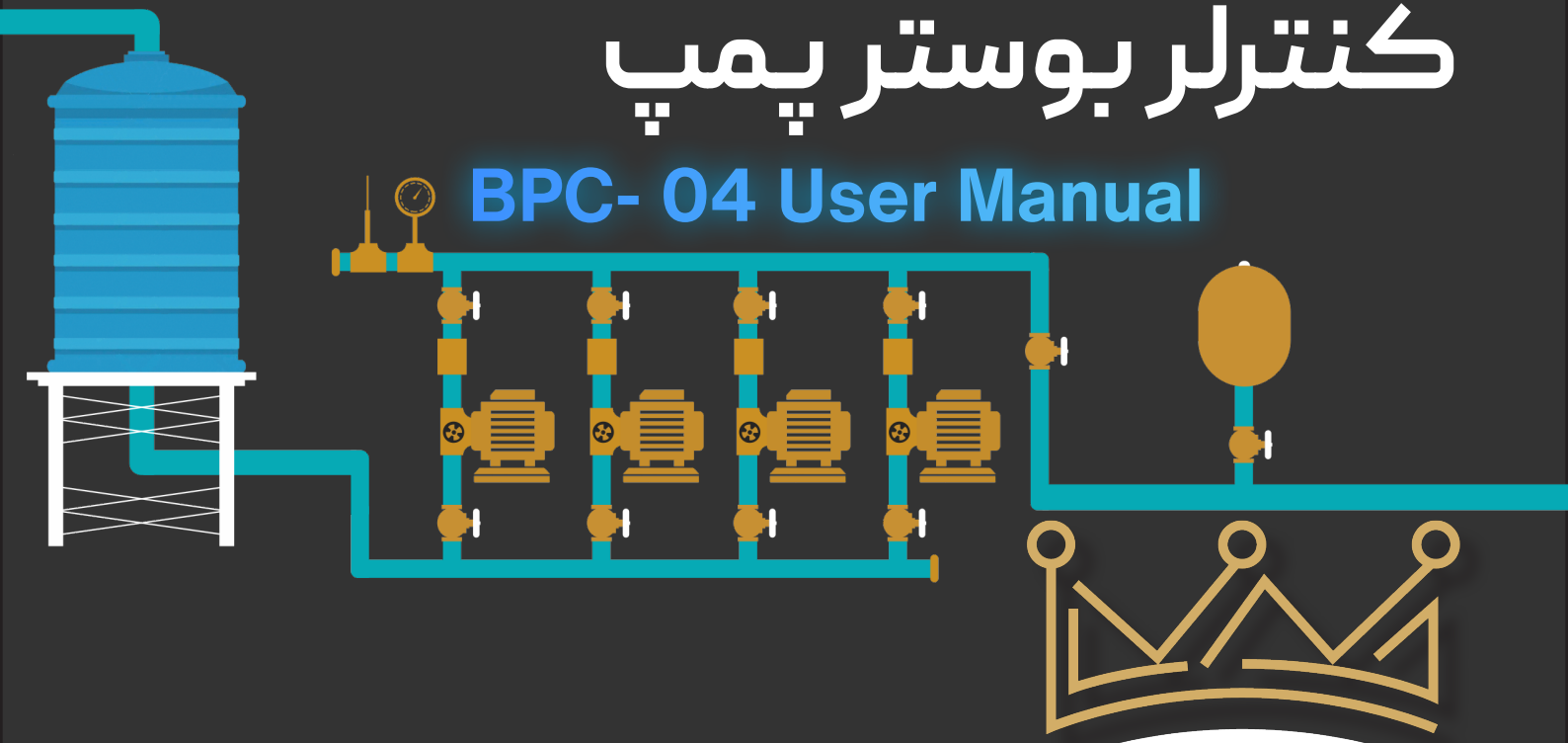
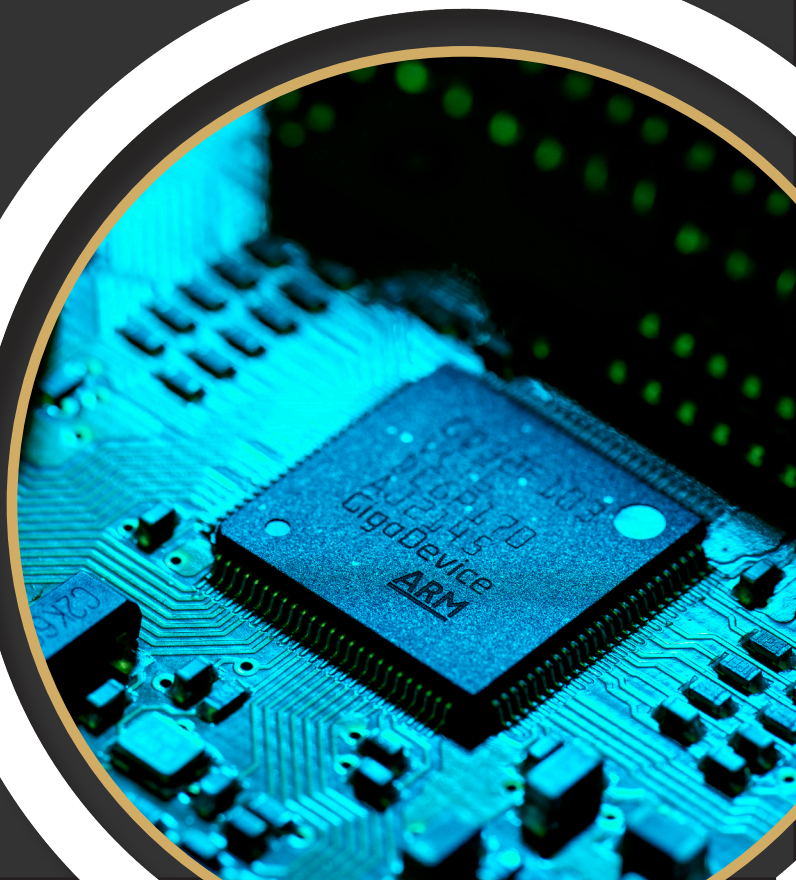
DIGITAL GOSTAR PARSIAN

راهنمای
کنترلر بوستر پمپ

BPC- 04 User Manual





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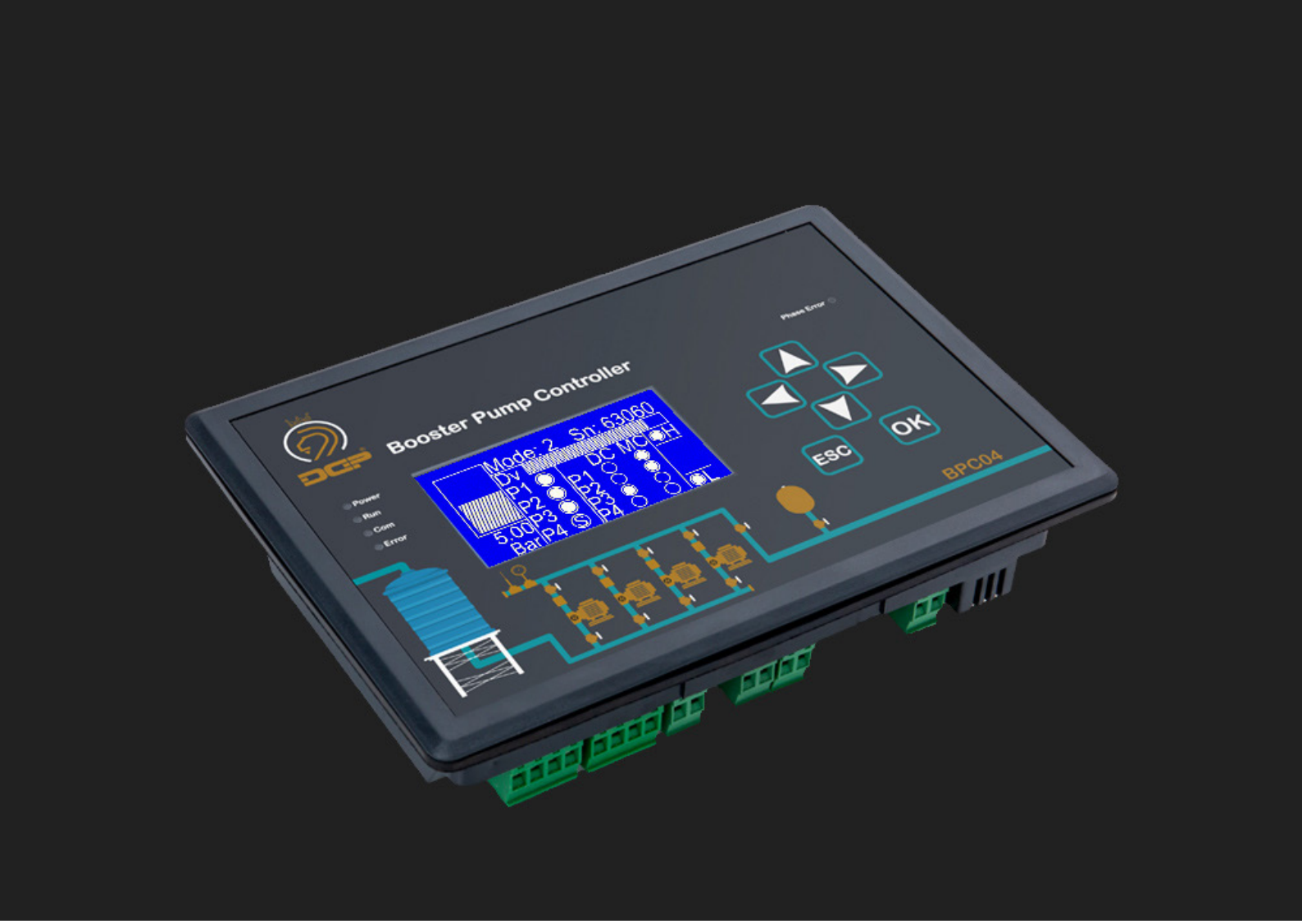


Thank you and congratulations on your choice and joining the largest automation family in Iran.

