

DPC 1-1 CSCR

Installation & Operating Instruction

DPC CSCR- For Single Phase Pumps, 0.37-2.2 kW



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SAFETY

Following are the safety instructions which must be followed by the service partners or user while installing and operating. If ignored, physical injury or even death may happen. Read the safety instructions before handling the system.

WARNING

If these safety instructions are not observed, it may result in personal injury.

- Before carrying out any installation or maintenance operation, controller must be disconnected from the power supply.
- Don't open the cover while the pump is running.
- Don't put wire, metal bar lument etc. into the controller.

CAUTION

If these safety instructions are not observed, it may result in malfunction or damage of the equipment.

- All electrical connections must be carried out by a skilled and qualified personnel.
- Never connect AC power to output L1,C,N terminals.
- Ensure the motor, controller, capacitor ratings match the output power.



NOTE

(Notes or attention to ensure safe operation)

IMPORTANT

The manufacturer is not liable for malfunctioning if the product is not correctly installed or damaged, modified and/or put to run beyond the working range as given in this manual.

The manufacturer reserves the right to make any modifications to this product from time to time.

INTRODUCTION

DPC CSCR is Digital Pump Controller, which is easy to use, programmable device for single phase pump, which require both starting capacitor and running capacitor. It can be used to control the pumps from 0.37 to 2.2 kW rating.

APPLICATION

DPC CSCR is very useful in water and wastewater applications, be it water transfer, tank filling, tank emptying or even pressure boosting in Hydro-pneumatic applications. It is ideal choice in residential, industrial or institutional segments where water and energy conservation is of utmost importance.

FEATURES

- ◆ LCD screen displays pump running information
- ◆ Over load protection
- ◆ Motor stalled protection
- ◆ Dry run protection without installing a float switch
- ◆ Under voltage protection
- ◆ Over voltage protection
- ◆ Transient surge protection
- ◆ Memory function when power off & power recovery
- ◆ Visual & audio alarm for fault prompt
- ◆ DIP switch settings to make it suitable for different applications like water supply, drainage or pressure boosting
- ◆ Auto/Manual switch
- ◆ Liquid level probes/ floats (in case of fully automatic models) for clear water
- ◆ Total run hours
- ◆ Last five fault records
- ◆ RS 485 Modbus communication

PARAMETER AND SPECIFICATIONS:

Following chart shows main technical parameters & specifications:

Main technical characteristics	
Control characteristic	Level control (with probes for clear water or with floats) Pressure control (with pressure switch)
Working modes	Manual/Auto
Main technical data	
Rated output power	0.37 to 2.2 kW
Rated input voltage	AC 220V/ 50 or 60 Hz/ Single Phase
Trip response time of over load	5sec - 5min
Trip response time of pump stalled	Less than 0.5 sec
Trip response time short circuit	Less than 0.1 sec
Trip response time of under/over voltage	Less than 5 sec
Trip response time of dry run	6 sec (or this can be set manually)
Recovery time of over load	30 min
Recovery time of under/over voltage	5 min
Recovery time of dry run	30 min (or this can be set manually)
Trip voltage of over voltage	+ 15% of rated input voltage
Trip voltage of under voltage	- 15% of rated input voltage
Trip current of dry run	85% of rated current (adjustable)
Trip current of pump stalled	170% of rated current (adjustable)
PROTECTIONS COVERED	DRY RUN (without float/probe)
	Overload (auto calibrated or can be set)
	Transient surge
	Under voltage
	Over voltage
	Pump stalled
Short circuit	
Other technical data	
Permissible ambient temperature	Up to 55 Deg C
Degree of protection	IP 55
Install position	Vertical
Unit dimensions (L X W X H)	380 x 280 x 130 mm
Unit weight	5.5 Kg

INSTALLATION

Please read this manual carefully before starting installation and operation. Any damage to the equipment caused due to failure to comply with the descriptions in this manual in installation or operation will be beyond the scope of the company's quality guarantee.

TOOLS USED IN CONTROLLER INSTALLATION

Controller installation and wiring will need the following tools. You also can choose the right tools according to your own experience.



