CDI–SPD Series Solar Pump Drive
Operation Manual
(Edition: A0)

☐ Before the product is installed and used, please thoroughly read the Manual and keep it well.

Version: July 2021

Foreword

Before using CDI-SPD series photovoltaic water pump driver (hereinafter referred to as "the Product"), please read the manual carefully in order to ensure the proper use. Improper use may result in the equipment's abnormal operation, malfunction, decrease of service life and even personal injury accident. Therefore, please do read the manual carefully before use and use the Product strictly according to the manual. The manual is a standard file which must be kept properly after reading for further repairing and maintenance of the Product in the future.

Besides the operating instructions, the manual also provides wiring diagram for your reference. If having difficulties or special requirements for usage of the Product, please feel free to contact our local offices or dealers or call our customer service center of the headquarters directly. We will offer dedicated service to you. We may change the contents of this Manual without a prior notice.

Please confirm the followings seriously when unpacking the Product:

1. Check if the Product is damaged, components and parts are damaged and drop and the body is collided in the transportation process.

2. Check if the rated value labeled on the nameplate of the Product accords with your order requirements and if the packaging box contains the machine that you order, product certificate, operation manual and warranty card.

We are strict in the manufacture, packaging and delivery. For any inspection omissions, please contact us or your supplier to solve the problem.
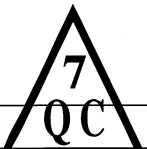
Garantie

La garantie du produit doit être mise en œuvre conformément aux«Garantie de qualité» dans la mode d'emploi.

1. La période de garantie est de 18 mois depuis le code à barres départ usine.Dans la période de garantie, vous pouvez profiter d'un service de réparation avec les cartes de garantie et le code à barres en cas de défaillance des produitssous des conditions normales.

2. La maintenance payé e sera effectué e dans les conditions suivantespendant la période de garantie:

2-1. La panne provoqué e par la manipulation qui n'a pas suiviles demandes du manuel ou les réparations non autorisées;

2-2. La panne causée par une mauvaise utilisation de ce produitqui va au-delà des spécifications standard;

2-3. Les dommages causés par une chute ou un mouvement incorrect;

2-4. Vieillissement ou défaillance des équipements causée par le mauvais environnement;

2-5. Dommages causés par un tremblement de terre, un incendie, une tempête, des dégâts d'eau, la foudre, une tension anormale ou d'autres catastrophes naturelles;

2-6. Les dommages causés par le transport (Remarque: le mode dela livraison est à la discrétion de l'acheteur, Delixi aiderait àgestion des procédures de transfert de marchandises);

2-7. Lorsque la marque, le logo, la marque déposée, le numéro de série du fabricant,la plaque signalétique est endommagée ou illisible;

2-8. Ne pas effectuer le paiement intégral conformément aux dispositions d'achat;

2-9. L'installation, le câblage, le fonctionnement, la maintenance ou d'autres conditions d'utilisation ne peuvent pas être décrits de manière objective et pratique à notre unité de service;

3. Les produits de l'entreprise bénéficient d'un service payant à vie.

Carte de garantie

Nom du client :	
Adresse détaillée :	
Code postal :	Contactez-nous :
Téléphone :	Télécopie :
Numéro de produit :	Modèle de produit :
Nom de l'équipement :	Moteur adapté :
Date d'achat :	Fournisseur :
Contactez-nous :	Téléphone :
Personnel de maintenance :	Fax :
Date de maintenance :	

Certificat de conformité

Inspecteur qualité :

Date de production :
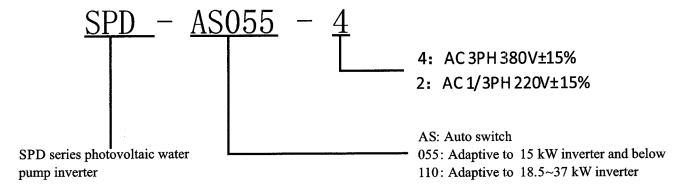
Numéro de série d'usine :

7
QC

Low voltage electrical selection table:

Function Code	AC circuit breaker (A)	DC circuit breaker	AC contactor (A)	Lightning arrester	Fuse
CDI-SPDG0R4SS2	16	16A/1000VDC	16		
CDI-SPDG0R7SS2	16	16A/1000VDC	16		
CDI-SPDG1R5SS2	25		25		
CDI-SPDG2R2SS2	40	25A/1000VDC	40		
CDI-SPDG4R0SS2	50	63A/1000VDC	50		
CDI-SPDG5R5SS2	63	100A/1000VDC	63		
CDI-SPDG0R4S2	16	16A/1000VDC	16		
CDI-SPDG0R7S2	16	16A/1000VDC	16		
CDI-SPDG1R5S2	25		25		
CDI-SPDG2R2S2	40	25A/1000VDC	40		
CDI-SPDG4R0S2	50	63A/1000VDC	50		
CDI-SPDG5R5S2	63	100A/1000VDC	63		
CDI-SPDG4R0T2	25	25A/1000VDC	25	Type II 1000VDC	30 A fast fuse
CDI-SPDG5R5T2	40	63A/1000VDC	40		
CDI-SPDG0R7T4	10	16A/1000VDC	12		
CDI-SPDG1R5T4	10		12		
CDI-SPDG2R2T4	10	16A/1000VDC	12		
CDI-SPDG4R0T4	25		25		
CDI-SPDG5R5T4	25	25A/1000VDC	25		
CDI-SPDG7R5T4	40		40		
CDI-SPDG011T4	50	63A/1000VDC	50		
CDI-SPDG015T4	63		63		
CDI-SPDG018.5T4	63		63		
CDI-SPDG022T4	100	100A/1000VDC	95		
CDI-SPDG030T4	100		95		
CDI-SPDG037T4	125	125A/1000VDC	115		

Table of Contents

Model descriptions:

SPD – AS055 – 4

4：AC 3PH 380V±15%
2：AC 1/3PH 220V±15%

AS: Auto switch
055: Adaptive to 15 kW inverter and below
110: Adaptive to 18.5~37 kW inverter

SPD series photovoltaic water
pump inverter

Installation size:

Remarks:

If this module is used, set F28.61 PV input and working frequency input as 0: Automatic switch mode.

Appendix 2 Inverter AC/DC Switching Module

The inverter does not accept the simultaneous access of AC and DC in general. If simultaneous access is required, the switch control circuit should be configured additionally so as to support the work for all day long:
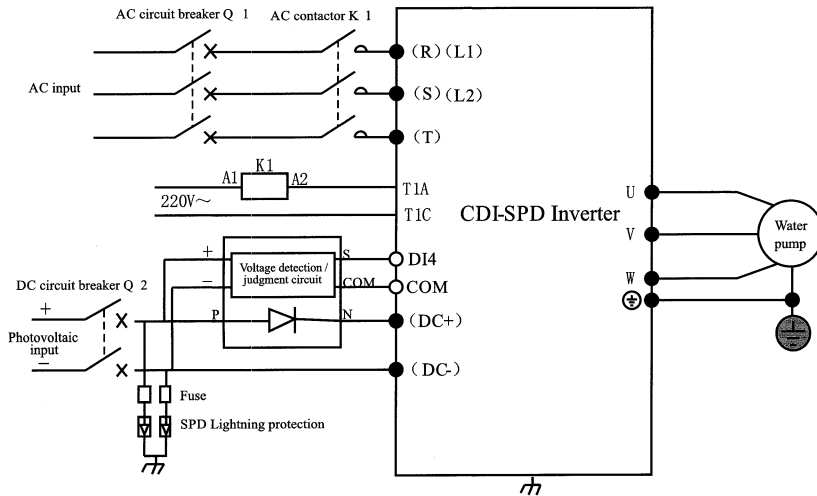
Descriptions of switching module terminal:

Terminal Symbol	Terminal	Terminal Description
+	Photovoltaic input anode	Connect the anode of voltage detection board and diode module
-	Photovoltaic input cathode	Connected to cathode of voltage detection board and input cathode of frequency inverter
P	Diode module positive	Connect photovoltaic input anode
N	Diode module negative	Connect inverter input anode
DC+	Inverter input positive	Connect cathode of diode module
DC-	Inverter input negative	Connect photovoltaic input cathode
S,COM	Voltage detection signal	Switch signal; connect inverter DI4 and COM terminals

Chapter I Safety Operation and Attentions

Please read this manual carefully before installation, operation, maintenance and inspection of the Product.

Please read this chapter before using the Product in order to ensure personal, equipment and property safety. Attentions related to safety operation in the manual are classified into "warning" and "cautions".

Warning

: Potentially dangerous condition, which maybe cause severe body injuries or dead if relevant requirement is ignored.

Cautions

: Potentially dangerous condition, which maybe cause middle,light injuries or device damage if relevant requirement is ignored, it also applies to unsafe operation.

1.1 Acceptance

The items in the table below must be inspected:

Items Inspected	Note
1. Is the model of frequency inverter consistent with order?	Check the Model indicated on the nameplate on one side of the frequency inverter.
2. Is there any damage to the components?	Survey the external appearance of the frequency inverter and make sure that no damage has occurred during
3. Are the components properly fastened?	Take off front cover of frequency inverter and use proper tools to inspect all visible components.
4. Is the user's manual received?	User's manual of frequency inverter

Please contact us or our agent if any of the items above fails to pass the acceptance.

1.2 Safety Operation Attentions

Warning (⚠)	1. Installation and maintenance should be performed by professional only.
	2. Verify that rated voltage of the frequency inverter should conform with voltage level of AC power supply. Otherwise it shall cause hurt to human body or fire accident.
	3. Don't connect main circuit power with output terminals U, V and W. The connection will damage equipment, thus warranty card will be invalid.
	4. Don't connect input power until panel is well installed. Do not remove the cover when it is powered; otherwise, electric shock may occur.
	5. Don't touch high voltage terminal within frequency inverter under power-on status; otherwise, electric shock may occur.
	6. Maintain the frequency inverter after powering off it for at least 15 minutes because it has plenty of capacitance energies. At the moment, charging indicator light will be off or confirm the positive and negative Bus line voltages are under 36V; otherwise, electric shock can occur.
	7. Don't turn on or off line and connector when the circuit is powered on Otherwise, personal injury may occur.
	8. Electronic components can be easily damaged by static electricity so please avoid touching them.
ESD Anti-static	9. This frequency inverter should not undergo voltage withstand test, which might result in damages to the semiconductor devices in it.
	10. Cover plate must be covered up before power on; otherwise, electric shock and explosion can occur.
	11. Never confuse the input and output terminals. Otherwise, explosion or damage to the property might occur.
	12. For frequency inverter of which storage period exceeds half year, please increase the input voltage gradually by using regulator, to prevent from electric shock and explosion.
	13. Don't operate the frequency inverter with wet hands; otherwise, electric shock may occur.
	14. All parts should be replaced by professional only. It is strictly prohibitive to remain stub or metal object in machine, to prevent from fire.
	15. After replaced control board, please perform relevant parameter setting before operation to prevent from damage of materials.
Cautions (⚠)	1. If the motor is used for the first time or has been in leisure for a long time, remember to check its insulation first. It is advisable to use a 500V tram egger. Make sure the insulation resistance should not be less than 5 MΩ.
	2. Please consider the tolerance of mechanical device if it needs running above 50 Hz.
	3. In the regions with an altitude above 1,000 m, the heat dissipation effect of frequency inverter will be reduced due to thin air so it must be used with a reduced capacity. Reduce capacity by 1% for every 100m after the altitude exceeds 1,000m.
	4. Do not start or stop the frequency inverter with contactors. Otherwise, damage might occurto the equipment.
	5. Do not modify factory set value of frequency inverter without authorization, or damage might be caused.