Please read this guide carefully before using this product. Incorrect settings may harm devices connected to this product.
(This guide may change without prior notice for system performance improvement.)
This controller aims to stabilize fluid pressure by sampling fluid pressure and based on pre-set parameters. The main use of this controller is in water supply systems, especially in building water supply systems. One of the strengths of this controller is its lack of limitations in the number of consumers and building floors for water supply.

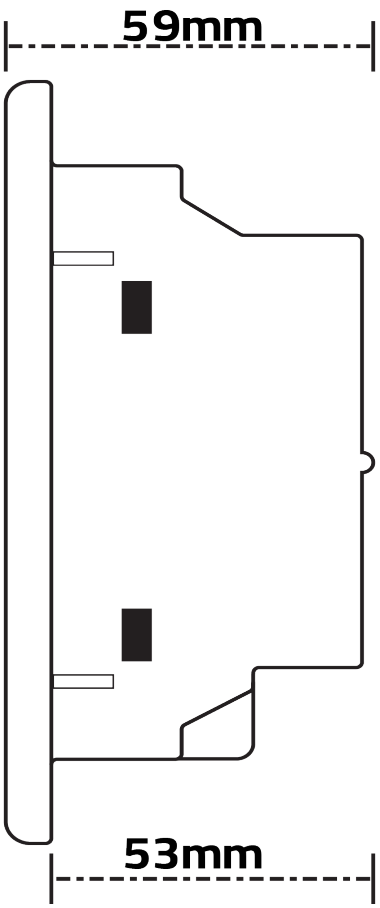
In most areas of large cities, water pressure in the upper floors of buildings is low. To address this issue, a booster pump system is designed and constructed, which is installed and commissioned by relevant specialists in these buildings. This device includes a city water storage tank where the incoming city water is stored, and this stored water is pumped into the building pipes by pumps based on the consumption rate. In this system, there is a pressurized tank that holds a certain amount of water for pressure storage inside the building pipes. Booster pumps with pressurized tanks have lower consumption compared to booster pumps without pressurized tanks. This water pumping station (booster pump system) can create water pressure inside the pipes. To start up and optimally control water pressure, this system requires a controller to sample the water pressure, which, based on consumption and pre-set parameters, activates an appropriate number of pumps. In this booster pump system, the controller is responsible for this task. This guide provides a comprehensive explanation of this controller.

Features of this controller:

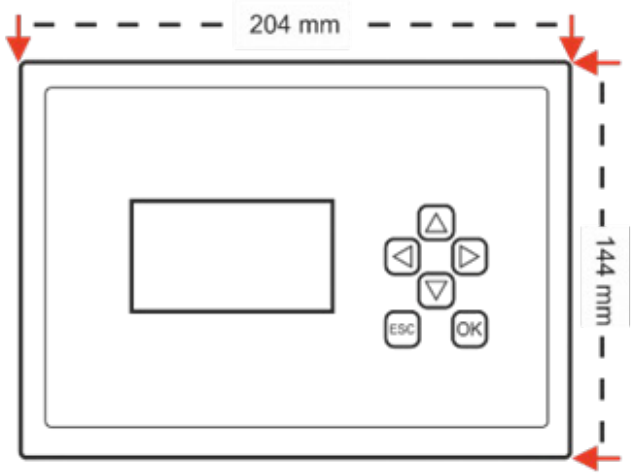
- Ability to start both 3-phase and single-phase pumps
- Display of city power waveform (T, S, R) on the LCD screen
- Internal phase control and the ability to connect external phase control
- Adjustable high and low voltage settings from the LCD
- Sensitivity adjustment capability from the LCD (phase imbalance)
- Device can be set for single-phase or three-phase operation
- Separate On-Delay and Off-Delat timers in case of errors
- Protection against two-phase connection to the system (phase connected to neutral)
- Digital display of frequency and voltages phase-to-phase and phase-to-neutral
- Display of pump and floater status, graphical display of pressure and drive frequency, and display of date and time on the main screen
- Control of 4 variable-speed pumps with 4 variable-speed drives
- Internal floater and the ability to connect an external floater
- Separate On-Delay and Off-Delay timers for the floater in case of errors
- Sensitivity adjustment capability for the floater from the LCD
- Internal auto-service capability
- Control of variable-speed pumps in PID mode with the ability to adjust PID parameters
- LCD with a resolution of 8000 pixels
- RS-485 network for displaying device information and setting parameters
- 4 separate inputs for external phase control, external floater, emergency flush, MAX Pressure input, Pressure Switch, and PR inputs
- Ability to connect 60Bar, 40Bar, 25Bar, 16Bar, 10Bar, 6Bar, PS sensors
- Ability to connect output of 2-10 V, 0-10 V, 0-5 V, 0-20 mA, 4-20 mA sensors
- Calibration capability for displayed pressure values on the controller and pressure gauge on the manifold
- Separate alarm and fan outputs
- DC 24 V output with a maximum current of 100 mA for sensor activation and command return
- 4 separate analog outputs for controlling 4 drives
- Overchange capability for uniform pumps (constant speed - variable speed).

- Manual system startup capability
- Ability to activate the alarm (audible alert) during errors
- Adjustable maximum pressure setting for connection protection
- Start frequency definition capability to prevent initial pressure drop
- Stop frequency definition capability
- Full Load definition capability (detecting collector input blockage, pump suction and discharge blockage detection, pump airlock detection, detecting pipe rupture at the collector outlet)
- Time definition capability for pump entry or exit from the circuit
- Access level definition capability for User Level Password settings
- Defective pump detection capability and ability to replace it
- Capability to remove the defective pump from the system by the user (Pump Service)
- Display of all errors and their times on the Error History page
- Ability to connect to Building Management System (BMS) smart building system
- Network communication through the RS-485 port
- Pump activity scheduling capability throughout the week with a maximum of six custom scenarios
- Over several thousand successful projects per year
- Execution of over 80% of water supply projects with the 4th generation DGP booster pump controller
- Energy consumption reduction and maintenance cost reduction
- Compliance with IP65 standard
- Significant increase in the lifespan of pumps compared to similar models
- Simplification of the control circuit
- Easier user interface compared to similar models
- Two-year warranty

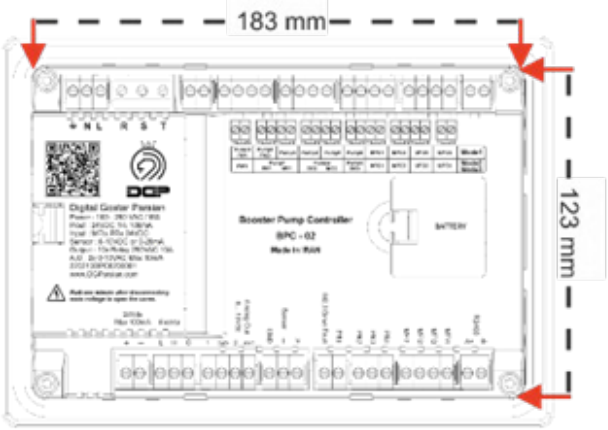
Product Depth



External Dimensions of the Product



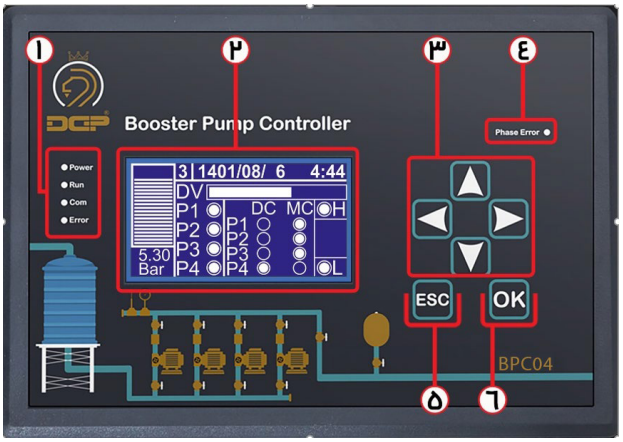
Dimensions of the Control Panel Cutout



Protective Section	
Short circuit of analog outputs	Protected
Short circuit of 24 Volts output	Protected
Short circuit of floater output	Protected

Allowable values	
Input Voltage	100 - 250 V AC
Input Frequency	50 HZ / 60 HZ
Output Current of Relays	10 A
Output Current 24 Volts	100 mA
Input Voltage of Digital Inputs	24 V
Operating Ambient Temperature	0 – 55 °C
Storage Temperature	-20 – +65 °C

Introduction to the front section of the controller:

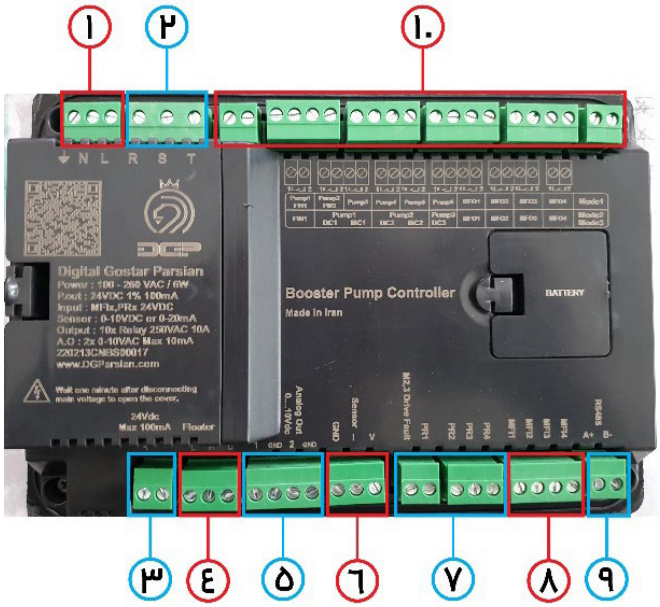


1,4 LEDs indicating the controller status, in order from the top:

Power	When the system power is connected, this LED will turn on.
RUN	When the controller starts functioning, this LED will turn on.
Com	When the controller establishes communication with the RS-485 network, this LED will blink.
Error	Whenever the controller encounters an error, this LED will turn on.
Phase Error	If the controller is connected to 380 volts instead of 220 volts in the power terminal, this LED will turn on.

