DAYLIFF

SUNVERTER 3
AC SOLAR PUMP CONTROLLER

Installation & Operating Manual

INDEX

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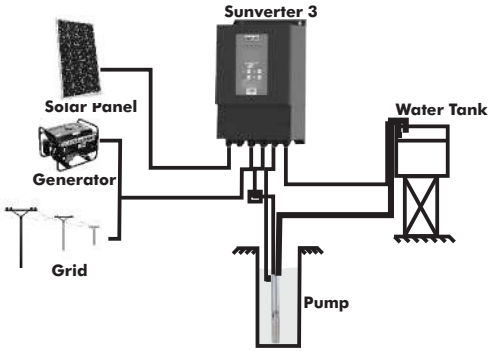
Contents herein are not warranted

Congratulations on selecting a Dayliff Sunverter3. It is manufactured to the highest standards and if installed and operated correctly will give many years of efficient and trouble free service. Careful reading of this Installation Manual is therefore important, though should there be any queries they should be referred to the equipment supplier.

1. CONTROLLER SPECIFICATIONS



Solar Water Pumping System Layout

Dayliff Sunverter 3 is the latest update of the established Sunverter range of advanced AC/DC inverters specially designed for solar-powering AC motors in various water pumping applications. As well as a general upgrade of the electronics and functionality an important new feature is hybrid capability that enables concurrent operation with direct AC power from mains or generator supply while prioritising solar supply. It is adaptable to all AC motor types and can be retro fitted to existing AC supply installations in solarisation projects. Particular features include;

- Hybrid capability with the option of DC solar power, generator or mains grid power inputs
- Patented MPPT (Maximum Power Point Tracking) capability providing fast response, good stability and up to 99% efficiency.
- Fully automatic operation with up to 8 years storage capacity of operating data.
- Supports motor soft start and gives full motor protection
- User friendly LCD display interface with comprehensive display information
- Integral remote monitoring and control capability activated by installing a registered Sim Card with data plan or alternatively signing up to the unique iDayliff Service
- Strong IP65 rated enclosure for enhanced component protection

CONTROLLER FUNCTIONALITY

The controller offers the following control functions:

- Settable minimum and maximum frequency and open circuit voltage.
- Display of operating parameters including frequency, voltage, amperage, input power and pump speed.
- Display of historical data including energy generation, maximum power and operating times.
- Protection against over and under voltage, over current, system overload and module over temperature.
- Fault detection with error code display.
- Selectable hybrid modes that prioritise solar supply as well as maximise output through optimal blending of both power supplies

INSTALLATION

Dayliff Sunverter 3 controllers are surface mounted and should be provided with a housing for water and heat protection. They must also be provided with a circuit breaker between the PV modules and controller. Due to the high operating voltages proper earthing is essential, which must be done by a qualified electrician. As a rule, all PV powered solar pumping systems should be provided with a solar module array with a nominal output about 30% greater than the motor size. In hybrid applications, higher array MPP voltage is specified to allow achievement of larger solar supply share of hybrid power supply. The arrays should be wired in a combination of series and parallel connections to ensure that the correct voltage is available into the inverter. It is important that the connection arrangement is approved by the pump supplier.

OPERATING CONDITIONS

Ambient Temperature: -20^{0}C to 60^{0}C

Relative Humidity: 0-90% (Non-Condensing)

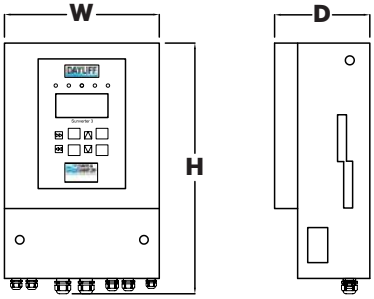
Frequency: 0-60Hz

Altitude: 0-2000m***

CONTROLLER DATA

Model	Motor Rated Power (kW)	Rated AC Input Current (A)	Rated AC Output Current (A)	Rated Voltage	Max DC Input Voltage VDC	MPP Voltage VDC, Solar	MPP Voltage VDC, Hybrid	Dimensions (mm)			Weight (kg)
								H	W	D	
SV3/1.5M	1.1	14	8.6	1x240V	450	150-360	150-360	315	219	143	5.5
SV3/2.2M	1.5	23	11								
SV3/3.7M	2.2	35	17			310-370	324-370	416	257	158	8
SV3/3.7T	3.0	12	9	3x415V	850	500-700	600-700				
SV3/5.5T	3.7	17.5	13								
SV3/7.5T	5.5	22.5	18								
SV3/11T	11	30	24					458	300	175	11.5
SV3/15T	15	39	30								
SV3/18T	18.5	45	39								
SV3/22T	22	54	45								
SV3/30T	30	68	60		780	500-600	540-600	625	388	235	29
SV3/37T	37	84	75								
SV3/45T	45	98	92								

***If the altitude is over 2,000m, the rated output current of the inverter should be derated by 10% for every 1500m increase in height.



All dimensions in mm

2. SYMBOLS AND WARNINGS

WARNING

Misuse will result in fire, serious injury to persons or even death.

CAUTION

Misuse will cause low or middle-level injury to person or equipment damage.

2.1 Purchase Inspection

CAUTION

Check the inverter before installation. Do not install if it is damaged or with missing parts, else may cause accidents.

2.2 Installation

CAUTION

To ensure good cooling effect, the inverter must be installed vertically with atleast 10cm space at the sides and 30cm at the top and bottom.

CAUTION

Sunverter is normally wall mounted. Ensure that the mounting backplate can support the weight of the inverter.

CAUTION

Suitable for indoor installation with sufficient ventilation. Do not install under direct sunlight. Keep away from dust and moisture.

2.3 Wiring

Wiring must be performed by a qualified electric professional, else may cause electric shock or fire.

Always ensure input power is isolated before wiring and connection; else may cause electric shock or fire.

Earth terminal must be reliably grounded, or else inverter enclosure may be electrified.

The selection of solar array, motor and inverters should be reasonable, in case of doubt, consult nearest dealer.

2.4 Connection

Ensure to fasten terminal with specified torque, or else may cause fire

Do not connect capacitor or phase-advanced LC/RC noise filter with inverter output.

Make sure all the wiring and connection are correctly connected before powering on, or else may damage the PV disconnect box or cause fire.

2.5 Running

Do not change wiring and connection when the inverter is powered, else may cause electric shock.

Before operation, adjust the function parameters according to the steps indicated in this manual. Do not change the function parameters of the inverter randomly, else may cause damage to the equipment.

The temperature of heat sink is normally high during running and it should not be touched, else may cause burns.

For areas with altitude over 2000m, the inverter output current should be derated at 10% for every 1500m increase in altitude.

2.6 Hybrid Operation

Do not switch off DC or AC power to the inverter while the pump is running. The disconnect switch and/or MCB should only be operated after the inverter is in stop mode otherwise there will be damage .

2.7 Others

Maintenance and inspection must be performed by a qualified technician.

Do not disassemble the inverter during operation. The inverter must be powered off atleast 5 minutes before conducting maintenance and inspection and this is to avoid the residual voltage of electrolytic capacitor in major loop causing personal injuries.

Reverse engineering is not permitted.

At the end of its design life, the inverter should be disposed as industrial waste. During incineration, the electrolytic capacitor may explode and some parts may produce toxic and harmful gas.

