



SMARTCON 2 INTELLIGENT PUMP CONTROLLER



Installation & Operating Manual

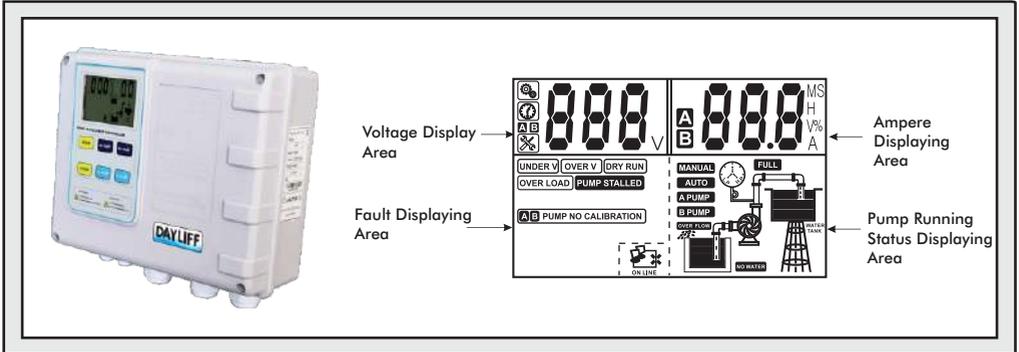
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Congratulations on selecting a Dayliff Smartcon 2. It is manufactured to the highest standards and if installed and operated correctly will give many years of efficient and trouble free service. Careful reading of this Installation Manual is therefore important and any queries should be referred to the equipment supplier.

1. CONTROLLER SPECIFICATIONS



Dayliff SmartCon 2 is a high specification multifunction electronic twin-pump controller designed for a wide variety of operating conditions in borehole, wastewater, booster and general water supply applications. Controllers are fitted with a digital display that indicates both operating and fault parameters and can be programmed using panel buttons for various functions. They are available for single phase up to 2.2kW and three phase up to 11kW motors, configuration to a particular motor size being effected by adjustments to the maximum running current. Particular features include:-

- Inbuilt incoming mains supply MCB switch and individual contractors for each pump.
- Multifunction LCD display indicating pump operating status, voltage, current, fault indicators and hours run.
- An Inbuilt protection for motor current overload, phase loss, voltage imbalance, over/under voltage, phase reversal and pump short cycling.
- In built dry run protection or level sensor connections for electrodes, float switch or pressure switch.
- Pump start/stop time delay function and multiple system configuration options for duty/standby, alternate duty cycling and parallel operation with auto trip changeover operating cycles.
- Pump start and stop options determined by different level and pressure settings.
- Digital connectivity interface for BMS application (Modbus RS485 communication port).

Dayliff SmartCon 2 is a comprehensive control solution for all pumping requirements in both submersible and surface applications providing exceptional levels of functionality and protection in one compact enclosure. They are the ideal solution for all twin pump installations.

OPERATING CONDITIONS

Enclosure Class: IP54

Temperature Range: -25° - +55 °C

Relative Humidity: 20% - 90%

Power Supply: 240V ±15% 1Ph, 415V ±15% 3Ph

CONTROLLER DATA

Model	Motor Size, kW		Current Range,A	Dimensions,mm			Weight (Kg)
	Min	Max		Height	Width	Depth	
SmartCon 2 1Ph/2.2kW	0.37	2.2	2-24	302	240	120	3
SmartCon 2 3Ph/4kW	2.2	4					
SmartCon 2 3Ph/11kW	5.5	11					

2. SYMBOLS AND WARNINGS



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



The electrical panel must be used exclusively for the purpose and function as specified in design. Misuse of this Controller will result in fire, serious injury, or even death. It can also cause low or middle-level injury to persons or equipment damage.



Any other application or use is to be considered improper and therefore hazardous. In the event of a fire in the place of installation or the surrounding area, avoid the use of water jets and use the appropriate extinguishing equipment and means (powder, foam, carbon dioxide).

3. TECHNICAL SPECIFICATIONS

3.1 Smartcon Components

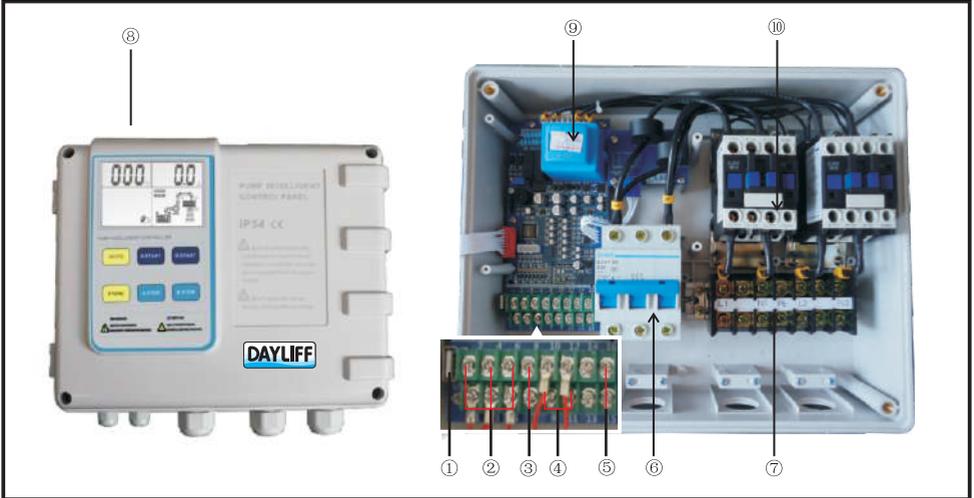


Fig 1: SmartCon Controller Components

- | | |
|--|---|
| <ul style="list-style-type: none"> 1. USB port 2. Control terminals for electrical connection to float switch/probe pressure switch 3. RS 485 terminals for communication link (remote monitor) 4. Terminals for temperature probe | <ul style="list-style-type: none"> 5. Passive dry contacting point 6. MCB for electrical connection to the power supply 7. Terminals to electrical pump 8. 9. Main board + Transformer board 10. AC contactor |
|--|---|