ELECTRIC DRILL



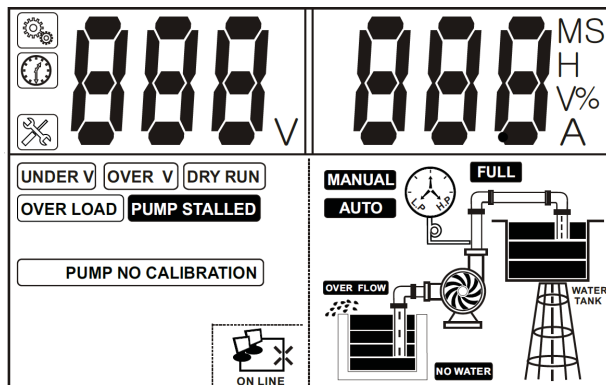
CRIMPING PLIER



CROSS SCREWDRIVER

CONTROLLER COMPONENTS:

LCD Screen



MEANING OF THE ICONS SHOWN ON THE LCD



The parameter configuration icon, when this icon appears, controller is in manual parameter adjustment mode.

Time displaying icon, when this icon appears, it means controller is displaying some parameter of time, eg: pump dry run trip time(units: seconds)



Pump fault icon, when this icon appears, it means controller is displaying some fault condition

Voltage

V

M

Minute

Second

S

H

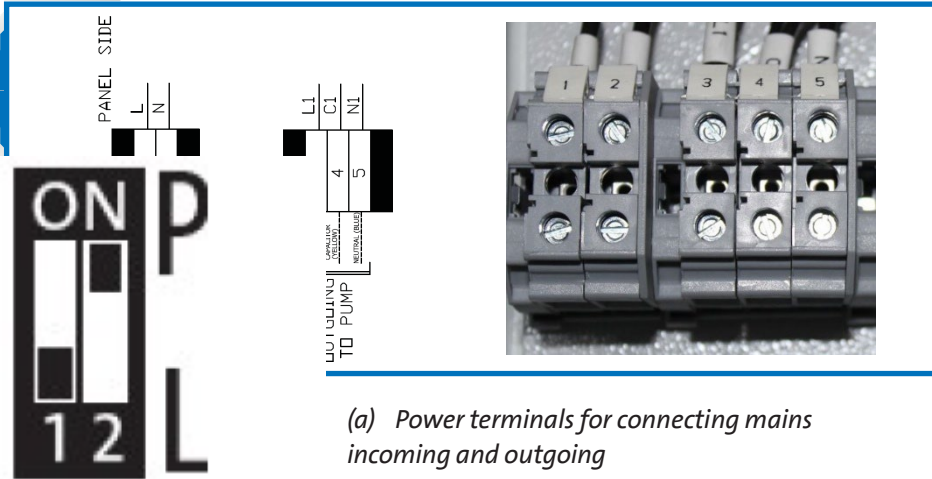
Hour

Ampere

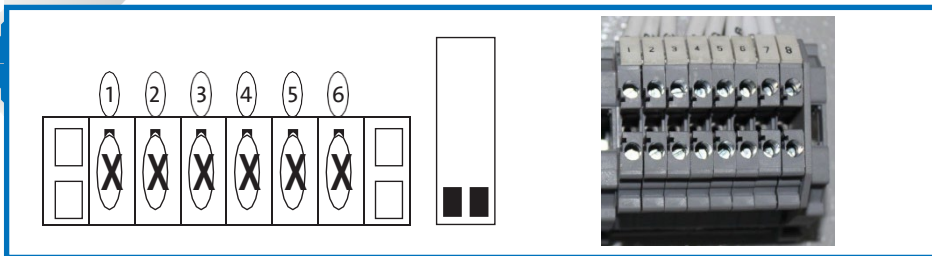
A

Terminals

Power terminals



Control terminals



DIP switch settings

Users can set the function switch to suit different applications. Before setting the function switch; the unit should be disconnected from the power supply. After completing the settings of dip switches, power may be applied to the unit. Following signs will be displayed in voltage displaying area on the LCD conforming to the following list.

S.NO	SWITCH POSITION	MESSAGES & IN VOLTAGE DISPLAYING AREA	DESCRIPTION
1		000	Applied for water supply by liquid level control through probe/float switch
2		222	Applied for water supply by pressure control through pressure switch & pressure tank
3		111	Applied for drainage by liquid level control through float switch

PARAMETER-CALIBRATION AND ERASING

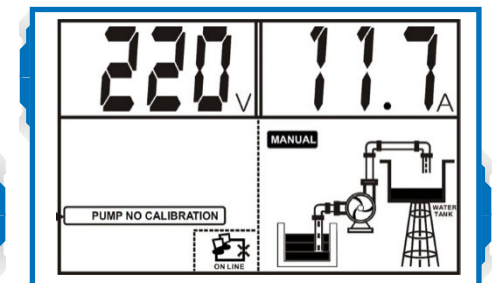
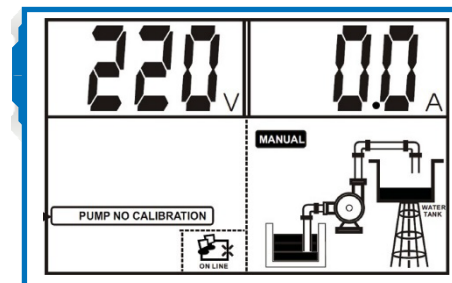
In order to achieve best performance of the controller and for providing maximum protection to the pump, it is essential that parameter calibration is done at the time of installation itself or after pump is repaired and installed back.

