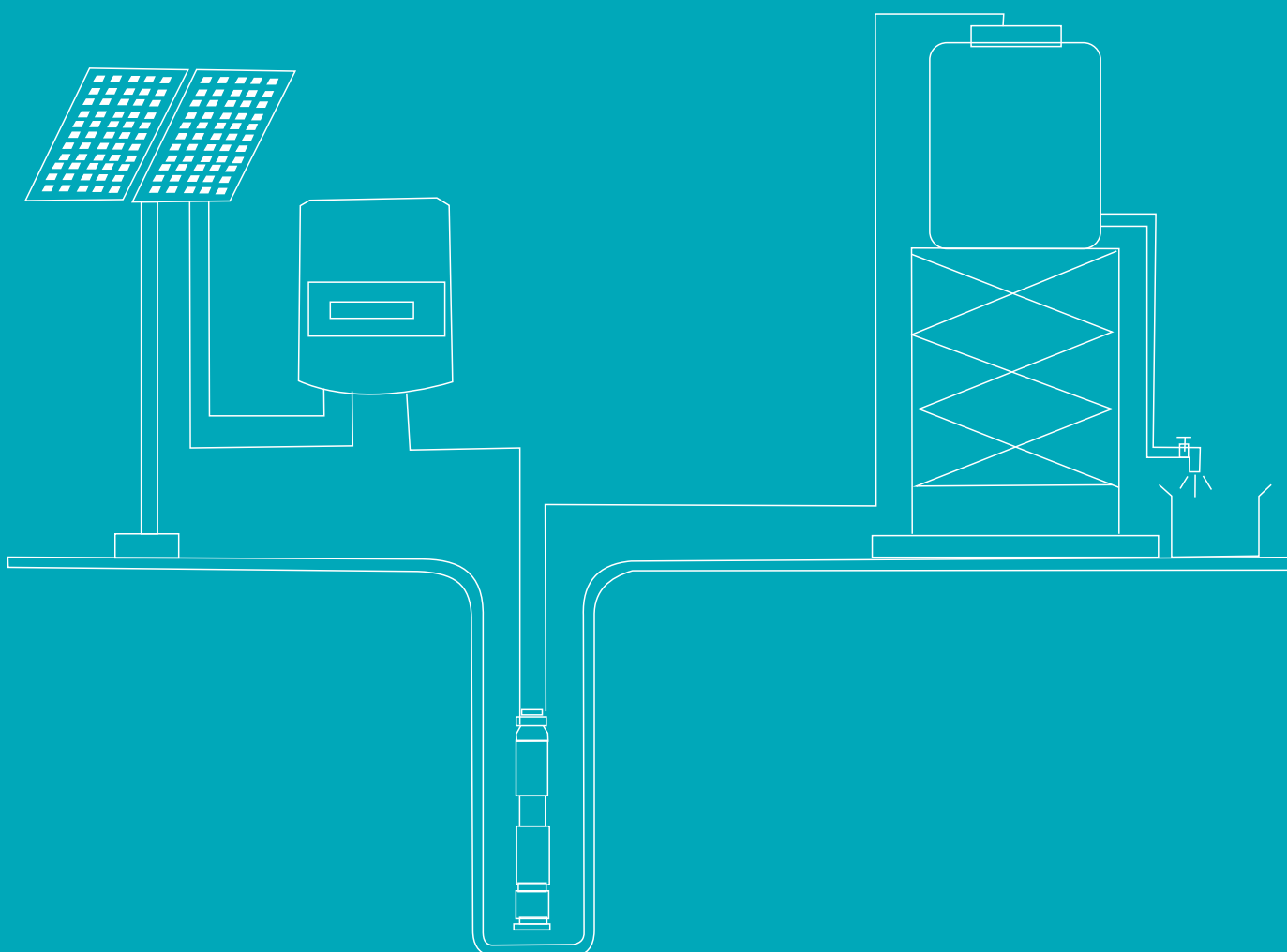# VEICHI

Solar Pump Inverter

Solar Pump Controller Features

SI series inverter is positioned in the environmental-friendly and high-efficiency global solar pump marketing. It devotes to contributing to the theme of the times called energy saving and emission reduction.

After several years' effort on research and development, the new generation product--SI20 has began selling for global marketing. It can drive not only asynchronous motor but also synchronous motor. The advanced technology MPPT and CVT allow solar pumps system to catch up with the maximum power of solar arrays in real time according to sunlight.