3.2 Smartcon Display

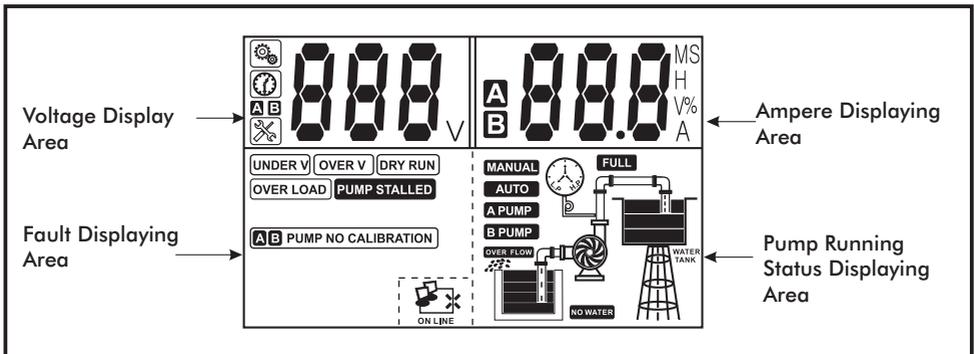


Fig 2: SmartCon Display

Icon	Meaning/Description	Icon	Meaning/Description
V	Voltage	S	Second
M	Minute	H	Hour
%	Percentage	A	Ampere (current)
	Pump running.		Pump stops
	Low/no pressure in the pipeline or pressure tank		High/Full pressure in the pipeline or pressure tank
	Pump parameter configuration-the controller is in parameter adjusting manual		Time display-pump running hours, count down etc
	Pump fault information		
 ON LINE	Network connection error (not connected)	 ON LINE	Network connection error (not connected)
	Normal network		Voltage

3.3 Smartcon Technical Characteristics

Description		Setting Range	
Trip voltage of over voltage		115% of rated input voltage	
Trip voltage of under voltage		80% of rated input voltage	
Liquid level transfer distance		≤1000m	
Trip Response Time		Recovery Time	
Overload	5 Sec to 5 min	Overload	5 min
Open phase	< 2 sec		
Short Circuit	<0.1 sec		
Under/Over Voltage	<5 sec	Under/Over voltage/ 3PH Imbalances	2 min
Dry Run	6 sec	Dry run	30 min

4. INSTALLATION & WIRING



All installation and/or maintenance must be done by a qualified electrician in observance of the relevant electrical and safety standards.



Ensure the power specifications for the motor and controller match.



Before any installation or maintenance operation, the controller must be disconnected from the power supply.



The installation of a safety switchgear is recommended to protect the panel power line in compliance with current electrical and safety standards.



Install the equipment far from heat sources and in a dry and sheltered location in observance of the stated protection rating (IP). Avoid areas with mechanical shock, corrosive gases and liquids, extreme heat and cold, salt mist corrosion, rain and moisture and flammable materials.



No parts of the panel must be disassembled without the official authorization. Any tampering with or modifications to the unit will render all terms of the warranty null and void.



Ensure the installation is connected to an efficient earthing system. After making the electrical connection, check that all electrical panel settings are correct to avoid automatic start-up of the electric pump.



To prevent equipment damage, refrain from making random changes to the dip switch parameters of the controller.

4.1 Installation Environment Requirements

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

Environment Factor	Requirements
Working Temperature	-25°C to +55°C
Working Humidity	20% to 90% RH
Degree of Protection	IP54
Install Position	Vertical
Vibration	Less than 0.5g

4.2 Wiring Diagram

4.2.1 Three Phase input and output wiring

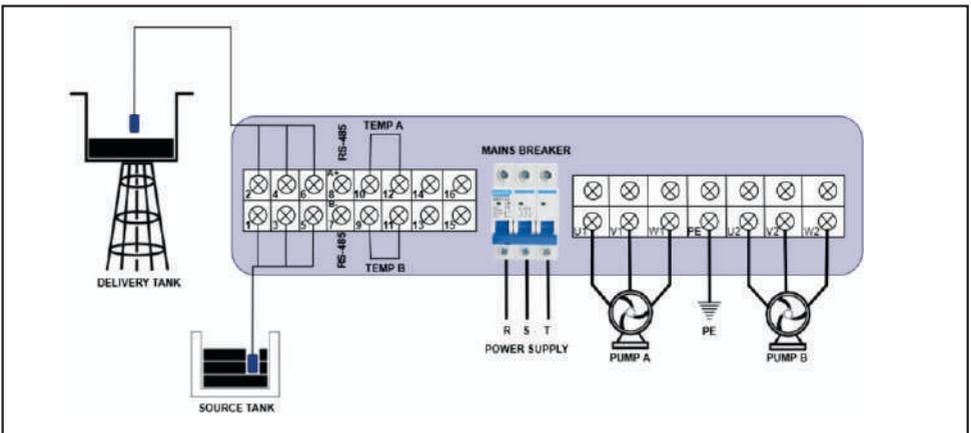


Fig 3: Three Phase Wiring

4.2.2 Single Phase input and output wiring

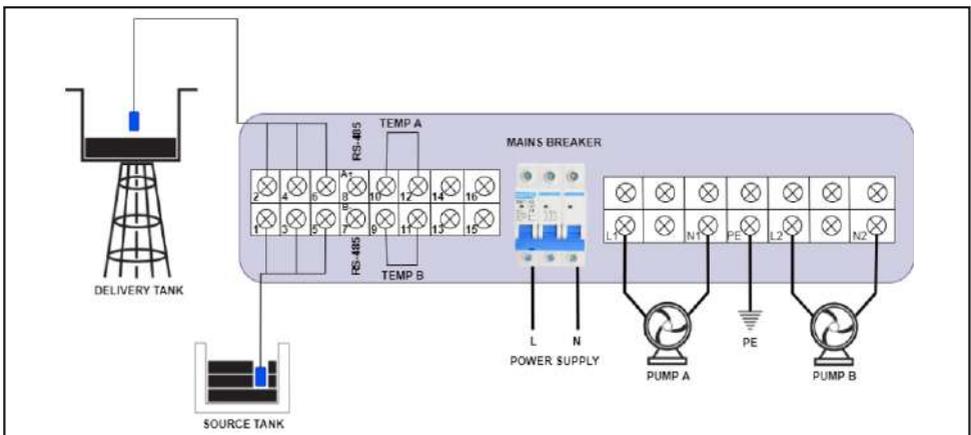


Fig 4: Single Phase Wiring



To avoid the risk of fire, make sure to securely tighten the terminal.



Never connect the AC power to the Motor (U, V, W / L, N) terminals.

4.3 Parameter Calibration and Calibration Clearing

Pump calibration is done to set the running voltage and current for protection of the pump. This is done after the successful pump installation or during pump maintenance.

