Installation & Operation Manual

Bore Hole Pump Controller

Ver. 2.0

1. OVERVIEW

The Bore Hole Pump Controller abbreviated to BHC is a programmable control panel that is used to protect and control pumps. Primarily deep well submersible pumps, but also centrifugal; in-line; circulation and multistage pumps. The BHC has four general operating modes namely tank to tank; booster by pressure switch; drainage by sensor; timed pumping. The BHC's protection features are dry run; overload; stalled pump; over voltage; under voltage; open phase, phase reversal and thermal control.

2. BUTTON & OPERATIONS

BUTTON	OPERATION [MANUAL mode unless otherwise stipulated]
START	Pump should start if not running.
STOP	Pump should stop if running.
STOP then MODE	Display shows last five failure records.
STOP then START	Display shows accumulative running time.
MODE	**[Parameter 011 set to 00]** – Manual to Auto / Auto to Manual **[Parameter 011 set to 01]** – All buttons locked in Auto mode. To deactivate hold "MODE" for 5sec. Pump will then stop, and controller will switch to manual mode.
To ensure pump and motor is protected it is essential to calibrate the controller parameters as soon as pump is running to operational standards. Perform calibration after each installation or maintenance operation.	
START	**Parameter calibration:** While pump is running press and hold "START" until the controller makes a "Di" sound. (*Hold for approximately 5-10 sec*). The controller should now be calibrated to the current spec of the motor.
STOP	**Parameter erasing:** Ensure pump has stopped running then hold "STOP" until the controller makes a "Di" sound. (*Hold for approximately 5-10 sec*). The controller should now be cleared of all calibrations.

3. SPECIFICATIONS

Main technical characteristics of controller		
Control functions	Double liquid level control	
	Pressure switch control	
	Temperature control	
Main technical data		
Rated output power	Refer to label on controller	
Rated input voltage	Refer to label on controller	
Liquid level transfer distance	≤200m	
Protection function	*Dry run*	*Pump stall*
	Overload	*Open phase*
	Under/Over voltage	*Phase reversal*
Main installation data		
Working temperature	-25°C – +55°C	
Working humidity	20% - 90% Relative Humidity	
Degree of protection	IP65	
Installation position	Vertical	
Unit dimensions (L x W x H)	275 x 200 x 125 mm	
Unit weight (net)	1.168 kg	

4. APPLICATION SETTING

There are two different controllers namely the BHC and the BHC PT 100. The BHC and BHC PT 100 function the same except that the BHC PT 100 has an additional switch to toggle on for thermal sensing enabling the controller to read the temperature through a thermal probe. Whenever the controller is to be adjusted for application the power to the controller needs to be off and only re-energized once the switches have been toggled to the desired settings.

Application	2 Pole Switch	Description
1	**0 0**	Tank to tank. [2, 3 NC & 5, 6 NC]
2	**1 1**	Booster pump control by pressure switch. [2,3 NC & 5 NC, 6 NO]
3	**0 1**	Drainage by level sensor. [2,3 NC & 5,6 NO]
4	**1 0**	Timed start and stop. [Cancels out sensor terminal]
1 Pole Switch (BHC PT 100 model)		
5	**1**	Thermal control.

5. PARAMETER SETTINGS

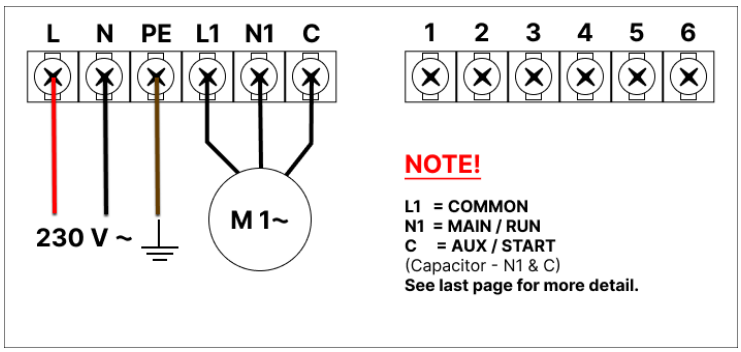
PLEASE NOTE: Parameter settings should be adjusted after "Auto" calibration.

