· Check electronic thermal setting current. · Check and adjust torque boost level (parameter P011). · Reduce the load.
OH	· Heat sink overheated	· Check ambient temperature.
AU	· External fault stop input signal is input from control circuit terminals.	· Check if the external signal is proper and if timing circuit is correct.
OP	· The power supply is turned ON with run signal ON. · Timeout detected · The communication cable comes off.	· Check start mode (parameter P031). · Check communication setting and wiring. · Reduce the interference around the inverter.
FAN	· Abnormal cooling fan	· Check if the fan is locked.
SEr	· Speed search failed · The rotation direction of motor is different. · The rating of the motor is too small compared with that of inverter. · Speed is slow during normal operation.	· Reduce the noise around the inverter. · Check the rotation direction of motor.
CPU	· Too much interference is applied to the inverter	· Reduce the interference around the inverter.
ErrC	· Too much interference is applied to the inverter	· Reduce the interference around the inverter.

7.2 Reset Method during Abnormal Trip

If the abnormality indicator in the display part of operation panel lights up and operation is stopped, please handle the abnormality before resetting operation.

Reset by power supply	The reset can be made by cutting off the power once. (The inverter can operate when powered on again.)
Reset by stop signal	① For the operation in panel setting mode (parameter P003 is set to "0" or "1"), press "STOP" button on operation panel to reset, and then restart the inverter. ② For the operation in external control mode (parameter P003 is set to "2" or "4"), turn off OPERATION COMMAND button designed for external control once to reset, and then restart the inverter. Note) Reset by stop signal cannot be made through communication.
Reset by operation panel	For the operation in external control or communication setting mode (parameter P003 is set to "3", "5" or "7"), the reset cannot be made even if OPERATION COMMAND button designed for external control or communication is turned OFF once. Press STOP button on operation panel to reset, and then restart the inverter.
Reset by multi-function terminal	Set parameters P101 to P106 to "2" or "r2". Turn function setting button ON once and OFF again to reset, and then restart the inverter.
Reset by communication command	Write 0x9696 into register No. 505 (DT505) to reset the inverter.

*The error codes of SC6 and CPU cannot be reset through [Reset by stop signal], [Reset by operation panel], [Reset by multi-function terminal] and [Reset by communication command], they are only valid for [Reset by power supply].

6 RATINGS

■ 3-phase 400 V input type

Model AMK300□□□ 4		0P7	1P5	2P2	3P7
Standard specification	Applicable motor output (kW) *1	0.75	1.5	2.2	3.7
	Rated output current (A) *2	2.6	4.0	6.0	9.5
	Rated output capacity (kVA) *3	2.1	3.2	4.8	7.6
	Rated input current (A) *4	3.9	6.0	9.0	14.3
	Power supply capacity (kVA) *4	3.1	4.8	7.2	11.4
Light load specification	Applicable motor output (kW) *1	1.5	2.2	3.7	5.5
	Rated output current (A) *2	3.6	5.4	6.9	11.1
	Rated output capacity (kVA) *3	2.9	4.3	5.5	8.8
	Rated input current (A) *4	5.4	8.1	10.4	16.7
	Power supply capacity (kVA) *4	4.3	6.5	8.2	13.3
Weight (kg)		1.5	1.6	1.9	2.0

*1 "Applicable motor output" refers to the maximum applicable capacity of standard 4-pole motor. Make sure that the rated output current of inverter is higher than the rated current of motor during inverter selection.
*2 The rated output current of inverter varies with the set carrier frequency. Derate the output current as shown in the following figure.
*3 Rated output capacity refers to the value at output voltage of 460 VAC.
*4 The input current and the power supply capacity varies with the impedance at its side. Prepare the power supply with capacity larger than values shown in the above table.

■ Table 1 Relationship between carrier frequency and rater current

Unit: A

Model	5.0 kHz max.		7.5 kHz		10.0 kHz		12.5 kHz		15 kHz	
	Light load	Heavy load	Light load	Heavy load	Light load	Heavy load	Light load	Heavy load	Light load	Heavy load
AMK300 0P74	3.6	2.6	2.6	2.6	2.0	2.0	1.3	1.3	0.7	0.7
AMK300 1P54	5.4	4.0	4.0	4.0	3.4	3.4	2.8	2.8	2.2	2.2
AMK300 2P24	6.9	6.0	6.0	6.0	5.1	5.1	4.2	4.2	3.3	3.3
AMK300 3P74	11.1	9.5	9.5	9.5	8.1	8.1	6.7	6.7	5.2	5.2

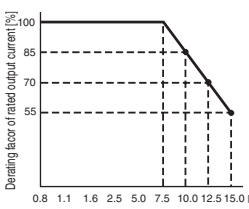


Fig. 1 Derating Caused by Carrier Frequency (1P54, 2P24, 3P74)

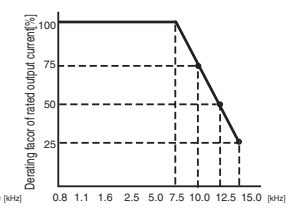


Fig. 2 Derating Caused by Carrier Frequency (0P74)

1.The rated output current of inverter varies with the set carrier frequency. Derate the output current as shown in Table 1, Fig.1 and Fig.2.