4.3.1 Parameter Calibration for Pump A and B

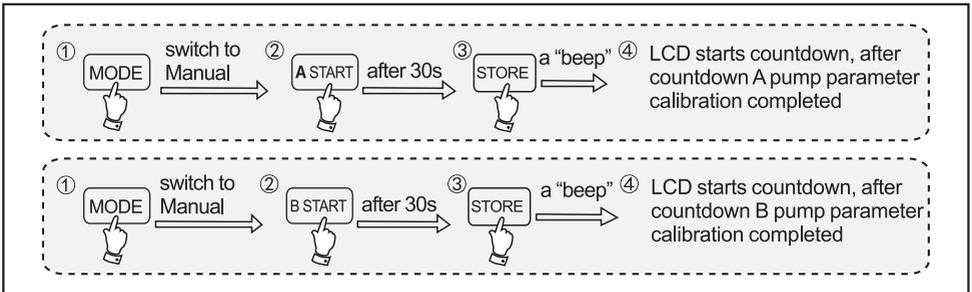


Fig 5: Parameter Calibration

Ensure the pump and all pipe network is functioning normally (including voltage and running current) before pressing **STORE**

4.3.2 Parameter Calibration Clearing for Pump A and B

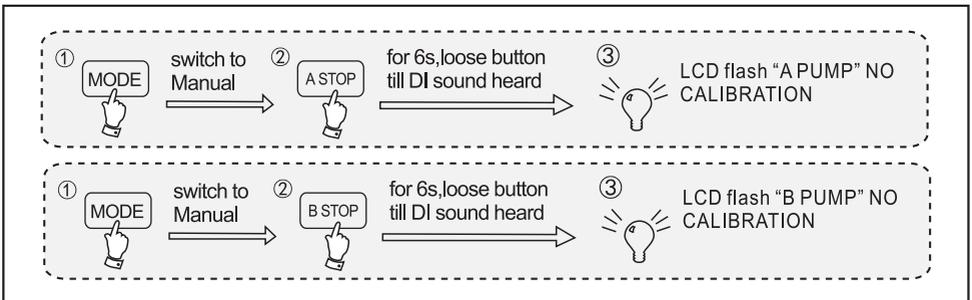


Fig 6: Parameter Calibration Clearing

4.4 Installation of Water level Electrode Probe & Float Switch

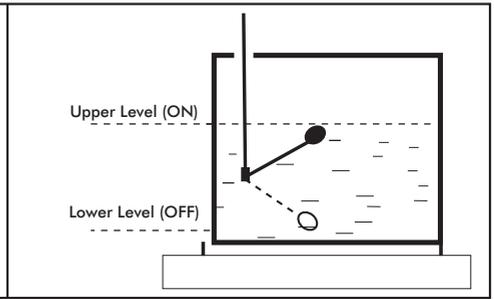
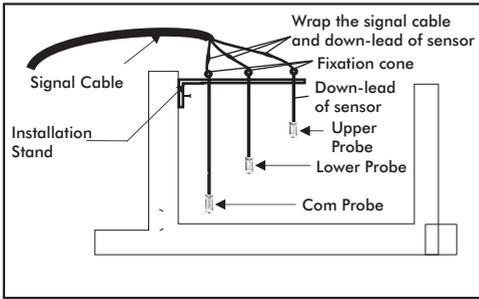


Fig 7: Water Level Electrode (Probe) Installation

Fig 8: Float Switch Installation



In event of high risk of electric storms (lightning) or when liquid medium in well or tank or sump is very dirty it is recommended that a float switch is used.



If the float switch has three wires, use Black and Brown wires. If the float switch has different colors, use a multimeter to identify connections as follows: Low Level - no reading [OFF], High Level - positive reading [ON]



Do not enclose sensor leads, float switch wires or signal cables within metal pipes, instead use PVC or PE tubing.

4.5 Installation of Temperature Sensor

To connect the temperature sensor, the motor must have a thermal switch embedded in the motor windings. Connect the thermal switch with the NC (normally closed) contact.

If the motor doesn't have a thermal switch, the terminals 9, 10 and 10, 12 should be connected using two jumpers.

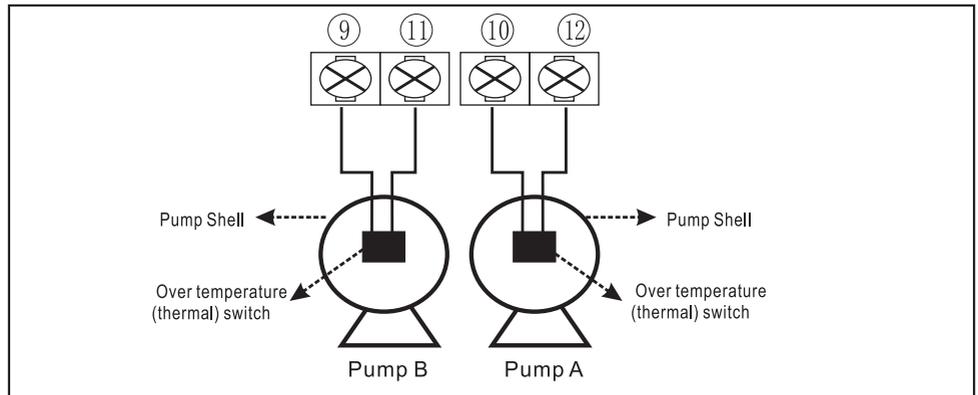


Fig 9: Temperature Sensor Connection

4.6 Function Switch Setting

There are four built-in pump applications that can be configured using this controller.

- Pressure Boosting Mode
- Emptying Mode
- Water Transfer Mode
- Sewage Pump with piggyback float switch Mode