3. INSTALLATION AND WIRING

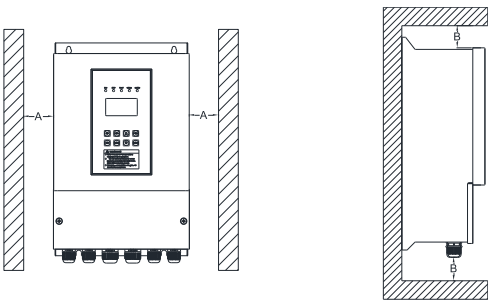
3.1 Installation Environment Requirements

Installation of the inverter according to the specified environmental conditions is the precondition for ensuring long-term normal and stable operation of the inverter.

Environment Factor	Requirements
Ambient Humidity	5 ~ 95% (No dew condensation)
Ambient Temperature	-20°C ~ +60°C (For 37/45kW inverter, the rated output current should be derated by 2% for every 1°C increase when ambient temperature over 50°C.)
Storage Temperature	-40°C ~ +70°C When operating in a small enclosed space such as a cabinet, ensure enhanced cooling to avoid the internal temperature exceeding the ambient temperature requirements.
Vibration	Less than 0.5g
Altitude	0 ~ 2000m, If the altitude is over 2000m, the rated output current of the inverter should be derated by 10% for every 1500m increase in height.
Installation Site	Indoor and outdoor use. For outdoor use, install the inverter under the shaded places to avoid direct sunlight, rain or snow. Install the inverter on flame retardant surface with sufficient heat dissipation space and good ventilation. Install the inverter on a firm support that fully bears the inverter weight. Keep away from electromagnetic radiation sources and the place with high incidence of lightning. No flammable, explosive, corrosive gases; no radioactive substances, no flammable substances; no dust, oil mist, steam. Install the inverter in a place where data observation and maintenance are convenient. Do NOT install the inverter in a place accessible to children. Do NOT install the inverter in living area to prevent noise from affecting daily life.

3.2 Installation Direction

- Leave enough installation space between inverter and other objects nearby to ensure good ventilation and heat dissipation. As shown on **Fig 1**, install the invert vertically or backwards with maximum 10^0 inclination angle do **NOT** install it horizontally or transversely.
- Leave enough space in front of the inverter, install the inverter at a height that is convenient to operate device and read information in the LCD display screen



A >100mm
B>200mm
B>300mm for 11-45kW

Fig 1: Installation Direction Diagram

NOTE

The installation surface should be flat and closely attached to the inverter bottom surface to ensure good heat dissipation.

NOTE

If multiple inverters are to be installed in the same cabinet, it is recommended to adopt side by side installation. If two inverters are to be installed longitudinally, a guide plate should be added in the middle.

3.3 Installation Method

- Choose the installation place and drill holes according to the size and shape of support plate. For models up to 22kW the recommended diameter of holes is 8±1mm with 60±5mm depth. For 30-45kW, the recommended diameter for drilling holes is 11±1mm with 60± 5mm depth
- Fasten the inverter on the wall with using expansion bolts with 35Nm tightening torque.

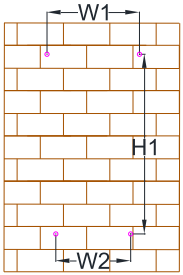


Fig 2: Mounting Hole Diagram

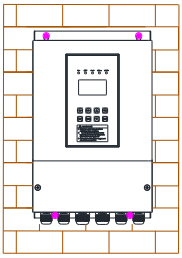


Fig 3: Inverter Mounting Installation Diagram

Model	Dimensions (mm)		
	W1	W2	H1
SV3/1.5M	139		288
SV3/2.2M			
SV3/3.7M	200	162	387
SV3/3.7T			
SV3/5.5T			
SV3/7.5T			
SV3/11T	215	193	423
SV3/15T			
SV3/18T			
SV3/22T			
SV3/30T	324	324	594
SV3/37T			
SV3/45T			

NOTE

Do NOT install the inverter on rocks or thin wooden panels with toggle bolts.

NOTE

The expansion bolts provided by manufacturer are suitable for installation on concrete walls. If the inverter is to be mounted on wooden walls, select the expansion bolt suitable for wooden wall mounting, and ensure the expansion bolts are long enough to penetrate at least 1/2 of the wall thickness.