Solar Pump System
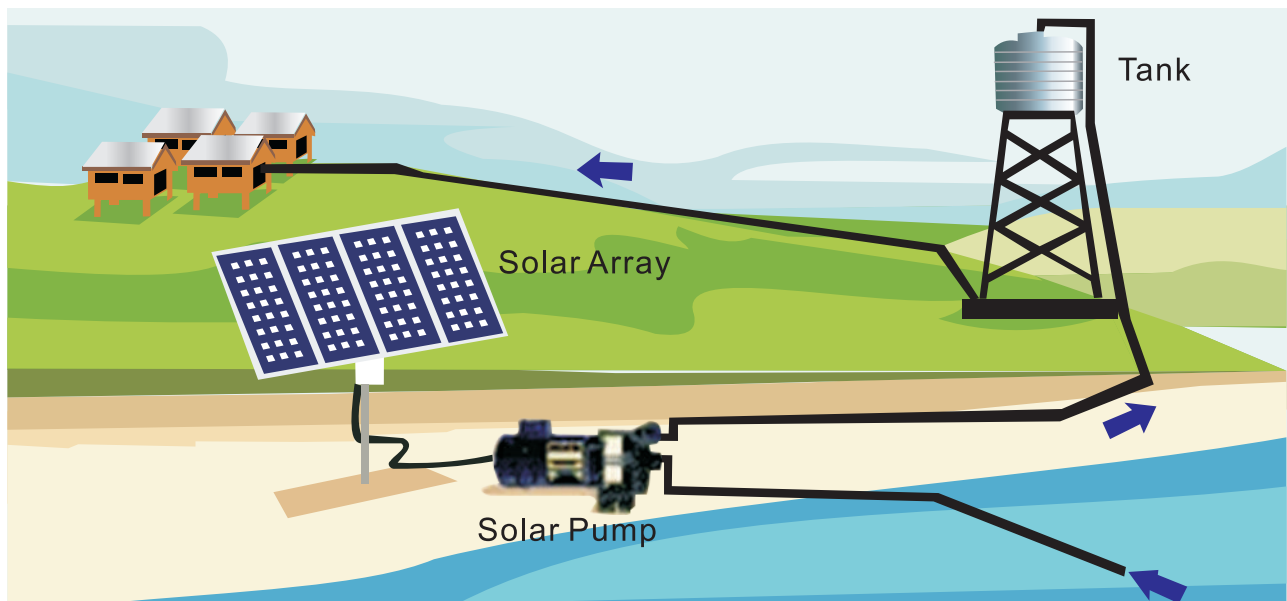
Applications

- Ground water lowering
- Drip irrigation& sprinkler
- Rural water supply for ranches, cabins, and cottages
- Irrigation systems
- Tank/ cistern filling
- Industrial application
- Wildlife refuge
- Fountains.

SI20 Solar Pump Inverter

◎ Perfectly drives three-phase AC AM and PMSM pump.
◎ Maximum MPPT efficiency up to 99.9%.
◎ Powerful PC remote monitor system ensures that you can monitor system status whenever and wherever you like.
◎ Adopts international well-known IGBT module-- Infineon.
◎ Adopts advanced 32-bit high speed TI DSP special for motor control.
◎ International certificate--CE.

SI20-D0-1R5G-A – Special Model Solar Pump Inverter

◎ It can drive 300W pump perfectly with 30Vdc input and enough power.
◎ " One panel, one pump" will come true.
◎ Available for three-phase AC AM and PMSM pump.
◎ Built-in output sine wave filter and boost circuit.
◎ Input power: 30-300VDC/1 * 90-240VAC; Output voltage: 3*90-230VAC.
◎ Maximum power is 1.5KW; Maximum output current will be limited to 10A.

Application of Permanent Magnet Synchronous Motor in Solar Pump System

Recently, permanent magnet synchronous motor (abbreviated to PMSM) is more and more popular. It has been widely applied in pumping system as it has high efficiency, small size, low heat, high sensitive response and other features.
Its application in renewable energy area – solar pump, is considered as the most promising solution in migrating water and solving water crisis in the remote rural areas where there is no electricity supply.