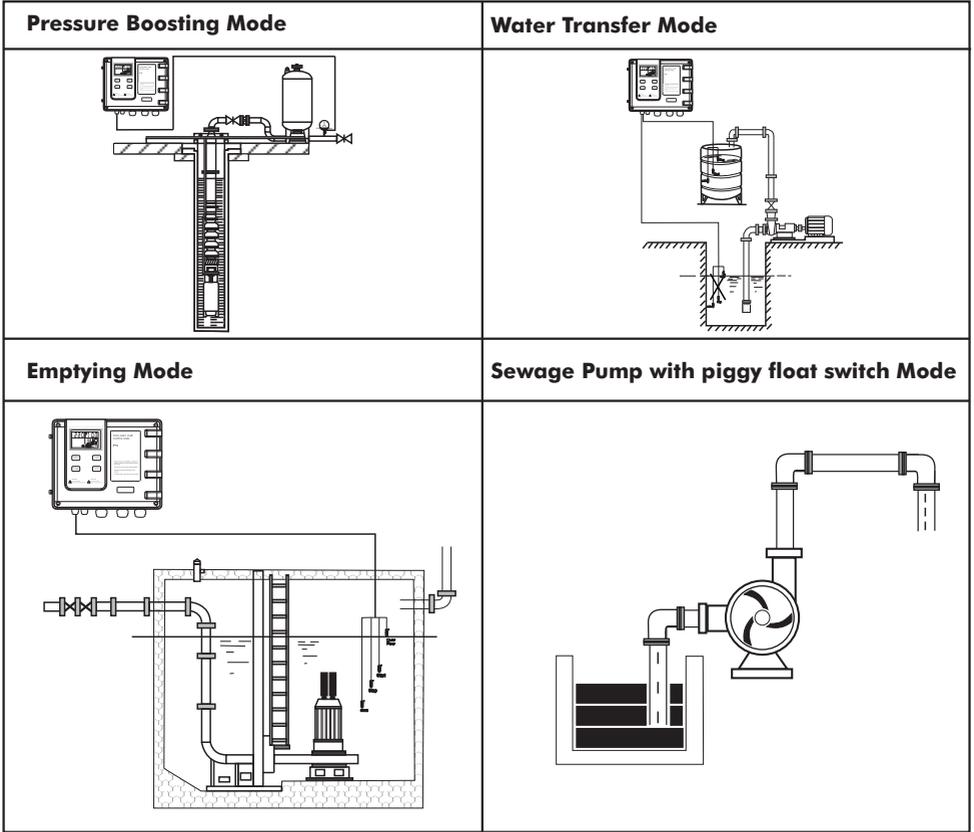


Fig 10: Various Pump Application Mode

The function switch which is located on the door of the controller as shown in Fig 11 is used to set various pump application requirements. The controller should be disconnected from the power supply before changing the switch. Once the configuration is complete, switch ON the controller. Take note of the application display on the LCD if it matches what has been set.

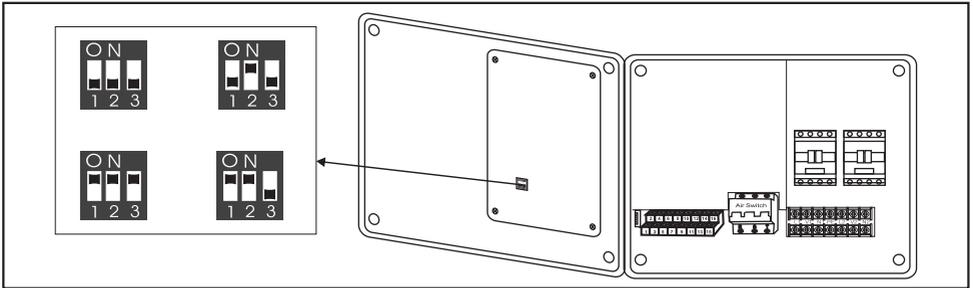


Fig 11: Function Switch Position

Item	Switch Position	Messages & Graphic	Application
Pressure Booster Mode			For booster application using pressure switch and pressure tank. Enables simultaneous operation of two pumps when the pressure demand is high.
Water Transfer Mode			For water supply applications by level control. Enables simultaneous operation of two pumps when there is high demand for water.
Emptying Mode			For irrigation, sewage, or drainage applications. Has an overflow sound alarm. Enables simultaneous operation of two pumps when there is high water level (overflow).
Sewage Pump with piggy float switch Mode			For sewage pump with piggyback float switch.

Fig 12: Function Switch Settings

4.7 Sensor connections for different function switch settings

4.7.1 Pressure Booster Mode

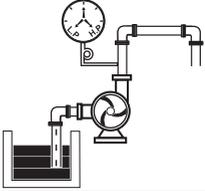
Function Switch Setting	LCD Display
	

Fig 13: Pressure Booster Mode Setting and Display

Operation

- Suppose the pressure setting of Pressure Switch B is higher than Pressure A.
- Pressure switch with N/C (normal close) contact, no pressure, contact is ON; meet the pressure setting, contact point is OFF.
- User can set the pressure value of the two pressure switches by themselves, but there must be pressure difference between pressure switch A&B.

Normal Pressure Demanding

When the Pressure in the pipeline is lower than the setting of pressure switch B, the controller will run a single pump, until the pressure reaches the setpoint of pressure switch B, then the single pump stops running.

When the pressure in the pipeline varies in the range of pressure switch B, the controller will alternate both pumps.

Extra Pressure Demanding

When the pressure in the pipeline is decreasing from the set point of pressure switch A and a single pump is running, the controller will run the second pump, till pressure in the pipeline reaches the setting of pressure switch B, both pumps will not stop running.