CALIBRATION:

Setting of parameters (calibration of unit according to the connected load):

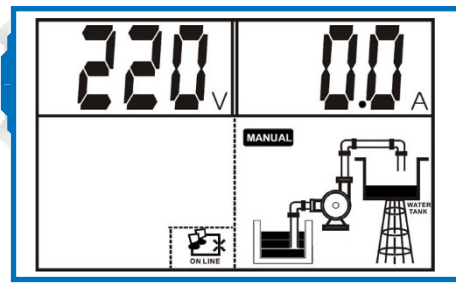
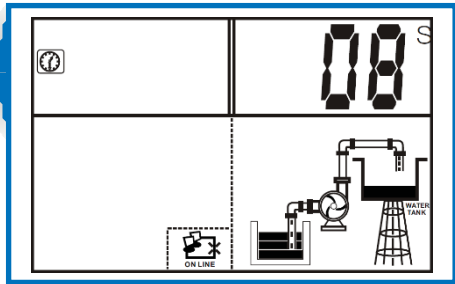
Press the **MODE** key to switch to manual mode. Make sure the pump is not running and LCD screen looks as below

Press the **START** key to run the pump, confirm the pump is running OK and drawing rated current. Also confirm the mains supply is healthy and incoming voltage is normal, LCD screen will display voltage and current being drawn by pump:



Again press **START** key approximately for 3 secs and release when the unit makes a “Beep” sound and a countdown timer starts on the LCD screen as shown below

Pump stops running and parameter calibration completed, and LCD screen looks as below



ERASING:

This needs to be carried out whenever pump is repaired or a new pump is installed, previous parameters needs to be erased before the unit is re-calibrated.

Follow the below instructions to erase the parameter calibration:

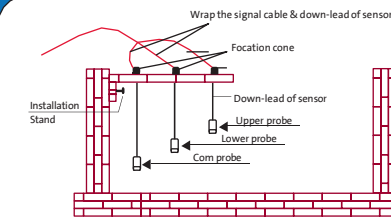
- 1 Press the **MODE** key to switch to manual mode. make sure the pump is not running.
- 2 Press the **STOP** key approximately for 3 secs and release when the unit makes a “Beep” sound.

Unit is now back to factory settings, “NO CALIBER” sign will start flashing on the LCD screen. For re-calibration, follow the instruction as given in “CALIBRATION” section.

CONNECTIONS-CONTROLS DEVICES AND APPLICATIONS

INSTALLING LIQUID LEVEL PROBES SWITCH:

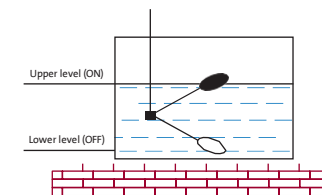
LIQUID PROBE INSTALLATION



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

(c) Liquid level probe installation

FLOAT SWITCH INSTALLATION



If the float switch is equipped with three wires use the **BLACK** and **BROWN** wires. In event of different colours use a multimeter to identify correct connections as follows:

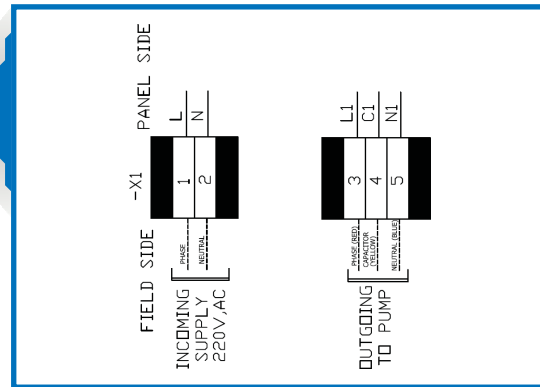
Low level no reading OFF
Upper level-positive reading ON