Solar panels

Energy flow

SI20

Energy flow
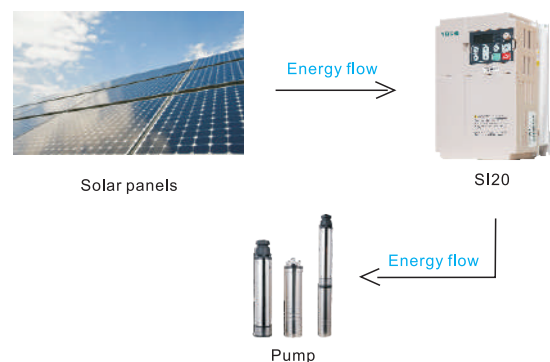
Pump

Protections

Special Protections: water fulfilled, dry run, low frequency, minimum power, maximum current, dormancy.
General Protections: high voltage, low input voltage, open circuit, short circuit, over heat, phase missing and etc.

Pump Monitor Function

PQ Curve: according to the user-defined curve, Veichi solar pump inverter can calculate pump status parameters such as present flow speed, flow per day, total flow, present power, generation per day and total generation.
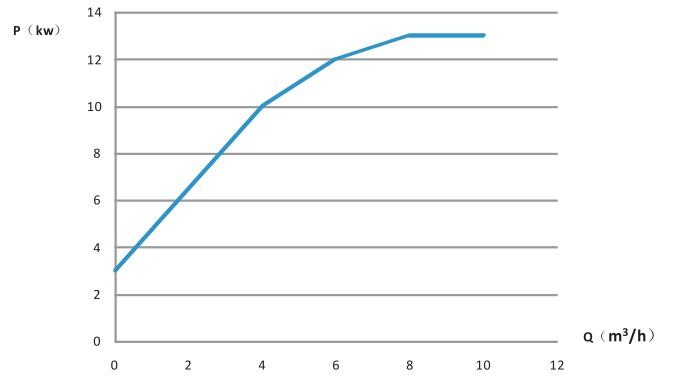
Optional Devices

Smart GPRS: it is convenient for customers to monitor the pump system status via the PC remote monitor system online.

PC Remote Monitor System

Smart GPRS System

◎ Easy to operate.

◎ Small size; powerful function.

◎ Powerful communication.

◎ Auto-detecting APN.

◎ Variable SMS function.
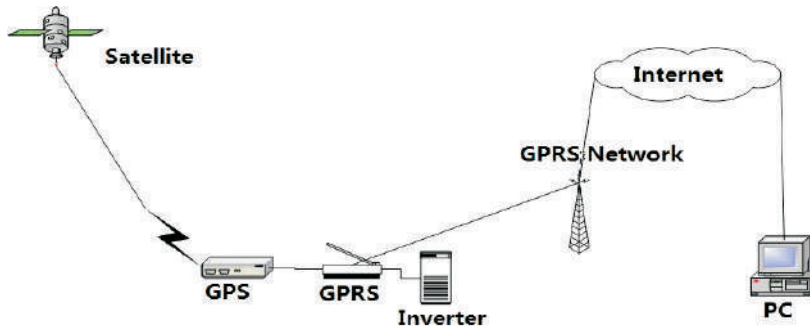
◎ Necessary node of agricultural internet of things application.

USB Data Recorder

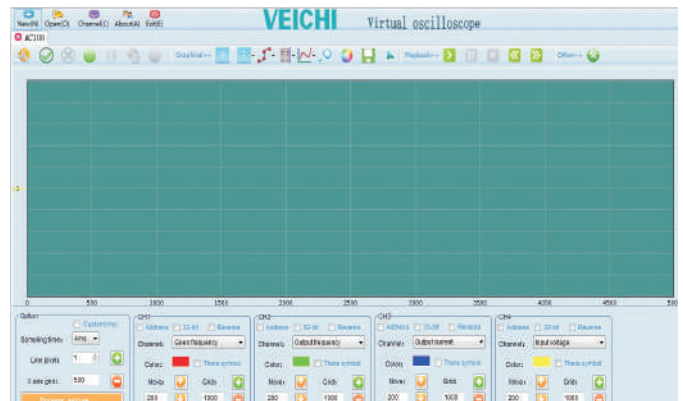It is possible for customer to monitor system status offline.