2. Controller Display: All changes made inside the controller are visible and can be performed through the display.
3. Directional Keys: These keys are used for navigation in menu pages and changing values.
5. ESC Key: This key is used to return to the previous menu (with a single click) and, when held for three seconds, stops the controller.
6. OK Key: This key is used to save information (with a single click) and, when held for three seconds, enters the controller menu.

Introduction to the back panel of the controller:



1. Device Power Input (N - L)

2. Phase Control Input (R - S - T)

3. 24 Volts Output Power Supply (up to 100 milliamps)

4. Fluid Level Control (LOW=L, High=H, Com=C)

5. Two Analog Outputs (0-10 V) for connection to the drive

6. Pressure Sensor Connection:
- If it is a voltage pressure sensor, connect it to the V and GND terminals.
- If it is a current pressure sensor, connect one end of the sensor to +24 and the other end to the I terminal. Note: Jump V and I for current pressure sensors.

7. Command Return:
- 2.3M Drive Fault: Fault relay in modes 2 and 3
- PR:1 NO/NC Direct Pump Contactor 1
- PR:2 NO/NC: PR Direct Pump Contactor 2
- PR:3 NO/NC: PR Direct Pump Contactor 3
- PR:4 NO/NC: PR Direct Pump Contactor 4

8. Configurable Inputs MFI:
- Four configurable inputs that can be used for PR, FL, CP, EMG, MP, PS as needed. These inputs are explained on page ...

9. RS-485 Terminal:
- Using the RS-485 network, you can display controller information on another display according to the addressing table.

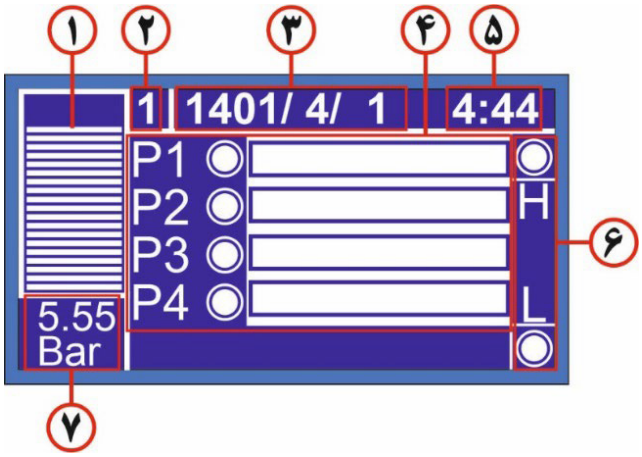
10. Controller Outputs:
- Terminals designated for the controller's relay outputs, which are wired based on your operating mode. This controller has three operating modes, each of which will be explained separately.

Operating Mode:
The booster pump controller in Mode 1 can start 4 variable-speed pumps. To start pumps at variable speed, a drive is required, and the drives need 0 to 10 volts to control the pump speed. The booster controller can control 4 drives separately, and it is equipped with 4 analog outputs for this purpose. The booster pump controller supports pressure measurement in water pipes from all models of sensors. For pressure measurement, the user can connect all 4-20 mA sensors available in the market to the controller, including milliamp and millivolt sensors, and 0-20 mA. Some examples of these sensors include 0-10, 2-10, and 0-5 volt sensors. The booster pump controller has an internal floater that

Menus

Home Page:

On the home page, the parameters measured by the controller are displayed. These parameters are used to show the controller's operation trend. Different sections of the home page are depicted in the following figure:



Controller Mode 1:

1- Graphic display of pressure

2- Controller operating mode is shown in this section.

3- Adjustable date (Gregorian/Shamsi)

4- Graphic display of inverter frequencies 1 to 4

5- Adjustable clock display in the main menu

6- This section shows the status of electrodes inside the source.

7- Numerical display of pressure

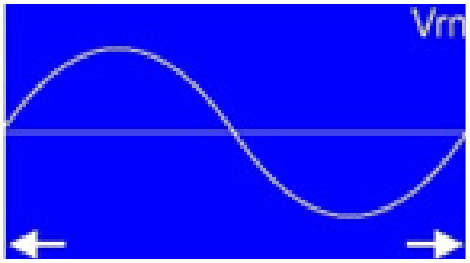
Low Level: L, High Level: H

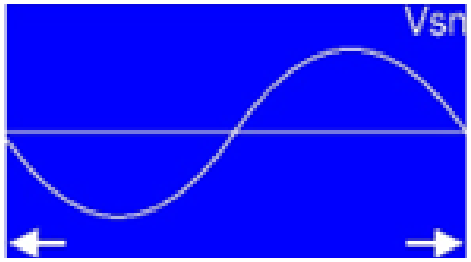
Main Contactor: MC, Drive Contactor: D

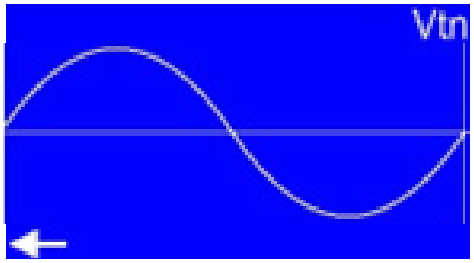
Introduction to Direction Keys Function:

Right Key:

Function Explanation: By pressing the right key on the main page, the measured values by the phase controller are displayed. On this page, the city's power frequency is displayed with an accuracy of 0.01. The first column corresponds to the voltages of each phase with neutral, and the second column corresponds to the phase-to-phase voltage imbalances. In single-phase mode, the controller will only display the input phase R voltage and frequency. By pressing the right key on the Phase Control page, we can separately observe the waveforms of phases T, S, and R. If one of the controller phases is disconnected, this waveform will be displayed as a straight line, making it easy to detect the phase disconnection.





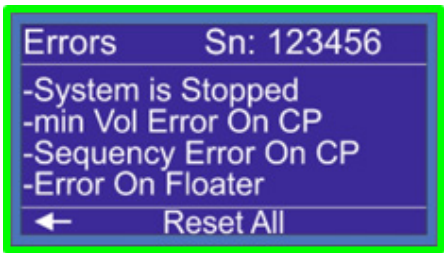


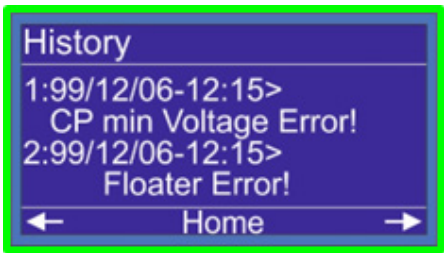
Left Key:

Function Explanation: By pressing the left key on the main page, the user can enter the Error page and view the system's existing errors. Depending on the type of error, the user can take corrective actions.

By pressing the left key again, the user can view the history of the last 250 recent errors, along with their date and time. By selecting (pressing the OK key) the up and down keys in the specified section, all errors on this page can be viewed.

By pressing the left key again on the Error History page, we enter the Pump Error page. If a pump has an error, a checkmark is placed next to it. By pressing the OK key on that pump, the error is removed.





Down Key:

By pressing the down key on the main page, we enter the Manual section, where we initially encounter a password page. The password for this section is 2222. To enter the password, we enter the key up twice and the key right once until the end of 2*, then press the OK key, and we enter the Manual page. On this page, we can manually run the inverter and provide it with frequency, or connect/disconnect the direct contactors and inverters. Additionally, the pressure value is displayed on this page.**

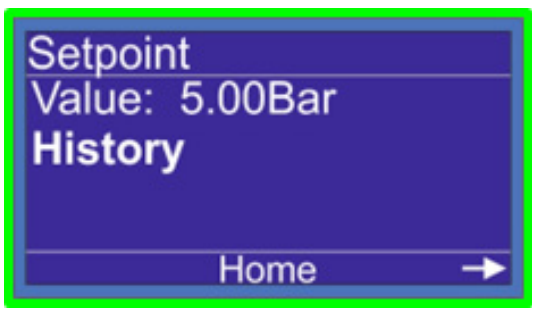
Note that in the Manual Settings page, the controller will exit the automatic control mode, and after leaving this page, it will return to automatic mode. Additionally, all protections will remain active.

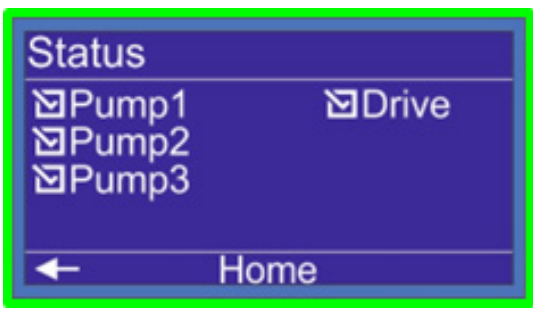
Up key:

To enter the setpoint menu, press the up key. Upon entering the setpoint page, you can use the OK key and the directional key (up or down) to change the setpoint value.