Product Model	Open-circuit Voltage Class of Solar Cell Module			
	37±1V		45±1V	
	Module Power ±5 Wp	Number of each string of modules * number of strings	Module power ±5 Wp	Number of each string of modules * number of strings
CDI-SPDG022T4	250	18*6	300	15*6
CDI-SPDG030T4	250	18*8	300	15*8
CDI-SPDG037T4	250	18*10	300	15*10
CDI-SPDG045T4	250	18*12	300	15*12
CDI-SPDG055T4	250	18*15	300	15*15
CDI-SPDG075T4	250	18*20	300	15*20
CDI-SPDG090T4	250	18*25	300	15*25
CDI-SPDG110T4	250	18*30	300	15*30
CDI-SPDG132T4	250	18*36	300	15*36
CDI-SPDG160T4	250	18*43	300	15*43
CDI-SPDG185T4	250	18*50	300	15*50
CDI-SPDG200T4	250	18*55	300	15*55
CDI-SPDG220T4	250	18*60	300	15*60
CDI-SPDG250T4	250	18*67	300	15*67
CDI-SPDG280T4	250	18*75	300	15*75
CDI-SPDG315T4	250	18*84	300	15*84
CDI-SPDG350T4	250	18*94	300	15*94
CDI-SPDG375T4	250	18*100	300	15*100
CDI-SPDG400T4	250	18*107	300	15*107

Appendix 1 Recommended Configuration of Solar Cell Modules

| Product Model | Open-circuit Voltage Class of Solar Cell Module | | | |
| | 37±1V | | 45±1V | |
	Module Power ±5 Wp	Number of each string of modules * number of strings	Module power ±5 Wp	Number of each string of modules * number of strings
CDI-SPDG0R4SS2	250	11*1	300	9*1
CDI-SPDG0R7SS2	250	11*1	300	9*1
CDI-SPDG1R5SS2	250	11*1	300	9*1
CDI-SPDG2R2SS2	250	11*1	300	9*1
CDI-SPDG4R0SS2	250	11*2	300	9*2
CDI-SPDG5R5SS2	250	11*3	300	9*3
CDI-SPDG0R4S2	250	11*1	300	9*1
CDI-SPDG0R7S2	250	11*1	300	9*1
CDI-SPDG1R5S2	250	11*1	300	9*1
CDI-SPDG2R2S2	250	11*1	300	9*1
CDI-SPDG4R0S2	250	11*2	300	9*2
CDI-SPDG5R5S2	250	11*3	300	9*3
CDI-SPDG4R0T2	250	11*2	300	9*2
CDI-SPDG5R5T2	250	11*3	300	9*3
CDI-SPDG0R7T4	250	18*1	300	15*1
CDI-SPDG1R5T4	250	18*1	300	15*1
CDI-SPDG2R2T4	250	18*1	300	15*1
CDI-SPDG4R0T4	250	20*1	300	16*1
CDI-SPDG5R5T4	250	18*2	300	15*2
CDI-SPDG7R5T4	250	18*2	300	15*2
CDI-SPDG011T4	250	18*3	300	15*3
CDI-SPDG015T4	250	18*4	300	15*4
CDI-SPDG018.5T4	250	18*5	300	15*5

Chapter II Product Information

2.1 Nameplate Data and Naming Rule

Nameplate data: Take CDI-SPDG1R5S2 as an example:

IP20

Model: CDI-SPDG1R5S2
Input: DC 150~440V
        AC 1PH 220V±15% 50/60Hz
Output: AC 3PH 0V~Uinput 0~400Hz
        7.0A 1.5kW
Hardware Version: 1.1.00
Software Version: 1.01.45

SPDG1R5S219K000001

CDI- SPD G 1R5 S2

inverter

Product series no.
SPD Series

Product type
G:General Type

Power of the adapting motor

Voltage Level (Rated Voltage)
SS2:1PH AC 220V（Input/Output）,50/60Hz DC:150~440V
S2:1PH AC 220V,50/60Hz,DC:150~440V
T2:3PH AC 220V,50/60Hz,DC:150~440V
T4:3PH AC 380V,50/60Hz,DC:250~800V
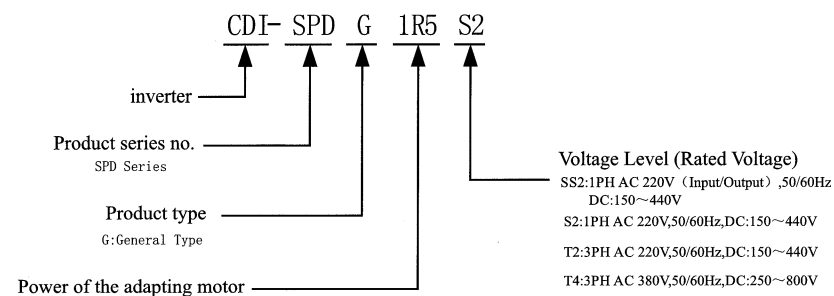
2.2 Technical specifications

Item			specification
control	Control method		MPPT model，V/F model
	Overload capacity		150% rated current for 30s; 180% rated current for 3s
Config uration	Control power supply P24V		Maximum output current 300mA
	Input terminal	SPD series (0.4kW～15kW)	4-way digital input terminals (DI1~DI4): DI1 can be set for forward running, DI4 can be set for AC/DC automatic switching of on-off input; DI2 and DI3 can be set for water-empty and water-full pre-warning.
		SPD series (18.5kW and above)	5-way digital input terminals (DI2~DI6): DI4 can be set for AC/DC automatic switching of on-off input, DI2 and DI3 can be set for water-empty and water-full pre-warning and DI5 can be set for reverse running.
running	Running method		keypad、terminal、RS485 communication
	Timing control		can realize the inverter reaches a given time and automatically stops
communication			SPD series(0.4kW~15kW)the control board no RS485 communication terminal，requires an external communication expansion card，SPD series(18.5kW and above) control board directly has an RS485 communication interface and supports standard MODBUS-RTU protocol
display	Running information		Output current, output voltage, bus voltage, output frequency, etc.
	Fault information		In operating status during fault protection, save 5 fault history information. Each fault information includes the frequency at the time of fault, the current at the time of fault, the bus voltage at the time of fault, the status of the input and output terminals at the time of fault, etc.
Protect	Inverter protection		Overcurrent, overvoltage, under-voltage, overheating, overload, phase loss protection, external fault protection, etc.
	Inverter alarm		Under-load warning, light and weak warning, water full warning, water and air warning, etc
Environ ment	Environment Ambient temperature		-10℃～40℃
	Storage temperature		-20℃～65℃
	Ambient humidity		MAX 90%RH(no condensation)
	Height / vibration		1000m or less, 5.9m / s² (= 0.6g) or less
	Application		No corrosive gas, flammable gas, oil mist or dust and other
Cooling method			Forced air cooling

Failure	Description	Detail	Troubleshooting
A-tF	Water fullness warning	Full reservoir	If the user sets water fullness alarm function; the equipment will shut down automatically when the warning is on for a certain period of time, and the user needs not to notice it; otherwise, please check if the terminal wiring is wrong.
A-tL	Water empty warning	Empty suction basin	If the user sets water empty alarm function; the equipment will shut down automatically when the warning is on for a certain period of time, and the user needs not to notice it; otherwise, please check if the terminal wiring is wrong.

Failure	Description	Detail	Troubleshooting
ETH1	Short circuit to ground fault 1	The output of the Product is short circuited to ground; current testing circuit is failed	Inspect whether motor wiring is normal; replace Hall; replace the main control panel
ETH2	Short circuit to ground fault 2		
LL	Electronic under-load fault	The inverter will report the under-load pre-alarm according to the set value.	Check the load and the under-load pre-alarm point.
PINV	PV reverse connection fault	Incorrect PV wiring	Change the wiring direction of the positive and negative terminals and connect the cables again.
PVOC	PV overcurrent	1. The acceleration or deceleration is too fast. 2. The inverter power is too low. 3. The load transients or is abnormal. 4. The grounding is short circuited.	1. Increase the ACC or DCC time. 2. Select the inverter with a larger power. 3. Check if the load is short circuited (the grounding short circuited or the wire short circuited) or the rotation is not smooth.
PVOV	PV overvoltage	1. The solar cell panel input voltage is too high. 2. Model -4 is set as another model.	1. Reduce the number of solar cell panels that are wired in series. 2. Check and reset the model.
PVLV	PV under-voltage	1. The power of the solar cell panel series is too low or it is cloudy and rainy weather. 2. The motor start-up current is too high.	1. Increase the number of solar cell panels or perform the test in the normal sun light. 2. Change the motor.
A-LS	Weak light warning	Weak solar irradiance, or too little configuration of cell panel	After the light is strong, the device will run automatically, and the user does not need to pay attention; please inspect if the configuration of cell panel is reasonable.
A-LL	Under-load warning	Empty suction basin	Check the pumping pool

2.3 Product Specification

Machine Type	-SS2 Product	-S2 Product	-T2 Product	-T4 Product
AC input voltage (V)	220(±15%) (1PH)		220(±15%)(3PH)	380(±15%)(3PH)
Max. DC voltage (V)	440	440	440	800
Starting voltage (V)	200	200	200	300
Min. working voltage (V)	150	150	150	250
Range of DC input voltage recommended (V)	200~400	200~400	200~400	300~750
Recommended MPP voltage (V)	330	330	330	550