To access parameter settings the controller should be in manual mode and the pump should NOT be running. Press and hold "MODE" for 5sec to enter the parameter menu. Once inside the parameter menu use the "START" button to move 'UP' in the menu and "STOP" button to move 'DOWN' the menu. To enter a parameter, press the "MODE" button. This will display the current value for the parameter. To change the value, press the "START" or "STOP" buttons respectively to increase or decrease the value. To store the value and return to the main menu press the "MODE" button. To store all changes and exit the parameter menu either press the yellow button on the circuit board or hold the "MODE" button for 5 sec if yellow button is not on circuit board.

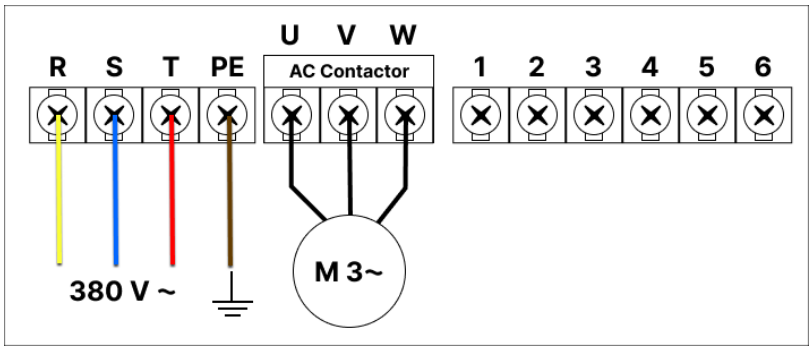
Para-meter	Description	Range	Default value
001	Dry run protection trip amps.		0.0 A
002	Overload protection trip amps.		26 A (0.75-7.5kW) 52 A (11-15kW)
003	Stall protection trip amps.		33 A (0.75-7.5kW) 66 A (11-15kW)
004	Under voltage protection trip voltage.		175 V (Single Phase) 300 V (Three Phase)
005	Over voltage protection trip voltage.		253 V (Single Phase) 439 V (Three Phase)
006	Dry run protection trip response time.	0 – 254 sec	6 seconds
007	Dry run protection recovery time.	0 – 254 min	5 minutes
008	Pump running timer.	0 – 254 min	5 minutes (Only if dip set to 1 0)
009	Pump stop timer.	0 – 254 min	0 minutes (Only if dip set to 1 0)
010	Pump stop timer under manual state.	0 – 254 min	0 minutes (0 = inactive)
011	LCD & button operation lock function.	00 - 01	00 (unlocked) [01 locked]
012	Open phase & phase reversal protection. [00 (open phase & phase reversal OFF)] [01 (open phase OFF, phase reversal ON)] [02 (open phase ON, phase reversal OFF)] [03 (open phase & phase reversal ON)]	00 - 03	03
The following parameters are only visible for controller model BHC PT 100 and the expansion module is equipped.			
013	Pump start temperature. Pump will start below set temp.	0 – 100 °C	35 °C
014	Pump stop temperature. Pump will stop above set temp.	0 – 100 °C	45 °C

6. POWER WIRING DIAGRAMS

6.1 Single phase input and output wiring.



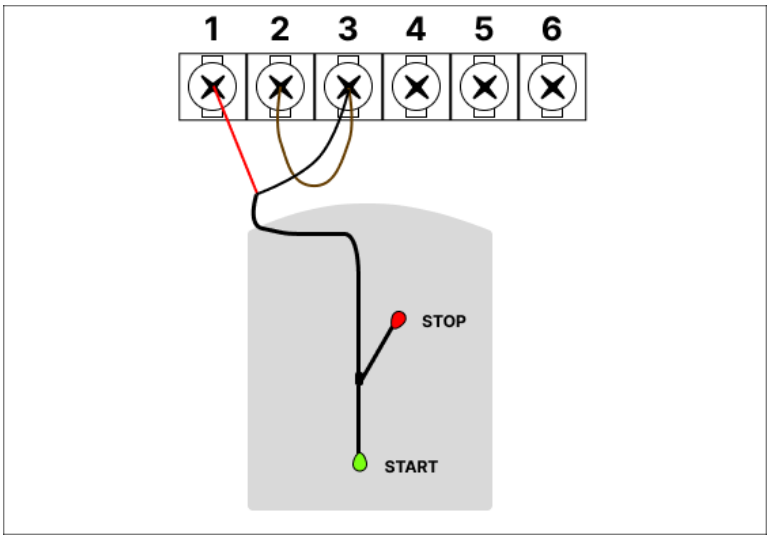
6.2 Three phase input and output wiring.