3.4 Wiring Diagram

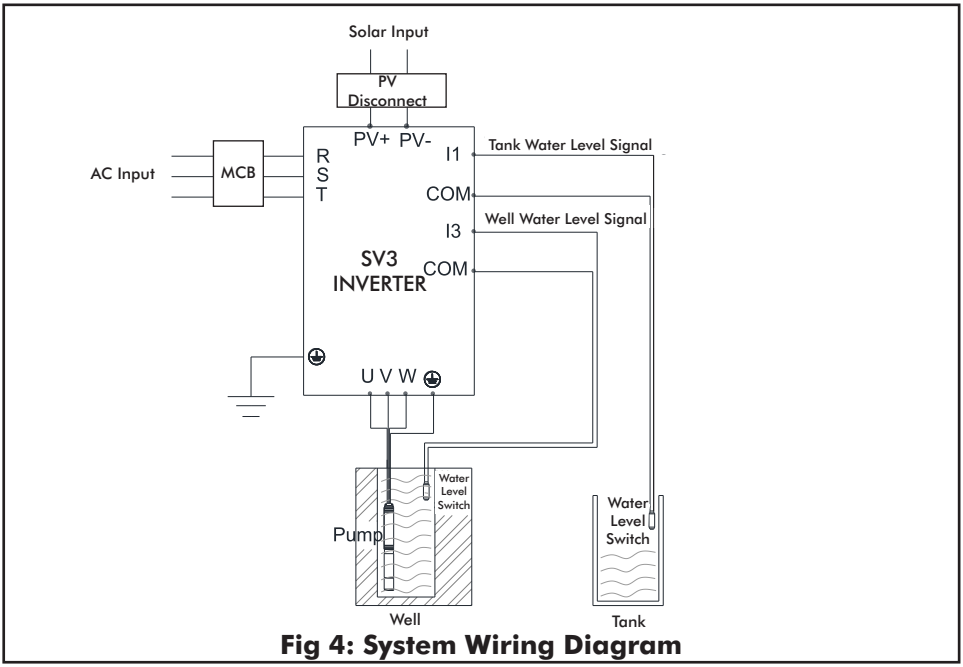


Fig 4: System Wiring Diagram

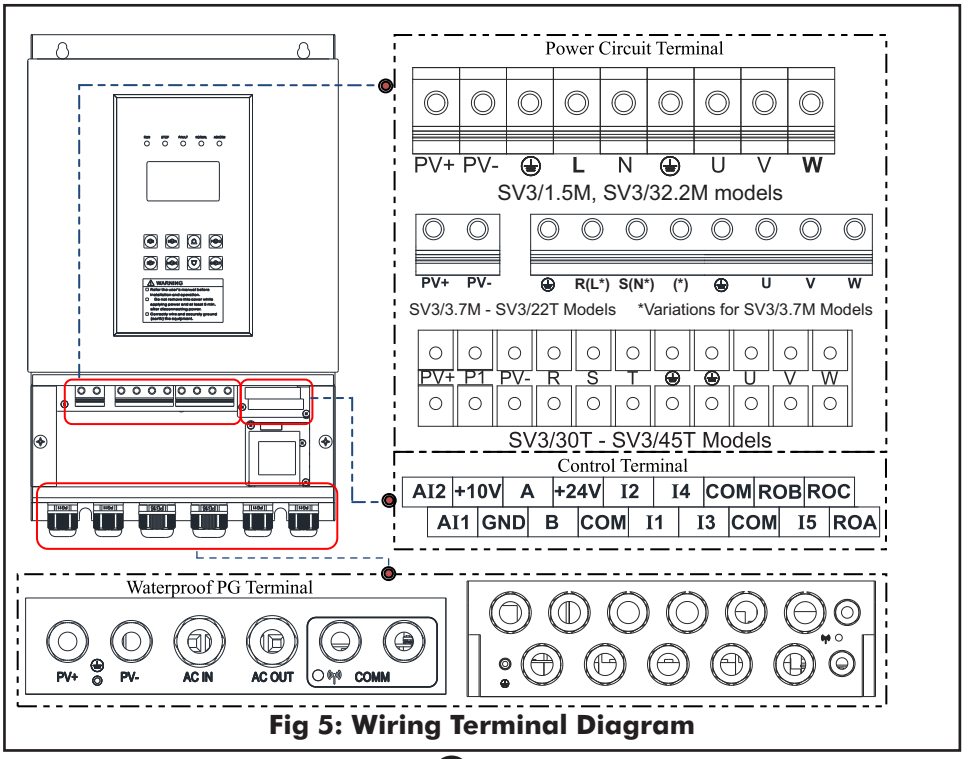


Fig 5: Wiring Terminal Diagram

Socket	Terminal Description	Connection Description
DC Input	PV+	Connected to positive pole of solar array
	PV-	Connected to negative pole of solar array
Three - Phase AC Input	R	Connected to R phase of grid
	S	Connected to S phase of grid
	T	Connected to T phase of grid
	⏚	Connected to earth cable
Single - Phase AC Input	L	Connected to L phase of grid
	N	Connected to N phase of grid
	⏚	Connected to earth cable
DC reactor Connector (30kW and above models)	P1	A jumper is connected by default. If a DC reactor is selected, remove the jumper and connect to the DC reactor. There is no polarity requirement
	PV - (Multiplexed with negative PV input)	
AC Input	U/A	Connected to U phase of three-phase motor/auxiliary winding terminal A single phase motor with no capacitor/ L terminal of single phase motor with capacitor
	V/M	Connected to V phase of three-phase motor/auxiliary winding terminal M single phase motor with no capacitor/ N terminal of single phase motor with capacitor
	W/C	Connected to W phase of three-phase motor/winding common terminal C of single-phase motor with no capacitor
	⏚	Connected to earth cable

The input/output sockets are different for models, subject to the silk screen on the inverter sockets and the terminal description.

For single-phase pumps, remove the external capacitor before wiring

Terminal	Terminal Name	Function Description
I1-COM	Switch input terminal 1	Tank water level signal input, open circuit is normal, short circuit is abnormal. Function setting through Pr15, default value 7
I2-COM	Switch input terminal 2	Reserved. Function setting through Pr16, default value 0.
I3-COM	Switch input terminal 3	Well water level signal input, open circuit is abnormal, short circuit is normal. Function setting through Pr17, default value 6.
I4-COM	Switch input terminal 4	Reserved. Function setting through Pr18, default value 0
I5-COM	Switch input terminal 5	Woltman water meter signal input. Function setting through Pr19, default value 3.
+24V-COM	+24V power supply	24V power supply, maximum output current 300mA; can be used as power supply of communication module, external sensor or miniature relay
+10V-GND	+10V power supply	10V power supply, maximum output current 50mA; can be used as power supply of an external potentiometer with resistance value range of 1k Ω~5kΩ
A-B	RS485 communication interface	Interface for communication with wired external host or inbuilt wireless communication module. (Default setting enable the communication with inbuilt imodule, if needed for external host, relevant advanced parameter must be modified)
A11-GND	Analog input terminal 1	Water level sensor signal input (default current type). Range: DC 4~20mA
A12-GND	Analog input terminal 2	Pressure sensor signal input (default current type) Range: DC 0~10V
ROA - ROC	Normal open relay contact	Contact drive capability: AC250V, 3A, cosØ = 0.4 DC30V, 1A
ROB - ROC	Normal close relay contact	

In order to ensure communication quality, use twisted shielded pair cable as communication cable.

All cables, analog, digital, power and signal should be separated to avoid entanglement.

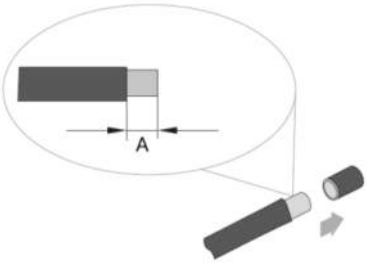
Model	Solar Array Cable (mm^2)	AC Cable (mm^2)		Earth Cable (mm^2)	Signal Cable (mm^2)
	(+)/(-)	L/N	R/S/T, U/V/W	PE	
SV3/1.5M	2.5	2.5	2.5	1.5	1.5
SV3/2.2M	4	4	4	1.5	
SV3/3.7M	4	6	6	2.5	
SV3/3.7T	2.5		2.5	2.5	
SV3/5.5T	4		4	2.5	
SV3/7.5T	4		4	2.5	
SV3/11T	6		6	4	
SV3/15T	10		10	6	
SV3/18T	10		10	6	
SV3/22T	10		10	10	
SV3/30T	16		16	10	
SV3/37T	25		25	16	
SV3/45T	25		35	16	

To ensure the system works normally, the cable size should be selected according to the table above.

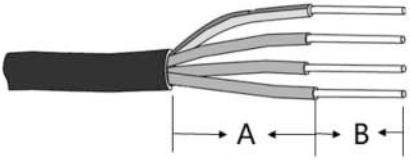
The recommended cable should be used under the conditions of ambient temperature ⩽ 40°C, cable length ⩽100m and working current ⩽ rated current.

3.4 Electrical Connection

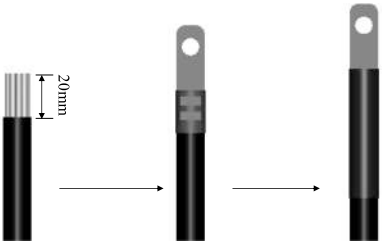
Step 1 : Prepare all the input/output cables as shown in **Fig 6**.



Single Core Cable Stripping Diagram



Multi-Core Cable Stripping Diagram



Crimping Diagram

Fig 6: Wire Process Diagram

Cable	Type	Process Description
Power Cable	Single-Core	Strip 10mm at A (for 30kW and above power models, 20mm)
	Multi-Core	Strip 50mm at A, Strip 10mm at B (for 30kW and above power models, 20mm)
Control Signal Cable	Multi-Core	Strip 50mm at A, Strip 5mm at B

Step 2: Open the cover of the inverter wiring area(SV3/M models up to 2.2kW need to use the key to open the cover), pass the cable through the waterproof PG terminal following the terminal instructions.

A. For SV3/T models up to 22kW, fasten the corresponding cable connector with a slotted screwdriver, the tightening torque is 10Nm for the PV/AC terminal and 7Nm for the signal terminal, as shown in **Fig 7**.

B: For SV3/T models 30kW and above, crimping the cable and the connector accessory with a crimper, use a cross screwdriver to lock the terminals to the corresponding places. The tightening torque is 12Nm for the PV/AC terminal and 7Nm for the signal terminal as shown in **Fig 8**.