2.4 Product List

Model of Frequency Inverter	Rated Input Current (A)	Rated Output Current (A)	Adaptive Motor (kW)	net weight (kg)	gross weight (kg)
CDI-SPDG0R4SS2	6.5	5.0	0.4	0.9	1.2
CDI-SPDG0R7SS2	9.5	7.0	0.7	1.3	1.8
CDI-SPDG1R5SS2	15.7	10.0	1.5	1.3	1.8
CDI-SPDG2R2SS2	27.0	14.0	2.2	——	——
CDI-SPDG4R0SS2	32.8	17.0	4.0	——	——
CDI-SPDG5R5SS2	51.5	25.0	5.5	——	——
CDI-SPDG0R4S2	6.5	3.0	0.4	0.9	1.2
CDI-SPDG0R7S2	9.5	5.0	0.7	0.9	1.2
CDI-SPDG1R5S2	15.7	7.0	1.5	1.3	1.8
CDI-SPDG2R2S2	27.0	10.0	2.2	1.3	1.8
CDI-SPDG4R0S2	32.8	17.0	4.0	——	——
CDI-SPDG5R5S2	51.5	25.0	5.5	——	——
CDI-SPDG4R0T2	18.5	17.0	4.0	——	——
CDI-SPDG5R5T2	26.0	25.0	5.5	——	——
CDI-SPDG0R7T4	3.4	3.0	0.7	1	1.5
CDI-SPDG1R5T4	5.0	4.5	1.5	1	1.5
CDI-SPDG2R2T4	6.8	6.0	2.2	1.5	2
CDI-SPDG4R0T4	10.5	9.5	4.0	——	——
CDI-SPDG5R5T4	15.5	13.0	5.5	2.7	3.3
CDI-SPDG7R5T4	20.5	17.0	7.5	2.7	3.3
CDI-SPDG011T4	26	25.0	11	4	5
CDI-SPDG015T4	35	32.0	15	4	5
CDI-SPDG018.5T4	38.5	37.0	18.5	10	11
CDI-SPDG022T4	46.5	45.0	22	8	9.5
CDI-SPDG030T4	62	60.0	30	14.5	16

Model of Frequency Inverter	Rated Input Current (A)	Rated Output Current (A)	Adaptive Motor (kW)	net weight (kg)	gross weight (kg)
CDI-SPDG037T4	76	75.0	37	15	16.5
CDI-SPDG045T4	92	90.0	45	25	31.5
CDI-SPDG055T4	113	110.0	55	25.5	32.5
CDI-SPDG075T4	157	152.0	75	35	43
CDI-SPDG090T4	180	176.0	90	36.5	44.5
CDI-SPDG110T4	214	210.0	110	37	45
CDI-SPDG132T4	256	253	132	75	89
CDI-SPDG160T4	305	300	160	75	89
CDI-SPDG185T4	344	340	185	75	89
CDI-SPDG200T4	383	380	200	160	180
CDI-SPDG220T4	425	420	220	160	180
CDI-SPDG250T4	484	480	250	180	205
CDI-SPDG280T4	543	540	280	180	205
CDI-SPDG315T4	605	600	315	180	205
CDI-SPDG355T4	683	680	355	200	232
CDI-SPDG375T4	714	710	375	200	232
CDI-SPDG400T4	753	750	400	207	232

Ordering instruction:

Please specify the corresponding model and specification of the products when placing an order. For any special requirements, please contact us for negotiation.

Failure	Description	Detail	Troubleshooting
OL2	PV pump driver overload	Too fast acceleration; restart of running motor; Low grid voltage; Too large load; Mismatching of drive and load	Increase acceleration time; Avoid downtime and restart; Check grid voltage; Inspect grid voltage; Select a higher power level PV pump driver;
SPI	Phase loss in input terminal	Phase loss or large phase fluctuation upon the input of R, S and T.	Inspect the input power supply; inspect the installed wires;
SPO	Phase loss in output terminal	Phase loss output of U, V and W (or serious asymmetry of the 3 phases of load)	Inspect the output wiring; inspect motor and cable
OH1	Overheat of rectification module	Blocked air duct or damaged fan; Environmental temperature too high; Over-load operation too long time ;	Dredge the air duct or replace the fan; Reduces environmental temperature for overheat fault of OH2 inverter module;
OH2	Overheat of inverter module		
EF	External fault	DI external fault input terminal acts;	Inspect the input of external equipment
CE	485 communication fault	Baud rate is set improperly; Communication circuit is faulty; Communication address error; Communication is disturbed strongly;	Set baud rate properly; Check wiring of communication interface; Set communication address correctly; Replace or change wiring and improve resistance to interference;
ItE	Current detection fault	Connector of control board has poor contact; Hall device is damaged; Amplification circuit is faulty;	Check connector and re-insert the wire; Replace the Hall device; Replace the main control board;
END	Running time is up	The actual running time of the Product is longer than the internally set running time	Seek suppliers to help adjust set run time
OL3	Electronic overload fault	Overload warning of the Product is given according to the set value	Inspect load and over-load warning point

Chapter VIII Troubleshooting

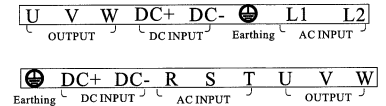| Failure	Description	Detail	Troubleshooting
OUt1	U phase protection of inverter unit	Too fast acceleration; Damage of IGBT; Mis-operation caused by inference; Poor connection of driving line; whether it is short circuit to ground;	Increase acceleration time; replace power unit; Inspect if there is strong interference source to the peripheral equipment; Inspect the driving line;
OUt2	V phase protection of inverter unit		
OUt3	W phase protection of inverter unit		
OV1	Acceleration over-voltage	Abnormal input voltage; Large energy feedback; Loss of braking assembly; Energy consumption braking function is not on;	Inspect the input power supply; Inspect if the load deceleration time is too short, or the motor starts during rotation; Add energy consumption braking assemblies; Inspect the setting of relevant functional codes;
OV2	Deceleration over-voltage		
OV3	Constant-speed over-voltage		
OC1	Acceleration over-current	Too fast acceleration or deceleration; Grid voltage is relatively low; PV pump driver power is relatively small; A sudden load change or abnormal load; short circuit to ground; Phase loss of input; Have strong source of interference on the outside; Overvoltage stall protection is not on;	Inspect acceleration and deceleration time; Inspect input power supply; Select a higher power level PV pump driver; Inspect if short circuit (short circuit to ground or line-to-line short circuit) or locked-rotor occurs to the load; Inspect output wiring; Inspect if there is strong interference source; Inspect the setting of relevant functional codes;
OC2	Deceleration over-current		
OC3	Constant-speed over-current		
UV	Bus over-voltage fault	Grid voltage is relatively low; Overvoltage stall protection is not on;	Inspect the input power supply of power grid; Inspect the setting of relevant functional codes;
OL1	Motor overload	Low grid voltage; Incorrect setting of the rated current of motor; Locked-rotor or too large sudden load change of motor	Inspect grid voltage; Set the rated current of motor again; Inspect load and adjust torque boost;

2.5 Appearance and Installation Dimension

Modell
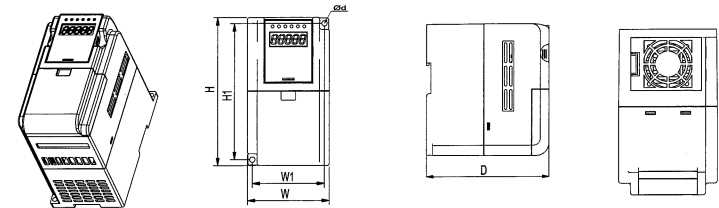
Model	W	W1	H	H1	D	Ød
CDI-SPDG0R4SS2						
CDI-SPDG0R4S2						
CDI-SPDG0R7S2	84	74	152	140	141	5.5
CDI-SPDG0R7T4						
CDI-SPDG1R5T4						

Unit:mm

Main Circuit Wiring Diagram:

U V W DC+ DC- ⏚ L1 L2
OUTPUT   DC INPUT   Earthing   AC INPUT

⏚ DC+ DC- R S T U V W
Earthing   DC INPUT   AC INPUT   OUTPUT

Note:
1. Plastic shell
2. The ordering of the terminals is subject to material object

Model2
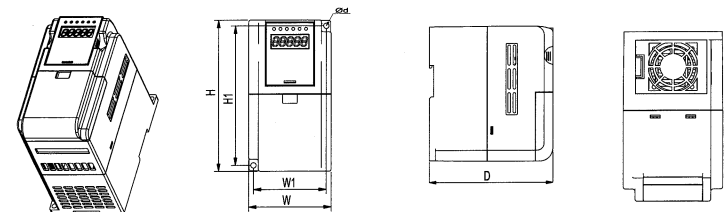
Model	W	W1	H	H1	D	Ød
CDI-SPDG0R7SS2						
CDI-SPDG1R5SS2						
CDI-SPDG1R5S2	105	95	165	153	154	5.5
CDI-SPDG2R2S2						
CDI-SPDG2R2T4						
CDI-SPDG4R0T4						

Unit:mm

Main Circuit Wiring Diagram:
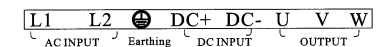
L1 L2 ⏚ DC+ DC- U V W
AC INPUT   Earthing   DC INPUT   OUTPUT

⏚ DC+ DC- R S T U V W
Earthing   DC INPUT   AC INPUT   OUTPUT

Note:
1. Plastic shell
2. The ordering of the terminals is subject . to material object

Model3

Main Circuit Wiring Diagram:

CHARGE ⏚ DC+ DC- L1 L2 | U V W
Earthing └ DC INPUT ┘ └ AC INPUT ┘ └ OUTPUT ┘

CHARGE ⏚ DC+ DC- R S T U V W
Earthing └ DC INPUT ┘ └ AC INPUT ┘ └ OUTPUT ┘

Note:
1. Plastic shell
2. The ordering of the terminals is subject to material object
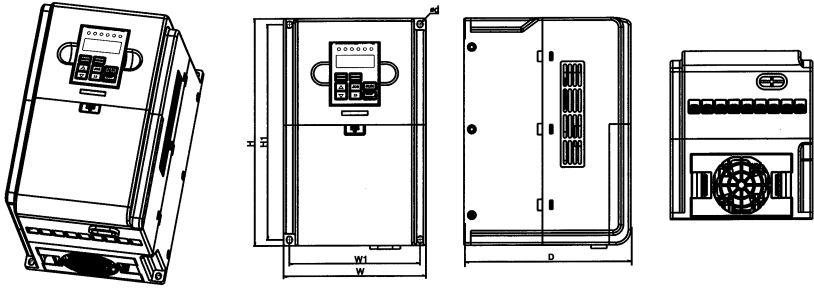
Model	W	W1	H	H1	D	d
CDI-SPDG2R2SS2						
CDI-SPDG4R0SS2						
CDI-SPDG4R0S2	145	133	230	218	170	5.5
CDI-SPDG4R0T2						
CDI-SPDG5R5T4						
CDI-SPDG7R5T4						

Unit:mm

Model4
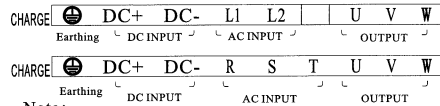
Main Circuit Wiring Diagram:

CHARGE ⏚ DC+ DC- L1 L2 | U V W
Earthing └ DC INPUT ┘ └ AC INPUT ┘ └ OUTPUT ┘

CHARGE ⏚ DC+ DC- R S T U V W
Earthing └ DC INPUT ┘ AC INPUT └ OUTPUT ┘

Note:
1. Plastic shell
2. The ordering of the terminals is subject to material object
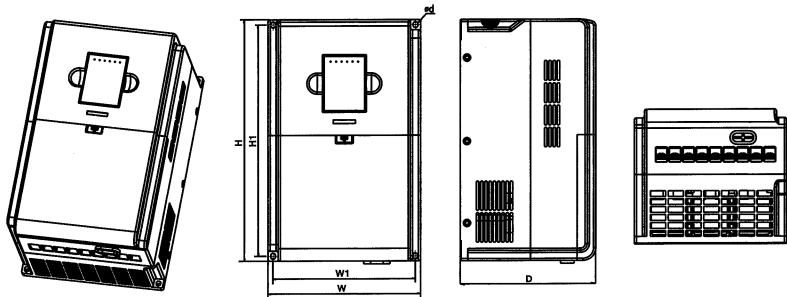
Model	W	W1	H	H1	D	d
CDI-SPDG5R5SS2						
CDI-SPDG5R5S2						
CDI-SPDG5R5T2	180	168	285	273	160	5.5
CDI-SPDG011T4						
CDI-SPDG015T4						

Unit:mm
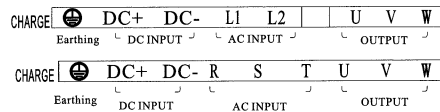
Suppose the response information is as follows

01	03	02	00 03	F8 45
Address of frequency converter	Read command	Byte number;	Data content	CRC calibration

Data content is 0003H. According to the table, the frequency converter is shut down:

Example of writing command 06:

Run the frequency converter with address of 01H. According to the table, the address of communication control command is 2000H; forward running is 0001H

01	06	20 00	00 01	42 28
Address of frequency converter	Read command	Parameter address	Forward running	CRC calibration

If operation succeeds, the response information returned is as follows (the same with command sent by host):

01	06	20 00	00 01	42 28
Address of frequency converter	Read command	Parameter address	Forward running	CRC calibration

Note: Do NOT add spacing in commands in use, for spacing in commands above facilitates introduction only, unless the spacing symbol can be removed by the upper computer.

Function Introduction	Address Definition	Meaning of Data		R/W Characteristic
Address of communication set value	200CH	Set value of voltage (V/F separation) (0~1,000, 1,000 corresponds to 100.0% rated motor voltage)		R/W
	200DH	Set value 1 of AO output (-1,000~1,000, 1,000 corresponds to 100.0%)		R/W
	200EH	Set Value 2 of AO output (-1,000~1,000, 1,000 corresponds to 100.0%)		R/W
Status word 1 of frequency converter	2100H	0001H	Forward running in progress	R
		0002H	Backward running in progress	
		0003H	Frequency converter shutdown	
		0004H	Frequency converter fault	
		0005H	POFF status of frequency converter	
		0006H	Pre-excitation status of frequency converter	
Status word 2 of frequency converter	2101H	Bit0: =0: Running preparation not ready =1: Running preparation ready Bit1~2: =00: Motor =01: Motor 2 = 10: Reserved = 11: Reserved Bit3: =0: Asynchronous machine =1: Synchronous machine Bit4: =0: Early warning of no overload =1: Early warning of overload Bit5~6: =00: Keyboard control =01: Terminal control =10: Communication control		R
Fault code of frequency converter	2102H	See introduction to fault type		R

Note: R/W character means this function is read/write character; for example, "Communication control command" is writing character and frequency converter is controlled through write command (06H). R character supports read only, while Character W supports writing only.
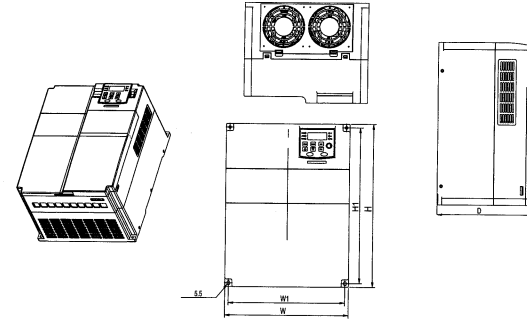
Example of reading command 03H:

Read the status word 1 of frequency converter with address of 01H. According to the table, the parameter address of status word 1 of frequency converter is 2100H.

Command sent to frequency converter

01	03	21 00	00 01	8E 36
Address of frequency converter	Read command	Parameter address	Data number	CRC calibration

Model5

Model	W	W1	H	H1	D	Ø d
CDI-SPDG018.5T4	260	245	340	325	210.5	5.5
CDI-SPDG022T4						

Unit:mm

Main Circuit Wiring Diagram:

| R | S | T | DC+ | DC- | U | V | W | ⏚ |

AC INPUT   DC INPUT   OUTPUT   Earthing
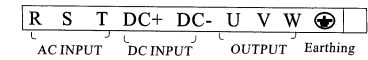
Note:
The ordering of the terminals is subject to material object
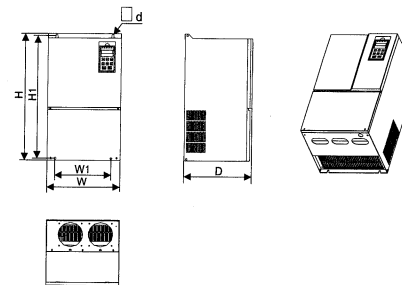
Model6

Model	W	W1	H	H1	D	Ø d
CDI-SPDG030T4	250	160	430	415	220	ø7
CDI-SPDG037T4						

Unit:mm

Main Circuit Wiring Diagram:

| R | S | T | DC+ | DC- | U | V | W | |

AC INPUT   DC INPUT   OUTPUT
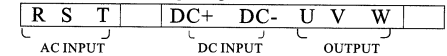
Note:
The ordering of the terminals is subject to material object
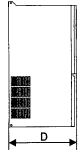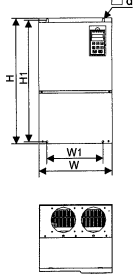
Model7

Model	W	W1	H	H1	D	▢d
CDI-SPDG045T4	300	240	530	515	270	ø9
CDI-SPDG055T4						

Unit:mm

Main Circuit Wiring Diagram:

R	S	T		DC+	DC-		U	V	W

AC INPUT   DC INPUT   OUTPUT
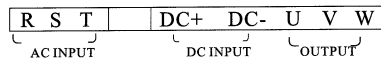
Note:
The ordering of the terminals is subject
to material object
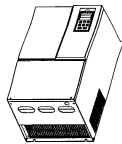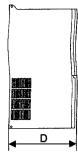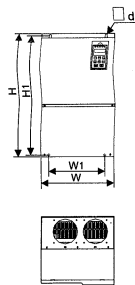
Model8

Model	W	W1	H	H1	D	▢d
CDI-SPDG075T4	340	260	580	565	313	ø9
CDI-SPDG090T4						
CDI-SPDG110T4						

Unit:mm

Main Circuit Wiring Diagram:

R	S	T		DC+	DC-		U	V	W

AC INPUT   DC INPUT   OUTPUT
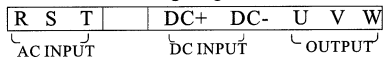
Note:
The ordering of the terminals is subject
to material object

Function Introduction	Address Definition	Meaning of Data		R/W Characteristic
Communication control command	2000H	0001H	Forward running	R/W
		0002H	Backward running	
		0003H	Forward jogging	
		0004H	Backward jogging	
		0005H	Shutdown	
		0006H	Free shutdown (emergency stop)	
		0007H	Fault reset	
		0008H	Jogging stop	
Address of communication set value	2001H	Set frequency of communication (0~Fmax (unit: 0.01Hz))		R/W
	2002H	Given PID, range (0~1,000, 1,000 corresponds to 100.0%)		R/W
	2003H	PID feedback; range (0~1,000, 1,000 corresponds to 100.0%)		R/W
	2004H	Set value of torque (-3,000~3,000, 1,000 corresponds to 100.0% rated current of motor)		R/W
	2005H	Set value for upper limit of forward rotation (0~Fmax (unit: 0.01Hz))		R/W
	2006H	Set value for upper limit of backward rotation (0~Fmax (unit: 0.01Hz))		R/W
	2007H	Upper limit of motor torque (0-3,000, 1,000 corresponds to 100.0% motor current of frequency converter)		R/W
	2008H	Upper limit of brake torque (0~3,000, 1,000 corresponds to 100.0% rated current of motor)		R/W
Address of communication set value	2009H	Special control command word: Bit0~1: =00: Motor 1 =01: Motor 2 =10: Motor 3 =11: Motor 4 Bit2: =1: Torque control disabling =0: Torque control Bit3: =1: Clear power consumption =0: Not clear power consumption Bit4: =1: Pre-excitation =0: Pre-excitation disabling Bit5: =1: DC braking =0: DC braking disabling		R/W
	200AH	Command of virtual input terminal; range: 0x000~0x1FF		R/W
	200BH	Command of virtual output terminal; range: 0x00~0x0F		R/W

3. Structure of Communication Data

FH START	T1-T2-T3-T4 (transmission time of 3.5 bytes)
Slave Address Field ADDR	Communication address: 0~247 (decimal) (0 means broadcasting address)
Functional Domain CMD	03H: Read parameter of slave 06H: Write parameter of slave
Data Domain DATA（N-1）... DATA(0)	Data of 2*N bytes: This is the main content of communication and the core of data exchange in communication.
CRC CHK Lower Order	Detection value: CRC test value (16 BIT)
CRC CHK Higher Order	
Frame Tail END	T1-T2-T3-T4 (transmission time of 3.5 bytes)

4. Definition of Parameter Address of Communication Protocol

The SPD series photovoltaic water pump drive has many function code parameters and non-function code parameters. To be specific, the read-write property is as follows:

Introduction to Read-write Address of Function Code Parameter:

Two bytes are occupied by parameter address, with the higher order at front and lower order at the rear side. The range of higher/lower order is: Byte of higher order – 00~ffH; byte of lower order: 00~ffH. Byte of higher order is the group number before the decimal point of function code, while the byte of lower order is the figure behind the decimal point of function code; both of them need to be converted into hexadecimal. By taking F28.01 as example, the group number before decimal point of function code is 28, the higher order of parameter address is 1C, figure behind decimal point of function code is 01 and lower order of parameter address is 01. Once converted into hexadecimal, the address of this function code is 1C01H.

The service life of EEPROM can be reduced by its repeated storage. For some users, no storage is required by some function codes under the communication mode; instead, the value of RAM can be changed to satisfy use requirements, and this function can be realized by replacing the highest order of function code address into 1 from 0. For example, function code F28.01 is not stored in EEPROM; instead, only RAM value is changed and address is set as 9C01H. This address is used in RAM writing only instead of reading; otherwise, it is an invalid address.

