DPC 1-1

Installation & Operating Instruction

DPC 1-1- For Single Phase Pumps, up to 15A

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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, the controller must be disconnected from the power supply.
- Don't open the cover while the pump is running.
- Don't put wire, metal bar filament 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 N1, L1, C terminals.
- Ensure the motor, controller, and power specifications match.

NOTE

IMPORTANT

The manufacturer is not liable for malfunctioning if the product is not correctly installed, 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.
This controller is suitable for submersible pumps, requiring only running capacitor. Also, it is suitable for all type of surface mounted/monoblock pumps. Not suitable for submersible pumps, which require starting capacitor.

INTRODUCTION

DPC is Digital Pump Controller, which is easy to use, programmable device for single phase pumps (monoblock or submersible). It can be used to control the pumps up to 15 Ampere.

APPLICATIONS:

DPC 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 an ideal choice in residential, industrial or institutional segments where water and energy conservation is of utmost importance.

FEATURES:

- **LCD screen displays pump running information**
- **Push button calibration**
- **Overload protection**
- **Motor stalled protection**
- **Dry run protection without installing a f l oat**
- **switch Under voltage protection (fixed settings)**
- **Over voltage protection (fixed settings)**
- **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 (in case of fully automatic models) for clear water**

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 current (amperes)	1.5 to 15 A
Rated input voltage	AC 220V / 50 HZ / Single Phase
Trip response time of overload	5sec - 5min
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
Recovery time of overload	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	253 Volts
Trip voltage of under voltage	175 Volts
PROTECTIONS COVERED	Dry run (without float/probe)
	Overload (auto calibrated or can be set)
	Transient surge
	Under voltage (fixed)
	Over voltage (fixed)
	Pump stalled
	Short circuit
Other technical data	
Permissible ambient temperature	Up to 55 Deg C
Degree of protection	IP 54
Install position	Vertical
Unit dimensions (L X W X H)	225 x 225 x 100 mm
Unit weight	1.5kg

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.

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

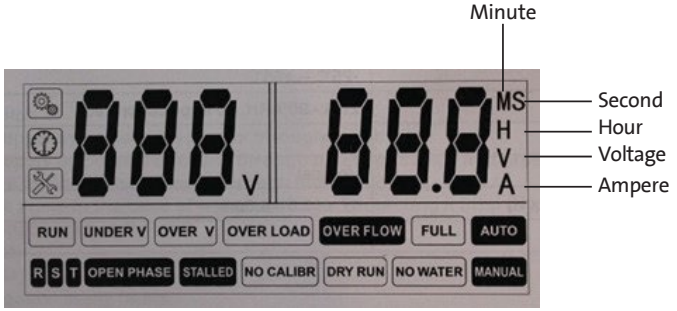
CONTROLLER COMPONENTS:

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.

ITEM	SWITCH POSITION	MESSAGES & IN VOLTAGE DISPLAYING AREA	ITEM
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

LCD SCREEN



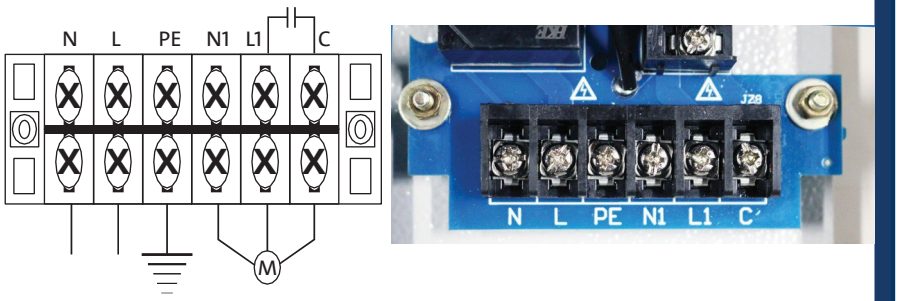
MEANING OF THE ICONS SHOWN ON THE LCD

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)

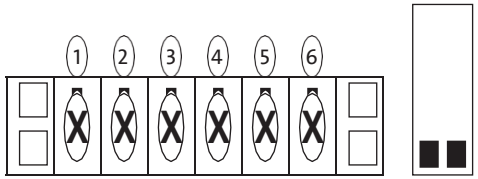
Pump fault icon, when this icon appears, it means controller is displaying some fault condition