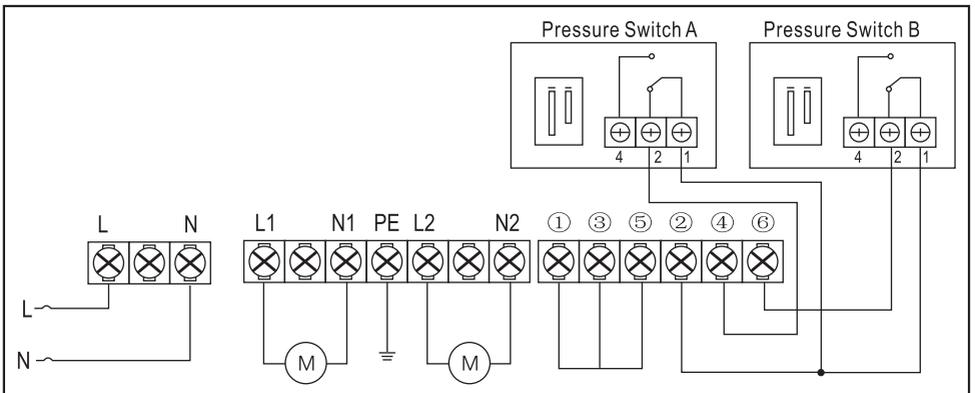


Fig 14: Pressure Booster Mode with Pressure Switches on Delivery Pipeline

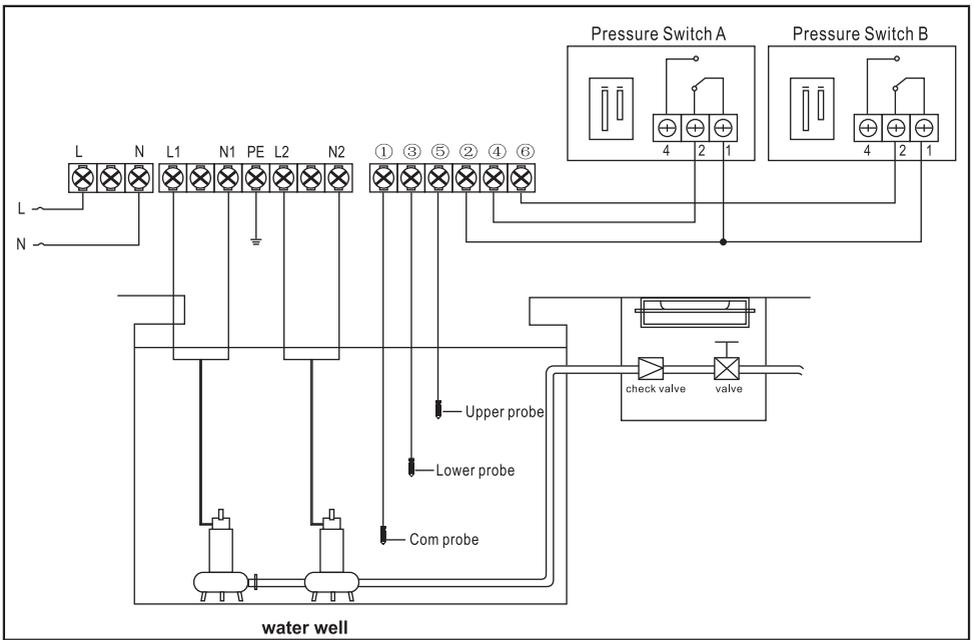


Fig 15: Pressure Booster Mode with Pressure Switches on Delivery Pipeline and Level Electrodes on Source Tank

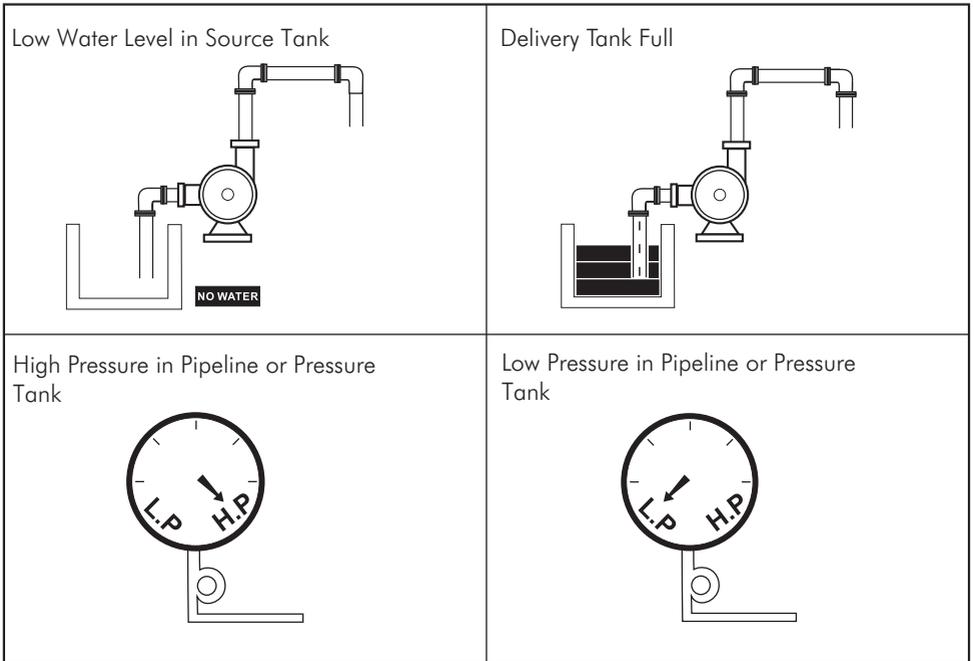


Fig 16: Meaning of Messages and Graphic on LCD

4.7.2 Water Transfer Mode

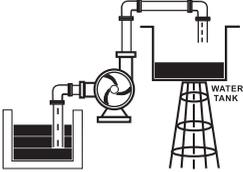
Function switch setting	LCD display
	

Fig 17: Water Transfer Mode Setting and Display

Operation:

Normal Water Demand

Fig 18 and 19 When the delivery tank water level is:

- Lower than Probe 1 (float switch A: Down level), the controller will only run one pump.
- Reaches Probe 4 (float switch A: Up level), the single pump stops running.
- Varies from Probe 1 & Probe 4 (float switch A: Down level Up level Down level), the controller will alternate between the two pumps automatically.

Extra Water Demand

- Decreases to Probe 2 (Float Switch B: Down level), with a single pump running, the controller will run both pumps together until the water level reaches Probe 4 (Float Switch A & B: Up level).