(d) Float switch installation



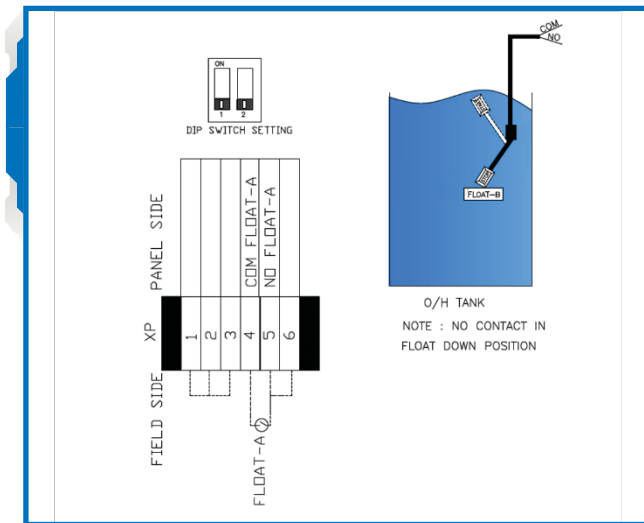
NOTE: For all applications, connect the "NO" contact of float switch in down position.

POWER CONNECTIONS:



CONTROL PCB CONNECTIONS:

Water Supply

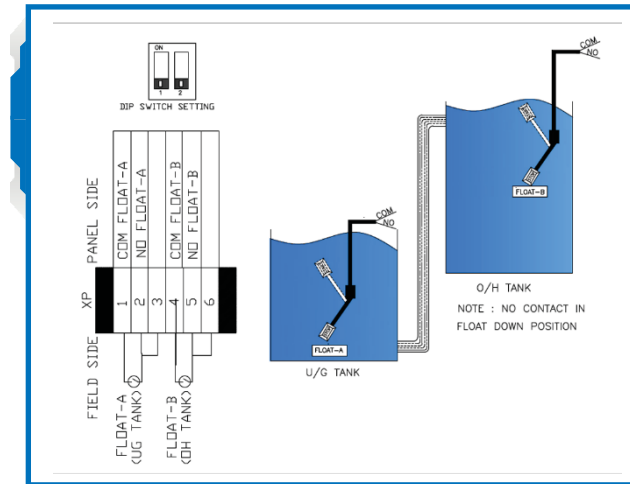


(e) Direct OH tank filling (using 1 float switch)

Short terminals 1,2,3. Connect common of float switch in terminal 4, connect NO contact of float switch in terminal 5. Short terminals 5,6.

Start Condition: If the water level in the OH tank falls and Float switch is in down position, the pump starts. LCD screen displays RUN indicating pump is running.

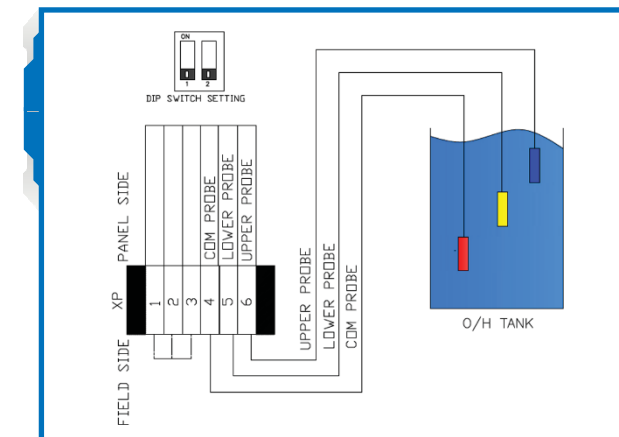
Stop Condition: If the water level in the OH tank rises and Float switch is in up position, the pump stops. LCD screen displays FULL, indicating OH tank is full.



(f) Water transfer UG tank to OH tank (using two float switches)

Start Condition: If the water level in OH tank falls and the Float switch in OH tank is in down position and the water level in UG tank is high and the Float switch in UG tank is in up position the pump starts. LCD screen displays RUN indicating pump is running.

Stop Condition: If the water level in the OH tank rises and Float switch in OH tank is in up position, the pump stops. LCD screen displays FULL, indicating OH tank is full.



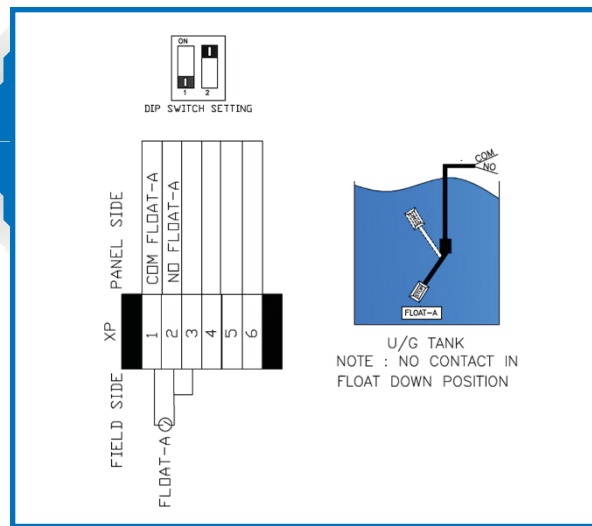
(g) Direct OH tank filling (using 1 liquid level probe)

Short terminals 1,2,3. Connect common liquid level probe in terminal no. 4 which is placed at the bottom of the tank touching the surface. Connect the lower liquid level probe in terminal no. 5 (this should be ideally at the level where the pump is desired to run). Connect the upper liquid level probe in terminal no. 6 (this should be ideally at the level where the pump is desired to stop ie. Tank should be full).