Table of Definition of Non-function Code Parameter Address

Model9

Model	W	W1	W2	H	H1	D	D1	⌀d
CDI-SPDG132T4	400	300	365	940	910	367	336	13
CDI-SPDG160T4								
CDI-SPDG185T4								

Unit:mm

R S T   U V W
AC INPUT   OUTPUT

(DC-) | (DC+)
DC INPUT

Note:
The ordering of the terminals is subject to material object

Model10

Model	W	W1	W2	H	H1	D	D1	⌀d
CDI-SPDG200T4	514	400	504	1235	1200	400	360	14
CDI-SPDG220T4								

Unit:mm

R S T   U V W
AC INPUT   OUTPUT

(DC-) (DC+)
DC INPUT

Note:
The ordering of the terminals is subject to material object

Model11.

Model	W	W1	W2	H	H1	D	D1	⌀d
CDI-SPDG250T4	545	400	504	1345	1310	400	360	14
CDI-SPDG280T4								
CDI-SPDG315T4								
CDI-SPDG355T4								
CDI-SPDG375T4	545	400	504	1450	1415	400	360	14
CDI-SPDG400T4								

Unit:mm

R S T   U V W
AC INPUT   OUTPUT

(DC+) (DC-)
DC INPUT

Note:
The ordering of the terminals is subject to material object

2.6 Daily Maintenance and Repairing

(1) Daily maintenance

The influence such as environmental temperature, humidity, dust and vibration may result in aging of the internal components of frequency inverter, which should cause potential fault of frequency inverter or reduction of its service life. Therefore, it is necessary to perform daily maintenance and regular inspection with the frequency inverter.

Daily inspection item:

A Check if the sound of motor running has any abnormal change.

B Check if there is any vibration in motor running.

C Check if the installation environment of frequency inverter is changed.

D Check if the cooling fan of frequency inverter works normally.

Daily cleaning:

A Keep frequency inverter always clean and tidy.

B Clean surface dust on the frequency inverter effectively in order to prevent dust from entering the frequency inverter, especially metal dust.

C Clean oil dirt of frequency inverter's cooling fan effectively.

(2) Regular inspection

Please inspect places that can be hardly inspected regularly.

Regular inspection item:

A Inspect and clean air flue regularly.

B Inspect if the screw is loose.

C Inspect of the frequency inverter is corroded.

D Inspect if there is arc on surface connecting terminal.

(3) Replacement of vulnerable parts

The vulnerable parts of the frequency inverter include cooling fan and filter electrolytic capacitor, the service life of which closely depend on operating environment and maintenance condition.

Users can confirm replacement period according to running time.

A Cooling fan

Possible damage reasons: Bearing abrasion and blade aging.

Judgment standard: Confirm if the fan blade has cracks and abnormal vibration sound when starting.

B Filter electrolytic capacitor

Possible damage reasons: Input power with low quality, high environment temperature, frequent load modulation and electrolyte aging.

Judgment standard: Confirm if the liquid leaks and safety valve has protruded; measurement of electrostatic capacity and insulation resistance.

(4) Storage of frequency inverter

After purchased the device, please pay attention to following points while storing it:

A Please store it in original package as much as possible.

B Long term storage should cause aging of electrolytic capacitor. Make sure to electrify it

Name	Introduction	Default Value
Communication response delay	0～200ms It means the interval between data receiving completion of frequency converter and response data sending of upper computer. The response delay is subject to the system processing time if response delay is shorter than the system processing time; otherwise, the data will not be sent by upper computer once processed until the delay period is reached.	5
Communication overtime fault period	0.0 (invalid), 0.1～60.0s Communication timeout period parameter is invalid when this function code is set as 0.0. When this function code is set as any value other than 0 and the interval between two communications exceeds the communication timeout period, the system will report "485 communication fault" (CE). Generally, this parameter should be set invalid. This parameter can be set in system with continuous communication to monitor the communication status.	0.0s
Transmission error handling	0：Send alarm and stop freely 1：Continue running without giving out an alarm 2：Shut down as default without giving out an alarm (under communication control mode only) 3：Shut down as default without giving out an alarm (under all control modes)	0
Selection of communication processing action	0x00～0x11 Ones unit of LED: 0：Writing is responded; the frequency converter makes responses to the read/write command of upper computer. 1. Writing is not responded; the frequency converter makes response to the read command of upper computer instead of write command, in order to improve communication efficiency. Ten's place of LED: 0：Encryption setting of communication is invalid 1：Encryption setting of communication is valid	0x00

Chapter VII RS-485 Communication

1. Introduction to RS-485 Communication Terminal of SPD Series Photovoltaic Pump Drive

Control board of SPD series (18.5 kW and higher) frequency converter is equipped with RS-485 communication terminal

SG+: Positive terminal of Signal 485

SG-: Negative terminal of Signal 485

However, the control board of SPD series (0.4 kW~15 kW) frequency converter is not equipped with RS-485 communication terminal. Communication expansion card is required for communication function.

2. Introduction to Communication Parameters of SPD Series Photovoltaic Pump Drive

The default values for communication parameters of frequency converter of photovoltaic water pump are as follows:

Name	Introduction	Default Value
Local communication address	Range: 1~247 When frame is written by host and slave communication address is set as 0, it is regarded as broadcasting communication address; this frame will be accepted by all salves on MODBUS bus, but no response will be made by slave. Local communication address is unique in the communication network, which is the basis for point-to-point communication of upper computer and frequency converter.	1
Communication baud rate	Set the data transmission rate between upper computer and frequency converter. 0：1200BPS 1：2400BPS 2：4800BPS 3：9600BPS 4：19200BPS 5：38400BPS 6：57600BPS	3
Data bit inspection	0：No check (N, 8, 1) for RTU 1：Even parity check (E, 8, 1) for RTU 2：Odd parity check (O, 8, 1) for RTU 3：No check (N, 8, 2) for RTU 4：Even parity check (E, 8, 2) for RTU 5：Odd parity check (O, 8, 2) for RTU	3

once every half a year for at least 5 hours and to raise voltage to rated value slowly via voltage regulator.

(5) Warranty of frequency inverter

Maintenance free is limited to the frequency inverter only.

We provide life-long paid service for our products, whenever and wherever they are used.

We bear the responsibilities of repair, replacement and return at most for the product once quality or product accident happens. If users need more responsibility compensation warranties, please place insurance at the property insurance company in advance.

Warranty service should be effective in 18 months after bar code date.

For fault caused in following reasons, a pay-needed maintenance service only is available even warranty term is effective:

A Faults caused by incorrect operation (subject to user's manual) or unauthorized repair and refitting.

B Problems caused by using the frequency inverter beyond requirements of standard and specification.

C Damage caused by accidental drop and improper handling after purchase.

D Aging or fault caused by severe environment.

E Damage caused by natural disasters such as earthquake, fire disaster, wind, lightning stroke, abnormal voltage or reasons happening together with disasters.

F Damage in the transportation process (Notes: Transportation mode is designated by user of themselves. We could assist agent to conduct transfer of goods).

G When brand, trademark, serial number and nameplate marked by manufacturers are damaged or can't be recognized.

H Failure to pay off fund according to purchase contract.

I Failure to describe actual conditions relating to installation, wiring, operation, maintenance, or other condition to the Company.

For the repair, replacement and return services, customers need to send the product back to us. We will provide the corresponding service after confirming the responsible party.

We still have the ownership of the product for which the buyer doesn't pay off the price or pay the residual fund in time. In such case, we do not undertake the above responsibilities and the buyer cannot propose any disagreement.

All relevant service fees shall be calculated in accordance with the identical standards of the factory. In the event that an agreement or a contract exists, its priority shall be performed.

Chapter III Installation and Wiring

3.1 Installation Site and Space

Installation site:

Warning	1. Avoid direct sunlight and outdoor direct use.
	2. Don't use it under corrosive gas and liquid environment.
	3. Don't use it under oil fog and splashing water environment.
	4. Don't use it under salt fog environment.
	5. Don't use it under raining and moist environment.
	6. Please equip the unit with filters device if metal dust or fiber wadding existing in air.
	7. Avoid power noise, such as electric welding machine and high-power electrical equipment, which can impact operation of the equipment.
	8. Radioactive materials can influence use of the Product.
	9. Avoid flammable materials, thinner and solvent.
Environment	Environment temperature: -10℃～+40℃
	Température de stockage: -20℃～+65℃
	Environment humidity: 90% RH at maximum (noncondensing)
	Height: Under 1,000 m. Reduce capacity by 1% for every 100 m after the altitude exceeds 1,000 m.
	Vibration: No greater than 5.9 m/s2 (0.6 g) at maximum.
	Installation direction: Please install the product vertically in order not to affect the heat dissipation effect of frequency inverter.

For sound performance and long service life, the frequency inverter shall be installed according to the above installation environment suggestions to prevent damages.

F28.02: Operation Mode

0. In MPPT mode, the frequency inverter turns power down and frequency reduction function; its final voltage upon start tracks from 80% open-circuit voltage, and the efficiency is above 98%. When luminous energy is adequate and table, the output frequency fluctuates within 1 Hz. In non-MPPT mode, any other parameters can be modified. To start in this mode, for a steady operation, the output frequency can be fixed at 35 Hz, and then raise frequency when the energy becomes steady. Alternatively, keep steady voltage mod from the beginning and fix bus voltage at about 270 V and let the frequency rise slowly. The minimum tracking voltage of MPPT must be higher than under-voltage failure 10 V;

1. In CVT mode, there is only PV panel input, It requires testing the bus voltage before starting and regarding 80% open-circuit voltage as the stabilized voltage directly.

2. Internal debugging mode

3. In the mode of universal frequency inverter, turn off the PV MPPT function and use the frequency inverter as a universal one. The frequency inverter operates in VF mode.

F28.09: Reset Times

Once a fault occurs, auto reset is supported after finishing the set period without occupying the reset times: A-LS (weak light), A-LL (under-load), UV (under-voltage), A-tF (overflow) and A-tL (empty).

For any minor fault, auto reset is supported after set period is finished and the reset times is occupied; for any major fault such as overcurrent and overheat, auto reset is not supported.

F28.39: Single-phase Mode

Generally, L and N of water pump are connected to U and W respectively when single-phase water pump is controlled by inverter. If failing to start through the method above, dismantle the capacitor of water pump and enter control mode of single-phase motor. Select P28.39 as 1 to enable single-phase control mode of frequency converter.