Fig 7: Wiring Diagram of Inverter Wiring Area

Fig 8: Wiring Diagram of 30kW and above Models Inverter Wiring Area

Step 3: After finishing the wiring, tighten the bottom waterproof PG terminal with a tightening torque of 10Nm and close the wiring area cover and lock it with a tightening torque of 12Nm (For SV3/M models up to 2.2kW need to close the top cover and use the key to lock). Fix the earth cable to the ground screw at the bottom of the shell as shown in Fig 9.

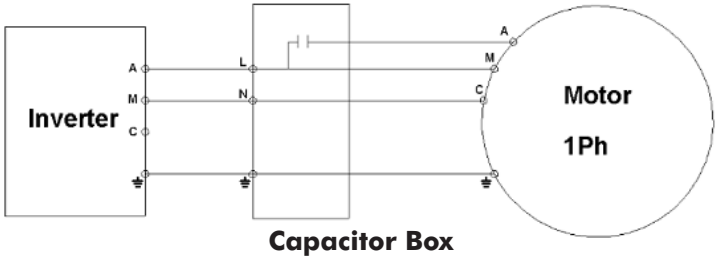
Fig 9: Grounded Connection Diagram

Step 4: After finishing wiring as shown in **Fig10**

Fig 10: Wiring Complete Diagram

3.5 Single Phase Motor Wiring Instruction

- Single Phase motors with capacitors (in terminal box or in external capacitor box) are wired as shown in Fig 10. Single phase motors without capacitors or with capacitor removed can be wired as per following instructions, however it should be noted that flow rate and head performance may be reduced by as much as 15%.



Capacitor Box

*Capacitors in terminal box for surface pumps

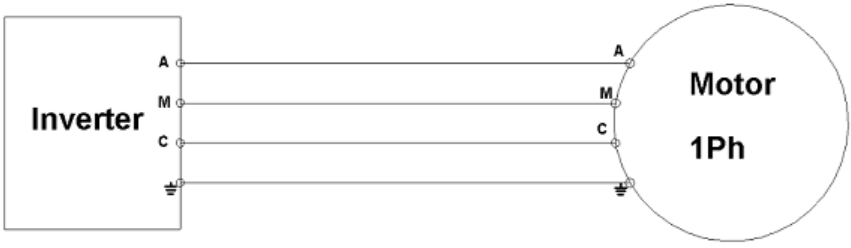


Fig 10: Single Phase Inverter Wiring Diagram

Ensure to connect the wires according to the instructions, incorrect connection may lead to abnormal operation of the system.

Wiring Reminder

In case single phase pump motor connection parts cannot be recognized, perform the following steps to identify

Step 1: Test the resistance between each pair of the connection parts with a multi-meter, the two ports with largest resistance value should be the main winding M and auxiliary winding A, so the other one is common port C.

Step 2: Test the resistance between C and the other 2 ports, the resistance between C and M should be relatively less and the resistance between C and A should be much bigger.

Step 3: If the measured resistance in step 2 appears to have little difference, then compare water flow during operation to determine if the wiring is correct. Keep C port wiring unchanged, exchange the wiring of A and M and observe the water flow. The wiring with bigger water flow should be the correct wiring.

From the above steps, the connection ports A, M,C of single phase motor can be confirmed

3.6 Water Level Switch Installation and Wiring Instruction

The water level switch is installed in the well for dry running protection or installed in the water tank for overflow protection.

Water level switch requires vertical installation with maximum 10° inclination angle. The installation position should be slightly higher than the pump outlet position in the well, while in the water tank it should be slightly lower than highest water level as shown in **Fig.11**.

To wire for well application, pass the water level switch cable through the waterproof PG terminal and connect to the I3 and COM terminals(remove the short-circuit strip between the two first), for tank application, connect to the I1 and COM terminals as shown in **Fig. 12**.

Fig 11: Water Level Switch Installation for Well/Tank

Fig 12: Water Level Switch Wiring Diagram

3.7 Others

- A DC circuit breaker should be installed as protection switch for solar DC input.
- The inverter has one pair of DC input terminals. If the solar modules are multi-paralleled, an additional solar combiner box is necessary.
- The inverter must be grounded reliably and the grounding cable properly sized and as short a possible. If possible, the inverter should be grounded separately.
- In areas with high incidence of lightning, it is recommended to install an external surge protector at the power input of the inverter.
- If the inverter is far from the motor (>200m), it is recommended to install on output reactor or filter.
- It is recommended to install input and output reactors, dedicated filters and magnetic rings at the input and output of the inverter which can effectively reduce the noise and avoid interference with other components.
- Consult nearest Dayliff dealer for the extra accessories such as PV disconnect switch/DC breaker, combiner, surge suppressor and reactors.

Model	AC Breaker (A)	DC Breaker
SV3/1.5M	25	16A/500VDC
SV3/2.2M	40	25A/500VDC
SV3/3.7M	50	
SV3/3.7T	25	16A/1000VDC
SV3/5.5T	25	25A/1000VDC
SV3/7.5T	40	
SV3/11T	50	40A/1000VDC
SV3/15T	63	63A/1000VDC
SV3/18T	63	
SV3/22T	100	80A/1000VDC
SV3/30T	100	125/1000VDC
SV3/37T	125	
SV3/45T	160	

3.8 Hybrid Installation

Sv3 series solar pumping inverter provides PV and AC hybrid power input function, as shown below, PV input is connected to bus circuit through anti-reverse diode and AC power input is rectified through rectifier bridge then connected to bus circuit. Two kinds of power can be connected with the inverter at the same time, and the hybrid power drives the water pump motor.

Hybrid Mode

Solar priority mode (Pr6=1) default.
Where there is both AC and PV power inputs, inverter adjusts pump running speed prioritising solar power and only blends with AC power when there is insufficient solar power. Insufficient solar power is detected when the pump speed falls to the set value 30Hz.

AC+PV blending (Pr6=0)
When there is both AC and PV power inputs, inverter drives the pump running at rated speed. Solar power usage is much higher when the solar irradiance is high (near 1000 W/m^2)

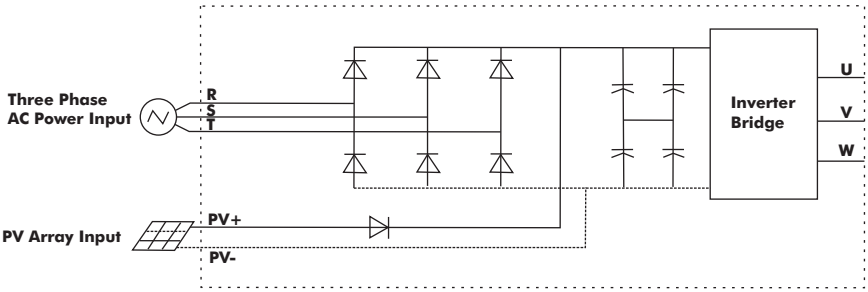


Fig 19 **Hybrid Power Supply Main Circuit**

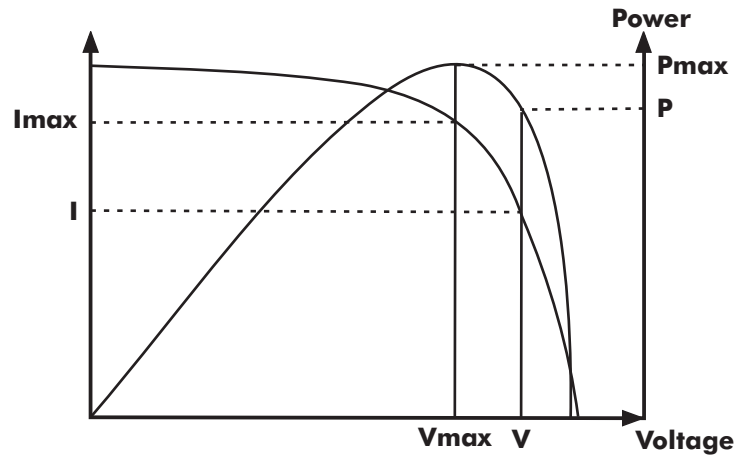
Model	SV3-M	SV3-T
AC Input Voltage (VAC)	1PH/220V - 240V	3PH/380V - 415V