Start Condition: If the water level in the OH tank falls below the lower liquid level probe, the pump starts. LCD screen displays RUN indicating pump is running.

Stop Condition: If the water level in the OH tank rises above the upper liquid level probe, the pump stops. LCD screen displays FULL, indicating OH tank is full.

Drainage / De-watering

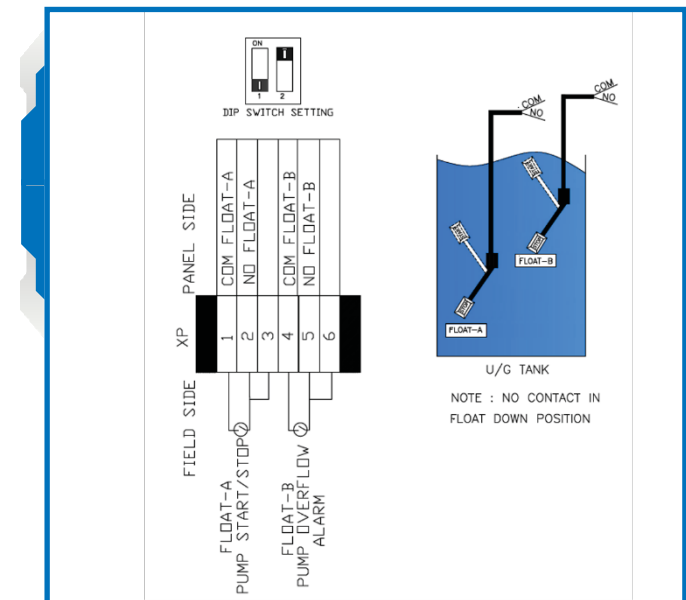


(h) Using 1 float switch - for pump start & stop

Connect common of Float switch to terminal 1, connect NO point of Float switch to terminal 2. Short terminals 2,3. Kindly ensure terminals 4,5,6 are open.

Start condition: If the water level in the pit/tank rises and the float switch is in up position, the pump starts. LCD screen displays RUN indicating pump is running.

Stop condition: If the water level in the pit/tank decreases and the float switch in down position, the pump stops. LCD screen displays NO WATER, indicating there is no liquid level in pit/tank.



(i) Using 2 float switches – for pump start & stop and overflow alarm (level-2)

Connect common of Float Switch A to terminal 1, connect NO point of Float switch A to terminal 2. Short terminals 2,3

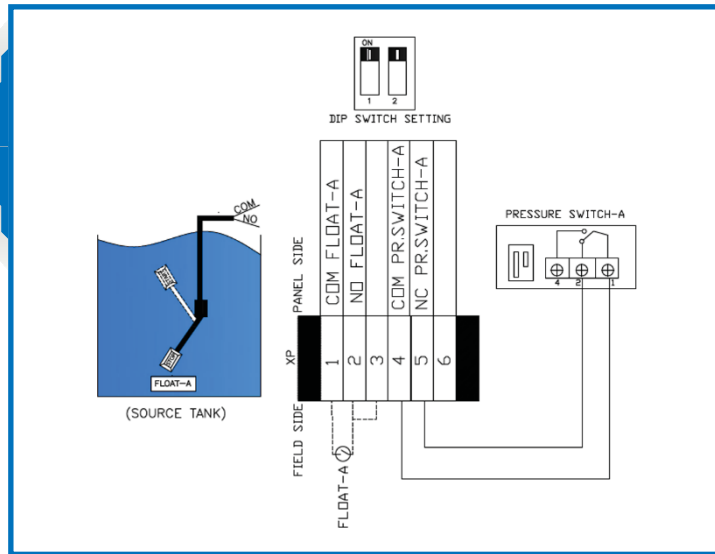
Connect common of Float Switch B to terminal 4, connect NO point of Float switch B to terminal 6. Kindly ensure terminal 5 is open.

Start condition: If the water level in the pit/tank rises and the float switch is in up position, the pump starts. LCD screen displays RUN indicating that the pump is running.