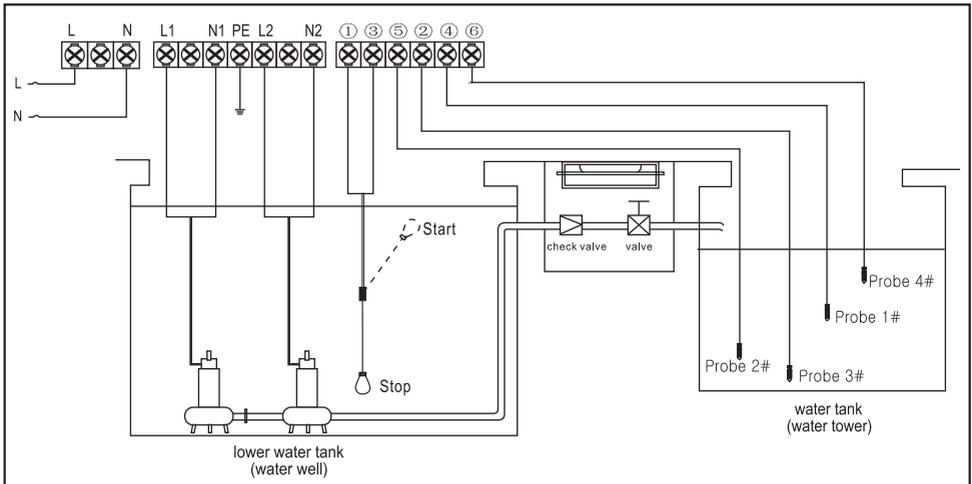


Fig 18: Water Transfer Mode with Delivery Tank Water Level Probes

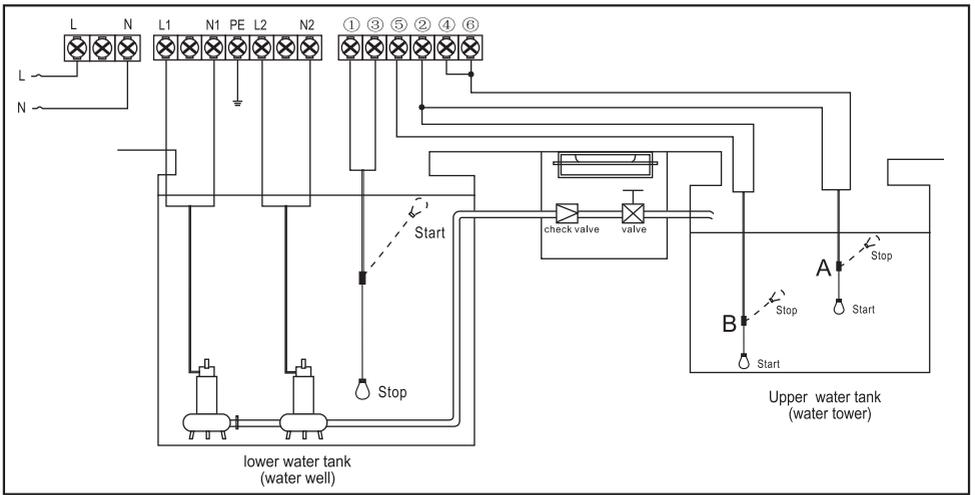


Fig 19: Water Transfer Mode with Delivery Tank Water Level Float Switches

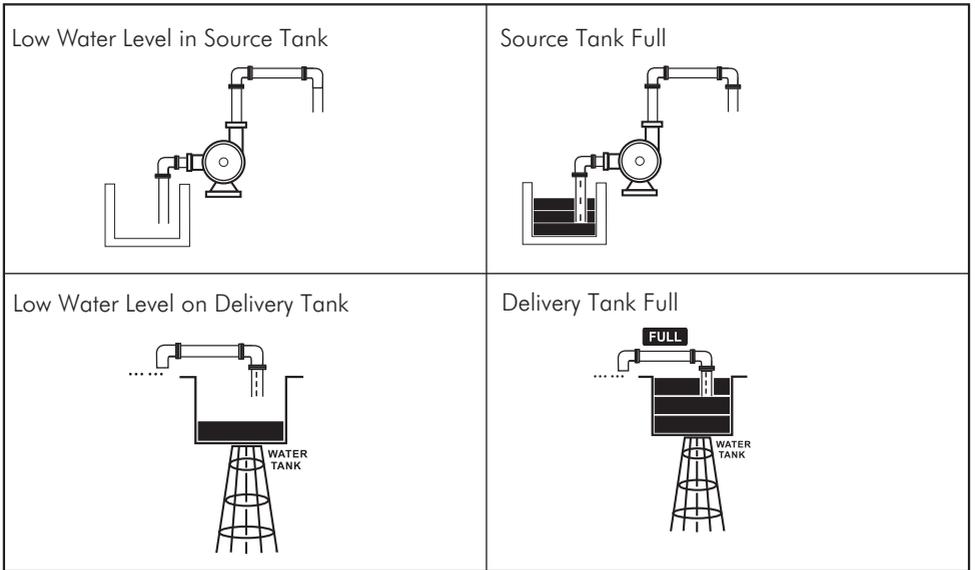


Fig 20: Meaning of Messages and Graphic on LCD

4.7.3 Emptying Mode

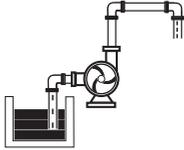
Function Switch Setting	LCD Display
	

Fig 21: Emptying Mode Setting and Display

Operation:

Normal liquid level in the sump

Fig 22 When the water level reaches Probe 3 (Float Switch A: Up Level), the controller will run a single pump; when the water level declines to Probe 2 (Float Switch A: Down Level), the single pump stops running.

When the water level varies from Probe 2 & Probe 3 (Float Switch A: Up level Down level), the controller will alternate the two pumps automatically.

Excess Flow into the Sump

When the water level in the sump rises to Probe 4 (Float Switch B: Up level), and a single pump is running, the controller will run the second pump to drain the water till the level declines to Probe 2 (Float Switch A & B: Down Level), then both pumps stop running.

Overflow in the sump

When the water level in the sump rises to Probe 5 (Float Switch C: Up level), the controller will sound a warning alarm and run both pumps simultaneously. When water level declines to Probe 5 (Float Switch C Down Level), the controller stops sounding warning alarm.