Functional Code	Name	Given Range	Introduction	Factory Default	Modification Restrictions
F28.57	T1 relay function selection	0-30	0: Invalid 1: Running 2: Forward running 3: Reverse running 4: Inch running 5: Inverter fault 6: Frequency level detection FDT1 7: Frequency level detection FDT2 8: Frequency reached 9: Zero-speed running 10: Frequency upper limit reached 11: Frequency lower limit reached 12: Ready for running 13: Pre-excitation 14: Overload warning 15: Under-load warning 16: Simple PLC stage completed 17: Simple PLC cycle completed 18: Set count value reached 19: Designed count value reached 20: External fault valid 21: Reservation 22: Current running time reached 23: Virtual terminal output of MODBUS communication 24~26: Reservation 27: Weak light 28~29: Reservation 30: Switching to photovoltaic	30	★
F28.59	Relay polarity selection	0-F	When the bit setting value is 0, the output terminal is positive; When the bit setting value is 1, the output terminal is negative.	0	★
F28.60	Status of switch input terminal	0000-00FF	Display the current status of on-off terminal of the inverter.	0000	●
F28.61	Select photovoltaic input and power frequency input	0-2	0: Auto switching mode 1: Power frequency input mode 2: Photovoltaic input mode	2	★

Installation space:

When frequency inverters are installed vertically, enough heat dissipation space shall be reserved in order to ensure effective cooling.
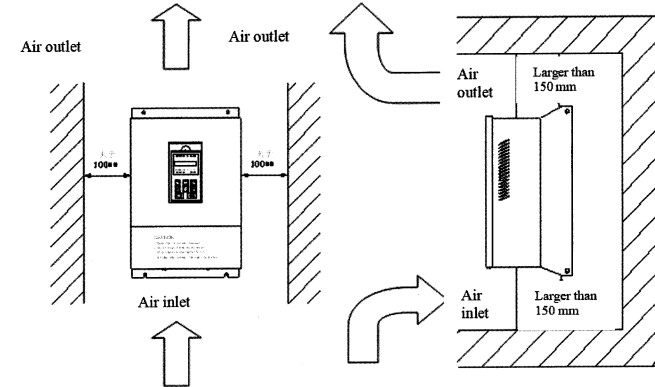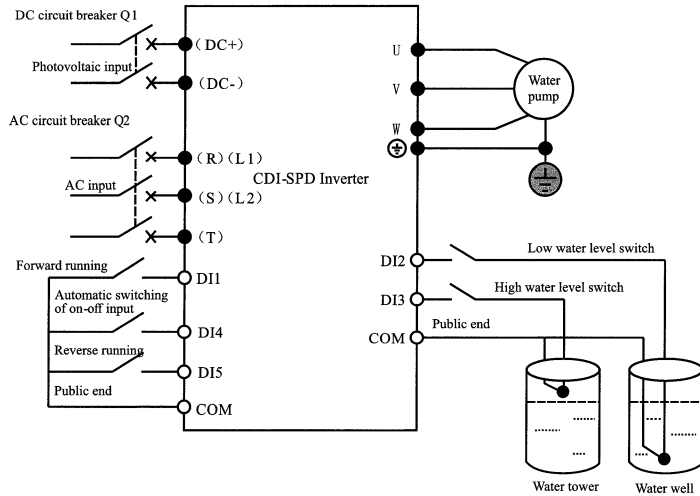

Installation Space of Frequency Inverter

⚠ Cautions	1. Necessary clearance for open-frame type (IP00) and enclosed wall-mounted type (IP20) is the same at the top/bottom and both sides.
	2. Air temperature at the permitted inlet of frequency inverter: -10℃～+40℃.
	3. Enough heat dissipation space shall be reserved in the upper and lower areas in order to ensure smooth air intake and emission of frequency inverter.
	4. Don't let foreign objects fall inside air duct during installation lest fan damage.
	5. Add filtering device at air intake when silk fibers fly or it is very dusty.

3.2 Standard Wiring

See the standard wiring diagram of the main circuit and control circuit of the Product in the figure below:

⚠	1. DC circuit breaker Q1 must be installed as the protection switch of PV DC input. 2. Frequency inverter must not be in AC and DC connection at the same time. If it requires AC/DC connection at the same time, switching control circuit shall be configured externally. 3. Special PV combiner boxes shall be used for the parallel connection of components. 4. When PV cell module is more than 10 m from frequency inverter, Type II lightning arrester shall be configured at DC input end. 5. When water pump is more than 50 m from frequency inverter, it is suggested to select output reactor. 6. Self-running upon power-up is defaulted for frequency inverter. If it needs to configure parameters, please set in strict accordance with the instruction steps of Chapter IV. 7. Tighten terminal screws according to the specified tightening torque. 8. Make sure the earthing terminals have been earthed before connecting the main circuit. 9. Terminal arrangement sequence shall be subject to physical objects.
Cautions	

Functional Code	Name	Given Range	Introduction	Factory Default	Modification Restrictions
			and deceleration time 23: Stop and resetting of simple PLC 24: Suspension of simple PLC 25: Suspension of PID control 26: Wobble suspension (stop at the current frequency) 27: Wobble resetting (return to center frequency) 28: Counter resetting 29: Torque control prohibition 30: Acceleration and deceleration prohibition 31: Counter triggering 32: Reservation 33: Temporary clearing of frequency increase and decrease setting 34: DC braking 35: Reservation 36: Command switched to keyboard 37: Command switched to terminal 38: Command switched to communication 39: Pre-excitation command 40: Clearing of power consumption 41: Maintenance of power consumption 42: Forced switching to power frequency (off status means switching to power frequency while disconnection means the input mode is controlled by the keyboard) 43: Full water signal 44: Empty water signal 45: Two-phase control mode of single-phase motor 46: PV on-off input without booster module (use via automatic switch) 47~63: Reserved		
F28.56	DI terminal polarity selection	0x000-0x11F	BIT8 / BIT3 / BIT2 / BIT1 / BIT0 DI5 / DI4 / DI3 / DI2 / DI1	0x000	★

Functional Code	Name	Given Range	Introduction	Factory Default	Modification Restrictions
F28.41	Frequency decrease rate	0-50.00Hz	When the bus bar voltage drops, the frequency converter will run at a lower frequency according to the set instantaneous power-down frequency of F28.41; unit: 0.01Hz/s	3	☆
F28.42	The last failure	/		/	●
F28.43	The second to last failure	/		/	●
F28.44	The third to last failure	/	The latest 5 faults can be viewed	/	●
F28.45	The fourth to last failure	/		/	●
F28.46	The fifth to last failure	/		/	●
F28.49	Power setting	0.4-400.0kW	Display the rated power of product	Model	●
F28.51	DI1 Function selection	0-63	0: No function 1: Forward running 2: Reverser running 3: Three-line running control 4: Forward jogging 5: Reverse jogging	01	★
F28.52	DI2 Function selection		6: Auto stop 7: Fault resetting 8: Running suspended 9: External fault input 10: Frequency setting increasing (UP)	44	★
F28.53	DI3 Function selection		11: Frequency setting decreasing (DOWN) 12: Clearing of frequency increase or decrease setting 13: Switching between A setting and B setting	43	★
F28.54	DI4 Function selection		14: Switching between combined setting and A setting 15: Switching between combined setting and B setting 16: Multi-stage speed terminal 1 17: Multi-stage speed terminal 2	46	★
F28.55	DI5 Function selection		18: Multi-stage speed terminal 3 19: Multi-stage speed terminal 4 20: Multi-stage speed suspension 21: Option 1 of acceleration and deceleration time 22: Option 2 of acceleration	02	★

3.2.1 Description of the terminals of frequency inverter
Description of the Main Circuit Terminals of Frequency Inverter:

Identification	Name	Function Description
R, S, T （L1, L2）	AC input	3-phase (single-phase) AC input terminal, connected to power grid
DC+, DC-	PV DC input	Input terminal of PV cell panel
U, V, W	Output of frequency Inverter	3-phase (single-phase) AC output terminal, generally connected to the motor of water pump
⏚	Safe protection earthing	Safe protection earthing terminal; each machine must be earthed reliably

Description for -SS2 single-phase output models

1) Generally, the output terminals U and W of the inverter connect to the phase cables of the single-phase motor.

2) If the single-phase pump cannot be started, the two-phase control method must be used, and the start-up and running capacitors (if any) of the motor must be removed. The figure below shows the internal wiring of the common single-phase motor. In the figure, L1, L2, C1, and C2 indicate the running winding, start-up winding, running capacitor, and start-up capacitor. When the motor speed exceeds 75% of the rated speed, the start-up capacitor is switched off.
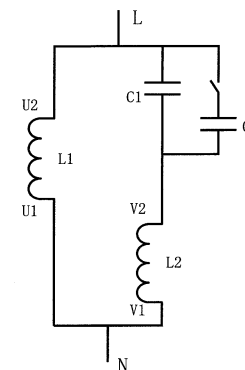
Internal wiring of the single-phase motor winding after removing the starting and running capacitor:
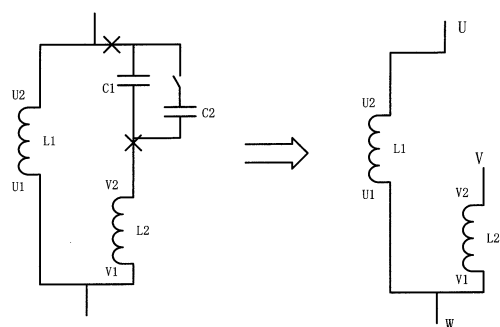
U1 and V1 are the common terminals of the windings. Connect them to the output terminal W of the solar pumping inverter. Connect U2 to the output terminal U of the inverter. Connect V2 to the output terminal V of the inverter. (Note: Use the screws equipped with the inverter.) Now F28.39=1.