Stop condition: If the water level in the pit/tank decreases and the float switch in down position, the pump stops. LCD screen displays NO WATER, indicating there is no liquid level in pit/tank.

Alarm condition: If the water level in the pit/tank rises even further despite pump running and Float switch (Level-2) is in up position, there is an audio-visual alarm. LCD screen displays OVERFLOW indicating that liquid level in the pit/tank has reached Overflow level.

Pressure Boosting



Pressure switch & 1 float switch

Note: If there is no UG tank/ source tank then short terminal 1, 2 and 3

Connect common of Float switch of source tank in terminal 1, connect NO point of this float switch in terminal 2. Short terminals 2,3.

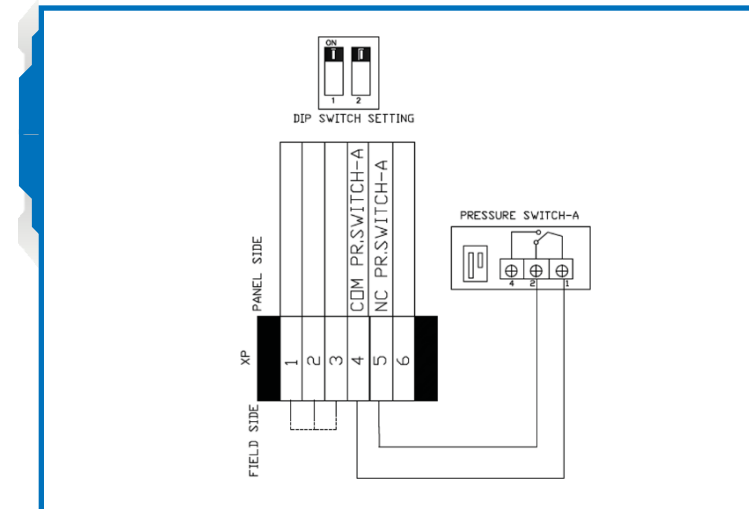
Connect common of Pressure Switch in terminal 4, connect NC point of this pressure switch in terminal 5. Kindly ensure terminal 6 is open.

Start condition: If the water level in source tank is high and the float switch in the source tank is in up position and the Pressure in the line is below the cut-in pressure setting on the pressure switch the pump starts. LCD screen displays RUN indicating pump is running

Stop Condition:

If the water level in the source tank is low and the Float switch in the source tank is in down position, the pump stops. LCD screen displays NO WATER, that means there is no water in the source tank and can lead to a dry run situation.

If the Pressure in the line is equal to or above the cut-out pressure setting on the pressure switch installed, the pump stops. LCD screen displays FULL, that means there is no demand of water.



(k) Using 1 pressure switch

Short terminals 1,2,3. Connect common of Pressure Switch in terminal 4, connect NC point of this pressure switch in terminal 5. Kindly ensure terminal 6 is open.

Start condition: If the water level in source tank is high and the float switch in the source tank is in up position and the Pressure in the line is below the cut-in pressure setting on the pressure switch the pump starts. LCD screen displays RUN indicating pump is running

Stop Condition: If the Pressure in the line is equal to or above the cut-out pressure setting on the pressure switch installed, the pump stops. LCD screen displays FULL, that means there is no demand of water.

BASIC OPERATION

MANUAL MODE:

Press the **MODE** key to switch to manual mode. Once the unit is in **MANUAL** mode, press the **START** key to run pump, press the **STOP** key to stop pump.

NOTE: In manual state, the unit doesn't receive signal from float switch or pressure switch.

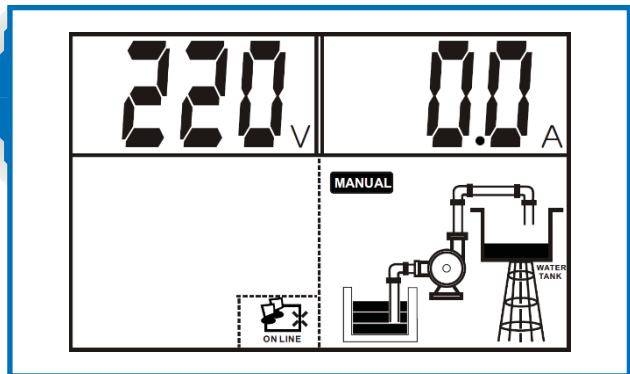
AUTO MODE:

Press the **MODE** key to switch to auto mode. Once the unit is in **AUTO** mode, the pump will start or stop according to the signal from sensor, float switch or pressure switch.