History: By selecting this option, you can view the pressure chart for the past 6 hours.

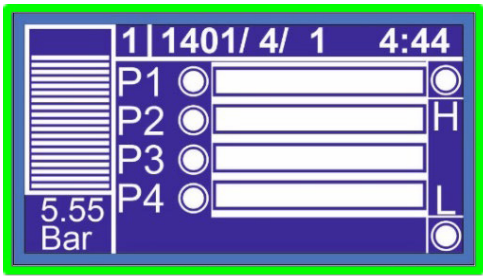
Pressing the right key on the Setpoint page takes you to the Status page. On this page, by removing the checkmark for the desired pump, you can put that pump into service, and the controller will continue its operation without considering that pump. After repairing the selected pump, you can remove it from service again on this page.



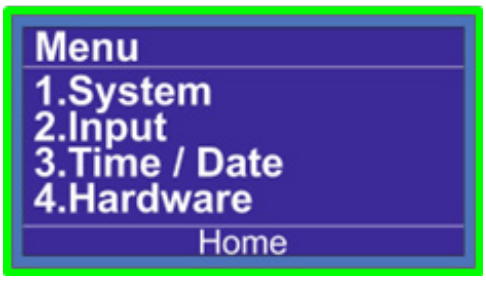


Introduction to the main menus of the controller:

On the main screen, by holding down the OK key for 3 seconds, we enter the controller menu and see the following options:



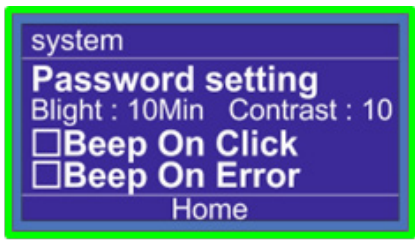
1. System
2. Input
3. Date/Time
4. Hardware



We will now describe the purpose of each:

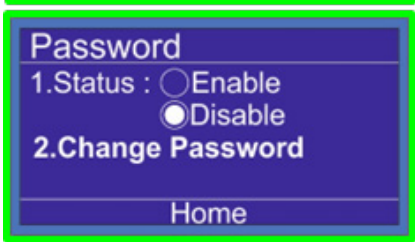
Main Menu - System - Password:

By selecting the Password option in the System menu, the following screen is displayed, consisting of two options:



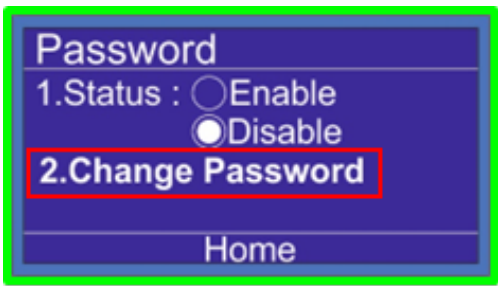
1. Status
2. Change Password

The first option is to enable or disable the password. By default, the first option (Disable) is selected. By choosing the Enable option, the controller will prompt you for the default password.

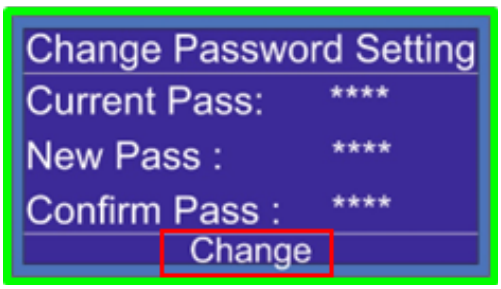


Note: In the booster pump controller, the default password for this section is 1111.

By selecting option number 2 (Password Change), we enter a new page where we need to enter the old password in the first row and the new password in the next two rows. For example, to change the system password, we perform the following steps:

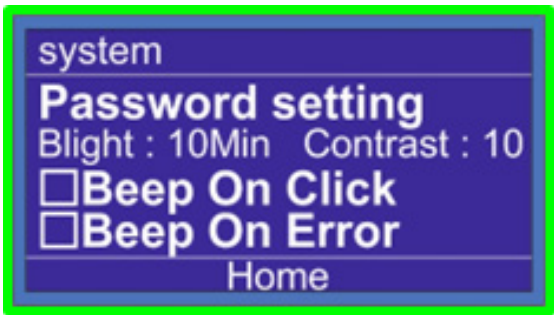


- Current Pass: 1111
- New Pass: 2222
- Confirm Pass: 2222



Note: Finally, to save the changes, we select the Change option.

Main Menu – System:



Blight:
With this option, you determine the time after which the controller's screen brightness decreases, ranging from 0 to 99 minutes.

Contrast:
Using this option, you adjust the intensity of the display screen brightness, ranging from 0 to 20 levels.

Main Menu – System:

The last options in this menu include:

** Beep On Click:**

With this option checked, every time a controller key is pressed, a beep sound is produced.

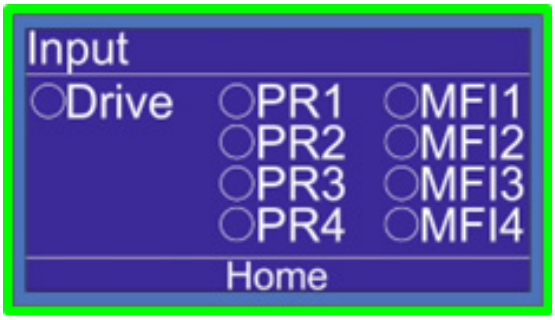
** Beep On Error:**

With this option checked, whenever the controller displays an error on the screen, it produces a beep sound.

These two options are responsible for audible alerts. If the checkbox on their left is marked, a beep sound is produced, and if unchecked, the controller operates silently.

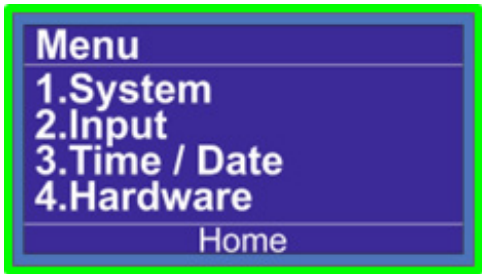
Main Menu – System – Input:

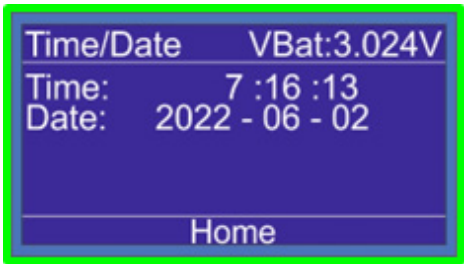
By selecting Input, you can check your system's input wiring by stimulating the inputs. The Input option is used to troubleshoot wiring issues.



Main Menu – Time/Date:

By choosing the third option from the menu list (Time/Date), you can configure the time and date. In the Time section, you set the time, and in the Date section, you configure the date.

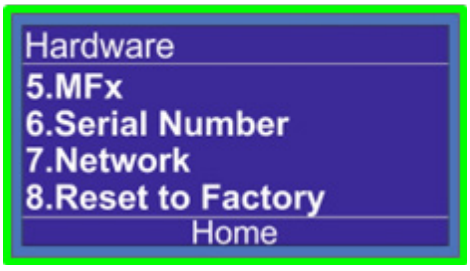




Main Menu – Hardware:

The fourth option in the main menu is the Hardware section, which includes 8 separate parts. Below, we briefly mention each title, and later, we provide a complete explanation for each.

1.Control Phase
2.Floater
3.Sensor
4.Control
5.MFx
6.Serial Number
7.Network
8.Reset To Factory



Main Menu – Control Phase – Page 1:

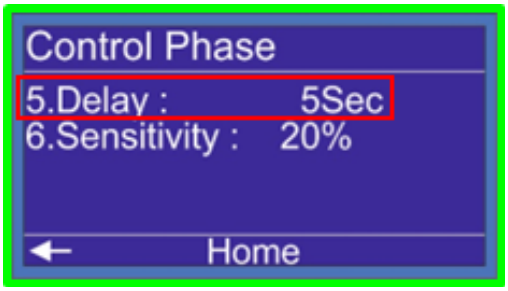
The first option in the Hardware settings is Phase Control. In option 1, Status, you can either disable or enable the internal phase control of the controller.

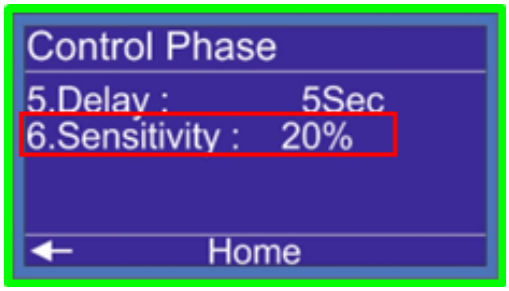
In option 2 (Type), you can define whether the controller should protect a single-phase (1P) or three-phase (3P) system.

In options 3 and 4, you specify the minimum and maximum voltage for each phase.

Main Menu - Control Phase–Page 2:

On the Control Phase page, you will see a right-pointing arrow at the bottom of the screen. By pressing the right arrow in option 5, you can set the delay time for displaying errors.
In the next option, number 6, you can define the allowable deviation between each phase.