7 SPECIFICATIONS

■ Standard specifications (3-phase 400 V input type)

Item		Specifications
Standard output of applicable motor		(kW) 0.75 to 3.7 kW
Rated output	Rated voltage	3-phase, 380 to 460 VAC (proportional to power supply voltage)
	Overload current rating	Heavy load specification: 150% of rated output current, 1 minute Light load specification: 120% of rated output current, 1 minute
Input power supply	Phase number/Voltage/Frequency	3-phase, 380 to 460 VAC, 50/60 Hz
	Allowable voltage fluctuation	+10% and −15% of rated input AC voltage
	Allowable frequency fluctuation	±5% of rated input frequency
	Instantaneous voltage drop ride-through capability	· Operation continues when voltage is above 323 VAC. · Operation continues for 15 ms when voltage drops below 323 VAC.

■ Common specifications

Input power supply	Applicable motor capacity (kW)	Model
3-phase 400 V	0.75	AMK3000P74
	1.5	AMK3001P54
	2.2	AMK3002P24
	3.7	AMK3003P74

Item		Specifications
Output frequency	Frequency range	VF control: 0.2 to 400 Hz Sensorless vector control: 0.5 to 120 Hz
	Frequency display	Digital display
	Frequency precision	Analog setting: within ±0.5% of maximum set frequency (25°C ± 10°C) Digital setting: within ±0.01% of maximum set frequency (-10°C to + 50°C)
	Frequency resolution	Analog setting : 0.1 Hz (in 50/60 Hz mode) Digital setting : 0.1 Hz
Inverter control mode		High carrier frequency sinusoidal PWM control (V/F control or sensorless vector control is available.)
Carrier frequency		· V/F control setting: 9 options (adjustable from 0.8 to 15 kHz) can be selected. · Sensorless vector control setting: 6 options (adjustable from 2.5 to 15 kHz) can be selected. (0.8, 1.1, 1.6, 2.5, 5.0, 7.5, 10.0, 12.5, 15.0 kHz)
Control / Operation	Start/Stop	· Operation panel buttons · 1a contact signal and 3-wire input (1a and 1b contact signals) can be selected. · RS485 communication · Wait time (0.1 to 100 s) can be set.
	Forward/Reverse run	· Operation panel buttons · 1a contact signal (reverse run can be disabled.) · RS485 communication
	Jogging operation	Operating frequency: adjustable from 0.2 to 400 Hz Acceleration/deceleration time: adjustable from 0.04 to 3600 s
	Stop mode	Deceleration stop / coast-to-stop (switchable)
	Reset function	Reset by stop signal/reset by external devuce/reset by operation panel(optional) / reset by power supply
	Starting frequency	Adjustable from 0.2 to 60 Hz
	Stop frequency	Adjustable from 0.2 to 60 Hz
	Ride-through restart selection	0 Hz restart/operation frequency restart/speed search restart (switchable)
	Speed search	Speed search during startup (optional)
	Retry function	Retry selection: validity of function, selection of details of retry faults Retry operations: adjustable from 1 to 10 operations
	Frequency setting signal	Panel setting (operation panel): digital setting Analog setting signal input from external control : · Potentiometer (10 kΩ, 1/4 W or higher) · 0 to 5 VDC, 0 to 10 VDC · 4 to 20 mA, 0 to 20cmA Digital setting signal input from external control: · PWM signal(signal cycle: 1 to 2000 ms), pulse input signal · Frequency rise SW/reduction SW/storage SW signal Communication setting: RS485
	Frequency/Voltage characteristics	Base frequency: fixed at 50/60 Hz, adjustable from 45 to 400 Hz 3-point V/F mode: adjustable voltage and frequency V/F curve: constant/reduced torque mode (switchable)
	Torque boost	Adjustable from 0 to 40% automatic torque boost (switchable)
	Acceleration/Deceleration time	0.04 to 3600S (independent acceleration / deceleration setting)
	Acceleration/Deceleration characteristics	Linear and S-shaped acceleration / deceleration (switchable)
	2nd function selection	Selects 2nd function (acceleration / deceleration time, torque boost, voltage/frequency characteristics (base frequency-3-piont type V/F mode), electronic thermal, analog frequency setting)
	Multi-step speed frequency setting	· Multi-step speed operation: up to 16-step speed setting (No limitation to frequency setting) · Timer operation: up to 8-step speed settings (No limitation to frequency setting) It can be linked with acceleration / deceleration time.
	Skip frequency setting	Up to 3 settings (skip frequency band adjustable from 1 to 10 Hz)
	Upper frequency limit setting	Adjustable from 0.2 to 400 Hz
	Lower frequency limit setting	Adjustable from 0.2 to 400 Hz
	Bias/Gain frequency setting	Bias frequency : adjustable from -99 to 250% Gain frequency : adjustable from 0 to 500%
	External stop function	Stop by external fault / coast-to-stop (switchable)
	PID function	PID Control mode (optional)
	Offline automatic tuning function	Automatic tuning of motor constant
	Cooling fan ON/OFF control	Optional
	Communication function	· Port : RS485 serial communication · Communication speed : 4800/9600/19200/38400/57600/115200 bps (switchable) · Protocols : MEWTOCOL-COM/Modbus (RTU) Modbus-ASCII (switchable) · Communication method : half-duplex · Maximum number of connected units : 31 · Maximum transmission distance : 500 m (in total)
Braking	Regenerative braking torque	· 400 V 0.75 to 3.7 kW: 20% min.
	DC injection braking	Operate at the frequency below stop frequency · Braking torque level: 0 to 100 · Braking time: adjustable from 0.1 to 120 s
Output signal	Analog output	Output specification: 0 to 10 VDC (max. 1 mA) Output function: output frequency and output current proportion (switchable)
	Open-collector output	Output specification: max. rating 50 VDC/50 mA Output functions: operation signal, arrival signal. overload alarm, frequency detection, abnormal reverse run signal alarm, current detection, timer OFF signal, output frequency/current proportion PWM signal output frequency/current proportion pulse train signal
	Relay output	Output specification : 1c contact (Contact capacity: 230 VAC 0.25 A resistive load 30 VDC 1 A resistive load) Output functions : operation signal, arrival signal. overload alarm, frequency detection, abnormal reverse run signal alarm, current detection, timer OFF signal (switchable)
Display	Operation/Control status	Output frequency, linear speed display (switchable), rotation direction Ouput voltage, internal DC voltage, set frequency, communication station No., operation times of timer, alarm type, control circuit terminal status (I/O signal), operation status, PID (setting value, mesured value and output value), progress of automatic tuning, accumulative operating time, accumulative operating time of fan
	Details of abnormality	Specific symbol is indicated when the protection function is activated (the latest four abnormalities are stored.)
Protection	Current limit	Current limit can be set within 1 to 200% of rated output current.
	Trip (stop)	Instantaneous overcurrent (SC1-6), abnormal temperature (OH) overcurrent(OC1-3),overload·electronic thermal relay (OL), undervoltage (LU), overvoltage (OU1-3), cooling fan fault (FAn), external fault(AU), operation fault(OP), CPU error (CPU)
	Stall prevention function	Overcurrent and overvoltage stall prevention
Environment	Ambient temperature and humidity	-10 to + 50°C (Note 1) (without freezing) and below 90%RH (without condensation)
	Storage temperature and humidity	-25 to +65°C and below 95%RH
	Vibration	5.9m/s² (0.6 G) max.
	Altitude	1000 m max.
	Location	Indoor areas free of corrosive gases, flammable gases, oil mist or dust
IP protection		IP20 cabinet-mounted
Cooling method		0.75 kW: self-cooling; 1.5 to 3.7 kW: air-cooling