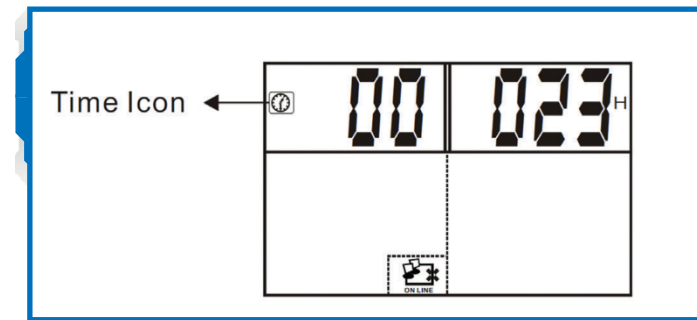
Displaying Run Hours of The Pump:

The controller can memorize hours the pump has run, so it is very convenient for the pump users to analyse pump running condition and perform maintenance.

Press MODE key to switch to manual state, make sure the pump is not running.



Press and hold STOP key and then press STORE key, the product makes a “Beep” sound and displays run hours of the pump since the pump was last calibrated.

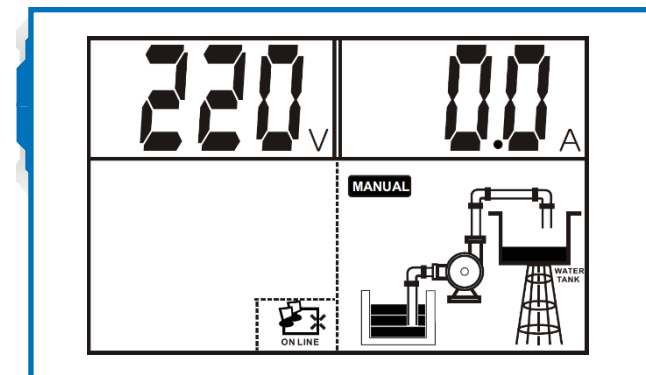


Press STOP key to exist the run hours display screen.

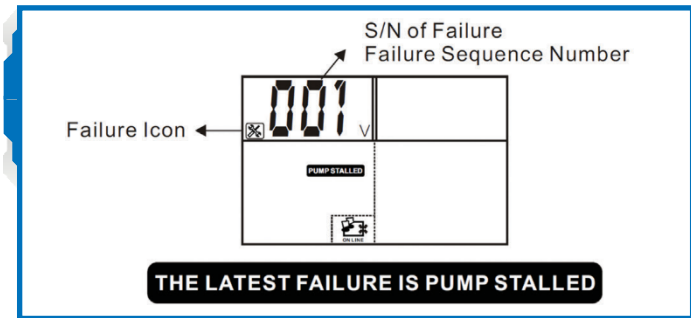
Displaying last five fault records

The controller can memorize the last five failures of pump, so it is very convenient for the pump users to analyse the pump running conditions and fault trend.

Press the MODE key to switch to manual state, make sure the pump is not running and LCD screen displays as below:



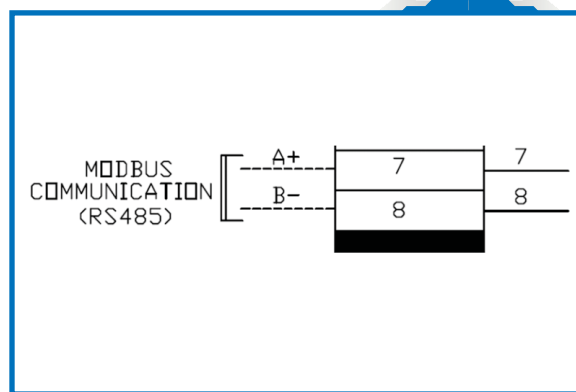
Press and hold the STOP key and MODE key together, the controller makes a “Beep” sound and the product displays last five fault records.



Press mode key to go to the next fault.

Press the STOP key to exit the fault record display screen.

Communication link:



The controller has communication interface, between the pump controller and computer/SCADA/BMS, users can realize a long-distance monitoring function.

In case the controller is installed in the basement and the user requires to monitor and control the pump on the ground or in a control room.

Basic Function:

Computer/SCADA/BMS (Optional) with communication interface can realize long distance monitoring. In the control room, users can realize all the functions of the master controller through the slave controller, except parameter calibration and adjusting.

Special Application:

As adopting communication interface, the communication distance through wire is less than 1200 meters, whereas for a longer communication distance like mine, water tower, across railway road and bridge etc., users can adopt RS485 extender.

Technical Parameters:

The following chart shows main technical parameters of communication between the pump controller and Computer/SCADA/BMS.