Data excel

1	Date&Time	OutputFreq(Hz)	OutPutCu	InPutPow	DcVolt(V	DcCurr(A	T_Model
2	2015/09/06|14:59:02	50	0.4	0.3	557	0.2	27.2
3	2015/09/06|14:59:12	50	0.4	0.2	556	0.3	27.2
4	2015/09/06|14:59:22	50	0.4	0.1	557	0.4	27.2
5	2015/09/06|15:18:40	50	0.4	0.1	550	0.4	29.5
6	2015/09/06|15:19:40	50	0.4	0.1	551	0.5	30.1
7	2015/09/06|15:20:40	50	0.4	0.1	554	0.1	30.1
8	2015/09/06|15:21:40	50	0.4	0.2	552	0.5	30.1
9	2015/09/06|15:22:40	50	0.4	0.1	552	0.1	30.1
0	2015/09/06|15:23:40	50	0.4	0.1	554	0.1	30.1
1	2015/09/06|15:24:40	50	0.4	0.2	553	0.3	30.7
2	2015/09/06|15:25:40	50	0.4	0.1	553	0.4	30.7
3	2015/09/06|15:26:40	50	0.5	0.2	553	0.4	30.7
4	2015/09/06|15:27:40	50	0.4	0.1	556	0.1	30.7
5	2015/09/06|15:28:40	50	0.4	0.1	557	0.1	30.7
6	2015/09/06|15:29:40	50	0.4	0.2	553	0.1	31.2
7	2015/09/06|15:30:40	50	0.4	0.2	552	0.4	31.2
8	2015/09/06|15:31:40	50	0.4	0.2	554	0.6	31.2
9	2015/09/06|15:32:40	50	0.4	0.1	553	0.3	31.2
0	2015/09/06|15:33:40	50	0.4	0.2	553	0.3	31.2
1	2015/09/06|15:34:40	50	0.4	0.2	552	0.4	31.8
2	2015/09/06|15:35:40	50	0.4	0.2	552	0.2	31.8
3	2015/09/06|15:36:40	50	0.4	0.1	554	0.1	31.8
4	2015/09/06|15:37:40	50	0.4	0.1	555	0.9	31.8
5	2015/09/06|15:38:40	50	0.4	0.1	558	0.3	31.8

Recorder

Virtual Oscilloscope

It is a kind of device allowing users to monitor the system status via PC software client.

Descriptions and Features

◎ Internal diagnostic will tolerate a lower input voltage.

◎ Whenever possible, the solar water pump controller will regulate the pump load in real time to achieve the maximum power transfer from the solar panel.

◎ It can be manually switched to AC backup power (when available) if the DC primary source is unable to support pump operation.

◎ Infineon PIM design, high quality.

◎ MPPT and CVT are available.

Easy to Monitor System Status

◎ A four-digit seven-segment display showcases the detailed indication of system status.

◎ Two line display keypad is optional.

◎ Built-in RS485 communication ports.

◎ SI20 can provide CAN communication function.

◎ Users can use PC virtual oscilloscope.

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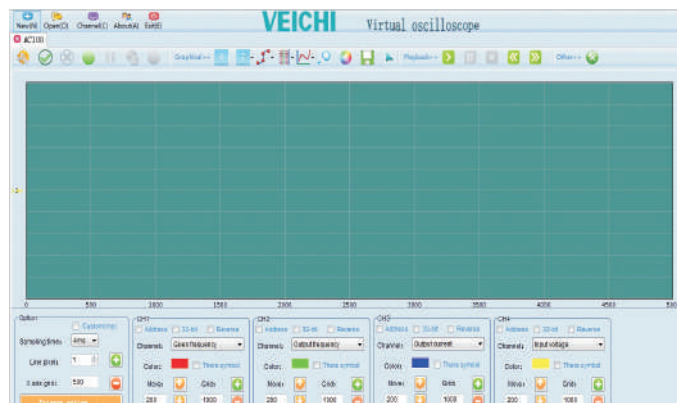