Recommended PV array voltage configuration:

As shown below, if the value of maximum power point voltage (Vmp) of the PV array is equal to value of the bus voltage (Vdc) when the system is running, the PV array will output the maximum power (Pmax). If Vmp deviates from Vdc, the more the deviation, the less PV array power output. Therefore, in order for the PV array to output the maximum power as much as possible, it is recommended to configure the Vmp of the PV array to be near the bus voltage value Vdc. The Vdc can be determined by the following formula: $Vdc = \sqrt{2} * V\,rms$

NOTE

Vrms is the effective voltage value of AC power, such as 1PH 220V/3PH 380V



PV Array Curve

Model	Motor Rated Power (kW)	Rated Output Voltage	Max Solar Input Power (kWp)	Output Current (A)	Max DC Input Voltage Vmax	MPP Voltage VDC
SV3/1.5M	1.1	1x220-240V	2.2	8.6	450	150-360
SV3/2.2M	1.5		3.3	11		
SV3/3.7M	2.2		5.0	17		324-370
SV3/3.7T	3.7	3x380-415V	5.0	9	850	600-700
SV3/5.5T	5.5		8	13		
SV3/7.5T	7.5		11	18		
SV3/11T	11		16	24		
SV3/15T	15		22	30		
SV3/18T	18.5		28	39		
SV3/22T	22		32	45		
SV3/30T	30		45	60	780	540-600
SV3/37T	37		56	75		
SV3/45T	45		68	92		

4. OPERATION AND CONTROL

4.1 Initial Settings before First Operation

While implementing initial settings below, refer to section 4.6 on how to view and modify parameters as well as section 4.7 for detailed parameter descriptions

Step	Initial Setting Content	Operating Method
1	Modify all control parameters as read-write parameters.	Modify Pr.0 value to 0.
2	Modify date and time	Modify Pr.9～Pr.10 (hour, minute) according to local time. ***Note: Do not use the inverter without setting the time else records will be incorrect. If the built-in communication module is selected, the time setting can be synchronized through the APP.***
3	Modify Solar array parameter	Modify Pr.2 parameter (open circuit voltage) according to the solar array. ***Note: Inverter may work without modifying Pr.2, but will work better after modifying Pr.2 especially where array VOC is greater than 700V. Set Pr2 to 0.85 of rated VOC of array.***
4	Modify rated voltage, current, frequency and power parameters of the pump	Modify Pr.3/4/5/13 value according to the rated parameters of the pump. For single phase pumps wired with capacitors, also modify Pr153 value to 0. For single phase pump without capacitor, modify Pr0 value to 4 ***Note: Pr153 is accessible in advanced settings mode. Press PROG+ENTER+UP ARROW+DOWN ARROW keys simultaneously to enter advanced settings mode. If successful screen will be blinking.***
5	Modify the water level switch settings	If the water level switch is not required, this step can be skipped else set according to description of Pr.15-Pr.18.
6	Confirm motor wiring	1. Modify Pr.7 value as 0, enable the frequency setting from panel 2. Pr 12 value as default 30.00 Hz 3. Press RUN key and observe water yield from the outlet 4. Press STOP key and exchange any pair of pump cable connections with the inverter 5. Press RUN key and observe water yield from the outlet again 6. Press STOP key, select the wiring method with bigger water yield to ensure the motor is rotating forwards.
7	Modify the minimum operation frequency	1. Modify Pr.12 value as 20.00 2. Press RUN key 3. Observe if there's water flowing out of the outlet 4. If there is no water flowing out, press UP key slowly to increase output frequency 5. When water starts flowing from the outlet, record the start operation frequency f0. 6. Modify the Pr.14 value as f0 (weak light frequency). ***Note: System can also work stably without setting above steps, but will work better after setting to appropriate value.***

Step	Initial Setting Content	Operating Method
8	Restore frequency adjustment mode	Modify Pr. 7 value to 1, enable the inverter to run in MPPT mode.
9	Modify the control parameters as read only	Modify Pr. 0 parameter value to 1 before the inverter restart.

Do NOT modify the inverter control parameters arbitrarily, else may work abnormally.

4.2 Panel Layout and Instruction

SV3 solar pumping inverter uses LCD display operation panel as shown in the figure below, it includes 5 LED lights, LCD screen and 8 keys in 2 rows.

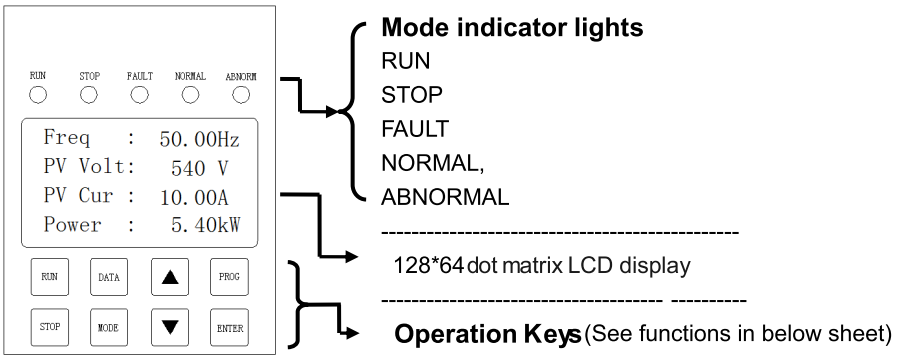


Fig 13: Keyboard layout

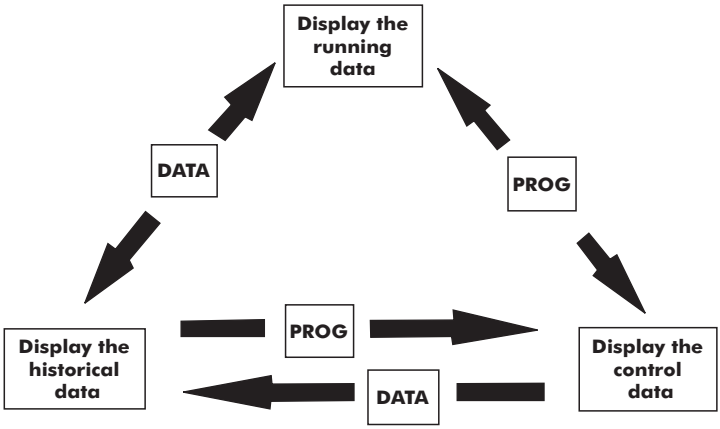
Indicator Lights & Keys	Name	Function	
RUN	Running Indicator Light	Green	On: Inverter is running
STOP	Shutdown Indicator Light	Red	On: Inverter is shut down
FAULT	Fault Indicator Light	Red	On: System fault
NORMAL	Normal Indicator Light	Green	On: System normal
ABNORM	Abnormal Indicator Light	Red	On: Water tank or well water level is abnormal
RUN	Run Key	Starts the inverter	
STOP	Stop Key	Shutdown the inverter	
DATA	Data Inquiry Key	Enter or quit from the display status of the historical data	
MODE	Mode Switch Key	1. Switch the contents to be displayed during data viewing 2. Switch the digit to be edited during data editing	
▲	Increasing Key	1. Increase parameter number or its value in control parameter display status 2. Change historical date upwards or display historical data in historical data display status 3. Increase output frequency or display current running data upwards in running data display status according to operation mode	
▼	Decreasing Key	1. Decrease parameter number or its value in contro parameter display status 2. Change historical date downward or display historical data in historical data display status 3. Decrease output frequency or display current running data downward in running data display status according to operation mode	
PROG	Programming Key	Enter or quit from the display status of the control parameter	
ENTER	Enter Key	1. Confirm the content to be viewed or edited 2. Confirm and save the parameter value when the parameter is edited	
▲ + ▼	Reset Key Combination	Press the combination key to reset in protection status	

4.3 Panel Operation

There are 3 kinds of status for operating panel display: running data display, control parameter display and historical data display. The default status is the running data display. Press the PROG key to enter the status of control parameter display, and press the key again to return the default status.