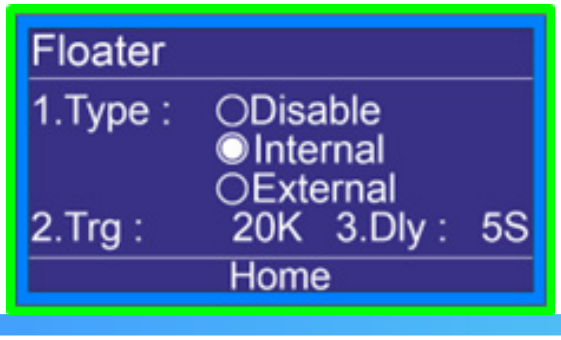


Main Menu – Hardware – Floater-Page 1
The second option in the Hardware menu is for controlling the water level or “Floater.”

1. **Type:**
 - If you don’t need water level control, you can disable this option to deactivate the capability on the controller.
 - If you want to use the internal water level control of the controller, select “Internal.”
 - If you prefer using an external water level control, choose “External.” In this method, the electrodes are connected to an external water level control, and through the external water level control blade, a 24-volt input is connected to MFI1 ~ MFI4, defining the external water level control (FL).

2. **Trg:**
 - This option is used to adjust the floater’s performance in different water hardness conditions. By decreasing the Trg value, you can adjust the internal floater of the controller to operate under conditions with higher water hardness.

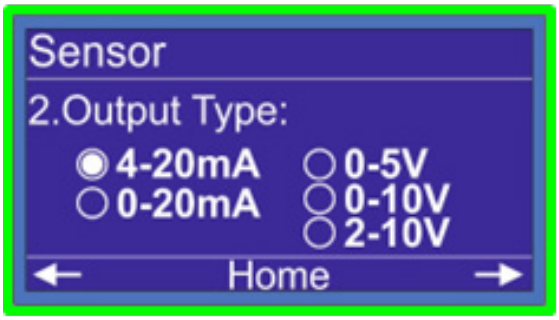
3. **Dly:**
 - By changing this option, you can determine the time delay for generating the floater error. For example, if set to 5 seconds on the current page, an error will be displayed on the screen 5 seconds after a lack of water in the source.



Main Menu – Hardware - Sensor Page-1

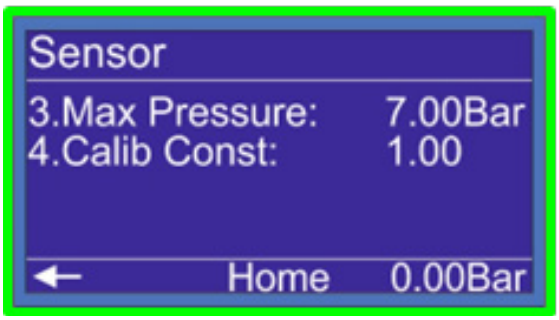
The third option in the Hardware menu is for configuring the sensor (Sensor).

On the first page, you specify the sensor type:
6Bar - 10Bar - 16Bar
25Bar- 40Bar-60Bar-PS
PS: Pressure Switch



On the second page, you determine the sensor output:
4-20mA 0-20mA 0-5V 0-10V 2-10V

3. ** Max Pressure:**
   On the third page, you set the Max Pressure, which can be adjusted from two-tenths to half bar of the setpoint.



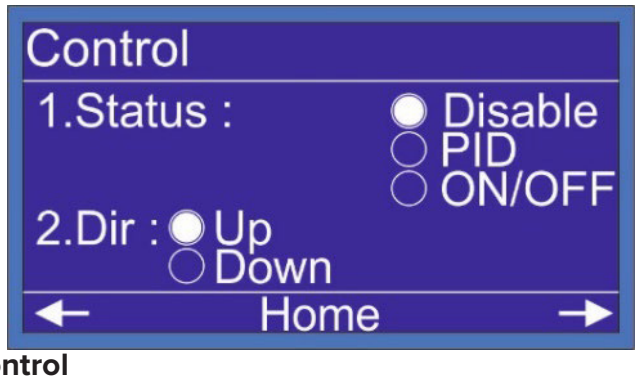
4. ** Calib Const:**
   If there is a difference between the pressure displayed on the controller and the gauge on the collector, you can use the calibration option to eliminate this difference.

Main Menu – Hardware - Control

On the first page, Pump
1- (Main): You introduce the number of pumps. In Mode 1, which is the change mode, the controller supports a total of 4 pumps, each with variable speed.

- ** Equal Speed:**
In full-drive mode, if the first pump fails to reach the setpoint and there is a need for the second pump in the system, both pumps will enter the system with the same frequency.

On the second page, you can change the system mode. The controller has one operating mode. As long as it is on, with each power cycle (on/off), your pumps will swap places. This swapping action is referred to as " OFF changing."



Main Menu – Hardware - Control

On the third page, (Status):

On this page, you can remove the checkmark from the desired pump, taking it out of the system. The controller will continue its operation without considering that pump. To reactivate the pump, return to this page, and check the pump again.

On the fourth page, Control:

By default, the Status option on the control page is disabled. You can use this option to stop the system. When you disable this option, a " System Stopped " error is displayed. To resolve the error, toggle this option to On/Off or PID.

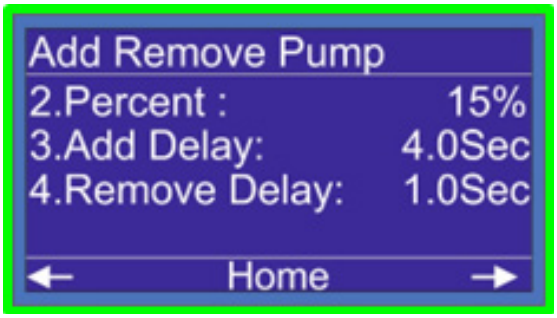
Dir:
If this option is set to UP, the controller raises the pressure to reach the setpoint. This setting is suitable for high-pressure projects. If it is set to Down, the controller decreases the pressure to reach the setpoint.

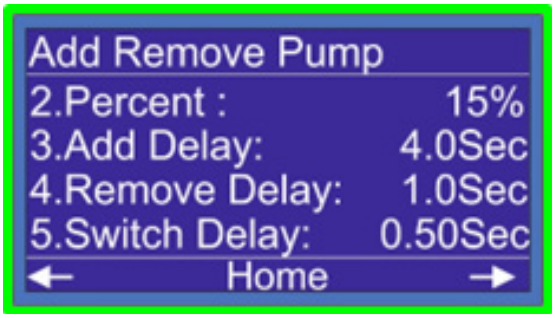
Main Menu – Hardware - Control – Page 5

On the fifth page, Add Remove Pump:
In the Percent option, you can specify the percentage of the next pump's capacity required before introducing it into the system. For instance, if the first pump fails to reach the setpoint, and there is a need for the second pump in the system, both pumps will enter the circuit with the same frequency. If the second pump entering the system causes the pressure to go above the setpoint, it will be removed, and the process repeats, resulting in pressure oscillations in your system. In the Percent option, you can specify the percentage of the next pump's capacity needed to enter the circuit. Set the Percent option to 15%.

Option 3, Add Delay, allows you to specify how much time it takes for the second pump to enter. Set this option to 4 seconds.

In Remove Delay, you can set the time it takes for the active pump to be removed periodically, potentially reducing consumption. In this option, you determine when the pump should be removed from the circuit after a certain period. Set this option to 1 second.
If you have selected Mode 3 on the controller, you will see the Switch Delay option at the bottom of this page. In this option, you can set the time for switching or changing the pump from the driver contactor to the power grid. This time is configured based on the pump's kilowatts. You can set this time from 35 milliseconds to 50 milliseconds.





Main Menu – Hardware - Control – Page 6

On the sixth page, Sleep:
On this page, we set the Sleep frequency. To obtain the Sleep frequency, we first need to determine the Start frequency. To find the Start frequency, assuming that the required system pressure is 5 bars, close the collector's output completely and increase the driver's frequency until the pressure is sufficient. Assuming we can achieve 5 bars with a frequency of 44 Hz, this becomes our Start frequency. For the Sleep frequency, add 2 to the Start frequency, resulting in a Sleep frequency of 46 Hz.

The second option is Off Delay:
When Sleep conditions are met, the controller executes Sleep after the Off Delay time.

The third option is Gap:
One of the Sleep conditions is the Gap option. If the oscillation on your Setpoint is less than the set Gap value, the controller initiates Sleep. Set the Gap to 0.20 Bar.

Main Menu – Hardware - Control – Page 7

On the seventh page, Wake Up:

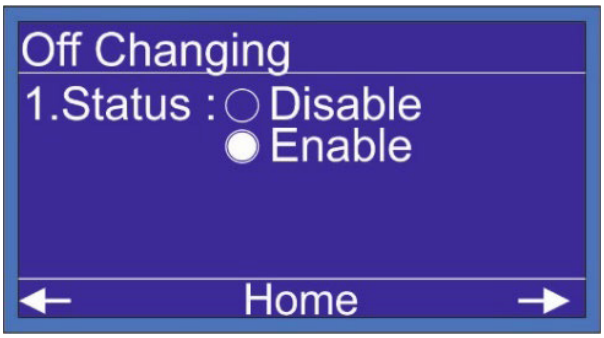
The first option is Differential, where you set how much lower the pressure should be than the Setpoint for the pumps to turn on. A suitable value is 0.5 bars.

The second option is On Delay: When your pump turns on and reaches the Start frequency, On Delay, which is the PID time, becomes active. This time is set between 3 to 5 seconds, depending on the time set in the ACC drive.

The third option is Start Frq: You can set the obtained Start frequency in this section. To obtain the Start frequency, assuming that the required system pressure is 5 bars, close the collector›s output completely and increase the driver›s frequency until the pressure is sufficient. Assuming we can achieve 5 bars with a frequency of 42 Hz, this becomes our Start frequency.