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SI20 Technical Specification

| Items		Criterion
Power input	Voltage, frequency	D0 Type: 30-300VDC / 1*90~240VAC 50/60Hz D1 Type: 90-400VDC / 1* 110VAC 50/60Hz D3 Type: 150-450VDC / 1* 220VAC 50/60Hz D5 Type: 250-780VDC / 3*380VAC 50/60Hz T3 Type: 350-780VDC/ 3*380VAC 50//60Hz
	Allowable fluctuations	Voltage unbalance rate: <3%; Frequency fluctuation: ± 5% Distortion rate: meet IEC61800-2 requirements
	Inverter efficiency	≥96%
	Recommended PV voltage-input range	D0 Type: 30~300VDC D1 Type: 150~250VDC D3 Type: 300~350VDC D5 Type: 500~620VDC T3 Type: 500~620VDC
Power output	MPPT efficiency	Up to 99.9%
	Output voltage	Under nominal conditions Output: 3 phase, 0 to the input voltage, the error is less than 2%;Can be over-modulation;
	Output frequency range	0 ~ 320 Hz (320 Hz or more can be factory customized)
	Overload capacity	150% of rated current for 1 minute; 180% of rated current for 10 seconds; 200% of rated current for 0.5 seconds
Protection function		Dry-run, Low-frequency, Minimum power, Dormancy, Water Fulfilled , Pump over current ,Bus overvoltage, mains under voltage, inverter over-current, module failure, inverter overload, motor overload, current detection zero drift failure, Hall failure, E2ROM failure, motor grounding failure, input phase failure, output phase failure, inverter overheating, communication failure, PG card failure, PG disconnection failure, motor parameter self-tuning failure;
Special function	Motor grounding short circuit detection	Can detect whether the motor is shorted to ground and the electricity can be automatically detected;
	Protection degree	Supporting basic functions like synchronous and asynchronous servo control, pulse tracking, zero servo positioning servo index location, supporting quadrature pulse given
	Telecommunication network	supporting 485 / Modbus protocol, CAN-open protocol, Profibus-DP protocol; Modbus freedom protocol, CAN custom protocols, networking and linkage control between WEICHI inverters can be realized;
	Remote and monitoring function	Supporting remote upgrading, remote monitoring, remote locking function, can be connected to WEICHI 3G module; Supporting virtual oscilloscope monitoring and debugging
Environment	Installation site	Indoor, altitude ≤1000m, no corrosive air or direct sunshine
	Temperature	-10 ～ +50℃ 20%～90%RH(no condensation)
	Vibration	Under 20Hz≤0.5g
	Storage temperature	-25～+65℃
	Installation method	-Hanging type, cabinet type
	Protection level	IP20
	Cooling method	Forced air cooling
Certificates		IEC61800-2 ,CE

SI20 Technical Specification

| Solar pump drive power (KW)	Pump motor		Max solar power input (KW)	Max DC input voltage(V)	Recommend MPPT voltage (V)	Rated output current(A)	Output frequency (Hz)
	Rated motor (KW)	Rated voltage(V)					
SI20-D0 series, DC30-300VDC input, 3phase 90-230VAC output							
1.5	1.5	110	1.95	300	30-300	10	0-320
SI20-D1 series, DC90-400VDC input, 3 phase 110-230VAC output							
0.75	0.75	110	1.0	400	100-350	7	0-320
1.5	1.5	110	1.95	400	100-350	10	0-320
SI20-D3 series,DC150V-450V input, 3 phase 150-230VAC output							
0.75	0.75	220	1.0	400	220-400	4	0-320
1.5	1.5	220	1.95	400	220-400	7	0-320
2.2	2.2	220	2.86	400	220-400	10	0-320
4.0	4.0	220	4.81	400	220-400	16	0-320
SI20-D5 series,DC250V to 780VDC input, 3 phase 230-460VAC output							
0.75	0.75	380	1.0	780	480-560	2.3	0-320
1.5	1.5	380	2.2	780	480-560	3.7	0-320
2.2	2.2	380	3.3	780	480-560	5.0	0-320
4.0	4.0	380	5	780	480-560	10	0-320
5.5	5.5	380	8	780	480-560	13	0-320
7.5	7.5	380	10	780	480-560	17	0-320
11	11	380	14.3	780	480-560	25	0-320
15	15	380	19.5	780	480-560	32	0-320
18.5	18.5	380	23.4	780	480-560	38	0-320
22	22	380	28.6	780	480-560	45	0-320
30	30	380	39	780	480-560	60	0-320
SI20-T3 series,DC350V to 780VDC input, 3 phase 230-460VAC output							
37	37	380	48. 1	780	480-560	75	0-320
45	45	380	58. 5	780	480-560	90	0-320
55	55	380	71. 5	780	480-560	110	0-320
75	75	380	97. 5	780	480-560	150	0-320
93	93	380	120. 9	780	480-560	180	0-320
110	110	380	143	780	480-560	210	0-320
132	132	380	171. 6	780	480-560	250	0-320
160	160	380	208	780	480-560	310	0-320
185	185	380	240. 5	780	480-560	340	0-320
200	200	380	260	780	480-560	380	0-320