Press DATA key to enter the status of historical data display, and press the key again to return to the default status as shown in the schematic diagram as follows:

Display status switching



4.4 View Running Data

Operation	Description	Display
Initial Status: Current running data MODE	Display current running data: output frequency, PV input voltage, PV input current, PV input power of the inverter	Freq : 50.00Hz PV Volt: 540 V PV Cur : 10.00A Power : 5.40kW
MODE	Display current running data: Output voltage, output current, generated energy, module temperature of the inverter.	AC Volt: 380 V AC Cur : 15.0A DC Volt: 540 V Tempera: 35.5℃
MODE	Display current running data: Date, time, input power supply mode (PV/AC/Hybrid), operation mode of the inverter (Manual/Auto).	Data : 2020-08-01 Clock : 08:00 Supply: PV Mode : Auto

Operation	Description	Display
MODE	Display current running data: Water flow, pipeline pressure, liquid, level depth and total energy generation.	Flow : 100.0 m³/h Press : 10.0 bar Level : 50.0 m Energy: 10.0 kWh

4.5 View Historical Data

Operation	Description	Display
Initial Status: Non historical running data DATA	Enter the data inquiry interface: Date, starting time, stopping time, restart times of the inverter.	Data : 2020-08-01 Start: 08:00 Stop : 18:00 Restart: 10 Times
MODE ▲ or ▼	Select the digit to be modified (year, month, day)	Data : 2020-08-■ Start: 08:00 Stop : 18:00 Restart: 10 Times
ENTER	Modify and confirm the date to inquiry	Data : 2020-08-02 Start: 08:10 Stop : 18:10 Restart: 5 Times
ENTER	Display historical data on inquired date: daily generated energy, max. output power, max. MPP voltage, total daily operation time.	Energy : 10.0kWh MAX pwr: 0.80kW MPPT U : 520 V Runtime: 8H.00M
DATA	Quit from the display status of the historical data.Display current running data	Freq : 0.00Hz PV Volt: 540 V PV Cur : 0.00A Power : 0.00kW

4.6 View or Modify Control Parameter

Operation	Description	Display
Initial Status: non-control parameter display PROG	Enter the parameter modification interface: Display menu type, parameter number, parameter value, parameter meaning of the inverter.	Menu : System Number: 0 ◁ Value : 0 Note : para set
▲ or ▼	Select the parameter to be viewed and modified: Parameter number can be viewed or modified when the cursor is at the end of the parameter number.	Menu : System Number: 12 ◁ Value : 20.00 Note : ref freq
ENTER	Confirm the parameter to view or modify: The cursor will move to the end of parameter value line.	Menu : System Number: 12 Value : 20.00 ◁ Note : ref freq
▲ or ▼	Modify the parameter value: When the cursor is at the end of parameter value line, the parameter value can be modified.	Menu : System Number: 12 Value : 30.00 ◁ Note : ref freq
ENTER	Confirm and save the modification: Cursor moves to the end of parameter number line.	Menu : System Number: 12 ◁ Value : 30.00 Note : ref freq
PROG	Quit from the parameter display mode. Display current running data	Freq : 0.00Hz PV Volt: 540 V PV Cur : 0.00A Power : 0.00kW

NOTE

When the inverter is operating, the control parameter can only be viewed. To modify, the inverter must first be stopped.

4.7 Function Parameter Description

Number	Name	Scope	Description	Factory Set Value
Pr.0	Parameter Set Mode	0-4	0: Parameter can be read and edited. Other parameter values cannot be modified until this parameter is modified to 0. 1: All parameters can only be read. 2. Restores user parameters (parameters of this table) to factory values. 4. Self diagnosis operation for single phase pumps wired without capacitors	1
Pr.1	Maximum Power Point Voltage Ratio	0.00-1.00	The ratio of MPP voltage (Vmp) to open circuit voltage (Voc) of PV array. Unit: 0.01	0.85
Pr.2	Open Circuit Voltage	1-1000	Open circuit voltage (Voc) of the PV array. Unit: VDC Associated with the startup PV voltage	180V 500V
Pr.3	Rated Voltage	1-1000	Rated voltage of the motor load Associated with the output V/F curve	220V 380V
Pr.4	Rated Current	0.1-300.00	Rated AC output current. Associated with protection thresholds such as overload and over current	According to inverter rating
Pr.5	Rated Power	0.1-300.00	Rated power of the pump motor. Unit:kW Associated with the power value for PV/AC power supply switching	According to inverter rating
Pr.6	AC+PV Power Supply mode	0-1	0: AC+PV hybrid mode, motor keeps running at rated frequency when there is AC power input. 1: Solar priority power supply mode.	1
Pr.7	Frequency Adjustment Mode	0-5	0: Panel setting, the frequency is determined by Pr.12. 1: MPPT way, automatically adjust the frequency according to the light condition. 2-5: Reserved	1
Pr.8	Running Control Mode	0-6	0: Panel control mode. 1: Full automatic operation. 2: Terminal control mode. 3-6: Reserved. ***Note: Under different running modes, the panel stop button is always valid. Once it is pressed the panel is shut down. To enable press Run button.***	1
Pr.9	Hour	0-23	Hour required to be corrected.	0
Pr.10	Minute	0-59	Minute required to be corrected.	0
Pr.11	Frequency Upper Limit	0-Pr.13	The upper limit of output frequency of current operation.	50.00Hz

Number	Name	Scope	Description	Factory Set Value
Pr.12	Reference Frequency	0-Pr.13	Target frequency when Pr.7 is O. Unit: Hz	30.00Hz
Pr.13	Maximum Operating frequency	0.01-60.00	To protect the motor load, maximum operating frequency must be same as rated frequency of motor. Associated with the output V/F curve	50.00Hz
Pr.14	Weak light frequency	0-60.00	Once the output frequency is less than the set value and continuously lasts for a period (set value of Pr.25), the inverter will enter weak light protection and report as too dark. Unit:Hz	30.00Hz
Pr.15	Terminal 11 Function	0-9	0: Invalid 1: run/stop control, open-circuit to run, short-circuit to stop. 2: run/stop control, open-circuit to stop, short-circuit to run. 6: Source low signal, open-circuit is abnormal, short-circuit is normal. 7: Tank full signal, open-circuit is normal, short-circuit is abnormal. 8: Valid when I1&I2(or I3&I4) are used as group for double source low signals, both input are open-circuit is abnormal, both input are short-circuit is normal. 9: Valid when I1&I2(or I3&I4) are used as group for double tank full signals, both input are open-circuit is normal, both input are short-circuit is abnormal. ***Others:*** Other value settings are forbidden, or else can cause abnormal operation ***Note: 11&I2, I3&I4 are group terminals, support linkage use or separate use. When Pr.15 or Pr.17 is set to 8 or 9, Pr.16 or Pr.18 value setting will be invalid.***	7
Pr.16	Terminal 12 Function			0
Pr.17	Terminal 13 Function			6
Pr.18	Terminal 14 Function			0
Pr.19	Terminal 15 Function	0-3	0:Invalid 1:run/stop control, open-circuit to run, short-circuit to stop 2:run/stop control, open-circuit to stop, short-circuit to run. 3:Water flow detection, work with flow detection unit setting parameters.	3