Main Technical Data	
physical interface	RS485 Bus interface: asynchronous semi duplex
Data format	1 start bit, 8 data bit, 1 stop bit, no verify
	1 start bit, 8 data bit, 2 stop bit, no verify
	Default: 1 start bit, 8 data bit, 1 stop bit no verify
Baud rate	1200,2400,4800,9600 bps (default 9600bps)
	Setting range of controller address: 1-126
	127: broadcast address, host computer broadcasting,
	Slave machine response forbidden
Protocol type	MODBUS protocol (RTU)
Rated input voltage for SC	AC 240V/50Hz, single phase
Main Installation Data	
Wire communication distance	1200 meters max by shield twisted pair cable (STP) FOR RS485 & CAN 5000 meters max by shield twisted pair cable (STP) and RS485 extender
STP	STP - 120U one pair 20AWG for RS485 & CAN
RS485 extender	5000 meters (9600bps)

NOTE:

- In AUTO mode, if the pump is running and user wants to stop the pump, press the MODE key to switch to MANUAL mode and pump will stop running.
- In **AUTO** mode, if the input power gets cut off and when the supply gets restored, the unit will start operating after 10 seconds automatically.
- No matter the unit is in **AUTO OR MANUAL** mode, the unit will resume operation in same mode when the power supply gets recovered after a cut off.

FAULTS AND PROTECTION:

During pump running, if dry run, overload, under voltage, over voltage etc. failures happens, the control unit immediately stops the pump, displays it on the LCD screen and automatically executes a check for restarting conditions after a built in time delay has elapsed. The control unit recovers automatically until all the abnormal conditions have been cleared. However, the recovery time of the control unit is different for different faults.

Details of recovery times for each fault have already been explained in this manual. Recovery time of dry run can be altered and set as per needs. However, recovery time of overload and under/over voltage cannot be altered as it is fixed at 30 minutes and 5 minutes respectively.



NOTE: To reset immediately without waiting for recovery time, cut off power supply and again switch on.

MEANING OF THE MESSAGES AND GRAPHIC SHOWN ON THE LCD SCREEN:

Application: Water Supply/transfer (Using Probes Or Floats)

FULL

Liquid level in the upper water tank reaches upper probe or float switch in up position, pump stop running

DRY RUN

Liquid level in the borewell or lower tank is below pump intake, pump stop running

NO WATER

Liquid level in the lower water tank/water well is below lower sensor/probe (float switch in down position)

Application: sewage/drainage (USING FLOATS)

FULL

When “float switch A” is at up position, pump start running

DRY RUN

Liquid level in the sump is below the pump inlet, pump stop running

NO WATER

When “float switch A” is at down position, pump stop

OVER FLOW

When “float switch B” is at up position, control panel sends overflow alarm

Application: pressure Boosting (Using Pressure Switch)

FULL

If there is full pressure in the pipeline or pressure tank, contact point of pressure switch is OFF then pump stop running

DRY RUN

Liquid level in the well is below the pump inlet, pump stop running.

NO WATER

Liquid level in the lower water tank/water well is below lower sensor/probe (float switch in down position)

TROUBLE SHOOTING

FAULT MESSAGE	POSSIBLE CAUSE	SOLUTIONS
Flashing of "UNDER V"	Actual voltage is lower than the calibrated voltage, pump is in under voltage protection state	Check the power supply at source Control unit will attempt to restart the pump every 5 minutes until line voltage is restored to normal
Flashing of "OVER V"	Actual voltage is higher than the calibrated voltage, pump is in over voltage protection state	Check the power supply at source Control unit will attempt to restart the pump every 5 minutes until line voltage is restored to normal
Flashing of "OVER LOAD"	Actual drawn current is higher than the calibrated current, pump is in over load protection state	Control unit will attempt to restart the pump every 30 minute until running current is restored to normal
	Pump impeller is jammed/ pump motor dragging/ pump bearing broken	Check pump impeller or bearing
Flashing of "NO CALIBER"	Parameter calibration not completed	Carry out parameter calibration
Flashing of "DRY RUN"	Liquid level in the well/ sump is below the pump inlet, pump is in DRY RUN prevention state	Control unit will attempt to restart the pump every 30 minutes (or set time) until liquid level reaches above the pump inlet
Flashing of "STALLED"	Current drawn exceeds 170% of calibrated rated current.	Cut off power supply & repair or replace pump

Note: Float / Pressure Switch should be ordered separately.

Abbreviation:

1. OH : Overhead
2. UG: Underground
3. NO: Normally Open
4. DOL: Direct online start
5. COM: Common