Solar Arrays for Veichi Solar Pump Inverters

Veichi solar pumps inverter model	Maximum Input DC current	Solar arrays open circuit voltage specification									
		Open circuit voltage range 21V±2V			Open circuit voltage range 31V±2V			Open circuit voltage range 43V±2V			Inverter rated current
		Power ±3WP	Short circuit current	Serial, parallel No.	Power ±3WP	Short circuit current	Serial, parallel No.	Power ±3WP	Short circuit current	Serial, parallel No.	
SI20-D5-R75G	4.6A	30WP	2.75A	30*1							2.3A
SI20-D5-1R5G	7A	60WP	3.48A	30*1							3.7A
SI20-D5-2R2G	10A	90WP	5.5A	30*1							5A
SI20-D5-004G	17A	85WP	4.7A	28*2							10A
SI20-D5-5R5G	23A				180WP	7.33A	19*2				13A
SI20-D5-7R5G	32A				240WP	8.81A	20*2	200WP	7.32A	15*3	17A
SI20-D5-011G	48A				180WP	7.33A	20*4	240WP	7.32A	15*4	25A
SI20-D5-015G	64A				240WP	8.81A	20*4	240WP	7.32A	15*5	32A
SI20-D5-018G	76A				240WP	8.81A	20*5	240WP	7.32A	15*6	38A
SI20-D5-022G	80A				240WP	8.81A	20*6	270WP	7.32A	15*7	45A
SI20-D5-030G	90A				240WP	8.81A	20*8	240WP	7.32A	15*10	60A
SI20-T3-037G	120A				270WP	8.81A	20*9	270WP	7.32A	15*11	75A
SI20-T3-045G	130A				270WP	8.81A	20*10	270WP	7.32A	15*14	90A
SI20-D3-R75G	7A	30WP	2.75A	17*2							4A
SI20-D3-1R5G	14A	60WP	3.48A	17*2							7A
SI20-D3-2R2G	20A	90WP	5.5A	17*2							10A
SI20-D3-004G	32A	90WP	5.5A	17*3							16A
Note: the required solar voltage is 1.15 times of inverter DC bus voltage. For example: in D5 series, we recommend 540V*1.15=621V; in D3 series, we recommend 311*1.15=357V.											
The required power of solar arrays is 1.3 times of the inverter rated power, which should not be less than 1.2 times of inverter rated power. For example, 7R5G, the required power is 7500*1.3=9750W.											
The current of solar arrays selection, approximately same to the rated current, is ok.											
Please select the maximum DC current input according to the rated current of IGBT.											