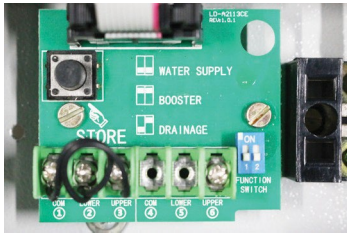
Power terminals



(a) Power terminals for connecting mains incoming and outgoing

Control terminals





(b) Control terminals for connecting probes or float switches

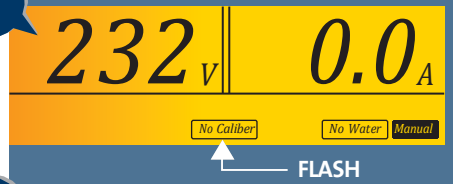
PARAMETER
CALIBRATION AND ERASING

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.

CALIBRATION:

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

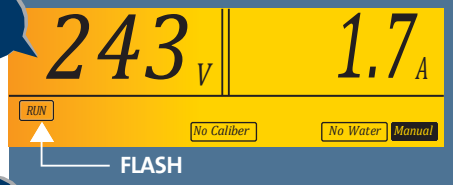
1



FLASH

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

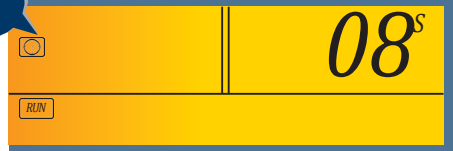
2



FLASH

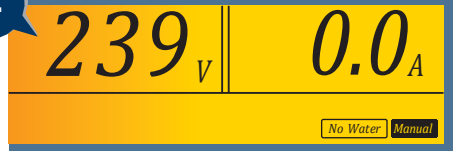
Press the START key to run the pump, confirm the pump is running OK and drawing rated current. Also confirm the mains supply is healthy and incoming voltage is normal, LCD screen will display voltage and current being drawn by pump

3



Again press START key approximately for 3 secs and release when the unit makes a "Beep" sound and a countdown timer starts on the screen. LCD screen display looks like the image on the left

4



Pump stops running and parameter calibration completes. LCD screen display looks like the image on the left

ERASING:

This needs to be done 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.

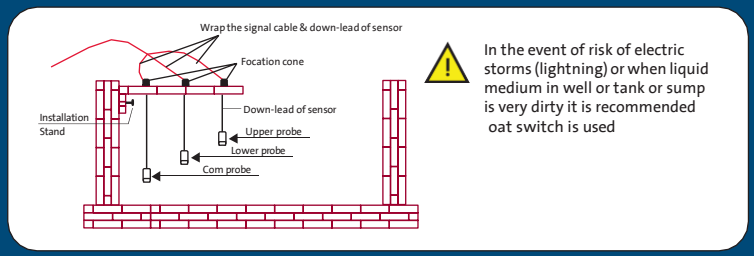
2. Press the STOP key approximately for 3 secs and release when the unit makes a “Beep” sound.

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

CONNECTIONS
CONTROLS DEVICES AND APPLICATIONS

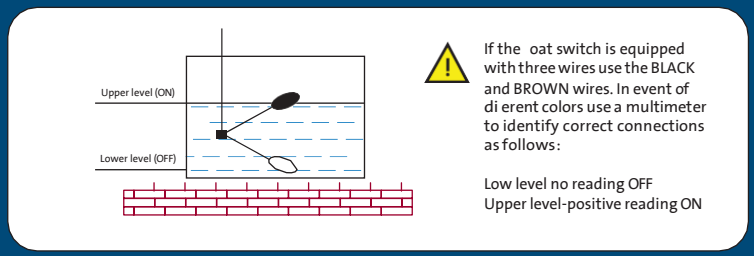
INSTALING LIQUID LEVEL PROBES SWITCH:

LIQUID PROBE INSTALLATION



(c) Liquid level probe installation

FLOAT SWITCH INSTALLATION

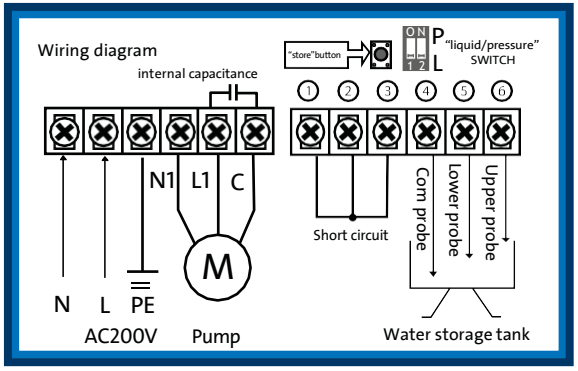


(d) Float switch installation

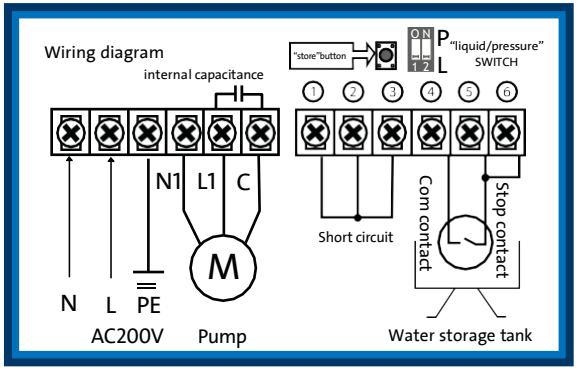
NOTE: Do not run or lay the sensor leads, oat switch wire or signal cables must be inside the metal pipe. So use PVC or PE tubing.

WORKING APPLICATIONS:

WATER SUPPLY/TRANSFER BY INSTALLING PROBES OR FLOAT SWITCH



(e) Application: Clear water supply - liquid level control (using probes)



(f) Application: Water supply - liquid level control (using float switch)

NOTE: In case of water transfer from underground tank to overhead tank, 3 probes for underground tank need to be installed and same to be connected at control terminals marked as 1, 2 & 3 after removing the shorting link.

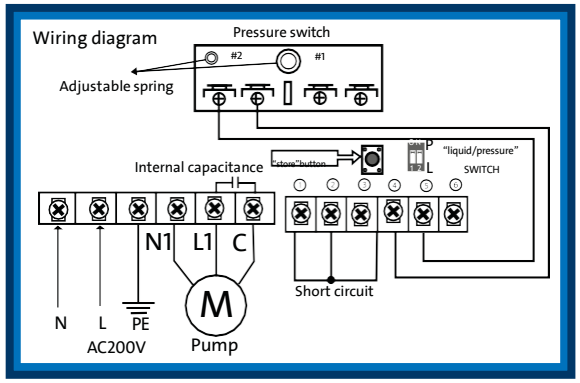
Start condition: When the liquid level in overhead tank is below lower probe (in case of float switch, float is down) and liquid level in the underground tank is above lower probe (in case of float switch, float is up), the controller will start the pump.

Stop condition: When the liquid level in overhead tank reaches upper probe (in case of float switch, float is up) or liquid level in underground tank is below lower probe (in case of float switch, float is down), the controller will stop the pump.

Probe/sensor free application in case of submersible pumps: The unit has reliable and automatic protection against dry running, if it is used for submersible pump for deep well. Users can short the terminals 1, 2 & 3 to achieve sensor free dry run protection.

Meaning of the messages & graphics displayed on the LCD screen	
TANK FULL	Liquid level in the overhead tank has reached upper probe (float switch: up position), pump stops.
DRY RUN	Liquid level in the borewell is below the pump intake, pumps stops running.
NO WATER	Liquid level in the underground tank/water well is below lower most probe (float switch: down position), pump stops.

PRESSURE BOOSTING APPLICATION BY INSTALLING PRESSURE SWITCH



(g) Application: Pressure boosting (using pressure switch)

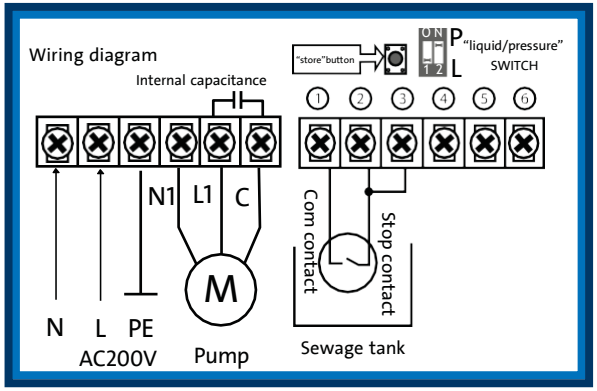
Start condition: Pressure in the pipe line is less than the set point of pressure switch, relay contact of pressure switch is ON and liquid level in the well/supply tank is above lower probe (Float switch up position), the controller will run the pump.