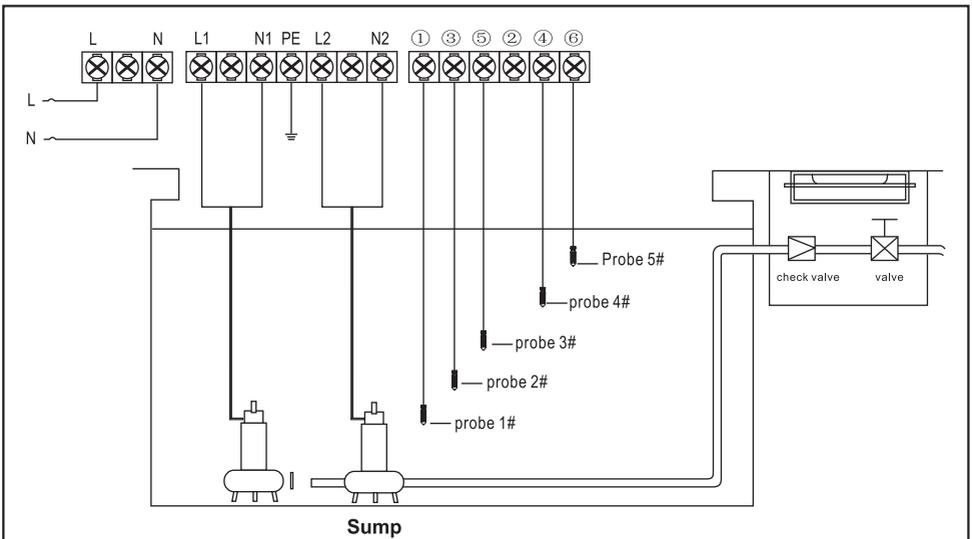


Fig 22: Emptying Mode with Level Electrodes at Source Tank

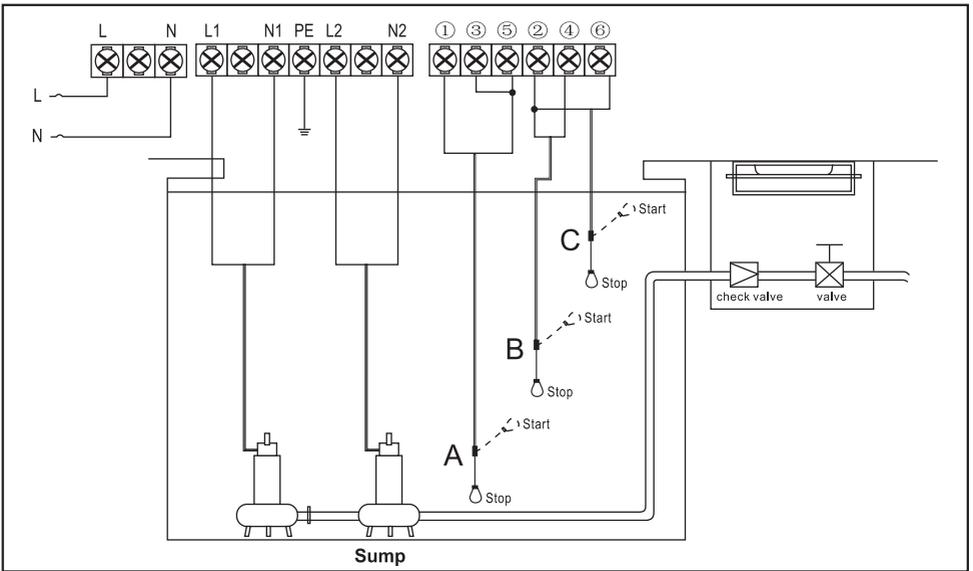


Fig 23: Emptying Mode with Float Switches at Source Tank

Auto Patrol (Anti-rust) Function

Auto Patrol function is a pump shaft antirust protection that helps protect the drainage / sewage pump from rust and the impeller being jammed due to extended periods of inactivity.

In Auto Mode, if the SmartCon Controller detects that both pumps have been inactive for 10 days, each pump will be run for 3 seconds and then stopped, with a 10-second

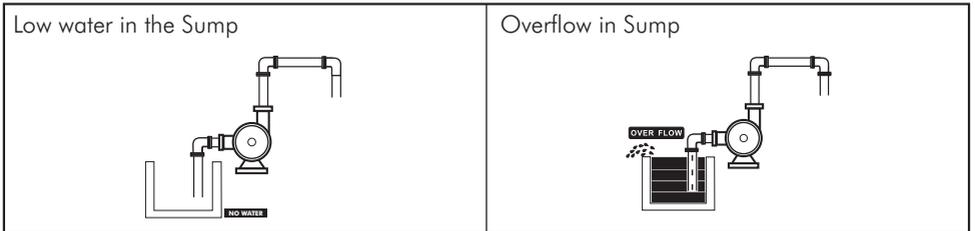


Fig 24: Meaning of Messages and Graphic on LCD

4.7.4 Sewage Pump with piggyback float switch mode

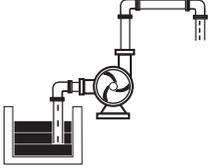
Function switch setting	LCD display
	

Fig 25: Sewage Pump Mode Setting and Display

Operation:

- Main pump and standby pump automatically alternate due to water level sensor position**

When water level raises and float switch A/B rise to up level, controller will run pump A. Water level falls and float switch A/B decline to down level, pump A stops. When the water level rises again and float switch A/B rises to up level, controller will alternate to run pump B.
- Automatic changeover due to pump fault.**

When pump A breaks down during operation, controller will run pump B.
- Pump parallel operation**

When pump A is running, the water level raises and float switch C rises to up level, controller will run pump B.

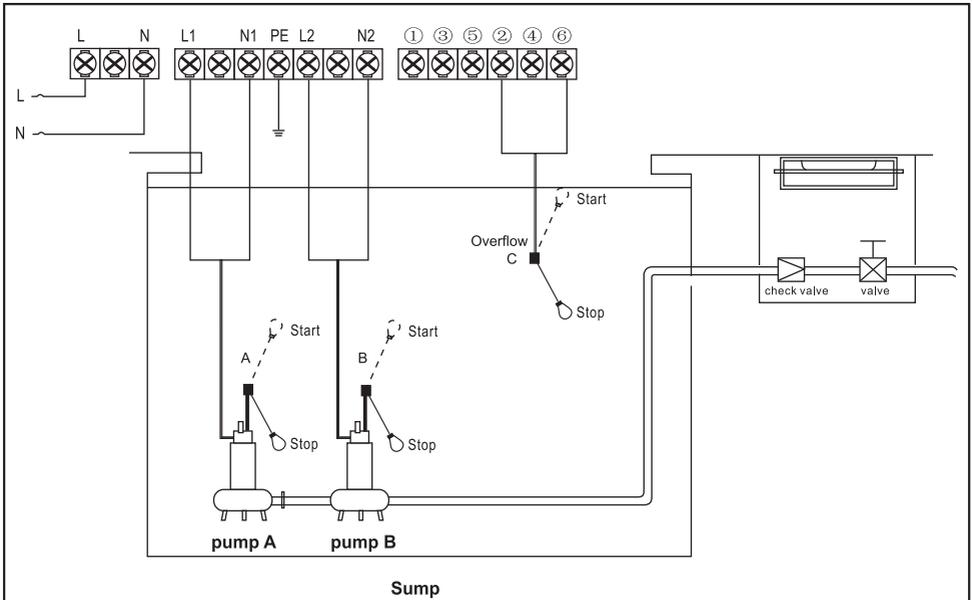


Fig 26: Sewage Pump with Piggy Float Switch Connection

Overflow in Sump Tank

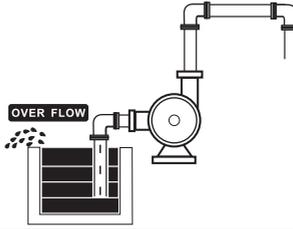


Fig 27: Meaning of Messages and Graphic on LCD

5. OPERATION

5.1 MANUAL and AUTO mode

Press the **MODE** key to switch between the Manual and Auto mode.

In **Manual mode**, the operator can run individual pumps by pressing **A START** / **B START** keys and pressing **A STOP** / **B STOP** keys to stop individual pumps. In this mode, the controller cannot respond to the water level sensors and / or pressure switch to start / stop the pumps.

In **Auto mode**, the controller will run / stop the pumps according to the signals from the water level sensors and/or pressure switch. In this mode, if the pumps are running and the operator wants to stop them, they have to switch to manual mode by pressing the **MODE** key.