Dimension of Inverter
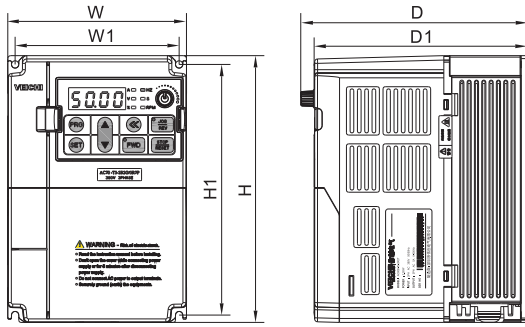
Inverter model	Inverter size				Install size		Install aperture
	W	H	D	D1	W1	H1	
SI20-D1-R75G	122	182	154.5	145	112	171	φ5
SI20-D1-1R5G	159	246	157.5	148	147.2	236	φ5.5
SI20-D3-R75G	122	182	154.5	145	112	171	φ5
SI20-D3-1R5G							
SI20-D3-2R2G	159	246	157.5	148	147.2	236	φ5.5
SI20-D3-004G							
SI20-D5-R75G	122	182	154.5	145	112	171	φ5
SI20-D5-1R5G							
SI20-D5-2R2G							
SI20-D5-004G	159	246	157.5	148	147.2	236	φ5.5
SI20-D5-5R5G							
SI20-D5-7R5G	195	291	167.5	158	179	275	φ7
SI20-D5-011G							
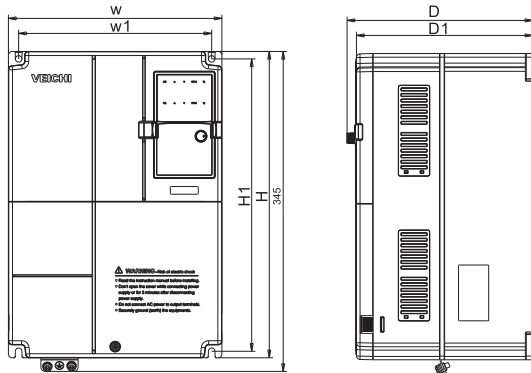
Inverter model	Inverter size				Install size		Install aperture
	W	H	D	D1	W1	H1	
SI20-D5-015G	230	330	200	190	208	315	φ7
SI20-D5-018G							
SI20-D5-022G							
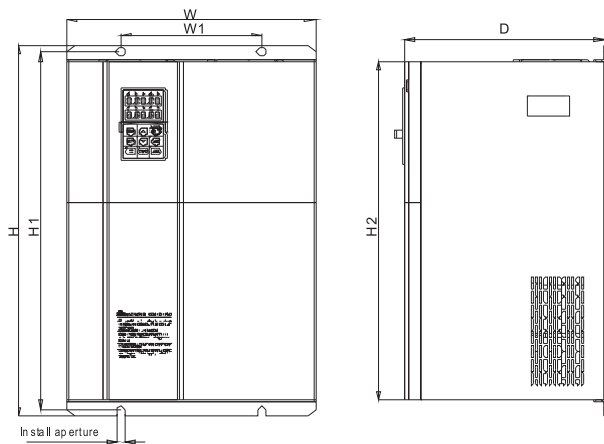
Inverter model	Inverter size				Install size		Install aperture
	W	H	D	H2	W1	H1	
SI20-D5-030G	255	410	225	370	180	395	φ7
SI20-T3-037G	305	570	260	522	180	550	φ9
SI20-T3-045G							
SI20-T3-055G							
SI20-T3-075G	380	620	290	564	240	595	φ11
SI20-T3-093G							
SI20-T3-110G							
SI20-T3-132G	500	780	340	708	350	755	φ11
SI20-T3-160G	650	1060	400	950	400	1023	φ16
SI20-T3-185G							
SI20-T3-200G							

SI20 Standard Wirings

brake module

R

DC reactor

brake resistor

short circuit

notice 1

circuit breaker

connector

input reactor

output reactor

AC input

R
S
T

inverter

(-) (+) (+) PB (+) P1

U
V
W

U
V
W

M
~

shielded cables)

E

(grounding resistor lower than 10Ω)

notice 2

+24V
PLC
COM

input terminals

(forward running) X1
(reversal running) X2
(water full detection alarm) X3
(water full detection reset) X4
(free stop) X5
(fault reset) X6
(none) X7
PUL
COM

passive terminal output

TA1
TB1
TC1

AC220V

max output:
3A/240VAC
5A/30VDC

TA2
TB2
TC2

AC220V

AC0V

AC0V

RS485 communication

A+
120Ω
B-

K7
K8

notice: default settings in bracket

collector open loop terminal output

+24V
Y
COM

线圈

shielded twisted pair line

notice:
1、+24V terminal max output:DC24V/100mA
2、Y terminal max output:DC24V/50mA

frequency reference input

notice 4

input pulse

X7
PUL

shielded twisted pair line

current model analog input
(0~20mA)/ (4~20mA)

+10V

voltage model analog input
(0~5V)/ (0~10V)

AS

VS

current/voltage analog input

AI

K3
K4

GND

J1
J2
J3

K5
K6

A02
GND

mA

shielded twisted pair line)

notice 3

K1
K2

A01
GND

V

notice: 1、+10Vterminals max input:50mA
2、VS/AI terminal resistor:75KΩ
3、AS terminal resistor:250Ω

notice:
A01/A02 terminal used as frequency
or voltage output,max current:2mA

analog monitor signal output

notice:
1、⊙ stand for main circuit terminal
2、◎ stand for control circuit terminal