The Start frequency is set to prevent an initial pressure drop when the pumps are turned on.

The fourth option is Stop Frq: To remove the pumps, there is no need to lower the frequency to 0 Hz. After that, we can take the pump out of the circuit at a frequency that is not effective. The Stop frequency can be set between 20 to 25 Hertz.



Main Menu – Hardware - Control - Off Changing

On the eighth page, Change Over:

1. This option is for changing the pumps' positions. If this option is enabled, the changeover is performed with each on/off cycle of your pumps. If this option is disabled, the changeover is deactivated.

2. Jockey: If this option is set to "on," the first pump always enters the circuit as the lead pump and remains in the circuit when additional pumps are added. If set to "off," after the entry of subsequent pumps, the lead pump exits the circuit.

Main Menu – Hardware - Control - Page 9

On the ninth page, Time Changing:

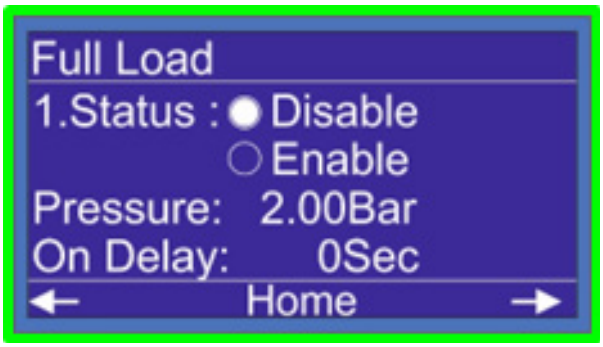
If this option is enabled and the pump's on-time reaches the Time Changing, the controller turns off the current pump, and the next pump takes its place after the Off Time duration.

The Off Time duration is equal to the time set in the DCC Time in your drive.

Main Menu – Hardware - Control – Page 10

On the tenth page, Reserve Automatic:

The pump controller has the capability to detect a faulty pump. With this option enabled, if a pump is deemed faulty, another pump replaces it in the circuit, and the error related to the faulty pump is displayed. In this option, you can specify the type of contactor return contact. If using a normally closed (NC) contactor blade, set it to NC, and if using a normally open (NO) contactor blade, set it to NO. *It is advisable to use the NO contactor blade.



Main Menu – Hardware - Control – Page 11

By pressing the right arrow key, we enter the Reserve Automatic and Full Load page. This option provides excellent protection for pumps, preventing them from burning out in case of air ingress, pump rotation in the wrong direction, pump suction and reservoir suction being closed, or lack of water in the reservoir. Depending on the conditions, you can enable or disable this option. If Full Load is enabled, you can set a pressure protection in the Pressure option. When the last pump in the circuit reaches its maximum speed and the pressure protection is not met, the controller stops your system after the set time in On Delay. You can set this pressure protection to be 1.5 bars lower than the Setpoint. The On Delay time can be set to 40 seconds.

Main Menu – Hardware - Control – Page 12

On the twelfth page, Auto Service:

By default, the controller checks the pump shutdown time and, to prevent pump seizing, momentarily turns on the pump for a user-defined period. This action causes the pump to rotate, preventing sedimentation and pump locking. If the pump service time is uniform, you can set the pumps to turn on with a few minutes' difference.

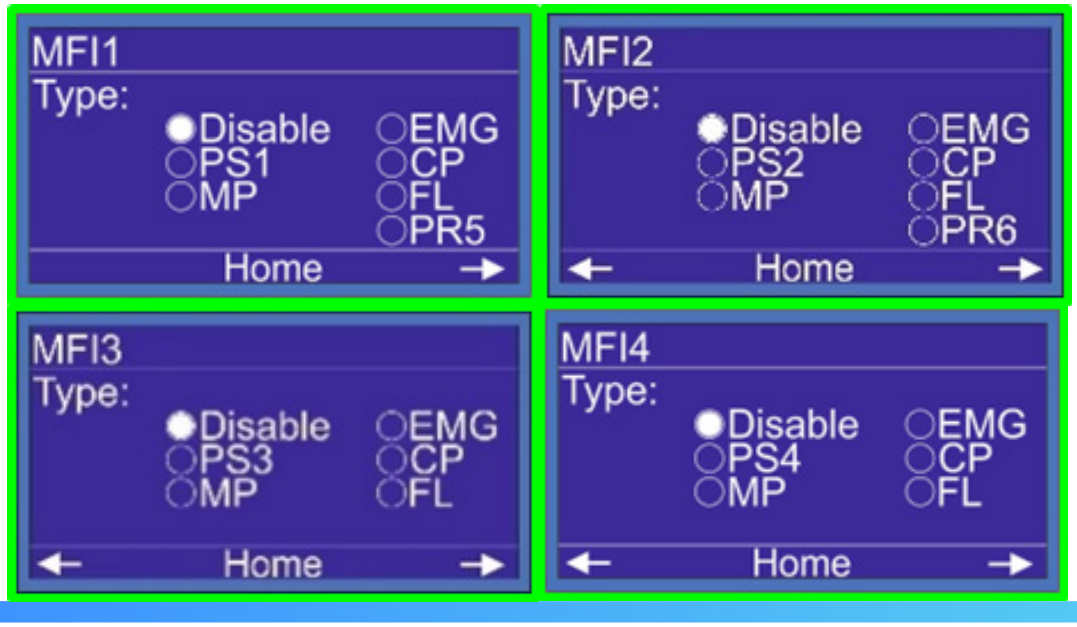
Main Menu – Hardware - Control – Page 13

On the thirteenth page, PID (Proportional, Integral, Derivative):
PID is a control loop method that utilizes feedback to control pressure in the system. The controller adjusts the pump speed based on the feedback it receives to control pressure in the system appropriately according to consumption levels. In simpler terms, your pressure remains constant, and only the pump speeds change relative to low or high consumption.

The numbers set for PID tuning do not require modification and suffice for 95% of projects.
D = 0 , I = 80, P = 250

Main Menu – Hardware - MFx – Page 1-4
On pages 1 to 4, MFI:
This controller has four configurable inputs, and depending on your needs, you can choose one of the following options:

PS: By selecting this option, you can use a digital pressure sensor (Pressure Switch) instead of an analog pressure sensor (pressure transmitter) in your project. The digital pressure switch operates between two set levels, high and low.
MP: This option stands for Max Pressure or Final Pressure. It operates when the pressure goes higher than the set point, causing the system to stop.
EMG: This option is connected to an emergency stop key. When this key is triggered, an EMG error is displayed on the controller screen, and the system shuts down.
CP: To use an external phase controller, connect the external level control to one of the multi-function inputs and select CP as the title.
FL: To use an external level control, select the “External” option on the Floater page. By going to the MFX page, place one of the multi-function inputs on “FL” and connect the control wire to that input.
PR: To receive feedback from the operation status of direct power contactors for pumps 3 and 4, connect them from the contactors to the multi-function inputs. Set that multi-function input to “PR.”
*These settings are configurable for each of the four controller inputs.



On pages 5 to 8, MFO:

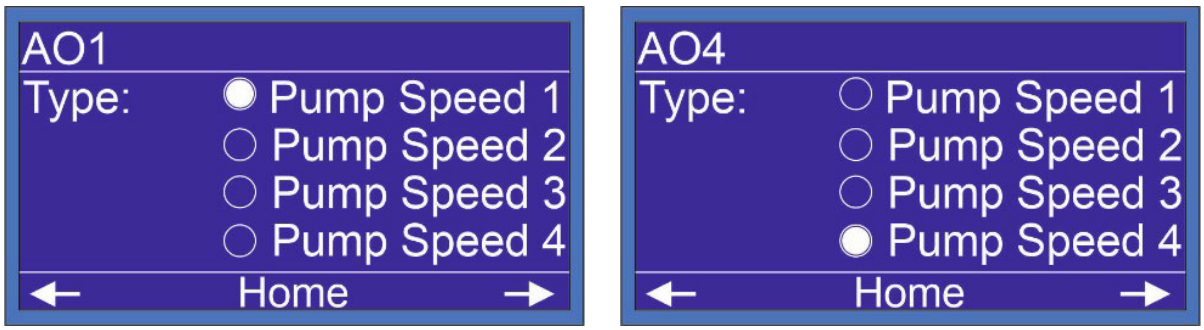
By pressing the right key on the multi-function input, we enter the Multi-Function Output page. The multi-function outputs correspond to relay outputs that can be defined according to your needs. For instance, if your system has three or four pumps, define the direct pump contactor for pump 3 or 3MC, and if there are four pumps, define DC4 or the pump 4 drive contactor, as well as the direct pump contactor for pump 4 or MC4.

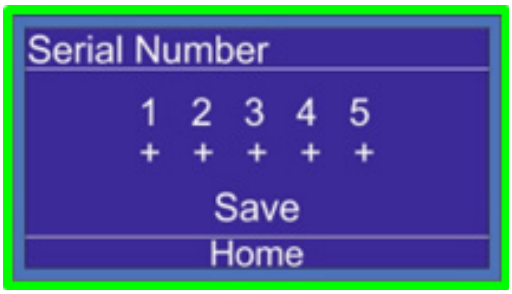
This controller has four configurable outputs that you can use based on your requirements.
MC: By placing the multi-function output on MC, the motor power contactors are commanded by this output.
DC: By placing the multi-function output on DC, the motor drive contactor is commanded by this output.
Fan: By placing the multi-function output on Fan, the corresponding output activates along with the drive.

E.Valve: By operating the auto-service multi-function output configured as E.Valve, it becomes active.
Ready: When the controller is in an active state, this output becomes active.
P. Run: This output becomes active when the first motor is turned on.