Stop condition: Pressure has reached the set point of pressure switch; relay contact of pressure switch is OFF; the controller will stop the pump.

Probe/sensor free application in case of submersible pumps: The unit has reliable and automatic protection against dry running if it is used for submersible pump for deep well. Users can short the terminals 1, 2 & 3 to achieve sensor free dry run protection.

Meaning of the messages & graphics displayed on the LCD screen	
FULL	Pressure has reached set point and pump has stopped.
DRY RUN	Liquid level in the borewell is below the pump intake, pumps stop running.
NO WATER	Liquid level in the underground tank/water well is below lower most probe (float switch: down position), pump stops.

DRAINAGE APPLICATION BY INSTALLING FLOAT SWITCH



(h) Application: Irrigation/sewage/drainage (using float switch)

Start condition: When the "Float switch A" reaches at up position, the controller will run the pump.

Stop condition: When the "Float switch A" reaches at down position, the controller will stop the pump.

Over flow alarm: In case the level in the sump rises even if the pump is draining water and the "Float switch B" reaches at up position, the controller will sound the over flow alarm to warn the pump operator.

Meaning of the messages & graphics displayed on the LCD screen	
FULL	"Float switch A" reaches up position, pump starts running.
DRY RUN	Liquid level in the sump is below the pump intake, pumps stop running.
NO WATER	"Float switch A" reaches down position, pump stops.
OVER FLOW	"Float switch B" reaches up position, controller will sound and alarm.

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).

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 happen, 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 for dry run and overload can be altered and set as per needs. However, recovery times and values for under and over voltage are factory set and can't be altered.

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

CAPACITOR

Grundfos Submersible Pumps with MS402 and MS4000 single phase, 3-wire, PSC motors must be connected to mains via a motor capacitor that is permanently connected during the operation. This type of motor does not require the starting capacitor. It only requires the running capacitor. The ratings of the capacitors are explained in the below table. Grundfos recommends using only the capacitors as per the below mentioned ratings and the capacitor must be installed as per the guidelines mentioned below.

Note: The warranty will be null & void if the suggested type, quality, and rating of capacitor is not followed as mentioned below:

CAPACITOR RATINGS AS PER MOTOR KW:

Motor Power	Capacitor (mfd)	Grundfos Capacitor kit	Part Number
0.37 Kw	16uF, 400V	Kit, Capacitor, 16MF 400V, MG71	96279800
0.55 kw	20uF, 400V	Kit, Capacitor, 20uF 400V, MG71, MG80	96279732
0.75 Kw	30uF, 400V	Kit, Capacitor, 30MF 400V, MG80	96279808
1.1 kw	40uF, 400V	Kit, Capacitor, 40MF 400V, MG90	96279810

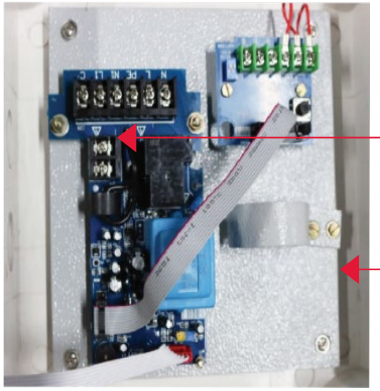
MOUNTING INSTRUCTIONS:

The below steps to be followed for proper installation of the running capacitor:

- Open the top cover gently, using normal star screwdriver.
- While opening the cover, make sure you don't damage the existing clip type probes, which is connected to the back of the cover.
- House the capacitor inside the holder by lifting the left side of the clamp and press it after inserting the capacitor, as shown in the Figure 1. and 2.
- Connect the capacitor cables to the specified terminal by gently bringing in cable below the circuit board (as shown in the picture), without disturbing the existing parts.
- Make sure you tighten the cables to the terminal and close the top cover.

CAPACITOR INSTALLATION DIAGRAM

1. **Without capacitor**



2. **With capacitor**

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
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 minutes 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 200%	Cut off power supply & repair or replace pump