Description of the Control Circuit Terminals of Frequency Inverter:

Classification	Terminal	Name	Function Description
Digital quantity input	DI1	Forward running	DI1: Forward running of frequency Inverter
	DI2	Low-level switch	DI2: level switch (low-level switch) connected to the normally on contact by default
	DI3	High-level switch	DI3: level switch (high-level switch) connected to the normally on contact by default
	DI4	Automatic switching of on-off input	DI4: PV on-off input without boosting module
	DI5	Reverse running	DI5: Reverse running of inverter SPD series 18.5 kW and models above it are not provided with DI1 terminal. 15 kW and models below it are not provided with DI5 terminal
T1 relay	T1A	Failure output	TA-TB is normally on TTA-TC is normally off Driving capability: AC 250 V below 3 A DC 30 V below 3 A
	T1B		
	T1C		
+24 V power supply	COM	24 V power output	Provide DC 24 V power voltage to the external. Driving capability: Maximum output current 300 mA
	+24V		

Functional Code	Name	Given Range	Introduction	Factory Default	Modification Restrictions
F28.25	Deceleration time	/	The period consumed by frequency converter to reach 0Hz from the designed frequency (all modes except for MPPT)	10S	☆
F28.26	Timing function	0-65535h	Set the actual running period of frequency converter. The product will shut down once exceeding the time above; it is valid only if parameter is any value other than 0; unit: h	0	☆
F28.27	Password protection	0-65535	It is invalid if parameter is 0; it will become a password once parameter is modified; password is required for the subsequent modification of product parameter	0	☆
F28.28	Inversion temperature	/	Temperature display of inverter	/	●
F28.29	Frequency reduction temperature	0-95℃	The output frequency will be reduced automatically when the inverter temperature reaches the set temperature points of F28.29	82	☆
F28.30	Under-load protection	0: No protection; 1. Start protection.	Switch of under-load protection function	0	☆
F28.31	Under-load current	0-6553.5A	When the running current is lower than the set under-load current of F28.31 and the set under-load time of F28.32 is exceeded, the fault A-LL will be given out	Model	☆
F28.32	Under-load time	0-6553.5S		60	☆
F28.33	Under-load reset	0-65535S	When the under-load reset time is finished, the frequency converter will start automatically; unit: S	600.0	☆
F28.35	Setting of the highest frequency	0-360Hz	6 for F28.04. This parameter can be used for setting the maximum operating frequency within the range	50.00	★
F28.39	Single phase mode	0. No start; 1. Start.	**See Note F28.39 for details**	0	★
F28.40	Power down and frequency reduction	0. No start; 1. Start.	Switch of power-off frequency reduction function	0	☆

Functional Code	Name	Given Range	Introduction	Factory Default	Modification Restrictions
F28.14	Empty water level delay	0-1000S	When the signal of switching value overflow is valid and the set delay time of F28.14 is finished, the frequency converter will give out A-tL fault	5	☆
F28.15	Wakeup delay upon empty water level	0-1000S	When the signal of switching value overflow is invalid and the set delay time of F28.15 is finished, the frequency converter will start automatically	20	☆
F28.16	CVT voltage	0-1000V	This parameter means the target and stabilized voltage under CVT mode and can be modified under CTV mode only; it is invalid if parameter is default value 0 and can become valid through modification. This function is enabled only if F28.02 equal to 1	0	☆
F28.17	Voltage of debugging mode	0-1000V	The parameter is voltage stabilization point in debugging mode. It is invalid if this parameter is 0 and this parameter applies to internal debugging mode	0	☆
F28.18	Rated power of motor	/	Rated frequency of motor: unit: 0.01Hz	Model	●
F28.19	Rated voltage of motor	/	Rated voltage of motor; unit: 1V	Model	●
F28.20	Rated current of motor	/	Rated current of motor; unit: 0.1A	Model	●
F28.21	Rated speed of motor	/	Rated speed of motor; unit: 1RMP	Model	●
F28.22	Instant recovery	0. No action; 1. Recover to the default.	1: Recover default setting	0	★
F28.24	Acceleration time	/	The period consumed by frequency converter to reach the designed frequency from 0Hz (all modes except for MPPT)	15S	☆

3.2.2 Wiring reference for the main circuit and control circuit is as shown in the table below

Model of Frequency Inverter	Wire Gauge of Main Circuit (mm²)		Wire Gauge of Main Circuit (mm²)
	DC+/DC-, R/S/T, U/V/W	⏚PE	
CDI-SPDG0R4SS2	2.5	2.5	1.0
CDI-SPDG0R7SS2	2.5	2.5	1.0
CDI-SPDG1R5SS2	4	4	1.0
CDI-SPDG2R2SS2	4	4	1.0
CDI-SPDG4R0SS2	6	6	1.0
CDI-SPDG5R5SS2	6	6	1.0
CDI-SPDG0R4S2	2.5	2.5	1.0
CDI-SPDG0R7S2	2.5	2.5	1.0
CDI-SPDG1R5S2	2.5	2.5	1.0
CDI-SPDG2R2S2	4	4	1.0
CDI-SPDG4R0S2	6	6	1.0
CDI-SPDG5R5S2	6	6	1.0
CDI-SPDG4R0T2	6	6	1.0
CDI-SPDG5R5T2	6	6	1.0
CDI-SPDG0R7T4	2.5	2.5	1.0
CDI-SPDG1R5T4	2.5	2.5	1.0
CDI-SPDG2R2T4	2.5	2.5	1.0
CDI-SPDG4R0T4	4	4	1.0
CDI-SPDG5R5T4	4	4	1.0
CDI-SPDG7R5T4	6	6	1.0
CDI-SPDG011T4	6	6	1.0
CDI-SPDG015T4	10	10	1.0
CDI-SPDG018.5T4	16	16	1.0
CDI-SPDG022T4	16	16	1.0
CDI-SPDG030T4	25	16	1.5
CDI-SPDG037T4	25	16	1.5
CDI-SPDG045T4	35	16	1.5
CDI-SPDG055T4	35	16	1.5
CDI-SPDG075T4	50	25	1.5
CDI-SPDG090T4	70	35	1.5
CDI-SPDG110T4	120	60	1.5
CDI-SPDG132T4	150	75	1.5

Model of Frequency Inverter	Wire Gauge of Main Circuit (mm²)		Wire Gauge of Main Circuit (mm²)
	DC+/DC-, R/S/T, U/V/W	⏚PE	
CDI-SPDG160T4	185	92.5	1.5
CDI-SPDG185T4	185	92.5	1.5
CDI-SPDG200T4	300	150	1.5
CDI-SPDG220T4	300	150	1.5
CDI-SPDG250T4	370	185	1.5
CDI-SPDG280T4	370	185	1.5
CDI-SPDG315T4	450	225	1.5
CDI-SPDG355T4	450	225	1.5
CDI-SPDG375T4	600	300	1.5
CDI-SPDG400T4	600	300	1.5

3.3 Earthing

1. Earthing resistance:
200 V level: 100 Ω or below
400 V level: 10 Ω or below

2. Don't earth frequency Inverter, electric welder, motor or other large-current electrical equipment commonly. Make sure all earth wires inside conduit are laid separately from the leads of large-current electrical equipment.

3. Use earth wires up to the specified standard and shorten their length as much as possible.

4. When several frequency Inverters are used in a row, please earth the device as shown in Fig. (a) and Don't make earth wires form a circuit as shown in Fig. (c).

5. Frequency Inverters and motors shall be earthed according to the connections given in Fig. (d).

(a) Correct   (b) Incorrect   (c) Not recommended

(d) Correct   (e) Not recommended
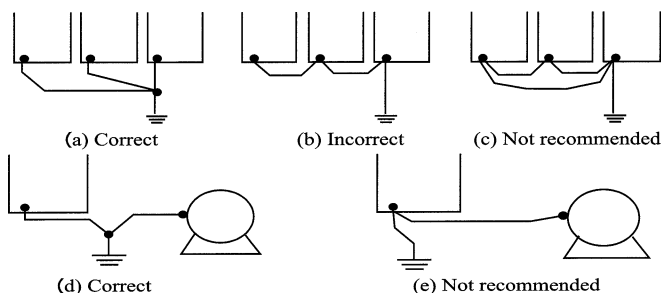
6. Wiring inspection:
Inspect the following items after installation and wiring are completed.
A. Check if the wiring is correct.
B Check if there is broken wire residues or screws left inside the device.
C Check if the screws are tightened firmly.
D Check if the naked leads on terminal contact with other terminals.

Functional Code	Name	Given Range	Introduction	Factory Default	Modification Restrictions
F28.06	Low-frequency time	0-65535S	When the frequency is lower than set value of F28.05 and the set time of F28.03 is finished, the frequency converter will display fault A-LS and stop running; unit: S	60	☆
F28.07	Low-frequency reset	0-65535S	If the time when the bus bar voltage exceeds the time set by F28.07 exceeds the under-voltage point for F28.07 after resetting at a low frequency, the frequency converter will start automatically; unit: S	600	☆
F28.08	Fault reset time	0-6553.5S	The frequency converter will start automatically once the fault reset time is finished, to avoid starting frequency converter repetitively; unit: 0.1S	600	☆
F28.09	Number of resets	0-65535	**See Note F28.09 for details**	10	☆
F28.10	Under-voltage setting	0-400V	Unit: V; under-voltage fault is displayed as: "UV". The under-voltage point is 140V for 220V frequency converter, or 240V for 380V frequency converter	T4:240V T2、SS2、S2:140V	☆
F28.11	Over-voltage setting	0-950V	The default overvoltage point is 800V for 380V frequency converter, or 450V for 220V frequency converter. Overvoltage fault is displayed as "OV"	T4:800V T2、SS2、S2:450V	☆
F28.12	Full water level delay	0-1000S	When the signal of switching value overflow is valid and the set delay time of F28.12 is finished, the frequency converter will show A-tF fault	5	☆
F28.13	Wakeup delay upon full water level	0-1000S	When the signal of switching value overflow is invalid and the set delay time of F28.13 is finished, the frequency converter will start automatically	20	☆

6.1 Basic Functions of F28 Group

Functional Code	Name	Given Range	Introduction	Factory Default	Modification Restrictions
F28.00	Software ver.	/	Software Version	/	●
F28.01	Starting mode	0: keyboard start: 1: auto start 2: terminal start 3: communication enabling	0: Keyboard enabling: To enable/disable keyboard; the TUNE lamp of keyboard is normally off; 1~2: Auto start and terminal start: TUNE lamp of keyboard flickers; 3: Communication enabling: To enable/disable communication; the TUNE lamp of keyboard is normally on	1	☆
F28.02	Operation mode	0: MPPT mode 1: CVT mode 2: debugging mode 3: universal mode of frequency inverter	See Note F28.02 for details	0	★
F28.03	Start waiting time	0.10S 1.30S 2.60S 3.90S 4.180S 5.300S 6.600S 7.1200S 8.1800S 9.0S	Under auto start mode, the frequency converter will run automatically once the set time of F28.03 is finished	1	☆
F28.04	Maximum frequency	0.60Hz; 1.50Hz. 2.70Hz. 3.80Hz. 4.90Hz. 5.100Hz. 6.Setting of other highest frequency	Select the rated frequency and max. operation frequency of power grid and motor through setting 0: 60Hz; motor's rated frequency: 60Hz; max. operation frequency: 60Hz 1: 50Hz; motor's rated frequency: 50Hz; max. operation frequency: 50Hz 6: This parameter is 6 and the other highest frequency can be set through F28.35	1	★
F28.05	Low-frequency protection	0.45Hz; 1.40Hz; 2.35Hz; 3.30Hz; 4.25Hz; 5.20Hz; 6.15Hz; 7.10Hz。	When the frequency is lower than set value of F28.05 and the set time of F28.03 is finished, the frequency converter will display fault A-LS and stop running; unit: Hz	7	☆

Chapter IV Keyboard Operation and Running

4.1 Selection of Operation Mode

The Product is provided with three control modes, including keyboard running, terminal running, self-running upon power-up, and communication operation. Users can select corresponding control mode according to field environment and working needs. See 6.1 for specific selections.