Main Menu - Hardware - MFx – Page 9-10

At the end of the MFI and MFO pages, we find the AO1 and AO2 pages. In case the first analog encounters an issue, by referring to this page, we can activate the second analog and connect it to AO2 in order to resolve the system problem.





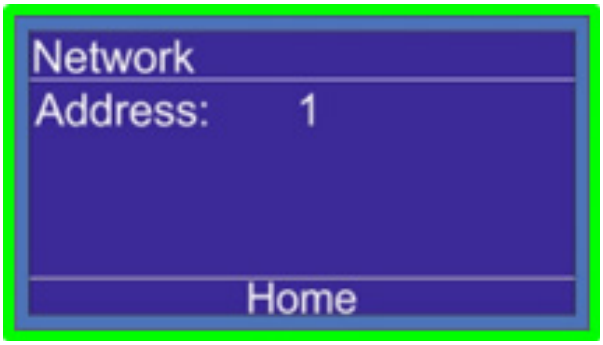
Main Menu - Hardware - Serial Number

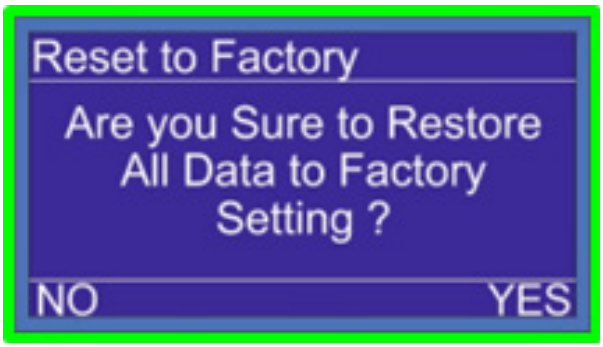
You can define a serial number for the controller, and this serial number will be displayed at the top of the error page.

Main Menu - Hardware - Network

This page is used in the 7th menu of the controller for the RS 485 network address. The network protocol is ModBus_RTU.

Network Settings:
- Baud Rate: 9600 bps
- Data: 8
- Parity: N
- Stop Bit: 1





Main Menu - Hardware – Reset to Factory

In the eighth option, Reset Factory, under Hardware, the user can reset all settings to their initial state by selecting YES. This action returns all settings to the default configuration.

Important Points in Booster Pump Startup:

• The maximum pressure set in SetPoint should be 1 bar lower than the maximum pump head.

• Usually, Max Pressure is set between 0.2 to 0.5 bar higher than the SetPoint pressure.

• Using a twisted pair wire for communication between the pressure sensor and the booster pump controller is mandatory.

• Ensure proper grounding of the motor and drive to the control panel.

• In mode 1,2, set the ramp-up (ACC) and ramp-down (DCC) in the drive between 3 to 5 seconds.

• In mode 3, set the controller's ramp-up (ACC) between 3 to 5 seconds and the ramp-down (DCC) to zero.

Troubleshooting Table for Booster Pump Controller

Errors	Fault Finding
Pump 1,2,3,4 Error	A metal or thermal switch has operated; check the motor current and the bimetal. According to the wiring diagram, check the connections at terminals PR1~PR4
Drive Error	The drive has an error; check the error code on the drive's LCD. According to the wiring diagram, check the connections at terminals M2.3 Drive Fault and the drive fault relay.
Sensivity Error	Phase T, S, R mismatch has exceeded the set limit. Check the phase control settings on the control page.
Minimum Voltage	The input voltage has decreased beyond the set limit. Check the controller settings on the control page.
Maximum Voltage	The input voltage has increased beyond the set limit. Check the controller settings on the control page.
Disconnected Sensor	The sensor connection to the controller has been interrupted. Check the communication cable and the wiring between the sensor and the controller.
Maximum Pressure Error	The water pressure has exceeded the set limit. With repeated consumption, the error will be resolved.
Full Load Error	The flow rate has exceeded the set limit in the controller. Check the water storage source, suction and discharge valves of the pumps, and ensure there is no air in the pumps. Check the rotation of the pumps.
Floater Error	The water level in the water reservoir has decreased below the specified level. Check the water reservoir.
sequence Error	The input phases of the panel T, S, R have been swapped.
All Pump Fault	All available pumps have error.

Caution

The following settings must be performed by specialists; otherwise, it can result in damage. The following steps are mandatory for starting up the booster pump:

1. Set the desired pressure in SetPoint.

2. In the manual section of the controller, check the frequency of all pumps with low frequency, approximately 3Hz, using drives (DC1, DC2, DC3, DC4).

3. In the manual section of the controller, check the speed of all pumps by activating the contactors (MC1, MC2, MC3, MC4).

4. Close the collector output completely. With regard to the pressure set in SetPoint, manually increase the frequency until it reaches the pressure set in SetPoint.

- Obtain the frequency and set it in the Start Frequency section.

- Increase the obtained frequency by 2 Hz and set it in the Sleep Frequency section.

Modbus Controller Addresses:

Porotocol : ModBus-RTU

Com Port Setting : 9600 8-N-1

Bit Address

No	Description	Address	Value
1	Output 0 Status	0	0:OFF 1:ON
2	Output 1 Status	1	0:OFF 1:ON
3	Output 2 Status	2	0:OFF 1:ON
4	Output 3 Status	3	0:OFF 1:ON
5	Output 4 Status	4	0:OFF 1:ON
6	Output 5 Status	5	0:OFF 1:ON
7	Output 6 Status	6	0:OFF 1:ON
8	Output 7 Status	7	0:OFF 1:ON
9	Output 8 Status	8	0:OFF 1:ON
10	Output 9 Status	9	0:OFF 1:ON
11	DR Status	10	0:OFF 1:ON
12	PR1 Status	11	0:OFF 1:ON
13	PR2 Status	12	0:OFF 1:ON
14	PR3 Status	13	0:OFF 1:ON
15	PR4 Status	14	0:OFF 1:ON
16	MFI1 Status	15	0:OFF 1:ON
17	MFI2 Status	16	0:OFF 1:ON
18	MFI3 Status	17	0:OFF 1:ON
19	MFI4 Status	18	0:OFF 1:ON
20	Pumpl Status	19	0:OFF 1:ON
21	Pump2 Status	20	0:OFF 1:ON
22	Pump3 Status	21	0:OFF 1:ON
23	Pump4 Status	22	0:OFF 1:ON

24	Pump5 Status	23	0:OFF
25	Pump6 Status	24	1:ON 0:OFF
26	Drive Fail	25	1:ON 0:Normal 1:Failed
27	Pump1 Fail	26	0:Normal 1:Failed
28	Pump2 Fail	27	0:Normal 1:Failed
29	Pump3 Fail	28	0:Normal 1:Failed
30	Pump4 Fail	29	0:Normal 1:Failed
31	Pump5 Fail	30	0:Normal 1:Failed
32	Pump6 Fail	31	0:Normal 1:Failed
33	Floater L Level	32	0: Not Co1111ected 1 :Con11ected
34	Floater H Level	33	0: Not Connected 1:Connected
35	Output 0 Manual	50	0:OFF 1:ON
36	Output 1 Manual	51	0 OFF 1:ON
37	Output 2 Manual	52	0:OFF 1:ON
38	Output 3 Manual	53	0:OFF 1:ON
39	Output 4 Manual	54	0:OFF 1:ON
40	Output 5 Manual	55	0:OFF 1:ON
41	Output 6 Manual	56	0:OFF 1:ON
42	Output 7 Manual	57	0:OFF 1:ON
43	Output 8 Manual	58	0:OFF 1:ON
44	Output 9 Manual	59	0:OFF 1 ON
45	Pump 1 Activation	4096	0:Disable 1:Enable
46	Pump 2 Activation	4097	0:Disable 1:Enable
47	Pump 3 Activation	4098	0:Disable 1:Enable
48	Pump 4 Activation	4099	0:Disable 1:Enable

49	Pump 5 Activation	4100	0:Disable 1:Enable
50	Pump 6 Activation	4101	0:Disable 1:Enable
51	Control Phase Activation	4106	0:Disable 1:Enable
52	OFF Changging Activation	4107	0:Disable 1:Enable
53	Time Changging Activation	4108	0:Disable 1:Enable
54	Reserve Automatic Activation	4109	0:Disable 1:Enable
55	Reserve Automatic Type	4110	0:NO 1:NC

Word Address

No	Description	Address	Value		Unit
1	Displaved Paoe Number	0			
2	Svstem Pressure	2			0.0lBar
3	Vrn	3			Volt
4	Vsn	4			Volt
5	Vtn	5			Volt
6	Vrs	6			Volt
7	Vst	7			Volt
8	Vtr	8			Volt
9	Frequency	9			0.01Hz
10	Drive Frequency	10	0-1600		
11	Pumpl Work Time in Sec	34			Sec
12	Pumpl Work Time in Min	35			Min
13	Pump1 Work Time in Hour	36			Hour
14	Pump2 Work Time in Sec	37			Sec
15	Pump2 Work Time in Min	38			Min
16	Pump2 Work Time in Hour	39			Hour
17	Pump3 Work Time in Sec	40			Sec
18	Pump3 Work Time in Min	41			Min
19	Pump3 Work Time in Hour	42			Hour
20	Pump4 Work Time in Sec	43			Sec
21	Pump4 Work Time in Min	44			Min
22	Pump4 Work Time in Hour	45			Hour
23	Analoq Output 0 Manual	50	0-500		0.1Hz
24	Analoo Output 1 Manual	51	0-500		0.1Hz
25	System Error	80	Error Description	Bit	
			Floater Error	3	
			Max Pressure Error	4	
			Pressure Sensor Disconnected	5	
			Control Phase Sensivity Error	6	
			Control Phase **Max** Voltage Error	7	
			Control Phase Min Voltaqe Error	8	
			Control Phase Sequency Error	9	
			Pumpl Error	10	

56	Control Status	4173	0-1		
57	Sleep Gap	4175	1-100		0.01Bar
SB	Auto Service Offlime	4177	1-9999		Hour
59	Auto Service On Time	417B	1-999		0.1Sec
60	Auto Service Interval	4179	1-99		Min
61	MFI1Type	41B0	Disable PS MP EMG CP FL	0 1 2 3 4 5	
62	MFI2Type	4181	Refer to MFI1		
63	MFI3Type	4182	Refer to MFI1		
64	MFI4 Type	4183	Refer to MFI1		
65	MF01 Type	4184	Disable E Valve Fan Alarm DC3 MC3	0 1 2 3 4 5	
66	MF02 Type	4185	Refer to MF01		
67	MF03Type	4186	Refer to MF02		
68	ModBus Address	4195	1		

Note: Settings from number 25 onwards relate to hardware configurations. Incorrect changes can damage the booster pump hardware.