NOTE: Sensor terminal block can be removed for ease of connection.

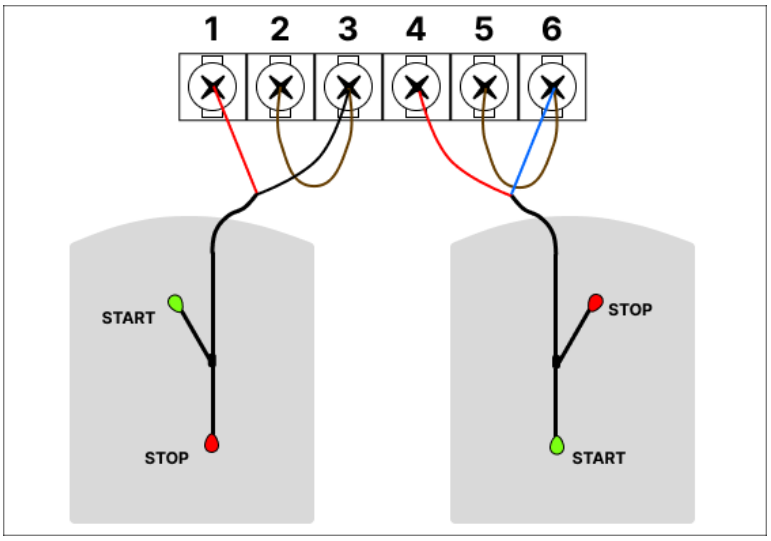
7. SENSOR WIRING DIAGRAMS

7.1 Tank filling only. [2, 3 NC]

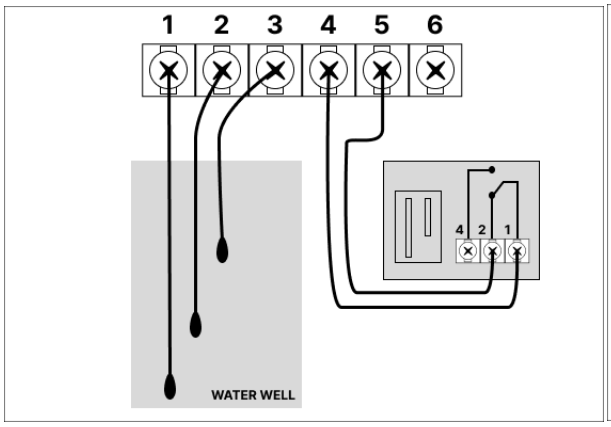


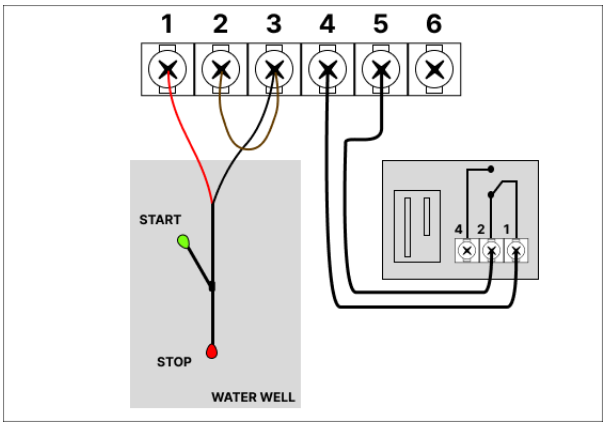
NOTE: When using only one sensor remove the bridging wires in terminals 1,2,3 and replace them with the sensor wiring.