Note 1) It is -10 to +40°C when multiple inverters are installed side-by-side.

8 Names and Content Marks of Toxic or Hazardous Substances and Elements Specified in "Administrative Measures for The Control of Pollution from Electronic Information Products" in China

Component Name	Toxic or hazardous substances or elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr6+)	Polybrominated Biphenyl (PBB)	Polybrominated Diphenyl Ethers (PBDE)
Base plate assembly	×	○	○	○	○	○
Enlosure	○	○	○	○	○	○
Other accessories	○	○	○	○	○	○

○: Indicates that the content of toxic or hazardous substances contained in all homogeneous materials for this component is below the standard specified in "Requirements for Concentration Limits for Certain Hazardous Substances in Electronic Information Products".
×: Indicates that the content of toxic or hazardous substances contained in at least one homogeneous material for this component is above the standard specified in "Requirements for Concentration Limits for Certain Hazardous Substances in Electronic Information Products".

Note : This product complies with RoHS Directive.
The items that does not comply with RoHS Directive are also listed in the table.

9 APPLICABLE STANDARDS OR REGULATIONS

This product is applicable to the following standards/regulations.
EU Directives

Council Directive:
2006/95/EC Low Voltage Directive
2011/65/EU RoHS Directive

Harmonized Standards:
EN61800-5-1: 2007 Second Edition
EN50581: 2012

Manufaturer : Panasonic Industrial Devices SUNX Suzhou Co., Ltd.
Address: No.97, Huoju Road, New District Suzhou, Jiangsu Province, China

Dealer: Panasonic Industrial Devices Sales (China) Co., Ltd.
Website: http://device.panasonic.cn/ac/c
Address: 2F, Building 7 and 8, No. 88, Maji Road, China (Shanghai) Pilot Free Trade Zone
Customer service center of Pansonic Semiconductor (Suzhou) Co., Ltd
Customer service hotline: 400-920-9200 Fax: 800-820-7185

PRINTED IN CHINA