Number	Name	Scope	Description	Factory Set Value
Pr.20-23	Fault Type Record 1-4	Read Only	Record the last 4 fault codes. It will only display the first six characters of the fault code here for descriptions see chapter 4.	0
Pr.24	Start delay time	1-6000	Start delay time in seconds after power on or shutdown.	30s
Pr.25	Weak light detection delay time	1-6000	Once the output frequency is less than the weak light frequency (set value of Pr.14) and continuously last for a period (this set value) inverter will enter weak light protection and report Too dark. Unit: s	100s
Pr.26	Restart delay time of weak light protection	1-6000	The Restart delay time after system enters weak light protection. Unit: s	180s
Pr.27	Water level detection corresponding time	0-6000	Water level signal detection effective delay time. If water level signal has no change within the time set by this value, it is a valid water level signal, otherwise the time will be cleared to re-accumulate. Unit: s	1s
Pr.28	Restart delay time of source low abnormal	1-30000	The delay time after water level return normal from source low protection. If countdown time is more than 999 seconds, the screen will still show 999 with the numbers blinking. Unit: s	600s
Pr.29	Restart delay time of tank full abnormal	1-30000	The delay time after water level return normal from tank full protection. If countdown time is more than 999 seconds, the screen will still show 999 with the numbers blinking. Unit: s	600s
Pr.30	Visit access code	0-30000	Advanced function parameter access password (optional when encryption for installment payment is needed).	0

After modifying parameters 2,3,4,5,6,7,8 and 13 in the table above, the next operation cannot be performed until the inverter is reset.
Under-voltage fault code caused by insufficient solar radiation is not recorded.

Too Dark and Low voltage protection fault codes caused by insufficient solar radiation will not be recorded.

The control parameter of the inverter must be changed with caution, else the system will malfunction.

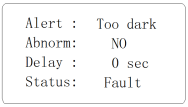
5. TROUBLE SHOOTING

5.1 Fault Code Description and Solution

Sv3 solar pumping inverter is provided with full protection. When a system fault occurs, the inverter stops the pump for a certain period of time before restarting.

When protection occurs, the inverter screen will automatically switch to the fault display page.

5.2 Fault Display Description

LCD Display	Code	Description
	Alert	Flashing display of fault code.
	Abnormal	Display of abnormal code.
	Delay	The restart delay countdown time after the fault or protection is cleared. When the count down time reaches 0, the fault display page will disappear automatically and the running data are displayed.
	Status	Displays "Fault"when fault or protection occurs. Displays "Starting"when the fault or protection is cleared. Displays "Reset" when maximum failures are reached. To reset user may cutoff the power supply or press the "RESET" key combination to reset. If the fault still exists after resetting, please contact the manufacturer for help.

5.3 Fault and Abnormal Code Description

Warning Code	Code Description	Possible Reason	Counter Measures
Too Dark	Solar radiation is too weak	Very low PV input voltage Very weak PV input power	Solar light is too weak, the PV input voltage is lower than the startup voltage, allow the voltage on solar array to reach the trigger voltage Pr.2 value is set too high, modify the value according to measured open circuit value of solar array at site or about 0.85 of rated VoC The light is weak, the operating frequency is lower than the weak light frequency, and it will restart automatically after the weak light reset delay time expires.

Warning Code	Code Description	Possible Reason	Counter Measures
Over Voltage	Over Voltage	High input voltage	Inspect solar array voltage
Low Voltage	Under Voltage	Low input voltage Weak sunlight intensity	Inspect solar array voltage. Incase it is sunny and yet warning code persists, increase Pr.1 slightly to not more than 0.9.
Over Current	Over Current	Large pump load Low solar array voltage Long pump cable Poor motor insulation Poor setting for single phase motor without capacitor	Change to low-power pump load Inspect solar array voltage Reduce the cable length between inverter and motor Inspect pump motor For single phase motor without capacitor, Set Pr.0=4
Overload	Over Voltage	Large pump load	Reduce operation frequency
IPM Prot	Over current of internal module	Output short circuit or grounded Module damaged	Inspect the wiring Contact D&S Retailer
Boosterr	Boost Circuit Error	Device or circuit damaged	Contact D&S Retailer
LossLoad	Loss of load protection	Pump dry running Pump cables all disconnected Inverter selection does not match the pump	Inspect water level Inspect pump cable connections Inspect if the pump power matches inverter capacity
Para Err	Communication Error	Device or circuit damaged	Reset Contact Dayliff Retailer
P to E	Output short circuit to ground	Output cable damaged Pump motor insulation damaged	Inspect cable connections Inspect pump motor
Too hot	Over temperature of module	Air duct blocked Too high temperature	Clear the air duct or improve the ventilation condition
CT U Err	U phase CT fault	Device or circuit damaged	Contact D&S Retailer
CT W Err	W phase CT fault		
CT D Err	DC CT fault		
U Loss	Output U phase Lose phase	U phase cable disconnected Device or circuit damaged	For single phase motor, set Pr.153=0 in advanced settings. Press PROG+ENTER+UP ARROW+ DOWN ARROW keys simultaneously to enter advanced setting mode. If successful screen will be blinking. Inspect pump cable connection Contact D&S Retailer.

Warning Code	Code Description	Possible Reason	Counter Measures
V Loss	Output V phase Lose phase	V phase cable disconnected Device or circuit damaged	For single phase motor, set Pr.153=0 in advanced settings. Press PROG+ENTER+UP ARROW+ DOWN ARROW keys simultaneously to enter advanced setting mode. If successful screen will be blinking. Inspect pump cable connection Contact D&S Retailer.
W Loss	Output W phase Lose phase	W phase cable disconnected Device or circuit damaged	
Date Err	Date error	Wrong time setting Device or circuit damaged	Check Pr.9~Pr.10 values about time setting Contact D&S Retailer
Lose phs	Phase loss protection	3 phase AC power supply phase lost	Inspect AC power supply cable connections
Tank/ Well	Abnormal Tank/Well water level	Water level abnormal	Wait for the water level to return to normal, system will begin countdown to restart
		Wrong installation	Correctly install and set the parameters according to manual
		Parameters setting for the water level switches	
		Water level switch damaged or wiring damaged	Change the water level switch or check wiring

5.4 Fault Inquiry and Reset

The Sunverter records the fault codes of the latest 4 events. Searching this information will help find the fault cause. Fault information is stored in the control parameters Pr.20~Pr.23 refer to the panel operation instructions to view the fault codes and find solutions.

When a fault occurs and the inverter needs reset to return to normal, press ▲ and ▼ keys simultaneously. Alternatively, switch off power and reset.

Be sure to check the cause of fault and eliminate it before resetting. Continuous resetting of the inverter is harmful to the controller.