7.2 Tank to tank. [2, 3 NC & 5, 6 NC]

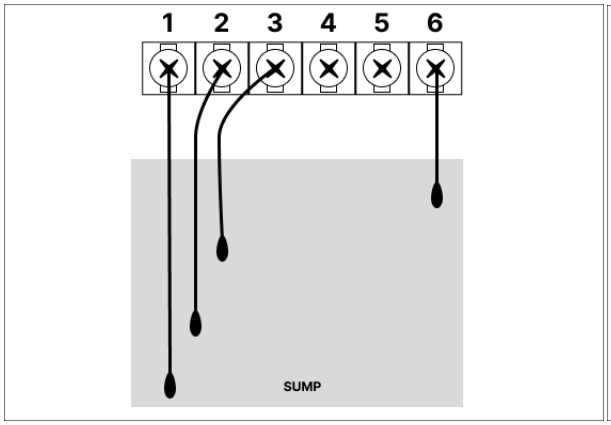


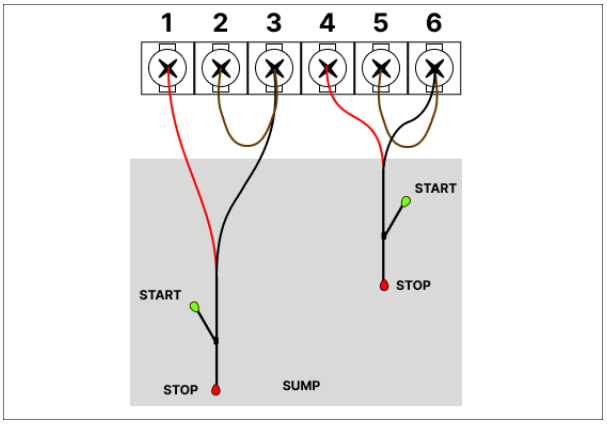
7.3 Booster pump control by pressure switch. [2,3 NC & 5 NC, 6 NO]



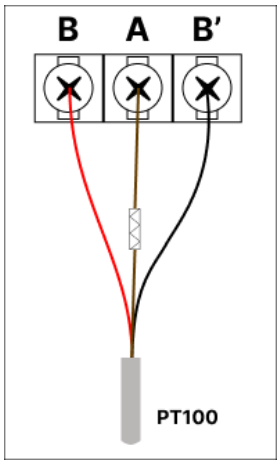


7.4 Drainage by level sensor. [2, 3 NC & 5 NO, 6 NC]

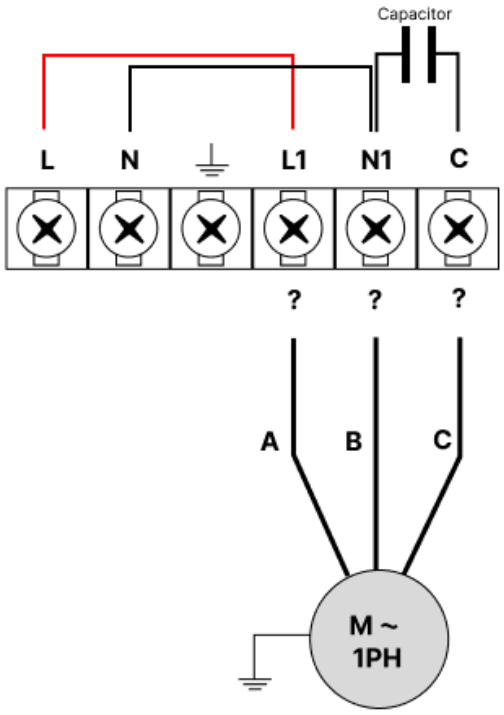




7.5 Optional temperature control.



Single phase motor winding check



Start - High Resistance
Run - Mid Resistance
Common - Low Resistance

Ohm Reading:

Note: Each motor winding has two ends. To read the resistance in a winding you need to measure it from end to end.

1. Set multimeter to ohms
2. Read resistance between wire A and wire B.
   a. Write it down and call it X.
3. Read resistance between wire A and wire C.
   a. Write it down and call it Y.
4. Read resistance between wire B and wire C.
   a. Write it down and call it Z.
5. Wire A is equal to value X plus value Y.
6. Wire B is equal to value X plus value Z.
7. Wire C is equal to value Y plus value Z.
8. If wire A's resistance is the highest it is the Start winding.
9. If wire A's resistance is the in between it is the Run winding.
10. If wire A's resistance is the lowest it is the Common winding.
11. Check each wire as described in steps 9 to 10 to establish each wires status.
12. Connect the START winding wire to C.
13. Connect the RUN winding wire to N1.
14. Connect the COMMON winding wire to L1.

Formula:	**Example:**
A + B = X A + C = Y B + C = Z	A + B = 8 ohm A + C = 3 ohm B + C = 6.5 ohm
A = X + Y B = X + Z C = Y + Z	A = 8 + 3 B = 8 + 6.5 C = 3 + 6.5
If A>B & C: A = START	A = 12 ohm B = 14.5 ohm C = 9.5 ohm
If B>A>C or C>A>B: A = RUN	A = RUN B = START C = COMMON
If A< B & C: A = COMMON	