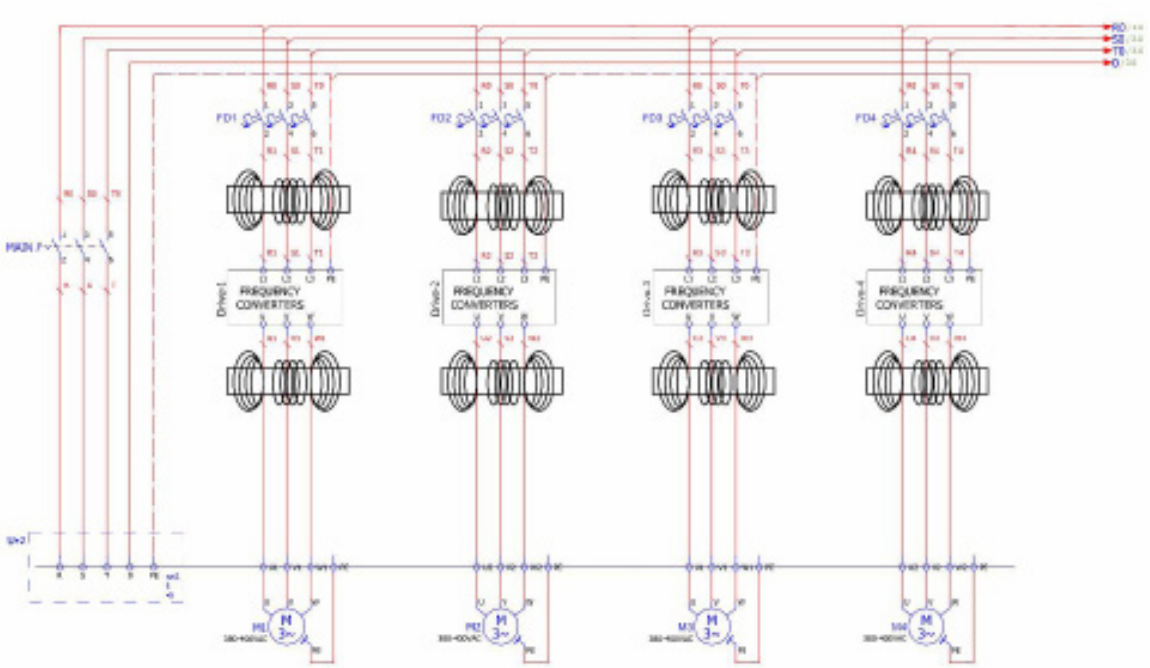
For manual mode, first set the value 1234 in the Multi Function Register at address 99. The system will enter manual mode. To turn on or off the controller outputs, use bits from address 50 to 59. For changing the pump speed, use Word addresses 50 and 51.

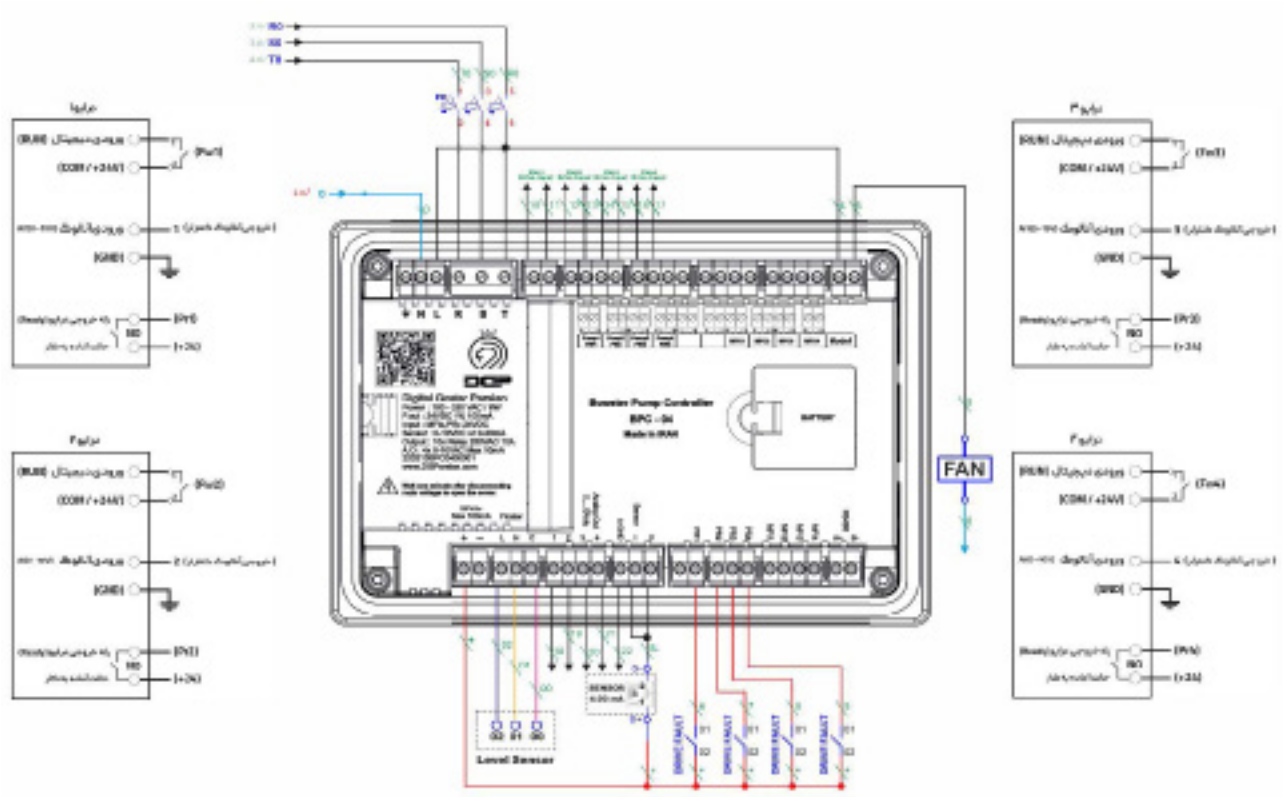
To exit manual mode and operate automatically, set the value zero in the Multi Function Register.

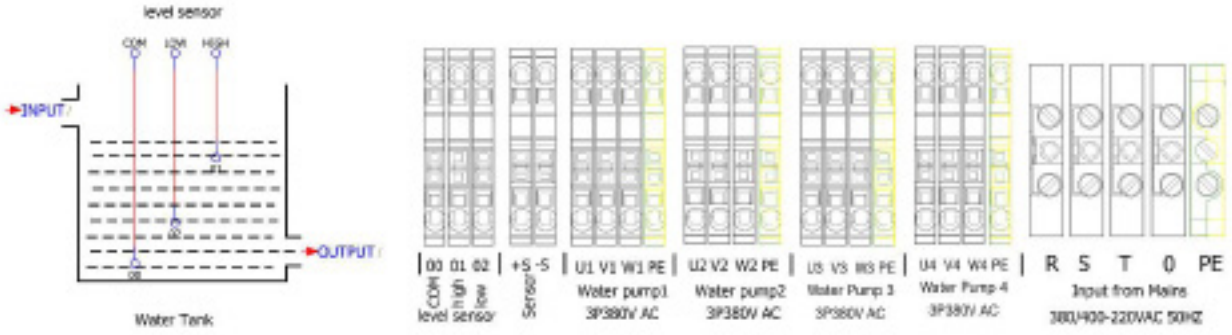
Wiring diagram for 4 pumps with 4 drives (Full Drive):

Customer	:	
Plant designation	:	
Drawing number	:	
Commission	:	
Manufacturer (company)	:	
Path (x\eplan8\p)	:	
Project Serial Number:	:	
Project Name:	:	
Project Type:	:	4 Line, 4 Variable Line (Water Pump)
Mounting site	:	
Responsible for project	:	
Part feature	:	

Changed on: 12/23/2019 from (Abbreviation): Number of pages : 4




FAN
Level Sensor


level sensor
COM
LOW
HIGH
INPUT
OUTPUT
Water Tank
00 01 02
COM high low
level sensor
+S -S
Sensor
U1 V1 W1 PE
Water pump1
3P380V AC
U2 V2 W2 PE
Water pump2
3P380V AC
U3 V3 W3 PE
Water Pump 3
3P380V AC
U4 V4 W4 PE
Water Pump 4
3P380V AC
R S T 0 PE
Input from Mains
380/400-220VAC 50HZ

Note

Note

Note

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