Allow delay of 5 minutes before reset for overload and overheat protection

5.5 Important Note Description

If there are operations such as important parameter modification or user parameter initialization, SV3 will automatically jump to the important note page.

5.6 Important Note Page Display Description

LCD Display	Column	Description
Alert : Para ini Model : L-2.20 Version: 2.02 Status: Reset	Alert	Flashing display of important note code
	Model	Displays inverter model E.g."L-2.20", L: 220V series, 2.20: rated power 2.2kW
	Version	Displays firmware version of the inverter
	Status	Displays "Reset", reset inverter to return to normal

5.7 Important Note Code Description

Important Note Code	Code Description	Explanation
Para ini	User parameters initialization	Return to normal after resetting
Para Chg	Important parameter modification	Return to normal after resetting
Para All	All parameters initialization	Return to normal after resetting
Model Err	Model Setting Error	Executes total parameter initialization

PROBLEM	POSSIBLE CAUSE	SOLUTION
Inverter does not work when powered on	Indicator light is off	Check DC input wires connection
	Indicator light is on	Cut of inverter input wires and check if input voltage is abnormal
The pump does not run	The motor overload has tripped out	Reset the motor starter overload. If it trips again, check the voltage else call service technician
	The inverter is defective	Check the inverter
	The dry running protection has cut out the pump due to low water level	Check the water level. If it is in order check the water level electrodes/ level switch
	The pump's submersible drop cable is defective	Repair/replace the cable
Flow not sufficient	Solar array has not met design requirements	Resize and increase the solar array
	Operation voltage insufficient	Select an appropriate pump
	The draw down is larger than anticipated	Increase the installation depth of the pump, throttle the pump or replace it by a smaller model to obtain a smaller capacity
	Wrong direction of rotation	Change direction of rotation
	The valves in the discharge pipes are partly closed or blocked	Check and clean or replace the valves and discharge pipe
	The non-return valve of the pump is partly blocked	Pull out the pump. Check and clean or replace the pump if necessary
	The pump is defective	Repair or replace the pump
	Leakage in the pipework	Check and repair the pipe work
High operation frequency but no water yield	Wires loosely connected	Tighten wires and check if firmly connected
	Installation head is more than pump maximum lift	Select an appropriate pump
	Pump is running in reverse	Check connections
	Dirt in the pump	Clean the pump

PROBLEM	POSSIBLE CAUSE	SOLUTION
Frequent starts and stops	The water level sensor not installed correctly	Check water level sensor and correct
	The non-return valve is leaking or stuck half open	Pull out the pump and clean or replace the non-return valve
	The pump is oversized for borehole	Increase the installation depth of the pump, throttle the pump or replace it with a smaller model to obtain a smaller capacity
Long delay before water flows after start	Riser pipe leakage	Check and repair riser pipe
	Pump non return valve faulty	Lift pump and rectify
Loud noise in the pipework	Water hammer	Fit a surface non-return valve and a diaphragm tank on the surface delivery piping
Mechanical damage to pump and motor	Pump activation due to low system head resulting in operation at insufficient pressure	Throttle the pump or replace it with a lower pressure alternative

6. SERVICE AND MAINTENANCE

6.1 Routine Inspection and Maintenance

Sunverter is affected by ambient temperature, humidity, dust, vibration and internal device aging. To ensure long term operation a yearly inspection is recommended.

6.2 Requirement of Inspection and Maintenance

- The inspection must be performed by a qualified technician.
- Ensure to cut off power supply of the inverter before carrying out any repair.
- Avoid leaving the metal components in the inverter as they may cause damage to the equipment.
- Electric insulation test is already carried out on the inverter before leaving the factory. If it is however necessary to conduct insulation test on the inverter, all the input and output terminals must be reliably grounded. It is not advisable to conduct insulation test on single terminal.
- It is not advisable to use the megohmmeter to test the control circuit.
- When conducting insulation test on the motor, dismantle the connection between motor and inverter.

6.3 Main Points for Inspection and Maintenance

Inspect and maintain as per the table below.

Inspect Frequency		Inspection on Item	Inspection Parameter	Allowable Standard
Routine	Regular			
√		Operating Environment	1. Temperature 2. Humidity 3. Dust, gas	1. Temperature<50^0C 2. Humidity<90% No dew condensation. 3. No peculiar smell, flammable, explosive gas
	√	Cooling System	1.Installation Environment 2. Radiator	1. Installation environment with good ventilation 2. Radiator air duct should not been blocked
√		Inverter Body	1. Vibration, Temperature rise 2. Noise 3. Wire, terminal	1. Stable vibration, normal temperature of the housing 2. No abnormal noise and peculiar smell 3. Fastening screws not loose
√		Motor	1. Vibration, Temperature rise 2. Noise	1. Steady running and normal temperature 2. No abnormal and non uniform noise
√		Input & Output Parameter	1. Input voltage 2. Output current	1. Input voltage in the specialized range 2. Output current should be below rated value

6.4 Inspection and Replacement of the Damageable Part

Filter Capacitor

The pulsating current of the main circuit will influence the performance of the aluminum electrolytic filter capacitor depend on the ambient temperature and the application condition. The electrolytic capacitor of the sunverter should be replaced after 10 years, however, if the filter capacitor's electrolyte is leaking or the safety valve bursting out of the capacitor main body is expanding it should be replaced immediately.

When the filter capacitor is powered, the voltage should be increased through a DC supply and power on time should not be less than 5 hours.

Cooling Fan

Except for SV3/1.5M and SV3/3.7T Sunverters have one or two cooling fans inside. Replace the fan if it makes abnormal noise or vibrations.

6.5 Storage

If the product is to be stored, the following should be noted:

- Avoid high temperature or humidity or where there is vibration and metal dust, ensure proper ventilation at all times.
- Filter capacitor performance declines with long–time disuse. It is necessary to energize it once every 2 years to restore performance. Inspect the inverter function at the same time.

7. TERMS OF WARRANTY

i) General Liability

- In lieu of any warranty, condition or liability implied by law, the liability of Dayliff (hereafter called the Distributor) in respect of any defect or failure of equipment supplied **is limited to making good by replacement or repair** (at the Distributor's discretion) defects which under proper use appear therein and arise solely from faulty design, materials or workmanship within a specified period. This period commences **immediately after the equipment has been delivered to the customer** and at its termination all liability ceases. Also the warranty period will be assessed **on the basis of the date that the Distributor is informed of the failure.**

- This warranty applies solely to equipment supplied and **no claim for consequential damages,** however arising, will be entertained. Also the warranty specifically excludes defects caused by fair wear and tear, the effects of careless handling, lack of maintenance, faulty installation, incompetence on the part of the equipment user, Acts of God or any other cause beyond the Distributors's reasonable control. Also, any repair or attempt at repair carried out by any other party **invalidates all warranties.**

ii) Standard Warranty

General Terms

If equipment failure occurs in the normal course of service having been competently installed and when operating within its specified duty limits warranty will be provided as follows:-

- **Up to two years - The item will be replaced or repaired at no charge.**
- **Over two years, less than three years - The item will be replaced or repaired at a cost to the customer of 50% of the Davis & Shirtliff market price.**

The warranty on equipment supplied or installed by others is conditional upon the defective unit **being promptly returned free to a Davis & Shirtliff office** and collected thereafter when repaired. No element of site repair is included in the warranty and any site attendance costs will be payable in full at standard chargeout rates.

DAYLIFF is a brand of **Davis & Shirtliff**

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