4.2 Precautions and inspection prior to test run

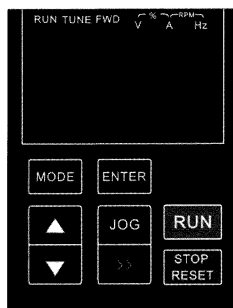| Danger	1. Don't turn power on until the front cover is installed and Don't remove the outer cover when power is on; otherwise, electric shock will be caused.
	2. Don't get close to frequency inverter or load when restart is selected, as the device will restart suddenly after it is just stopped. (Even if frequency inverter restarts, its mechanical system can ensure personal safety). Otherwise, personal injuries will be caused.
	3. As stop button will become not working after function setting, a separate emergency stop button should be installed; otherwise, personal injuries will be caused.
Cautions	1. Don't touch the radiator or resistor since it is hot; otherwise, burns will be caused.
	2. As low-speed running can easily become high-speed running, confirm the safe working range of motor and mechanical equipment before running; otherwise, personal injuries and equipment damages may be caused.
	3. If necessary, install a band-type brake separately; otherwise, person injuries will be caused.
	4. Don't change wiring during operation; otherwise, the equipment or frequency inverter will be damaged.

In order to ensure safety, mechanical coupler shall be unhooked before initial running, so that the motor can separate from mechanical equipment. If the motor and mechanical equipment are coupled before the initial running, special attention should be paid in to prevent possible dangers. Inspect the following contents before test run:

A Whether leads and terminals are connected correctly.
B Whether there is lead residues that may cause short circuit.
C Whether screw terminals are tightened firmly.
D Whether the motor is installed firmly.

4.3 Keyboard Operation Method
4.3.1 Keys and functions of keyboard
(1) Keys and functions of keyboard

Name		Description
Status indicator lamp	FWD	Light off means the frequency inverter runs forward; light on means the frequency inverter runs backward.
	RUN	frequency inverter is running when it is on
	TUNE	Keyboard start: TUNE light normally off Auto start and terminal start: TUNE lamp flickers Communication enabling: TUNE lamp is normally on
Unit indicator lamp	V	Indicate voltage value
	A	Indicate current value
	Hz	Indicate frequency value
	V-%-A	Indicate percentage
	A-RPM-Hz	Indicate rotating speed
Key area	MODE	Switch display mode; cancel data modification
	ENTER	Reads and stores parameter when it is set.
	▲	Functional code selection; data addition and subtraction setting
	▼	
	≫	When the parameter is displayed in cycle in the power-off display interface and running display interface, this key can display a certain parameter in a fixed manner. When it is pressed again, cycle display will be recovered. When parameters are modified, it can be used to select the modification bit.
	JOG	Multi-functional key
	RUN	Running key
	STOP/RESET	Stop and reset key

Chapter VI Functional Parameters Table

Description of functional parameters table:

1. The Product's functional code, F28 Group, contains several subgroups. Within each subgroup, there are several functional codes the value of which can be set as different values.

2. If F××.×× occurs to the table and other content of the Manual, it means the functional code numbered "××" of the subgroup numbered "××"; e.g. "F28.01" refers to 01 functional code of F28 subgroup.

3. Line content of the table is described as below:

The 1st line "functional code": The number of functional code parameter; the 2nd line "name": Complete name of functional code parameter; the 3rd line "given range": The range of the effective given values of functional code parameter; "Introduction" in the 4th column: Detailed explanation of function code; "Default value" in the 5th column: The original value of function code; "Change limitation" in the 6th column: Change property of function code (whether change is allowed and how change is made).

Restrictions on the modification of functional code parameters are described as below:

"☆": The given value of this parameter can be modified either in the shutdown or running status of the Product.

"★": The given value of this parameter cannot be modified when the Product is running.

"●": The value of this parameter is the actually tested value and cannot be modified.

Note:

Users shall read the Manual carefully while modifying the parameters of frequency inverter. If you want to use the special function of the Product but cannot understand, you can contact our Technical Department. We will provide safe and reliable technical support service for you. Please don't modify data at will; otherwise, serious failures might be caused, leading to serious property losses. User's failure to observe this warning shall be at your own risk.

Chapter V Commissioning Instructions

⚠	●Before the terminal operation of SPD series water pump driver, all power supply connected to the inverter must be cut off, and the waiting time after the power supply is cut off is not shorter than the time marked by the inverter. ●When the SPD series water pump driver is running, there is a high voltage inside, and any operation other than the keyboard setting of the inverter is prohibited ●The SPD series water pump driver defaults to power on and runs automatically. If you need to set parameters, please strictly follow the instructions in this chapter.

5.1 Check before operation

Be sure to confirm the following items before turning on the power.

a) Check whether the SPD series water pump driver is reliably grounded; ；

b) Check whether the wiring is correct and reliable; ；

c) Check whether the selection of AC and DC circuit breakers is correct; ；

d) Check whether the DC input voltage is within the allowable range of the inverter;

e) Check whether the motor type, voltage and power match the inverter type, voltage and power.

5.2 trial operation

Close the DC circuit breaker, the inverter will automatically run after about 30S delay, and observe the water output of the pump. If the water output is normal, the trial operation is successful; if the water output is small, adjust any two motor wires and then run.

5.3 Parameter setting

The inverter automatically runs when it is powered on by default. If you need to set parameters, you need to set F28.01 to 0 within 30S after the inverter is powered on, and change the inverter to the keypad control mode before setting the parameters. If the inverter is powered on, The operation indicator is on, then press the STOP / RESET key to enter the parameter setting interface. After completing the parameter setting, turn off the power switch, then close it again, and then it can be put into running again.

5.4 advanced setting

Note: The default settings of the pump inverter can be adapted to most operating conditions, and advanced settings generally do not need to be set.

(2) Keyboard 1:
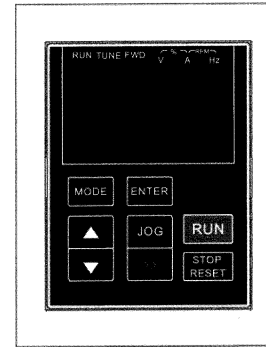
Keyboard dimensions: 65 mm*50 mm
Keyboard seat installation dimensions: 77.5*59 mm
Keyboard seat dimensions: 83.5*65 mm
Keyboard 3 is the standard configuration for frequency inverter model 1~4

(3) Keyboard 2:
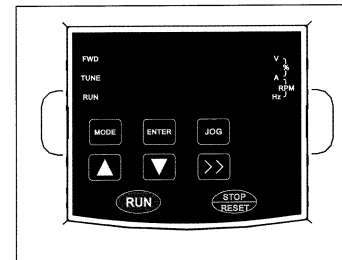
Keyboard dimensions: 63 mm*75 mm
Keyboard seat installation dimensions:99*70mm
Keyboard seat dimensions: 107*80mm
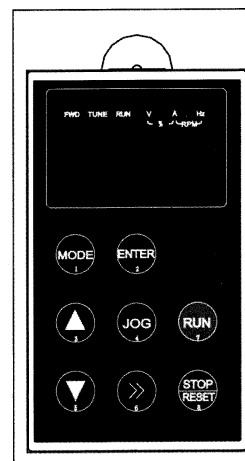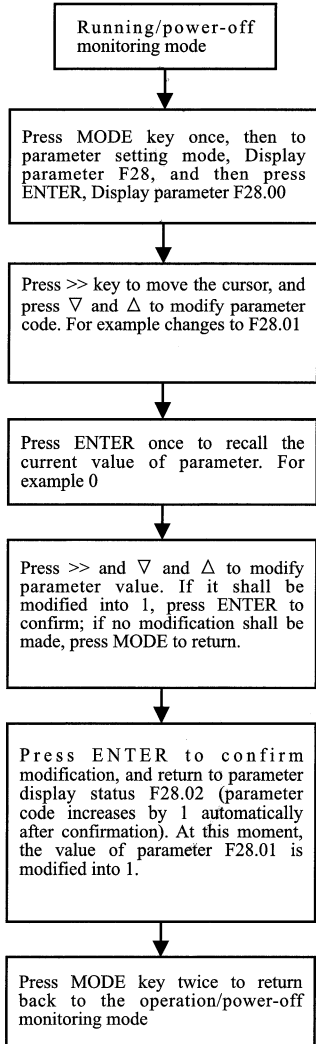Keyboard 3 is the standard configuration for frequency inverter model 5

(4) Keyboard 3:

Keyboard dimensions: 117 mm*68 mm
Keyboard seat installation dimensions: 136*72mm
Keyboard seat dimensions: 142*78mm
Keyboard 3 is the standard configuration for frequency inverter model 6 and above

4.3.2 Methods to view/give parameters (with digital keyboard)

Running/power-off monitoring mode

↓

Press MODE key once, then to parameter setting mode, Display parameter F28, and then press ENTER, Display parameter F28.00

↓

Press >> key to move the cursor, and press ∇ and △ to modify parameter code. For example changes to F28.01

↓

Press ENTER once to recall the current value of parameter. For example 0

↓

Press >> and ∇ and △ to modify parameter value. If it shall be modified into 1, press ENTER to confirm; if no modification shall be made, press MODE to return.

↓

Press ENTER to confirm modification, and return to parameter display status F28.02 (parameter code increases by 1 automatically after confirmation). At this moment, the value of parameter F28.01 is modified into 1.

↓

Press MODE key twice to return back to the operation/power-off monitoring mode

E.g.: Below is the example of modifying the parameter F28.03 of start waiting time from 1 to 2

1	Running/power-off monitoring mode	Display Running/power-off monitoring mode. Press MODE key to enter parameter setting mode. Display parameter F28, and then press ENTER, Display parameter F28.00
2	F28.00	Display parameter F28.00, and at the same time, the pointer blinks at the last data bit "0'. Press ∇ and △ to select the functional code to set, and press >> to move the data bit.
3	F28.03	Press △ to modify the display value into F28.03, and then press ENTER.
4	1	View whether the factory default of parameter is 1, and whether the pointer points at data bit "1".
5	2	Modify the display value of △ key into 2, and then press ENTER.
6	F28.04	Write 2 for data saving. The start waiting time for parameter display has been modified from 30s into 60s. At this moment, return to parameter display of F28.04.
7	F28.03	If MODE is pressed directly without pressing ENTER key in the 5th step, the keyboard will return to parameter display of F28.03, and data modification will not be saved, and the acceleration time stays at 30 s without change.
8	operation/power-off monitoring mode	Press MODE key twice to return to the operation/power-off monitoring mode.

Cautions: Data cannot be modified in any of the following situations.

1. Parameters cannot be adjusted when the frequency inverter is running. (See Functional Parameters Table)

4.3.3 Keyboard monitoring data

When inverter waiting, keypad will show in turn

Solar panel DC voltage
Biggest frequency
Output current

When inverter running, keypad will show in turn

Solar panel DC voltage
Output frequency
Output current

When the parameter is displayed in cycle on power-off display interface and operation display interface, press ⟩⟩ this key to show a certain parameter permanently, and press it again to recover the cycle display. When parameters are modified, parameter modification bit can be select.