When input power is cut off from the controller and reconnected, the controller will attempt to resume pump operation after 10 seconds count down.

5.2 Pump Operation

While the pump(s) is in operation, in case of occurrences like dry run, overload, under voltage, and other failures, the controller will immediately stop the pump(s). The controller will not restart the pump automatically until all the fault(s) have been cleared. Once this is cleared, the controller will attempt to restart the pump after a built-in time delay has elapsed.

If the pump is stalled, open phase etc., serious failures happen, operator must check the pump and motor and repair.

5.3 Historical Fault Display

The controller displays the last five faults. To view this, ensure the pump(s) is not running. Press the **MODE** key to switch to manual mode as per Fig 27. Press and hold the **STORE** key and **A STOP** key simultaneously until the controller make a sound. This will display the current fault for Pump A, Fig 28.

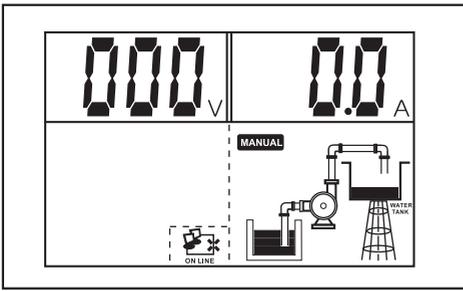


Fig 28: Manual Mode

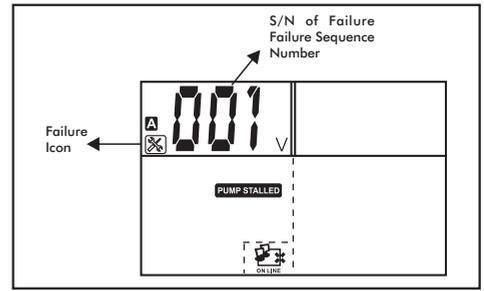


Fig 29: The last failure of Pump A



To display Pump B faults, use the instructions as above, but press **A STOP instead **B STOP** .**

5.4 Pump Running Hours Display

The controller displays the pump(s) accumulated running hours. To view this, ensure the pump(s) is not running. Press the **MODE** key to switch to manual mode as per Fig 29. Press and hold the **STORE** key and **A STOP** key simultaneously until the controller make a sound. This will display the current fault for Pump A, Fig 30.

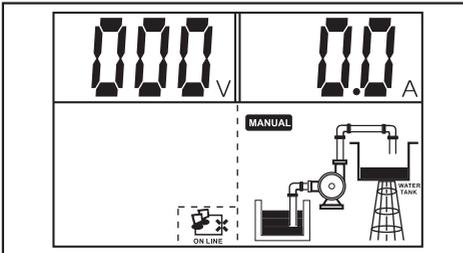


Fig 30: Manual Mode

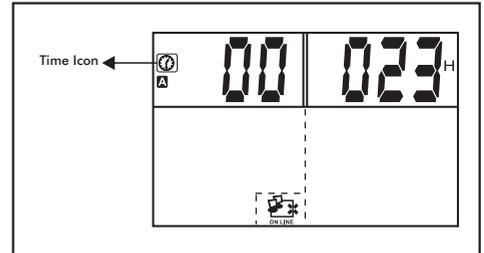


Fig 31: Runs hours for Pump A



To display Pump B run hours, use the instructions as above, but press **B STOP instead **A STOP** .**

5.5 Communication Link and Remote Monitoring

Smartcon 2 comes with an inbuilt communication interface (Modbus RS485) that can be used to integrate the controller to external Building Management Systems or iDayliff IoT. Please contact Dayliff for more information on the integration.

6. TROUBLE SHOOTING

PROBLEM	POSSIBLE CAUSE	SOLUTION
Flashing UNDER V	The pump motor running voltage is lower than the calibrated voltage, pump	<p>Report low line voltage to the power utility company</p> <p>Controller will attempt to restart the pump every 5 minutes until line voltage is restored to normal</p>
Flashing of PUMP STALLED	Pump motor running current higher than the normal running calibrated current by more than 200%	Cut off power supply & repair or replace pump immediately
Flashing of OVERLOAD	<p>The motor running current is higher than the calibrated current, pump is in over load protection state</p> <p>Pump impeller is jammed / pump motor dragging / pump bearing broken.</p>	<p>Controller will attempt to restart the pump every 30 minutes until running ampere is restored to normal</p> <p>Check pump impeller or bearing</p>
Flashing of PUMP NO CALIBRATION	Parameter calibration not completed	Cut off power supply & repair or replace pump
Flashing of DRY RUN	Low source water level in the well/ sump, pump stops running	Controller will attempt to restart the pump every 30 minutes until source water level is above the pump intake
Flashing of REPEATED START	Pump starts more than 5 times per minute.	<p>The most common cause for the rapid cycle condition is a waterlogged tank.</p> <p>Check for a leakages in the water tank. Check the air volume control or sniffer valve for proper operation</p> <p>Check the setting on the pressure switch and examine for defects.</p> <p>Cut off the power supply & repair the water tank, pressure switch or valve</p>

PROBLEM**POSSIBLE CAUSE****SOLUTION**

Flashing
OVER V

The running voltage is higher than the calibrated voltage, pump is in over voltage protection state

Report high line voltage to the power utility company

Controller will attempt to restart the pump every 5 minutes until line voltage is restored to normal

Flashing of
OPEN PHASE

Power supply phase loss

Report to the power utility company

Loose wires or no connections on the controller and/or pump

Check and reconnect power and pump cable

Flashing of
THREE PHASE UNBALANCE

The voltage between three phase(R/S/T) is not same and the difference is more than $\pm 15\%$

Report to the power utility company

Controller will attempt to restart the pump every 5 minutes until the voltage between three phases is restored to normal

Flashing of
PHASE REVERSAL

Phase sequence of the three phase input voltage (R/S/T) is not uniform

Change the sequence of the three phase (R/S/T)

Flashing of
OVER TEMP

The temperature in the motor winding is high and the thermal switch contact is open

Wait for the motor winding temperature to cool down the thermal switch is open.



No communication link between computer and controller

Connecting the controller to SC /computer for remote monitoring

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

The warranty on equipment supplied or installed by others is conditional upon the defective unit **being promptly returned free to a Davis & Shirliff 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 & Shirliff**

for enquiries contact

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P.O. Box 41762 - 00100, Nairobi, Kenya

Tel: 6968000/ 0711 079 000

or visit

www.davisandshirliff.com

for details of the nearest branch or stockist